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Investigating Tertiary Students' Perceptions about ChatGPT use in Higher Education: Bangladesh Perspective

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Abstract: ChatGPT, a revolutionary AI tool, has significantly impacted higher education, although there is limited research on understanding why students use it and how they perceive its influence on their academic experiences. This study aims to bridge that gap by investigating Bangladeshi tertiary students' perceptions of ChatGPT use in higher education. Through a qualitative approach, it examines the perceived benefits, potential drawbacks, and factors influencing ChatGPT's acceptance, along with its impact on learning and cognitive development. In-depth interviews with 50 students from six renowned Bangladeshi universities, collected via convenience and purposive sampling, provide insights into students' perceptions of ChatGPT. Thematic analysis was conducted using Taguette software, followed by Excel coding to capture perceptions and effects. Findings reveal mixed reactions: some students acknowledge productivity and learning benefits, while others express concerns about over-reliance on AI and its potential effects on higher-order thinking skills. The study suggests that while ChatGPT integration in Bangladeshi higher education could enhance productivity, it requires careful regulation and standardization by educational authorities. Without such measures, students may become overly dependent on AI, potentially impairing critical thinking development. By focusing on both benefits and risks, this study contributes new insights and practical recommendations for stakeholders in Bangladesh's tertiary education sector.

Keywords: *ChatGPT, Students' Perceptions, Consequent Effects, Tertiary-level Education, Bangladesh*

Introduction: Higher education is one of the many sectors where artificial intelligence (AI) is becoming more and more prevalent. Whether utilized for staff support, tailored learning, smart educational systems, or computerized evaluation, AI technologies are becoming indispensable for higher education institutions [1,2]. With ChatGPT, teachers can enhance their lessons and students' learning. It won't take on the position of instructor. Rather, it provides them with more beneficial tools to strengthen them [3-5]. OpenAI unveiled ChatGPT, a massive language model-based chatbot, on November 30, 2022. It allows users to tailor and steer a conversation toward the language, length, style, structure, and information level they choose [6-8]. ChatGPT is a chatbot powered by artificial intelligence (AI) that mimics human speech through natural language processing [9,10]. The language model may write messages, articles, papers, codes, postings on social networking sites, and other written materials and respond to queries [11,12]. Modern chatbots utilize advanced knowledge-based models, while previous models concentrated on more basic string processing and pattern matching [13-15].

Chatbots have long been utilized in academic and informal education as well as in a range of administrative projects [16-19] to improve learning [20,21] foster student participation and evaluate students. However, educational chatbots come with a variety of limitations and challenges [22-27] resulting in a transactional experience that lacks human emotion and presents difficulties with handling typos, understanding slang, evaluating student work, and mimicking the flow of natural conversation. Moreover, some experts claim that a significant problem with educational chatbots that results in learning difficulties and frustration is the datasets' insufficiency [28]. With time, ChatGPT tends to lose its novelty effect [29,30]. The researchers also pointed out that it is difficult to compare study outcomes since ChatGPT lacks a uniform design procedure [31,32]. As stated by [33,34], ChatGPT's capacity to apply knowledge—effectively store and retrieve information—will dictate if it can be employed as a long-term learning tool. Service providers should give top priority when creating ChatGPT's features so that users can learn and browse "anytime and anywhere" and receive trustworthy information [35,36]. Writing computer code, doing literature reviews, coming up with research ideas, writing essays, and editing articles are just a few of the many jobs that ChatGPT can assist [37-40]. As ChatGPT gathers more data from user interactions, its potential should proliferate [41]. Higher education users have praised and criticized ChatGPT [42-44]. As with computers and calculators in math and science, some writers predict that ChatGPT and other AI-based apps will someday become indispensable to writing [45]. Therefore, others recommend leveraging these tools to facilitate collaboration between teachers and students on teaching and learning rather than outright forbidding them [46].

Several authors have found the advantages and disadvantages of ChatGPT for instruction at different educational levels [47-49]. Having stated that, ChatGPT can assist students in acquiring various abilities, such as researching, writing, reading, and critical thinking; it can also be used to create practice problems [50]. It makes remote and group learning easier for disabled students [51]. Furthermore, unlike search engines like Google, ChatGPT operates differently since it only retains the knowledge it acquired

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before September 2021 and does not explore the internet for up-to-date information. Its unequal factual accuracy has thus been acknowledged as a serious problem [52,53]. Academic integrity is likely to be ChatGPT's most talked-about challenge to education. A few studies clarified ChatGPT's exam-taking expertise [54,55].

With the increasing use of online exams in higher education, ChatGPT poses a potential risk to test integrity [56,57]. While providing some first insights into the potential and challenges of ChatGPT, these studies do so from the perspective of educators rather than students. The system was specifically prompted in each referenced publication, and researchers—not students—evaluated the responses. To completely comprehend ChatGPT's influence on education, we must examine how students utilize and see this linguistic paradigm. Scholars urged that the impacts of ChatGPT integration in higher education be investigated from teachers' perspectives mostly [58] which lacks the research gap on the same points from students' perspectives. Furthermore, a large number of researchers have recently acknowledged that the perception and resulting impacts of ChatGPT in tertiary education from students' viewpoints should be given importance since the sector is still unexplored [59-63]. To the best of our knowledge, Bangladeshi tertiary-level students' perception of ChatGPT use in their education has not yet been studied. Therefore, the study aims to explore tertiary students' perceptions about using ChatGPT in higher education. Since student perceptions have a significant impact on motivation, engagement, and academic success, they are essential to education [64-66]. Students with a positive perception of the learning process are more likely to be motivated and interested in the subject matter, which can enhance their academic achievement [67,68]. Conversely, students with unfavorable opinions or emotions regarding their educational experience could lose interest or motivation, decreasing their chances of academic success [69-71]. Having not been done before, this study attempts to fill the research gap on tertiary students' use of ChatGPT in their education by addressing the following research objectives and questions.

Research Objectives: This study aims to uncover the perceptions of tertiary students regarding ChatGPT use in their higher educational domains and the consequent effects. Therefore, it sets the following objectives:

1. To investigate the perceptions of tertiary students' ChatGPT use in higher education.
2. To investigate the consequent effects of ChatGPT use on students in tertiary education.

Research Questions: The fulfillment of the research aims and objectives is guided by the research questions [72,73]. Open-ended and exploratory, qualitative research questions seek to comprehend a phenomenon's "how, what, or why" rather than merely measuring it [74]. Furthermore, research questions are formulated in accordance with the study objectives, according to Johnson & Christensen [75]. As a result, this study's research questions are constructed as below:

1. What perceptions do students have of ChatGPT use in tertiary education?
2. What are the consequent effects of ChatGPT use on students in tertiary education?

To make sure that their opinions were grounded in personal experience, the students had to utilize this application to finish a few activities before answering the surveys. The authors first asked students to respond to an open-ended inquiry with their opinions in their own words so that authors could freely explore their ideas. After that, a thematic analysis of their comments was conducted to determine the pertinent perceptions, advantages, and disadvantages of ChatGPT. The results of this theme analysis were then utilized to create a questionnaire that asked students to provide a numerical ranking of these impressions, benefits, and drawbacks. To help researchers and educators learn about relevant ChatGPT characteristics in the classroom along with the key findings and recommendations for further research, a framework for using ChatGPT was created.

The remainder of this research is described as follows after this introduction. The overview and usage of ChatGPT in higher education are covered in the second section. The methodology is then described in the third section. The thematic analysis with findings is then presented in the fourth segment. The discussions are finally summarized in the fifth part followed by implications, limitations, future research directions, and conclusion.

Literature Review

ChatGPT integration: An AI chatbot called ChatGPT was developed by OpenAI [76]. "Generative Pre-trained Transformer (GPT)" is the name given to a language processing framework that has been created using a ton of data to produce language similar to that of a human [77]. Again, [78] claimed that an artificial intelligence (AI) chatbot called ChatGPT is remarkably sophisticated, sensitive, and valuable for understanding and producing natural human language. On the other hand, an artificially intelligent technology called ChatGPT employs the analysis of natural language to resolve disputes. Because of this, it generates information more conversationally, absorbs information from those interactions, and can deliver increasingly precise, tailored responses. This technology can compose essays and emails, translate papers and code, and create poetry, among other things. Unlike previous chatbots, ChatGPT can react immediately, fostering more vibrant and diverse conversations on various subjects. According to [79], it is possible to customize ChatGPT to carry out particular functions like text production, language translation, and question-answering, and it is a flexible tool that may be used in a variety of industries, including education, thanks to its capacity to comprehend and react to natural language input. They again revealed that it is valuable because ChatGPT can be used for many things in the classroom, like language translation, discussion, summarizing, and text production. It is a technology

becoming increasingly well-liked in various disciplines, including research and education, through its capacity to learn from vast volumes of data and provide high-quality results.

It is discussed that ChatGPT can help students become more proficient by assisting them in asking questions and formulating them precisely, allowing them to learn more from ChatGPT's answers [80], and teaching them how to evaluate the correctness, dependability, and quality of ChatGPT's responses as well as how to sift through solutions to find the relevant information [81]. This technology suits various applications since it can adjust to different conditions and situations. It is highly accurate and fluent in responding to commands, but it requires a deep comprehension of the environment and the capacity for human thought [82,83]. Few studies have found the potential of ChatGPT in the tertiary education levels. ChatGPT can enhance learning by providing instant explanations and personalized responses, supporting students' self-paced learning and understanding of complex topics. It also increases productivity by assisting with tasks like idea generation and proofreading, allowing users to focus on higher-level cognitive activities. In contrast, other studies have found the opposite sides of ChatGPT use by students in higher education. Over-reliance on ChatGPT may reduce students' critical thinking and problem-solving abilities, as they may bypass essential cognitive processes. Additionally, issues like academic integrity, inaccuracy, and data privacy pose significant concerns, potentially impacting the quality and security of education.

[84] states that students can use this AI tool in various ways to improve their learning experience, including by receiving succinct responses and personalized recommendations, developing new abilities, managing their time, and having engaging experiences. Due to having mixed reactions from the previous studies, a novel study is proposed by the authors. The number of Bangladeshi university students using ChatGPT is increasing frequently [85]. Consequently, looking into how Bangladeshi students see ChatGPT in higher education is imperative.

Theoretical background: Educational technologies have become an essential component of the educational system since the COVID-19 epidemic. Students must embrace the latest technology advancements in the field of education in order to advance their education. According to the literature review, researchers have mostly employed the traditional models of technology adoption, including the technology acceptance (TAM) model [86], the unified theory of acceptance and use of technology (UTAUT) [87], the diffusion of innovations (DOI) [88], the social cognitive theory (SCT) [89], the theory of planned behavior (TPB) [90], and the technology readiness index (TRI) [91].

In light of previous theoretical implications, this study focuses on integrating the Constructivist learning theory, advocated by Piaget and Vygotsky [92] which emphasizes active student engagement and the development of higher-order thinking skills. This theory can explore how ChatGPT's use might influence students' learning processes, including critical thinking and problem-solving, especially relevant to concerns about over-reliance on AI. Moreover, the Technology Acceptance Model (TAM) developed by Davis, explores users' acceptance and use of technology. It identifies two main factors influencing adoption: perceived usefulness and perceived ease of use. This study also uses this theory because TAM could help explain the factors influencing students' acceptance or reluctance towards using ChatGPT in their studies, such as productivity, ease of learning, and concerns about dependency. Furthermore, the study uses Social Cognitive Theory (SCT) developed by Bandura, which posits that learning occurs in a social context and is influenced by behavior, personal factors, and environmental factors. This theory can shed light on how ChatGPT use is shaped by personal expectations and the educational context, influencing students' perceptions and behaviors in using AI tools.

Academicians and research communities around the world are very interested in ChatGPT. Its advantages, drawbacks, and potential applications in the field of education are covered in several papers [93,94].
The literature on students' uptake of ChatGPT is lacking. Few academics, nevertheless, have attempted to use a variety of quantitative research techniques [95,96] to examine this issue which lacks qualitative analysis. To investigate how early adopters in the education industry are successfully utilizing chatbots, [97] carried out a case study. Some scholars [98,99] extracted positive results from using ChatGPT in higher education students whereas others found drawbacks [100,101]. Moreover, in Bangladesh, there is still a research gap in exploring the tertiary students' perception of using ChatGPT for their educational purposes and the consequent results from the usage of ChatGPT in higher education. The literature regarding the perception and effects of the use of ChatGPT by students is lacking. Therefore, this study seeks to close this gap. Additionally, this study looked into the particular elements that encourage and discourage students from using ChatGPT for learning. This study on students' adoption of ChatGPT will benefit from the identified motivating and inhibiting factors, which will also add dimensions to the body of literature.

Students' Perception Regarding ChatGPT in Tertiary Education Level: ChatGPT has the potential to impact multiple facets of education, such as writing, instructional strategies, and pedagogy [102]. Since ancient times, writing has been vital for developing critical and creative thinking since it allows for the organization of data and the creation of stories. Higher education students can benefit from ChatGPT in several areas of their studies. Although many students are familiar with the application, [103] indicate that they do not consistently use it for academic objectives. Furthermore, students doubt that it will improve their learning, and they believe colleges should offer more explicit and excellent instructions on the appropriate uses of the tool for educational purposes. According to a study by [104], ChatGPT can help with asynchronous communication, feedback, and remote learning and improve accessibility, engagement, and student teamwork. According to [105], ChatGPT and similar

programs can help with various disciplines by fostering problem-solving abilities, supporting the development of analytical and critical thinking, and simplifying and contextualizing knowledge.

Additionally, it can help with professional training, empower learners with disabilities, and facilitate remote and group learning [106]. However, the authors also point out several significant issues, such as copyright concerns, unfairness, bias, and students' and teachers' over-reliance on ChatGPT; insufficient experience incorporating this technology into the classroom; difficulty differentiating between answers submitted by students and models; high maintenance and training costs; privacy of data and safety; and long-term use [107]. For this reason, research into Bangladeshi students' perceptions of ChatGPT is necessary.

Conceptual Research Mapping: In this research method, authors first observe the students performing several academic tasks using ChatGPT. The reasons include having ChatGPT using experience by the students. Eventually, they can provide actual and relevant responses regarding ChatGPT use at tertiary levels of education. In addition to that, the authors create some themes and analyze the answers accordingly. The proposed research design is depicted below.

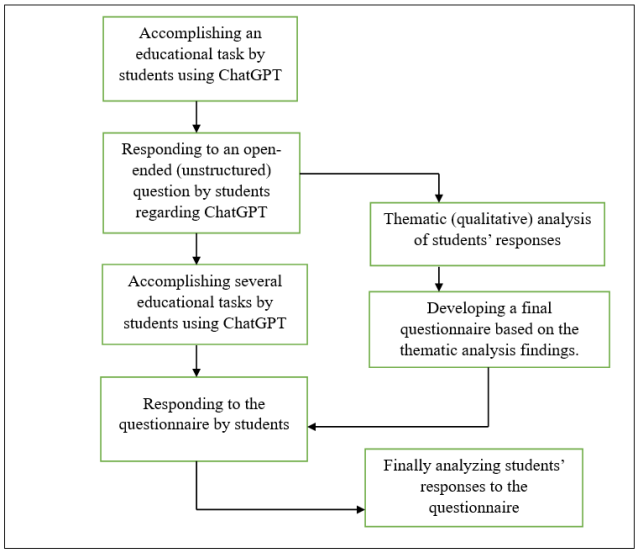

Fig. 1: Conceptual research mapping

Methodology of this study

Context: Students use ChatGPT in different academic contexts, like doing assignments or homework, writing thesis papers, proofreading, translating in other languages, practicing conversation by role-playing with chatbots, paraphrasing and summarizing texts, getting feedback, doing research-related work, etc.

Approach: The respondents of this study include the tertiary students of several public and private universities in Bangladesh. They are from different departments and years. The study uses the interview method to collect the responses from 50 students (80% male, 20% female). Then, the authors coded and analyzed the responses through Taguette software- a qualitative data analysis tool.

The study has followed observation and interview methods which are qualitative. This approach helps the researchers comprehend the background of the research problem and illustrate new theoretical aspects [108]. The authors have synthesized the observation and semi-structured interviews to explore students' reasoning toward the ChatGPT use in their learning domains. The arrangement of observation and interview has helped investigate the underlying reasons for fulfilling the study objectives.

Observation: Researchers can scale a wide range of data, including actions, contextual circumstances, and verbal and nonverbal communication, by using the observation technique, which is considered an important strategy for gathering qualitative data [109]. The authors visited different higher education institutes across the country and carefully looked at the respondents' body language and the activities during the usage of ChatGPT for educational purposes.

Interview: According to [110], conducting in-depth qualitative interviews can yield profound insights into a topic and lessen the likelihood that the researchers will impose their viewpoints or limit the conversation's breadth. To conduct the interview, the authors adhered to a predetermined methodology. Interview subjects volunteered to decline to answer any questions at any

moment. They ranged from easy to difficult questions. Each interview lasted five to ten minutes, with an emphasis on interviewees who were sufficiently earnest and eager to respond.

Sampling technique: This study uses convenience sampling in the data collection process since the authors have collected data from the participants readily available, willing, and easy to access. The respondents are intentionally selected based on their characteristics, knowledge, or experiences with ChatGPT usage for selective educational purposes. Therefore, the study covers convenience and purposive sampling techniques. While collecting data from the respondents six students did not reply completely. Later, this study avoided these incomplete responses.

Sample size: Most academic fields, including anthropology, business, economics, psychology, sociology, and medicine, have acknowledged and embraced qualitative research in recent decades [111]. However, choosing the right sample size is essential to guaranteeing qualitative research's richness and depth, credibility, and transparency [112]. Therefore, choosing a suitable sample size for qualitative research is important enough to yield significant results. [113] states that ten to twelve in-depth interviews should be included in the sample size of a qualitative study. However, the sample size requirements are met by the 50 in-depth interviews included in this study. Additionally, this study has concentrated on a data saturation method, in which the researcher keeps gathering fresh data until themes begin to recur. The typical sample size for this approach is 12–14 [114]. Thus, the sample size requirements are met by this investigation.

Data collection: Convincing the interviewees of secrecy and permission, the authors videotaped the interview. The writers used a set of pre-formulated questions to collect enough information from the interviews. After that, manuscripts were translated from mixed languages (Bangla and English) to purely English. The authors gathered data from the selective students of six prestigious Bangladeshi universities: Bangladesh University of Professionals, University of Dhaka, Jahangirnagar University, Jagannath University, University of Rajshahi, and Brac University. For four months, from January 2023 to April 2023, the authors carefully gathered the data.

Data analysis: The data analysis followed thematic analysis. The information was grouped and coded to assess similar themes. The authors have analysed the data through Taguette which is a qualitative data analysis software. The goal of the thematic analysis was to organize the ideas into themes and codes. A survey consisting of 26 items was created. For better understanding and rich data, the authors further used a 5-point Likert scale where the participants had to indicate how much they agreed with each statement. The findings section explains the questionnaire items from the topic analysis. Participants completed an additional three ChatGPT issues before answering this questionnaire. Utilizing a frequency analysis method, the students' questionnaire replies were assessed. Each component was given an average rate (AR) between 1 and 5 to compare its significance. AR is computed as:

The average rate of agreement (AR) is $5 \times f5 + 4 \times f4 + 3 \times f3 + 2 \times f2 + 1 \times f1$, indicating the relative frequency at which the rates are, respectively, highly agree, agree, neutral, disagree, and strongly disagree.

Results and Discussion

Thematic Analysis: A summary of the open-ended questions, including the number of students asked, who responded, how long their written responses were, and other relevant information, is given in Table 1. Some answered concisely, while others provided in-depth responses. The average response length was 64.8 words.

Table 1: Simple statistics of the students' responses.

Number of students interviewed	50
Number of words (total)	3240
Average word count for every response	64.8
Length of the longest response in words	252
Length of the shortest response in words	22

Using Taguette, the authors tidied and reviewed the students' answers to the open-ended questions. Open-ended questions, survey responses, and interview transcripts are examples of qualitative data that can be more easily analyzed with the help of this free program. Taguette allows users to encode various text data segments, which facilitates the identification of themes or trends. Figure 2 shows a screenshot of Taguette displaying the processed response file. A text section is highlighted and given a tag to encode it. When necessary, new tags (codes) are inserted. When there are different ideas in a text unit, Taguette allows for multiple labeling.

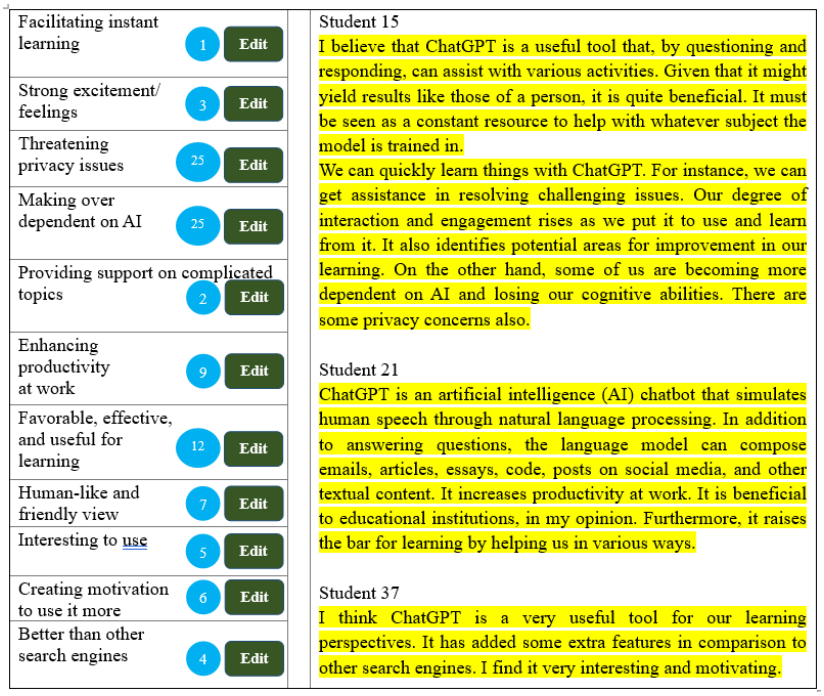

Fig. 2: Taguette: a software program that codes students' responses to the open-ended question, "What are your perceptions of ChatGPT? After carefully considering it, jot down anything that comes to your thoughts".

A portion of the developed tags from the left-hand tab coding are displayed in Figure 2. The data was transmitted to an Excel spreadsheet for additional analysis after finishing. "Theme building" is the process of organizing related codes into categories in the mind. The information about the codes and schemes created will be available in the results section.

Table 2 provides a brief summary of some relevant statistics related to the theme analysis that was done. A coded comment is a statement or a segment of a sentence that expresses a separate idea and might be assigned a simple coding. After reviewing the student replies, we found 196 of these comments. Most of the comments (70%) are positive regarding ChatGPT. 35 initial codes were generated by the coding process. Out of these codes, thirteen themes emerged from these codes following several iterations of similarity analysis.

Table 2. Simple statistics of the initial codes and themes.

Total coded comments	196
Total number of themes	13
Total number of initial codes	35
Positive comments	70%
Negative comments	30%

Together with the associated themes that emerged during the coding and theme-building process, Table 3 includes a list of the 35 initial codes. These results corresponded to eight positive themes (TP1 to TP8) and five negative themes (TN1 to TN5). There were 22 positive and 13 negative codes. Samples of student remarks for each theme are included in Table 4. We mapped a percentage of comments to each subject, as shown in Figure 3. Once more, it shows that, correspondingly, 30% and 70% of the responses were unfavorable and positive.

According to 22% of the comments, students think ChatGPT is helpful for immediate learning, assistance with complex subjects, identification of possible improvement areas, and exciting and engaging conversation (PT1). Students' enthusiasm for ChatGPT's features and technology, strong excitement/feelings, and appreciation of developers' efforts were evident in 20% of all responses (PT2). Pupils believe that ChatGPT is superior to other search engines and that it will soon change education, learning, and knowledge acquisition. According to PT3, 7% of students believe that ChatGPT is piquing their curiosity. It is interesting to use, and this feature motivates them to use ChatGPT. PT4 depicts that a portion of the students (6%) are getting human-like services from using ChatGPT. Receiving services such as natural language models and views that are friendly to humans is beneficial to them. Of the students, 5% believe ChatGPT is easy to use and have positive thoughts about it (PT5).

Table 3. Initial codes and Themes regarding ChatGPT use in Tertiary Level Education.

Initial Codes	Themes
Facilitating instant learning	PT1: Improving accessibility to learning
Providing support on complicated topics	
More engaging and interactive	
Finding potential areas of improvement	
Strong excitement/feelings	PT2: Creating enthusiasm and appreciation
Appreciating developers' efforts	
Better than other search engines	
going to transform learning, education, and acquiring knowledge	
Interesting to use	PT3: Creating Interest and Motivation
Creating motivation to use it more	
Human-like and friendly view	PT4: Conversation akin to humans
Answering naturally by this language model	
Simple to use	PT5: Simple to use and optimistic
Will eventually grow more potent	
Enhancing productivity at work	PT6: Improving efficiency
Advantageous to educational programs	
Raising the standard of learning	
Working well as a supplementary educational tool.	PT7: Favorable to learning
Favorable, effective, and useful for learning	
Giving recommendations for learning	
Well-organized responses	PT8: Better description and relevant
Relevant explanation	
Reducing cognitive abilities	NT1: Making human brains unproductive
Lessening reasoning, problem-solving, and critical thinking abilities	
Making overdependent on AI	
Erroneous searching results (not entirely dependable)	NT2: Providing erroneous answers
Requires upgrading	
Requires more relevance	
Decreasing teacher-student interaction	NT3: Adverse effects on learning
Becoming more passive in learning	
Facilitating fraud in exams and academic tasks	
Creating concerns for human employment	NT4: Might risk employment prospects
Creating challenges for the personnel at various levels	
Might disclose the search history publicly	NT5: Threatening privacy issues
Might disclose personal information	

Additionally, Others (4% of students) perceive that ChatGPT improves their efficiency by enhancing productivity at work and making it advantageous to educational programs (PT6). In addition, PT7 (4%) and PT8 denote ChatGPT is favorable to learning and provides a better description with relevance.

A sample of a few comments regarding ChatGPT's use in tertiary-level education is presented in Table 4. The comments against the themes are shown in this table.

Table 4. A sample of students' comments regarding using ChatGPT in Tertiary Level Education.\

Themes	Samples of students' responses
PT1: Improving accessibility to learning	We can learn instantly using ChatGPT. For instance, we can get assistance in solving difficult topics. It makes us more engaged and interactive while using it and learning. Furthermore, it clarifies the potential areas of improvement in our learning….
PT2: Creating enthusiasm and appreciation	It has created a very strong excitement among us and we all have been benefitted from using this learning tool. We appreciate the people developing this tool and making our learning easier than before. Additionally, ChatGPT is better than other searching tools, for instance, if we give a name like "Marium" to ChatGPT and say make this name a poem then ChatGPT can do it which other search engines cannot do alike.
PT3: Creating Interest and Motivation	Learning by using ChatGPT is very interesting to me from various perspectives. I'm motivated enough to use it further and tell others to use the tool.
PT4: Conversation akin to humans	It seems like we have a wise friend who can answer any questions we have. It answers naturally like a human being from different perspectives.
PT5: Simple to use and optimistic	It is incredibly user-friendly, explains the codes as well as the ideas that underlie them, allows for follow-up questions, and continues the discussion. When I am stuck on something in my studies, I believe it will come in handy. I hope that it will grow more potent eventually with the passage of time.
PT6: Improving efficiency	It enhances productivity at work. I find it advantageous to educational programs. Moreover, it extends the standard of learning by facilitating us in a wide array of ways.
PT7: Favorable to learning	It works well as a supplementary educational tool. I find it favorable, effective, and useful for learning. I can also get a good number of recommendations for learning using this search engine.
PT8: Better description and relevant	We can get well-organized responses with a good level of relevance…
NT1: Making human brains unproductive	To be honest, some students are becoming overdependent on AI resulting in reduced cognitive abilities through lessening reasoning, problem-solving, and critical thinking abilities.
NT2: Providing erroneous answers	It provides erroneous search results, and we should not depend entirely on those results. It doesn't deliver 100% relevant answers. Besides, it should be upgraded.
NT3: Adverse effects on learning	We think that learning by using ChatGPT constantly decreases teacher-student interaction. Students are not trying by themselves to learn. The habit of reading books for learning is decreasing dramatically among us. We are becoming more passive in learning. Additionally, the cheating rates are increasing in the cases of exams and academic tasks.
NT4: Might risk employment prospects	ChatGPT is creating threats to human employment. The employees are facing challenges for upgrading themselves constantly keeping pace with ChatGPT.
NT5: Threatening privacy issues	We are threatened regarding the disclosure of our search histories in academic purposes. Even, we feel like that our personal information might be hacked…

On the other hand, a significant portion of students (15%) perceive that using ChatGPT excessively in higher education makes the students' brains unproductive (NT1). Furthermore, some students (6%) think that ChatGPT provides erroneous answers while searching for information from various perspectives (NT2). Students (5%) also believe that the use of ChatGPT might produce adverse effects on learning in the long run (NT3). 2% of students think that ChatGPT use can threaten employment prospects in the country (NT4), whereas other 2% students fear of losing privacy issues by using ChatGPT (NT5).

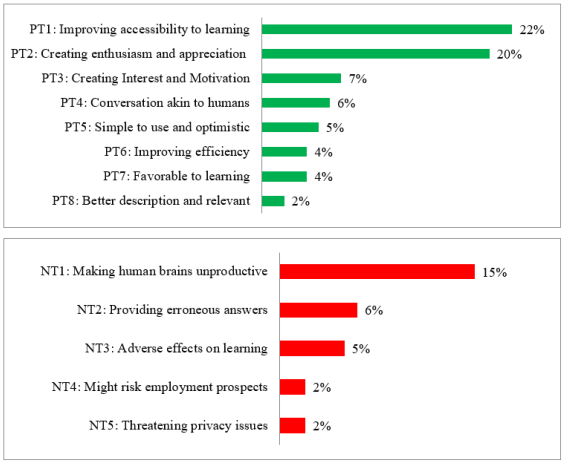

Fig. 3: Relative frequency of students' perceptions per theme regarding ChatGPT use in Tertiary Level Education (TLE).

Because of the theme analysis, the authors could create the questionnaire items and look at the range of viewpoints that the students had. The study can measure the extent of these perceptions because of student responses to the survey questions. Selected items were included in the questionnaire for each theme, as Table 5 highlights. Many of the items are directly extracted from the source code.

The average rate (AR) for every item in this survey is shown in Figure 4. Positive and negative themes are linked to most items with high and poor ratings. To be more precise, the positive-theme goods have an average rating of 4.08. On the other hand, the negative-theme items have an average rate of 3.37. Put differently, there is more robust agreement among the students regarding the positive aspects of ChatGPT.

Table 5. Questionnaire items per theme regarding ChatGPT use in TLE.

ChatGPT facilitates instant learning	PT1: Improving accessibility to learning
It provides support on complicated topics	
It has created strong excitement/feelings	PT2: Creating enthusiasm and appreciation
It is better than other search engines	
I find it interesting to use	PT3: Creating Interest and Motivation
I'm motivated to use it more	
I can get a "human-like and friendly view" perspective from ChatGPT	PT4: Conversation akin to humans
It's simple to use and I'm optimistic about it	PT5: Simple to use and optimistic
ChatGPT enhances productivity at work	PT6: Improving efficiency
It raises the standard of learning	
It performs well as a supplementary educational tool.	PT7: Favorable to learning
It's favorable, effective, and useful for learning	
It provides well-organized responses	PT8: Better description and relevant
The answers are mostly relevant	
Using ChatGPT constantly reduces the cognitive abilities of the students	NT1: Making human brains unproductive
It reduces reasoning, problem-solving, and critical-thinking abilities	
Students are becoming overdependent on AI	
It provides erroneous search results (not entirely dependable)	NT2: Providing erroneous answers
It requires more relevance	
It decreases teacher-student interaction	NT3: Adverse effects on learning
Students are becoming more passive in learning	
It facilitates fraud in exams and academic tasks	
It might create concerns for human employment	NT4: Might risk employment prospects
It's Creating challenges for the personnel at various levels	
It might disclose the search history publicly	NT5: Threatening privacy issues
It might disclose personal information	

The ARs of the positive items are as follows: ChatGPT facilitates instant learning (4.03), providing support on complicated topics (3.95), created strong excitement/feelings (4.21), better than other search engines (4.72), Interesting to use (4.5), motivated to use (4.12), human-like and friendly view (4.04), simple to use and making optimistic (4.01), enhancing productivity at work (4.07),

raising the standard of learning (4.05), performing well as a supplementary educational tool (4.17), favorable, effective, and useful for learning (4.26), providing well-organized responses (3.96), mostly relevant answers (3.09).

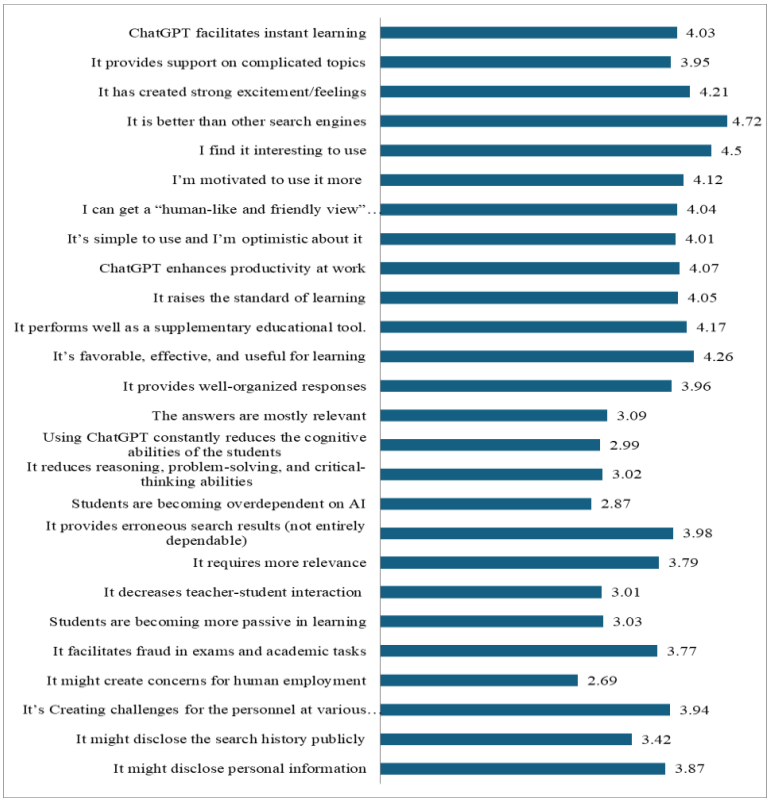

Fig. 4: Average Rates (AR) of the survey items of ChatGPT usage in TLE.

Most students—around 95%—strongly agree that ChatGPT is superior to other search engines. It has also generated strong feelings and excitement among the students. In contrast, students do not strongly agree with the statements that provide well-organized answers, and the answers are relevant enough.

The ARs of the negative items are as follows: Using ChatGPT constantly reduces the cognitive abilities of the students (2.99), reducing reasoning, problem-solving, and critical-thinking skills (3.02), becoming overdependent on AI (2.87), providing erroneous search results and not entirely dependable (3.98), requiring more relevance (3.79), decreasing teacher-student interaction (3.01), becoming more passive in learning (3.03), facilitating fraud in exams and academic tasks (3.77), might create concerns for human employment (2.69), creating challenges for the personnel at various levels (3.94), might disclose the search history publicly (3.42), might reveal personal information (3.87).

Students disagree with the statement, "Using ChatGPT constantly reduces the students' cognitive abilities". That means students perceive that using ChatGPT does not reduce their cognitive abilities. They also strongly disagree with another statement, "Students are becoming over- dependent on AI". On the other hand, they agree with the words "ChatGPT provides erroneous search results and is not entirely dependable, requiring more relevance, and other points having more than or equal to average ratings shown in figure 4.

Discussions on Findings: The emergence of large language models raises an essential concern for education: Will these models challenge or offer opportunities to the existing teaching and learning systems? In this scenario, students are the main actors. To answer this question, it is essential to understand their perspectives. The study participants' insightful and detailed comments on ChatGPT were very helpful in developing the questionnaire items. According to the research, most Bangladeshi tertiary-level education (TLE) students had positive thoughts about ChatGPT. The findings are supported by some other studies [115-118]. Students perceive that they can learn instantly using ChatGPT from various academic perspectives. They can have an opportunity to understand the unknown or cursory topics immediately with the help of ChatGPT. Other scholars [119,120] also found similar results to this study. Moreover, this study reveals that students benefit from understanding complicated topics. Along with that, students see ChatGPT as better than other search engines. After a while, these ChatGPT features start to inspire pupils. Additional research supports these findings [121,122]. In contrast, several studies found negative impacts of ChatGPT in higher education [123, 124]. This study discovers that students can get a "human-like and friendly view" perspective from ChatGPT, and it's

straightforward to use. [125,126] also found the similar results. Keeping pace with these findings, this study finds more positive perceptions and merits of ChatGPT, including productivity and standard enhancement at learning and providing well-organized responses. Several studies support these findings [127,128]. In the case of relevance in answers, students perceive that the significance levels with topics are not up to the mark, and it sometimes provides erroneous results. Some scholars also got similar findings [129,130]. Thus, ChatGPT's answers cannot be taken as one hundred percent correct. Instead, offering students various options or early drafts of a specific response can assist students as a helpful learning tool.

Students moderately agree with some comments; for instance, ChatGPT cannot be a substitute for teacher-student interaction but makes students somewhat passive in learning, might create concerns for human employment in some cases, and might disclose the search history and personal information in the future. Scholars also found similar results [131,132]. Finally, this study presents that the students at TLD in Bangladesh have mixed perceptions regarding using ChatGPT in their learning. In comparison to the negative perceptions, the levels of positive perceptions are higher. Thus, if students can use the ChatGPT with positive intentions and humanize the information, they can benefit themselves from various perspectives.

Implications

Managerial Implications: Despite its mediocre response accuracy, students regard ChatGPT as an easy-to-use tool. About it, they experience motivation, inspiration, curiosity, and optimism. Teachers should consider how to make the best use of this educational resource. They must investigate the advantages and disadvantages of ChatGPT in their domains and instruct students on its valuable applications. An educational psychology study is required to determine what makes ChatGPT so alluring and what can be done to keep students interested in this platform. According to this study, a few things that must be considered are human interaction and the level of explanation. The education sectors in Bangladesh can focus on integrating this learning tool into tertiary-level education sectors to ensure more productivity. However, the higher education authority must have controlling measures and standard maintaining procedures while combining it with education sectors. All the stakeholders should be well aware of ChatGPT before installing it in education. The teachers and students must know at which levels the benefits of ChatGPT can be welcomed. Students living in remote places or with learning disabilities may find this especially helpful. The findings highlight the need for regulatory frameworks to guide ChatGPT use in Bangladeshi higher education, ensuring that AI tools are used responsibly and productively. Educational authorities could develop policies that encourage ChatGPT's beneficial use while reducing risks of over-reliance. These insights also suggest that curriculum designers could integrate ChatGPT thoughtfully, using it as a supplement for personalized learning while preserving critical thinking components. Instructional strategies might include ChatGPT for specific tasks, like brainstorming or research support, to enhance learning without compromising essential skills. To maximize the tool's benefits, institutions could provide training for both students and faculty on effective and ethical AI use, helping them understand its capabilities and limitations. This training would also guide faculty in integrating ChatGPT responsibly as a complementary resource in their teaching. Furthermore, strengthening academic integrity protocols becomes essential, as ChatGPT can easily be misused for assignments. Institutions could enhance plagiarism policies, develop AI detection methods, and design assessments that prioritize originality, encouraging a balanced approach to AI in education. Finally, since ChatGPT use raises privacy concerns, institutions should establish data security measures and educate students about privacy risks, promoting trust in AI-integrated learning environments.

Theoretical Implications: The literature on ChatGPT's case and Bangladeshi tertiary students' perspectives will be enhanced by this study. The study also brings fresh perspectives to this sector. ChatGPT can personalize learning experiences to each student's needs and pace, which could lead to improved knowledge and engagement by providing explanations, feedback, and appropriate practice at the proper level. The students at the tertiary level of education in Bangladesh agree on the positive and negative features, perceptions, merits, and demerits of ChatGPT. The education sector can benefit its stakeholders by adequately using this learning tool. A growing number of stakeholders are using this learning tool in various sectors. Consequently, it has been advantageous for the respective parties. The demerits of ChatGPT might be avoided, and the positive features can be received to enhance the standard and productivity in education. By investigating how ChatGPT affects students' engagement and cognitive development, the research adds to Constructivist Learning Theory, emphasizing the role of active learning with AI. It also provides a deeper understanding of how students balance AI use with traditional learning, adding nuance to constructivist perspectives on technology-enhanced education. Furthermore, the study offers insights for Social Cognitive Theory (SCT) by examining the influence of ChatGPT on students' behavior and motivation, shaped by social and environmental factors in academic settings. These findings can help SCT scholars understand the effects of AI on learning and social dynamics in education. Additionally, the study contributes to the Critical Theory of Technology by highlighting the empowering yet limiting aspects of ChatGPT, revealing how technology may shape student agency. This can inform discussions on the ethical and societal impacts of AI in higher education, helping theorists address broader concerns.

Limitations and future research directions: This study has some limitations, so it's essential to address them with future research directions. The respondents are mainly from a few public and private universities in Bangladesh. If all Bangladesh universities are considered, the results might be different. This study primarily focuses on qualitative analysis, whereas quantitative research might generate additional findings with other features. Additionally, the study explores students' perspectives on using ChatGPT in the classroom. Here, the results may alter if the opinions of educators and other stakeholders are quantified. Moreover, most of the respondents are from business and social sciences backgrounds. Thus, the perceptions of students from other backgrounds might be different. Future research in this field can include respondents of all backgrounds to

get more accurate results. Besides, specific results can be drawn focusing on groups regarding ChatGPT use in tertiary-level education sectors. This study's use of convenience and purposive sampling limits generalizability, as it may not fully represent Bangladeshi tertiary students. The reliance on qualitative interviews and thematic analysis introduces subjectivity, potentially influencing the interpretation of students' perceptions. Findings may also become outdated as ChatGPT evolves, and the study does not consider faculty or administrators' perspectives, which could provide a more comprehensive view. Future studies could use a larger, more diverse sample and include quantitative methods to statistically analyze ChatGPT adoption factors. Including faculty and administrative perspectives would offer a broader understanding, while longitudinal research could track changes in perceptions as ChatGPT develops.

Conclusion: In this study, the authors examine how students in tertiary-level education sectors perceive ChatGPT in their learning. The findings are drawn using a qualitative analysis of collected interviewed data from different public and private universities. The results show mixed perceptions of students regarding ChatGPT use in higher education. Despite limitations, ChatGPT can benefit its users from various perspectives. The stakeholders should know its merits and demerits while using this learning tool. The concerned authority can integrate this learning tool to excel in education by avoiding negative features and receiving positive ones. In conclusion, this study provides valuable insights into Bangladeshi tertiary students' perceptions of ChatGPT and its potential impact on higher education. Through qualitative analysis, it highlights both the benefits and concerns associated with ChatGPT use, such as enhanced productivity and learning support, alongside issues like over-reliance and challenges to critical thinking. The findings suggest that while ChatGPT has the potential to assist students in educational tasks, there are significant concerns about academic integrity and the need for responsible use. This underscores the importance of developing regulatory frameworks to guide its integration into education effectively. By exploring ChatGPT's perceived advantages and risks, this study contributes to technology acceptance theories and provides a cultural perspective on AI in education. It also calls attention to the evolving role of AI in academic environments, urging stakeholders to balance technological innovation with educational integrity. Limitations of the study, such as sampling constraints and evolving technology, suggest that further research is needed to validate and expand these findings. Overall, this research serves as a foundation for educational policy discussions and future studies on the integration of AI tools like ChatGPT in higher education.

References:

[1] Chaudhry, I. S., Sarwary, S. A. M., El Refae, G. A., & Chabchoub, H. (2023). Time to Revisit Existing Student's Performance Evaluation Approach in Higher Education Sector in a New Era of ChatGPT—A Case Study. Cogent Education, 10(1), 2210461.

[2] Gill, S. S., Xu, M., Patros, P., Wu, H., Kaur, R., Kaur, K., ... & Buyya, R. (2024). Transformative effects of ChatGPT on modern education: Emerging Era of AI Chatbots. Internet of Things and Cyber-Physical Systems, 4, 19-23.

[3] Javaid, M., Haleem, A., Singh, R. P., Khan, S., & Khan, I. H. (2023). Unlocking the opportunities through ChatGPT Tool towards ameliorating the education system. BenchCouncil Transactions on Benchmarks, Standards and Evaluations, 3(2), 100115.

[4] Kohnke, L., Moorhouse, B. L., & Zou, D. (2023). Exploring generative artificial intelligence preparedness among university language instructors: A case study. Computers and Education: Artificial Intelligence, 5, 100156.

[5] Mogavi, R. H., Deng, C., Kim, J. J., Zhou, P., Kwon, Y. D., Metwally, A. H. S., ... & Hui, P. (2023). ChatGPT in education: A blessing or a curse? A qualitative study exploring early adopters' utilization and perceptions. Computers in Human Behavior: Artificial Humans, 100027.

[6] Dwivedi, Y. K., Kshetri, N., Hughes, L., Slade, E. L., Jeyaraj, A., Kar, A. K., ... & Wright, R. (2023). "So what if ChatGPT wrote it?" Multidisciplinary perspectives on opportunities, challenges and implications of generative conversational AI for research, practice and policy. International Journal of Information Management, 71, 102642.

[7] Liu, M., Ren, Y., Nyagoga, L. M., Stonier, F., Wu, Z., & Yu, L. (2023). Future of education in the era of generative artificial intelligence: Consensus among Chinese scholars on applications of ChatGPT in schools. Future in Educational Research, 1(1), 72-101.

[8] Sohail, S. S., Farhat, F., Himeur, Y., Nadeem, M., Madsen, D. Ø., Singh, Y., ... & Mansoor, W. (2023). Decoding ChatGPT: a taxonomy of existing research, current challenges, and possible future directions. Journal of King Saud University-Computer and Information Sciences, 101675.

[9] George, A. S., & George, A. H. (2023). A review of ChatGPT AI's impact on several business sectors. Partners Universal International Innovation Journal, 1(1), 9-23.

[10] Keshamoni, K. (2023, August). ChatGPT: An Advanceds Natural Language Processing System for Conversational AI Applications—A Comprehensive Review and Comparative Analysis with Other Chatbots and NLP Models. In International Conference on ICT for Sustainable Development (pp. 447-455). Singapore: Springer Nature Singapore.

[11] Adeshola, I., & Adepoju, A. P. (2023). The opportunities and challenges of ChatGPT in education. Interactive Learning Environments, 1-14.

[12] Pavlik, J. V. (2023). Collaborating with ChatGPT: Considering the implications of generative artificial intelligence for journalism and media education. Journalism & Mass Communication Educator, 78(1), 84-93.

[13] Ali, O., Murray, P., Momin, M., & Al-Anzi, F. S. (2023). The knowledge and innovation challenges of ChatGPT: A scoping review. Technology in Society, 102402.

[14] Cambria, E., Mao, R., Chen, M., Wang, Z., & Ho, S. B. (2023). Seven pillars for the future of AI. IEEE Intelligent Systems, 38(6).

[15] Kusal, S., Patil, S., Choudrie, J., Kotecha, K., Vora, D., & Pappas, I. (2023). A systematic review of applications of natural language processing and future challenges with special emphasis in text-based emotion detection. Artificial Intelligence Review, 1-87.

[16] Liu, Y., Han, T., Ma, S., Zhang, J., Yang, Y., Tian, J., ... & Ge, B. (2023). Summary of chatgpt-related research and perspective towards the future of large language models. Meta-Radiology, 100017.

[17] Prieto, S. A., Mengiste, E. T., & García de Soto, B. (2023). Investigating the use of ChatGPT for the scheduling of construction projects. Buildings, 13(4), 857.

[18] Raj, R., Singh, A., Kumar, V., & Verma, P. (2023). Analyzing the potential benefits and use cases of ChatGPT as a tool for improving the efficiency and effectiveness of business operations. BenchCouncil Transactions on Benchmarks, Standards and Evaluations, 3(3), 100140.

[19] 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.
[20] Firaina, R., & Sulisworo, D. (2023). Exploring the usage of ChatGPT in higher education: Frequency and impact on productivity. Buletin Edukasi Indonesia, 2(01), 39-46.
[21] Opara, E., Mfon-Ette Theresa, A., & Aduke, T. C. (2023). ChatGPT for teaching, learning and research: Prospects and challenges. Opara Emmanuel Chinonso, Adalikwu Mfon-Ette Theresa, Tolorunleke Caroline Aduke (2023). ChatGPT for Teaching, Learning and Research: Prospects and Challenges. Glob Acad J Humanit Soc Sci, 5.
[22] Lo, C. K. (2023). What is the impact of ChatGPT on education? A rapid review of the literature. Education Sciences, 13(4), 410.
[23] Seetharaman, R. (2023). Revolutionizing Medical Education: Can ChatGPT Boost Subjective Learning and Expression?. Journal of Medical Systems, 47(1), 1-4.
[24] Chocarro, R., Cortiñas, M., & Marcos-Matás, G. (2023). Teachers' attitudes towards chatbots in education: a technology acceptance model approach considering the effect of social language, bot proactiveness, and users' characteristics. Educational Studies, 49(2), 295-313.
[25] Hwang, G. J., & Chang, C. Y. (2023). A review of opportunities and challenges of chatbots in education. Interactive Learning Environments, 31(7), 4099-4112.
[26] Kuhail, M. A., Alturki, N., Alramlawi, S., & Alhejori, K. (2023). Interacting with educational chatbots: A systematic review. Education and Information Technologies, 28(1), 973-1018.
[27] Lo, C. K., & Hew, K. F. (2023, May). A review of integrating AI-based chatbots into flipped learning: new possibilities and challenges. In Frontiers in Education (Vol. 8, p. 1175715). Frontiers.
[28] Farrokhnia, M., Banihashem, S. K., Noroozi, O., & Wals, A. (2023). A SWOT analysis of ChatGPT: Implications for educational practice and research. Innovations in Education and Teaching International, 1-15.
[29] Baek, T. H., & Kim, M. (2023). Is ChatGPT scary good? How user motivations affect creepiness and trust in generative artificial intelligence. Telematics and Informatics, 83, 102030.
[30] Tlili, A., Shehata, B., Adarkwah, M. A., Bozkurt, A., Hickey, D. T., Huang, R., & Agyemang, B. (2023). What if the devil is my guardian angel: ChatGPT as a case study of using chatbots in education. Smart Learning Environments, 10(1), 15.
[31] Alshami, A., Elsayed, M., Ali, E., Eltoukhy, A. E., & Zayed, T. (2023). Harnessing the Power of ChatGPT for Automating Systematic Review Process: Methodology, Case Study, Limitations, and Future Directions. Systems, 11(7), 351.
[32] Antaki, F., Touma, S., Milad, D., El-Khoury, J., & Duval, R. (2023). Evaluating the performance of chatgpt in ophthalmology: An analysis of its successes and shortcomings. Ophthalmology Science, 100324.
[33] Bozkurt, A., Xiao, J., Lambert, S., Pazurek, A., Crompton, H., Koseoglu, S., ... & Jandrić, P. (2023). Speculative futures on ChatGPT and generative artificial intelligence (AI): A collective reflection from the educational landscape. Asian Journal of Distance Education, 18(1).
[34] Ooi, K. B., Tan, G. W. H., Al-Emran, M., Al-Sharafi, M. A., Capatina, A., Chakraborty, A., ... & Wong, L. W. (2023). The potential of Generative Artificial Intelligence across disciplines: perspectives and future directions. Journal of Computer Information Systems, 1-32.
[35] Le Duc, A. (2023). Prophetic Dialogue as Approach to the Church's Engagement with Stakeholders of the Technological Future. Available at SSRN 4461295.
[36] Lin, Z., Zhang, D., Tao, Q., Shi, D., Haffari, G., Wu, Q., ... & Ge, Z. (2023). Medical visual question answering: A survey. Artificial Intelligence in Medicine, 102611.
[37] Halaweh, M. (2023). ChatGPT in education: Strategies for responsible implementation.
[38] Lund, B. D., & Wang, T. (2023). Chatting about ChatGPT: how may AI and GPT impact academia and libraries?. Library Hi Tech News, 40(3), 26-29.
[39] Rahman, M. M., & Watanobe, Y. (2023). ChatGPT for education and research: Opportunities, threats, and strategies. Applied Sciences, 13(9), 5783.
[40] Schwenke, N., Söbke, H., & Kraft, E. (2023). Potentials and Challenges of Chatbot-Supported Thesis Writing: An Autoethnography. Trends in Higher Education, 2(4), 611-635.
[41] Haleem, A., Javaid, M., & Singh, R. P. (2022). An era of ChatGPT as a significant futuristic support tool: A study on features, abilities, and challenges. BenchCouncil transactions on benchmarks, standards and evaluations, 2(4), 100089.
[42] Guo, K., & Wang, D. (2023). To resist it or to embrace it? Examining ChatGPT's potential to support teacher feedback in EFL writing. Education and Information Technologies, 1-29.
[43] Stojanov, A. (2023). Learning with ChatGPT 3.5 as a more knowledgeable other: an autoethnographic study. International Journal of Educational Technology in Higher Education, 20(1), 35.
[44] Woithe, J., & Filipec, O. (2023). Understanding the Adoption, Perception, and Learning Impact of ChatGPT in Higher Education: A qualitative exploratory case study analyzing students' perspectives and experiences with the AI-based large language model.
[45] Megahed, F. M., Chen, Y. J., Ferris, J. A., Knoth, S., & Jones-Farmer, L. A. (2023). How generative ai models such as chatgpt can be (mis) used in spc practice, education, and research? an exploratory study. Quality Engineering, 1-29.
[46] Seitz, D. K., Cockayne, D., Good, R. Z., Hannum, K. L., Kroepsch, A. C., Rhodes, M. A., ... & Worth, N. (2023). Navigating STEMification for critical geography educators: finding leverage in classroom and institutional pedagogies. Journal of Geography in Higher Education, 1-17.
[47] Baidoo-Anu, D., & Ansah, L. O. (2023). Education in the era of generative artificial intelligence (AI): Understanding the potential benefits of ChatGPT in promoting teaching and learning. Journal of AI, 7(1), 52-62.
[48] Elbanna, S., & Armstrong, L. (2023). Exploring the integration of ChatGPT in education: adapting for the future. Management & Sustainability: An Arab Review.
[49] Lee, H. (2023). The rise of ChatGPT: Exploring its potential in medical education. Anatomical Sciences Education.
[50] Rasul, T., Nair, S., Kalendra, D., Robin, M., de Oliveira Santini, F., Ladeira, W. J., ... & Heathcote, L. (2023). The role of ChatGPT in higher education: Benefits, challenges, and future research directions. Journal of Applied Learning and Teaching, 6(1).
[51] Kasneci, E., Seßler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., ... & Kasneci, G. (2023). ChatGPT for good? On opportunities and challenges of large language models for education. Learning and individual differences, 103, 102274.
[52] Kocoń, J., Cichecki, I., Kaszyca, O., Kochanek, M., Szydło, D., Baran, J., ... & Kazienko, P. (2023). ChatGPT: Jack of all trades, master of none. Information Fusion, 101861.
[53] Koubaa, A., Boulila, W., Ghouti, L., Alzahem, A., & Latif, S. (2023). Exploring ChatGPT capabilities and limitations: A critical review of the nlp game changer.

[54] Goh, K. M. (2023). Research Integrity and Publication Ethics. In Research Methodology in Bioscience and Biotechnology: Research Mindset• Best Practices• Integrity• Publications• Societal Impact (pp. 57-71). Singapore: Springer Nature Singapore.
[55] Mahama, I., Baidoo-Anu, D., Eshun, P., Ayimbire, B., & Eggley, V. E. (2023). ChatGPT in Academic Writing: A Threat to Human Creativity and Academic Integrity? An Exploratory Study. Indonesian Journal of Innovation and Applied Sciences (IJIAS), 3(3), 228-239.
[56] Cotton, D. R., Cotton, P. A., & Shipway, J. R. (2023). Chatting and cheating: Ensuring academic integrity in the era of ChatGPT. Innovations in Education and Teaching International, 1-12.
[57] Sullivan, M., Kelly, A., & McLaughlan, P. (2023). ChatGPT in higher education: Considerations for academic integrity and student learning.
[58] Al-Mughairi, H., & Bhaskar, P. (2024). Exploring the factors affecting the adoption AI techniques in higher education: insights from teachers' perspectives on ChatGPT. Journal of Research in Innovative Teaching & Learning.
[59] Almogren, A. S., Al-Rahmi, W. M., & Dahri, N. A. (2024). Exploring factors influencing the acceptance of ChatGPT in higher education: A smart education perspective. Heliyon.
[60] Tiwari, C. K., Bhat, M. A., Khan, S. T., Subramaniam, R., & Khan, M. A. I. (2024). What drives students toward ChatGPT? An investigation of the factors influencing adoption and usage of ChatGPT. Interactive Technology and Smart Education, 21(3), 333-355.
[61] ElSayary, A. (2024). An investigation of teachers' perceptions of using ChatGPT as a supporting tool for teaching and learning in the digital era. Journal of computer assisted learning, 40(3), 931-945.
[62] Chan, C. K. Y., & Tsi, L. H. (2024). Will generative AI replace teachers in higher education? A study of teacher and student perceptions. Studies in Educational Evaluation, 83, 101395.
[63] Cambra-Fierro, J. J., Blasco, M. F., López-Pérez, M. E. E., & Trifu, A. (2024). ChatGPT adoption and its influence on faculty well-being: An empirical research in higher education. Education and Information Technologies, 1-22.
[64] Sun, W., Hong, J. C., Dong, Y., Huang, Y., & Fu, Q. (2023). Self-directed learning predicts online learning engagement in higher education mediated by perceived value of knowing learning goals. The Asia-Pacific Education Researcher, 32(3), 307-316.
[65] Wang, M. T., & Holcombe, R. (2010). Adolescents' perceptions of school environment, engagement, and academic achievement in middle school. American educational research journal, 47(3), 633-662.
[66] Zapata-Cuervo, N., Montes-Guerra, M. I., Shin, H. H., Jeong, M., & Cho, M. H. (2023). Students' psychological perceptions toward online learning engagement and outcomes during the COVID-19 pandemic: A comparative analysis of students in three different countries. Journal of Hospitality & Tourism Education, 35(2), 108-122.
[67] Kaya, O. S., & Ercag, E. (2023). The impact of applying challenge-based gamification program on students' learning outcomes: Academic achievement, motivation and flow. Education and Information Technologies, 1-26.
[68] Plak, S., van Klaveren, C., & Cornelisz, I. (2023). Raising student engagement using digital nudges tailored to students' motivation and perceived ability levels. British Journal of Educational Technology, 54(2), 554-580.
[69] Logan, M. (2023). Interest, Attitudes, Motivation, and Engagement. In Young People's Voice in School Science: Research from Five Years in the Classroom (pp. 9-37). Cham: Springer Nature Switzerland.
[70] Marion, É., & Tchuindibi, L. (2023). The educational experience of young people in residential care through the lens of learning careers. British Educational Research Journal.
[71] Al Murshidi, G., Daoud, S., Al Derei, R., Alhamidi, H., Jabir, W., & Sayed, N. (2023). Parental involvement in English as foreign language learners' education: Challenges and solutions in a post-pandemic era. International Journal of Educational Research Open, 5, 100297.
[72] Johnson, R. B., & Christensen, L. B. (2007) Educational Research: Quantitative, qualitative, and mixed approaches. Available at: http://ci.nii.ac.jp/ncid/BA71205674.
[73] Lim, W. M. (2024). What is qualitative research? An overview and guidelines. Australasian Marketing Journal, 14413582241264619. https://doi.org/10.1177/14413582241264619.
[74] McCaslin, M., & Scott, K. (2015) The Five-Question Method for framing a qualitative research study, The Qualitative Report. Available at: https://doi.org/10.46743/2160-3715/2003.1880.
[75] Johnson, R. B., & Christensen, L. B. (2007) Educational Research: Quantitative, qualitative, and mixed approaches. Available at: http://ci.nii.ac.jp/ncid/BA71205674
[76] S. Lock. (2022) What is ai chatbot phenomenon chatgpt and could it replace humans? AccessedDecember10,2022.
[77] M.U. Haque, I. Dharmadasa, Z.T. Sworna, R.N. Rajapakse, H. Ahmad, I think this is the most disruptive technology: Exploring sentiments of ChatGPT early adopters using Twitter data, 2022, arXiv preprint arXiv:2212.05856.
[78] X. Zhai, ChatGPT user experience: Implications for education, Available at SSRN 4312418, DOI (2022).
[79] Y. Bang, S. Cahyawijaya, N. Lee, W. Dai, D. Su, B. Wilie ., P. Fung, A multitask, multilingual, multimodal evaluation of ChatGPT on reasoning, hallucination, and interactivity, 2023, arXiv preprint arXiv:2302.04023.
[80] Fitria, T. N. (2021, December). Artificial Intelligence (AI) In Education: Using AI Tools for Teaching and Learning Process. In Prosiding Seminar Nasional & Call for Paper STIE AAS (Vol. 4, No. 1, pp. 134-147).
[81] Emran, A. Q., Mohammed, M. N., Saeed, H., Keir, M. Y. A., Alani, Z. N., & Ibrahim, F. M. (2024, January). Paraphrasing ChatGPT Answers as a Tool to Enhance University Students' Academic Writing Skills. In 2024 ASU International Conference in Emerging Technologies for Sustainability and Intelligent Systems (ICETSIS) (pp. 501-505). IEEE.
[82] Fu, C. J., Silalahi, A. D. K., Shih, I. T., Phuong, D. T. T., Eunike, I. J., & Jargalsaikhan, S. (2024). Assessing ChatGPT's information quality through the lens of user information satisfaction and information quality theory in higher education: A theoretical framework. Human Behavior and Emerging Technologies, 2024(1), 8114315.
[83] Hombeck, J., Voigt, H., & Lawonn, K. (2024). Voice user interfaces for effortless navigation in medical virtual reality environments. Computers & Graphics, 124, 104069.
[84] Nipun, M. S., Talukder, M. S. H., Butt, U. J., & Sulaiman, R. B. (2023). Influence of Artificial Intelligence in Higher Education; Impact, Risk and Counter Measure. In AI, Blockchain and Self-Sovereign Identity in Higher Education (pp. 143-166). Cham: Springer Nature Switzerland.
[85] Harpreet, G., Gagandeep, D., Varun, M., Pranjal, S., Buddhavarapu, V. S., Gurmanpreet, S., & Rahul, K. (2023). Radiology Gets Chatty: The ChatGPT Saga Unfolds. Cureus, 15(6).
[86] Davis, F. D. (1989). Technology acceptance model: TAM. Al-Suqri, MN, Al-Aufi, AS: Information Seeking Behavior and Technology Adoption, 205, 219.

[87] Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. MIS quarterly, 425-478.
[88] Rogers, E. M., & Singhal, A. (2003). Empowerment and communication: Lessons learned from organizing for social change. Annals of the International Communication Association, 27(1), 67-85.
[89] Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. Psychological Review.
[90] Ajzen, I. (1991). The Theory of planned behavior. Organizational Behavior and Human Decision Processes.
[91] Parasuraman, A., & Colby, C. L. (2015). An updated and streamlined technology readiness index: TRI 2.0. Journal of service research, 18(1), 59-74.
[92] DeVries, R. (2000). Vygotsky, Piaget, and education: A reciprocal assimilation of theories and educational practices. New ideas in Psychology, 18(2-3), 187-213.
[93] Baidoo-Anu, D., & Ansah, L. O. (2023). Education in the era of generative artificial intelligence (AI): Understanding the potential benefits of ChatGPT in promoting teaching and learning. Journal of AI, 7(1), 52-62.
[94] Herft, A. (2023). A teacher's prompt guide to ChatGPT aligned with'what works best'. CESE NSW "What Works Best in Practice.
[95] Kasneci, E., Seßler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., ... & Kasneci, G. (2023). ChatGPT for good? On opportunities and challenges of large language models for education. Learning and individual differences, 103, 102274.
[96] Qadir, J. (2023, May). Engineering education in the era of ChatGPT: Promise and pitfalls of generative AI for education. In 2023 IEEE Global Engineering Education Conference (EDUCON) (pp. 1-9). IEEE.
[97] Tlili, A., Shehata, B., Adarkwah, M. A., Bozkurt, A., Hickey, D. T., Huang, R., & Agyemang, B. (2023). What if the devil is my guardian angel: ChatGPT as a case study of using chatbots in education. Smart learning environments, 10(1), 15.
[98] Shahzad, M. F., Xu, S., & Javed, I. (2024). ChatGPT awareness, acceptance, and adoption in higher education: the role of trust as a cornerstone. International Journal of Educational Technology in Higher Education, 21(1), 46.
[99] Maheshwari, G. (2024). Factors influencing students' intention to adopt and use ChatGPT in higher education: A study in the Vietnamese context. Education and Information Technologies, 29(10), 12167-12195.
[100] Mogavi, R. H., Deng, C., Kim, J. J., Zhou, P., Kwon, Y. D., Metwally, A. H. S., ... & Hui, P. (2024). ChatGPT in education: A blessing or a curse? A qualitative study exploring early adopters' utilization and perceptions. Computers in Human Behavior: Artificial Humans, 2(1), 100027.
[101] Zeb, A., Ullah, R., & Karim, R. (2024). Exploring the role of ChatGPT in higher education: opportunities, challenges and ethical considerations. The International Journal of Information and Learning Technology, 41(1), 99-111.
[102] Ma, Q., Crosthwaite, P., Sun, D., & Zou, D. (2024). Exploring ChatGPT literacy in language education: A global perspective and comprehensive approach. Computers and education: Artificial intelligence, 7, 100278.
[103] Singh, H., Tayarani-Najaran, M. H., & Yaqoob, M. (2023). Exploring computer science students' perception of ChatGPT in higher education: A descriptive and correlation study. Education Sciences, 13(9), 924.
[104] Wang, L., Chen, X., Wang, C., Xu, L., Shadiev, R., & Li, Y. (2024). ChatGPT's capabilities in providing feedback on undergraduate students' argumentation: A case study. Thinking Skills and Creativity, 51, 101440.
[105] Lazkani, O. (2024). Revolutionizing Education of Art and Design Through ChatGPT. In Artificial Intelligence in Education: The Power and Dangers of ChatGPT in the Classroom (pp. 49-60). Cham: Springer Nature Switzerland.
[106] Rane, N. (2023). Chatbot-enhanced teaching and learning: Implementation strategies, challenges, and the role of ChatGPT in education. Challenges, and the Role of ChatGPT in Education (July 21, 2023).
[107] Elbanna, S., & Armstrong, L. (2024). Exploring the integration of ChatGPT in education: adapting for the future. Management & Sustainability: An Arab Review, 3(1), 16-29.
[108] Rahimi, S., & Khatooni, M. (2024) Saturation in qualitative research: An evolutionary concept analysis. International Journal of Nursing Studies Advances, 100174. Available at: https://doi.org/10.1016/j.ijnsa.2024.100174
[109] Yang, D., Li, Y., Guo, J., Li, G., & Sun, S. (2023) Regional tourism demand forecasting with spatiotemporal interactions: a multivariate decomposition deep learning model. Asia Pacific Journal of Tourism Research, 28(6), pp. 625–646. Available at: https://doi.org/10.1080/10941665.2023.2256431
[110] Edwards, R. and Holland, J. (2020) Reviewing challenges and the future for qualitative interviewing, International Journal of Social Research Methodology, 23(5), pp. 581–592. Available at: https://doi.org/10.1080/13645579.2020.1766767.
[111] Wertz, F. J. (2011). The qualitative revolution and psychology: Science, politics, and ethics. The Humanistic Psychologist, 39(2), 77-104.
[112] Tai, J., & Ajjawi, R. (2016). Undertaking and reporting qualitative research. The clinical teacher, 13(3), 175-182.
[113] Boddy, C. R. (2016). Sample size for qualitative research. Qualitative market research: An international journal, 19(4), 426-432.
[114] Boddy, C.R. (2016) Sample size for qualitative research, Qualitative Market Research an International Journal, 19(4), pp. 426–432. Available at: https://doi.org/10.1108/qmr-06-2016-0053.
[115] Abdaljaleel, M., Barakat, M., Alsanafi, M., Salim, N. A., Abazid, H., Malaeb, D., ... & Sallam, M. (2023). Factors Influencing Attitudes of University Students towards ChatGPT and its Usage: A Multi-National Study Validating the TAME-ChatGPT Survey Instrument.
[116] Bin-Nashwan, S. A., Sadallah, M., & Bouteraa, M. (2023). Use of ChatGPT in academia: Academic integrity hangs in the balance. Technology in Society, 75, 102370.
[117] Hamid, H., Zulkifli, K., Naimat, F., Yaacob, N. L. C., & Ng, K. W. (2023). Exploratory study on student perception on the use of chat AI in process-driven problem-based learning. Currents in Pharmacy Teaching and Learning, 15(12), 1017-1025.
[118] Ngo, T. T. A. (2023). The Perception by University Students of the Use of ChatGPT in Education. International Journal of Emerging Technologies in Learning (Online), 18(17), 4.
[119] Essel, H. B., Vlachopoulos, D., Essuman, A. B., & Amankwa, J. O. (2023). ChatGPT effects on cognitive skills of undergraduate students: Receiving instant responses from AI-based conversational large language models (LLMs). Computers and Education: Artificial Intelligence, 100198.
[120] Pradana, M., Elisa, H. P., & Syarifuddin, S. (2023). Discussing ChatGPT in education: A literature review and bibliometric analysis. Cogent Education, 10(2), 2243134.
[121] Touretzky, D., Gardner-McCune, C., & Seehorn, D. (2023). Machine learning and the five big ideas in AI. International Journal of Artificial Intelligence in Education, 33(2), 233-266.
[122] Vázquez-Cano, E., Ramirez-Hurtado, J. M., Saez-Lopez, J. M., & Lopez-Meneses, E. (2023). ChatGPT: The brightest student in the class. Thinking Skills and Creativity, 49, 101380.

[123] Silva, C. A. G. D., Ramos, F. N., de Moraes, R. V., & Santos, E. L. D. (2024). ChatGPT: Challenges and benefits in software programming for higher education. Sustainability, 16(3), 1245.
[124] Wei, X., Chu, X., Geng, J., Wang, Y., Wang, P., Wang, H., ... & Lei, L. (2024). Societal impacts of chatbot and mitigation strategies for negative impacts: A large-scale qualitative survey of ChatGPT users. Technology in Society, 77, 102566.
[125] Nazir, A., & Wang, Z. (2023). A Comprehensive Survey of ChatGPT: Advancements, Applications, Prospects, and Challenges. Meta-radiology, 100022.
[126] Ma, X., & Huo, Y. (2023). Are users willing to embrace ChatGPT? Exploring the factors on the acceptance of chatbots from the perspective of AIDUA framework. Technology in Society, 75, 102362.
[127] Malik, A. R., Pratiwi, Y., Andajani, K., Numertayasa, I. W., Suharti, S., & Darwis, A. (2023). Exploring Artificial Intelligence in Academic Essay: Higher Education Student's Perspective. International Journal of Educational Research Open, 5, 100296.
[128] Amaro, I., Della Greca, A., Francese, R., Tortora, G., & Tucci, C. (2023, July). AI Unreliable Answers: A Case Study on ChatGPT. In International Conference on Human-Computer Interaction (pp. 23-40). Cham: Springer Nature Switzerland.
[129] Amaro, I., Della Greca, A., Francese, R., Tortora, G., & Tucci, C. (2023, July). AI Unreliable Answers: A Case Study on ChatGPT. In International Conference on Human-Computer Interaction (pp. 23-40). Cham: Springer Nature Switzerland.
[130] Johnson, D., Goodman, R., Patrinely, J., Stone, C., Zimmerman, E., Donald, R., ... & Wheless, L. (2023). Assessing the accuracy and reliability of AI-generated medical responses: an evaluation of the Chat-GPT model. Research square.
[131] Fui-Hoon Nah, F., Zheng, R., Cai, J., Siau, K., & Chen, L. (2023). Generative AI and ChatGPT: Applications, challenges, and AI-human collaboration. Journal of Information Technology Case and Application Research, 25(3), 277-304.
[132] Jeon, J., & Lee, S. (2023). Large language models in education: A focus on the complementary relationship between human teachers and ChatGPT. Education and Information Technologies, 1-20.