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Investigating the Pros and Cons of Artificial Intelligence (AI)-Based Systems: A Case Study on the Use of ChatGPT in Higher Education in the Northern Region of Bangladesh

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Abstract

Artificial Intelligence (AI) is the simulation of human intelligence process by machines, especially computer systems. ChatGPT, which stands for Chat Generative Pre-trained Transformer, is a big language model-based chatbot which was developed by open AI and launched in November 2022. This case study aims to delve into the application of ChatGPT, an Al-based conversational system, within the university setting, exploring the advantages and disadvantages of its use in educational contexts. ChatGPT's most common use is in the field of education, because in this field, the subject of knowledge acquisition is the top priority. Universities in Bangladesh are not lagging behind in this regard. ChatGPT is one such AI tool that universities are considering for various applications, including virtual teaching assistants, chatbots, and automated administrative support that everyone now has access to. But how good its effect is is questionable. This was the thought process behind the topic selection for this case study. A stratified random sampling method is used to select a representative sample of students. Data is collected through quantitative and qualitative methods. The results of this study show that AI technologies like ChatGPT yield both significant benefits and risks. The study advocates for a thoughtful and responsible combination of such technologies within Higher Educational Institutions.

Keywords: *Artificial Intelligence (AI), ChatGPT, Higher Education*

1. Introduction

Education system in Bangladesh is undergoing rapid digital transformation. ChatGPT has gained attention for its abilities and potential contributions to education. As a result, teachers and students use the ChatGPT system because they all want to learn how to complete a task successfully and correctly in the shortest possible time period. The introduction of AI-based systems like ChatGPT in higher educational institutions can offer numerous benefits, but it also brings about some challenges and concerns. Careful planning, transparent debates, and ongoing evaluation are essential for maximizing the advantages of AI while mitigating potential disadvantages.

This case study is designed to attain a comprehensive understanding of the multifaceted impact of ChatGPT in the educational landscape of universities in the northern region of Bangladesh. To address the research questions posed, the objectives encompass several dimensions. Through these objectives, the case study endeavors to provide a comprehensive analysis of the benefits and challenges created by AI in the university level education in Bangladesh, thus contributing valuable insights to inform future educational strategies and practices.

2. Literature Review

Researchers like (Johnson 2018, Smith, 2019) discuss the potential of AI to analyze vast amounts of student data, helping institutions make data-driven decisions for curriculum improvement, resource allocation, and student support. According to them, AI-driven systems can offer a highly personalized learning experience, adapting content and support to individual students' needs, thus enhancing engagement and performance. Turner (2019) in his study notes that AI-based systems like ChatGPT

can provide continuous support to students, breaking down time and location barriers for learning. Jones (2020) in his research on the impact of ChatGPT in higher education emphasizes that AI can efficiently scale educational resources, making quality education more accessible to a broader audience, including non-traditional students. Furthermore in his work, Brown (2021) points out the advantages of AI in automating assessment and providing instant feedback, streamlining the grading process, and improving the learning cycle. He finds out that ChatGPT can provide the students with instant feedback, learning tools and motivating them to learn more in their educational field.

However, researchers also have negative views on the use of ChatGPT in higher educational institutions. Johnson (2018) highlights concerns about the collection and usage of student data by AI systems, including privacy, security, and ethical considerations, calling for robust safeguards. Turner (2019) in his study discusses the impact of automation on educational jobs, with the potential for AI to replace certain tasks traditionally performed by educators and support staff. Contrary to the benefits of personalization, Smith (2019) warns that heavy reliance on AI might lead to a decrease in human interaction, potentially hindering the development of essential social and communication skills. In his study, Garcia (2020) stresses the potential for AI systems to perpetuate biases present in their training data, potentially leading to discrimination and unfair treatment of students from underrepresented groups. Brown (2021) also raises concerns about the risk of depersonalization in the learning experience, where students may perceive AI-driven education as transactional and devoid of empathy and mentorship.

The perspective of various authors on AI based system in university education provides a multifaceted view of the potential and challenges of integrating technologies like ChatGPT. The synthesis of these perspectives serves as foundation for further research, including the upcoming case study. The views of these authors point to the need for ongoing discussions and solutions in addressing the challenges associated with Al-based systems in university education.

3. METHODOLOGY

3.1. Data Sources

The case study employs a mixed-methods approach to investigate the pros and cons of AI- based systems, particularly ChatGPT, in higher educational institutions. A stratified random sampling method is used to select a representative sample of students. Data will be collected through quantitative surveys, with Likert scale questions, to gauge students' familiarity, experiences, and opinions on AI in education. Qualitative data will be gathered through semi-structured interviews with a subset of students to gain in-depth insights. Both types of data will be analyzed separately, with quantitative data using statistical methods and qualitative data undergoing thematic analysis. To accomplish the objectives outlined, this case study employs a mixed methods research approach. Initially, quantitative data will be collected through structured survey distributed among students and teachers at higher educational institutes. The survey explores their perceptions of AI impact on teaching and learning, its relevance to future job skills, satisfaction levels, and views on fostering creativity and personalized learning.

3.2. Participants

The study has been conducted at five universities and the researcher has chosen English department students and teachers to find out the access of students' familiarity, experience, perceptions, and opinions regarding AI-based systems, specifically ChatGPT in education. For the sake of research ethics, confidentiality is to be maintained, and the disguised names of students are used to confirm anonymity. There are a total of 50 participants (students and teachers) randomly selected from the Department of English of different universities to conduct this case study.

3.3. Instruments

The research instruments employed to collect data for this study are questionnaire and interview. The students' questions consist of 10 closed and open-ended questions designed in English. The researcher uses observation to see how university students' perception of AI in education.

4. DATA ANALYSIS

The quantitative data derived from the questionnaire is analyzed using MS 2021 Excel Program to answer the research question. The researcher has shown some data from the survey and analysis that

clearly demonstrates what the perception of 4th-year students is to their involvement of AI on education. The data analysis for this study comprises both quantitative and qualitative approaches. Quantitatively, the survey responses are analyzed using descriptive statistics to summarize students' familiarity with AI in education, experiences with AI-based tools like ChatGPT, and their opinions on its impact. Inferential statistics, such as chi-squared tests, may be used to identify any significant associations within the quantitative data. Qualitatively, the transcribed interviews undergo thematic analysis to extract patterns and themes related to students' experiences and perceptions. The integration of both data types offers a comprehensive understanding of the pros and cons of AI-based systems in higher education institutions, providing valuable insights for the study objectives. The qualitative data analysis involves coding the interview transcripts to identify recurring themes, allowing for a deeper exploration of students nuanced perspectives. These qualitative findings are triangulated with the quantitative results to provide a holistic view of how AI-based systems like ChatGPT are perceived in higher educational context in Bangladesh, shedding light on both advantages and drawbacks.

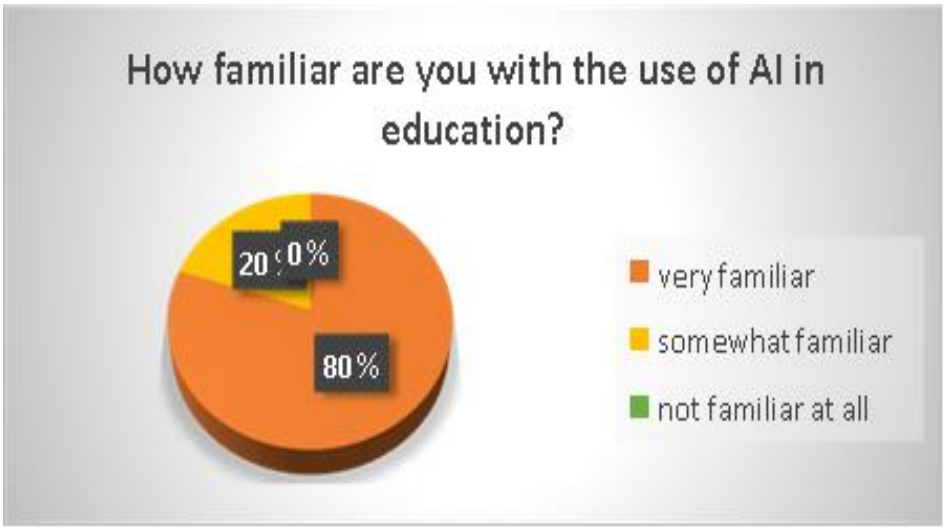

Figure 1

In figure 1, it is noticeable that (80%) of students familiar and use AI in education whereas (20%) students somewhat use AI in their education. This figure undoubtedly shows the number how familiar students are with AI in their education.

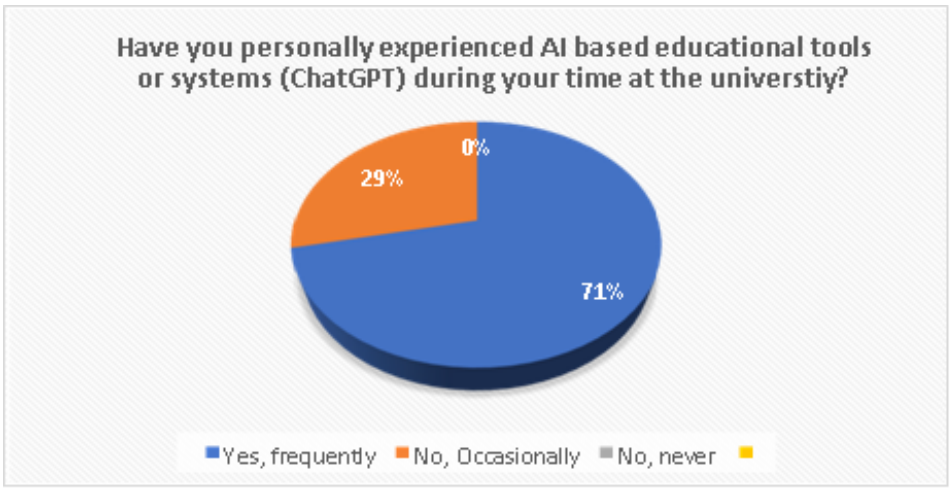

Figure 2

In figure 2, most of the students (71%) experienced AI educational tools like (ChatGPT) during their university time. On the other hand 29% also experienced ChatGPT but occasionally. This figure tells us about the high percentage of students who frequently use AI tools in their education.

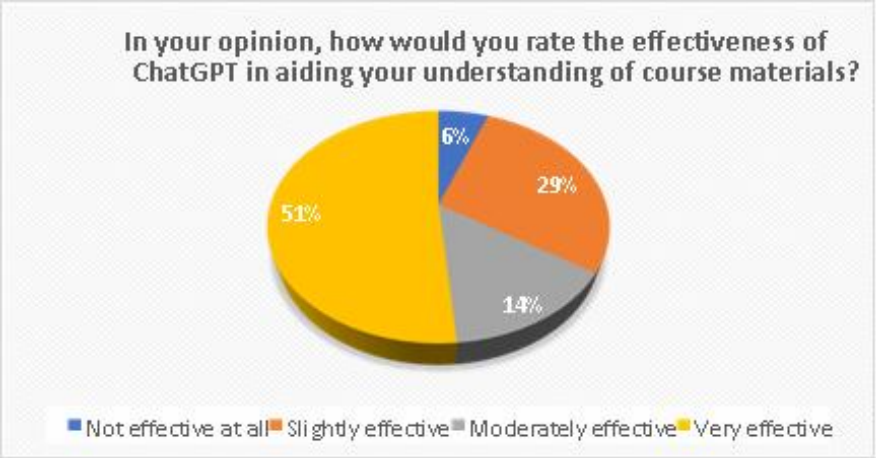

Figure 3

In figure 3, we asked the students about how they rate the effectiveness of ChatGPT for understanding of course materials. (51%) students' rate ChatGPT very effective, (29%) rate slightly effective, (14%) rate moderately effective, (6%) rate not effective at all.

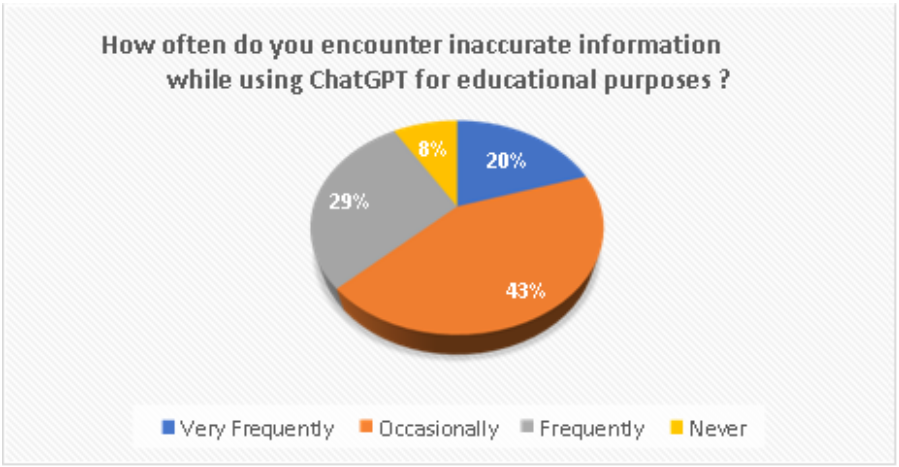

Figure 4

In figure 4, one of the vital figures in this data collection where (43%) of students assured that they had encountered inaccurate information while using ChatGPT for educational purpose, 29% find frequently, 20% very frequently and lastly 8% finds never.

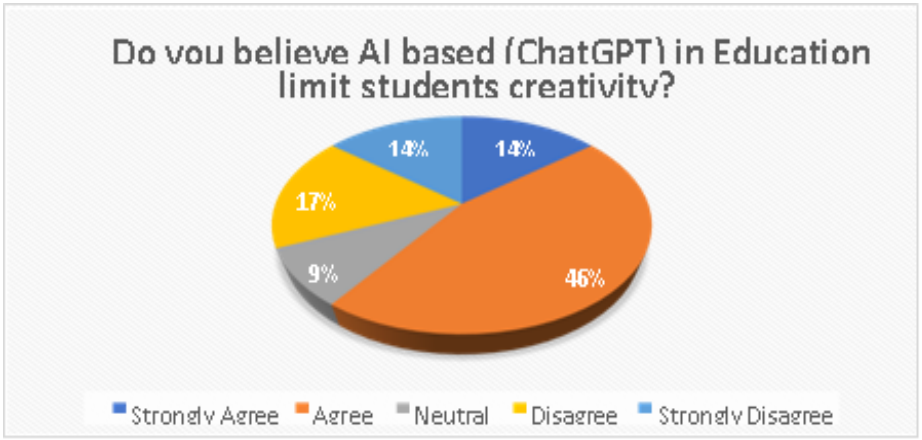

Figure 5

In figure 5, most of the students (46%) agreed that AI based (ChatGPT) in education limit students creativity. (14%) strongly agree, (9%) was neutral, (17%) disagree whereas (14%) was strongly disagree.

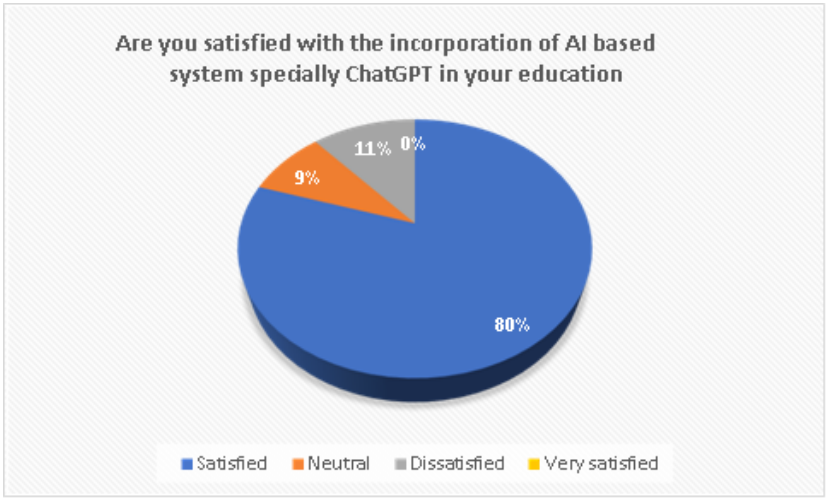

Figure 6

In figure 6, the students provided their satisfaction percentage. (80%) of students were satisfied with ChatGPT. (11%) were dissatisfied and (9%) were neutral.

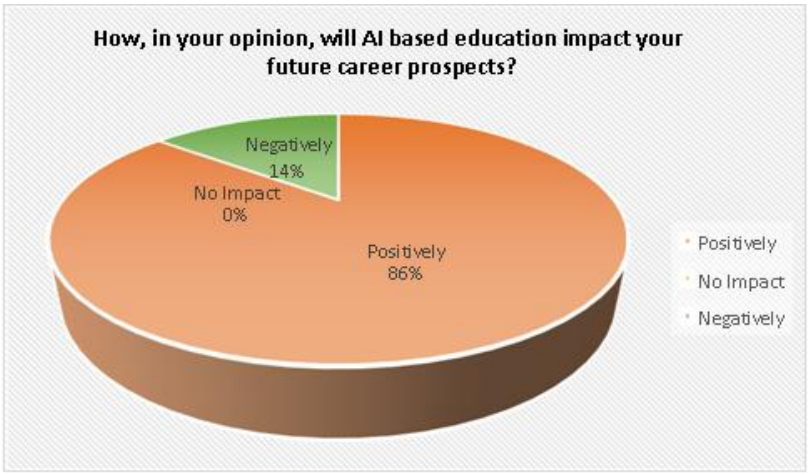

Figure 7

As the thesis conduct on AI We asked the students how they think AI based education will impact there career prospects. (86%) thought it will help them positively whereas only (14%) thought it will impact negatively.

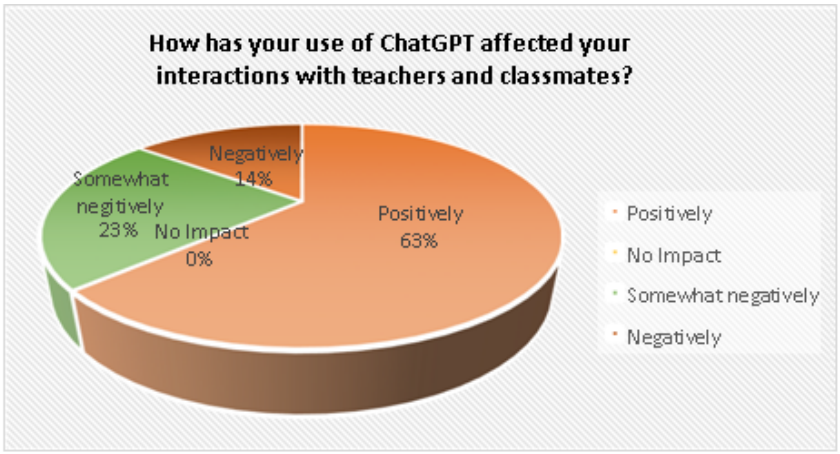

Figure 8

In figure 8, (63%) students thought ChatGPT affected their interactions with teachers and classmates positively, (23%) thought somewhat negatively and (14%) thought it is negative.

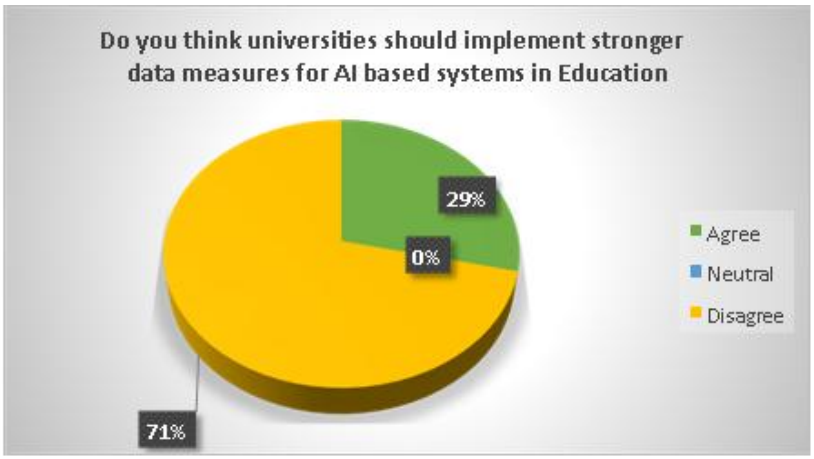

Figure 9

In figure 9, (71%) students disagree with it. They think university should implement stronger data measures for AI based system in education whereas (29%) students agree on this question.

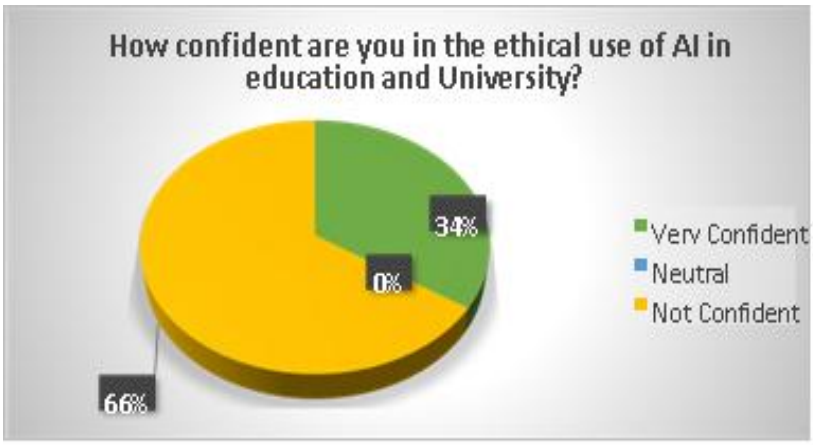

Figure 10

In figure 10, (66%) students were not confident about using AI in their education. On the other hand (34%) were very confident about using AI in their education.

4.1. Students Interview

Maximum students have mixed experiences. While using ChatGPT, most of the time, they get the correct answer. Many times, Chat GPT did not understand what they meant or what kind of answer was needed. Then they write again and again to search for the right answer. If they search too much, the account will be blocked. Then the search can no longer be done until the specified time.

ChatGPT can give instant feedback. It helps students prepare assignments and do research. By this they can learn more about any topics outside the book and the information are also well organized. ChatGPT cannot provide recent information like general knowledge question correctly.

Many times, the content of the literature is wrongly presented due to a lack of comprehension power. Searching for any research topic cannot give a book or author's name due to a lack of content. The information received has not been updated.

4.2. Teachers Interview

According to some teachers, ChatGPT is still less used in our universities. Many students still do not know what ChatGPT is or how to use it. Compared to university students in rural areas, the students of Dhaka are much ahead. University students will be benefited if they use it properly because by using it they will get organized answers in less time.

Some other teachers think that if students want a sample of a model or a template, they can easily obtain it. If they want to test themselves on subject-verb agreement, they can easily find questions

without anyone's help. However, there are some drawbacks in how students use it. So, I believe there are both beneficial aspects and challenges associated with ChatGPT.

A lecturer in English of a university says, “When teachers create questions for students, they do not expect one-word answers; instead, they anticipate diverse responses from different perspectives”. Therefore, if students use or rely on ChatGPT, they might receive only one specific viewpoint. In our department, when a teacher poses questions that seek personal opinions, depending solely on ChatGPT may not be suitable for students. Instead, they should seek to gain a perspective. By searching on platforms like YouTube, students can access a variety of perspectives, whereas ChatGPT offers a consistent viewpoint. Thus, for our subjective topics, ChatGPT may not prove beneficial or effective, presenting a challenge for our department.

ChatGPT is a powerful tool, and its impact largely depends on how users employ it. Users can utilize it for ethical purposes or engage in illegal activities. If students rely on ChatGPT to complete their assignments without reading a single line, it can be considered an inappropriate use of ChatGPT. Technology has the potential to enhance our intelligence, but if we misuse it for negative purposes, it can make us less knowledgeable. However regarding the misuse of ChatGPT, most of the teachers are concerned on this ground that students at universities might tend to use ChatGPT in a negative manner, and they believe that such practices could pose risks to their educational development.

5. Results And Findings

The survey reveals varying levels of familiarity among students with the use of AI in education, indicating that a significant portion of the students surveyed have some knowledge about AI in education. However, a smaller percentage is reported being very familiar, while others indicate they are not very familiar or not familiar at all. These findings suggest a need for educational initiatives to increase awareness and understanding of AI in education. A substantial number of students have personally experienced AI-based educational tools or systems during their time at the university, indicating that AI integration is already a part of their academic journey. However, a notable portion of students have had only occasional exposure, and some have never encountered such systems. This distribution highlights the varying degrees of AI integration across the student body.The majority of students perceive AI as important in enhancing the quality of education, with many indicating it is extremely important. These results reflect a positive outlook on AI's potential to improve the educational experience.

Students largely view AI as enhancing traditional teaching methods, with only a small portion perceiving AI as potentially replacing traditional methods. These findings indicate a generally positive attitude toward AI as a complementary tool in education. When asked about AI-based education limiting students’ creativity, responses are diverse, with a substantial number expressing a neutral stance. Some students express concerns, while others disagree, highlighting the complexity of the relationship between AI and creativity in education. Most students express satisfaction with the incorporation of AI-based systems in their education. However, a notable portion falls into the neutral and dissatisfied categories, indicating that there may be room for improvement in the user experience. Most students believe that AI-based education will positively impact their future career prospects, while a smaller portion is uncertain about the impact, and very few anticipate a negative effect. Most students express comfort with the use of AI-based systems for academic assessments, indicating a general acceptance of AI in this context. Students overwhelmingly agree that the university should implement stronger data protection measures for AI-based systems in education. Regarding confidence in the ethical use of AI in education, responses varied, with some students expressing strong confidence, while others are neutral or not confident. These findings underscore the importance of addressing ethical and data security considerations in AI integration.

6. Conclusion

This case study focused on investigating the pros and cons of AI-based systems in higher educational institutions provides valuable insights into the integration of artificial intelligence in higher education. The study encompassed an array of aspects related to AI in education, including student familiarity, personal experiences, perceptions of importance, impact on teaching methods, creativity limitations, satisfaction, impact on future career prospects, comfort with AI for assessments, learning outcomes,

engagement, and ethical considerations. The results reveal a nuanced landscape of AI integration at universities. Most of the students recognize the importance of AI in enhancing the quality of education and view it as a means of complementing traditional teaching methods, rather than replacing them. Regarding creativity limitations, students display diverse views, reflecting the multifaceted role of AI in nurturing creativity. Most students expressed satisfaction with AI incorporation, but a significant portion provides room for improvement. Students generally anticipate a positive impact on their future career prospects due to AI-based education. In conclusion, the findings underscore the multifaceted nature of AI integration in higher educational institutions in Bangladesh. The study demonstrates the importance of continuous awareness-building and transparency efforts to ensure that students and stakeholders are well-informed about the benefits and challenges of AI in education. The results also indicate the need for ongoing improvements in the user experience, including fostering creativity and addressing ethical considerations. As AI's role in education continues to evolve, universities can draw on these insights to make informed decisions and cultivate a positive and innovative learning environment for students.

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