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Impact of AI Chatbots in the Education Sector of Bangladesh

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ABSTRACT

The rapid global adoption of AI chatbots has prompted growing interest in their role in education. However, most existing research comes from developed countries, leaving a significant gap in our understanding of how these tools are being adopted in contexts shaped by socio-economic inequality, gender disparities, and uneven access to technology. Bangladesh represents one such context, where empirical research on AI chatbot adoption and its academic implications among university students remains very limited. This study addresses that gap using a mixed methods design, combining semi-structured interviews with a cross-sectional survey of 297 university students selected through convenience sampling. The findings reveal that factors like computer ownership, comfort with technology, and gender significantly shape who adopts AI chatbots and how often. Among those who do, using chatbots for study assistance, exam practice, and accessing correct answers is significantly linked to improved academic performance. These results extend the Technology Acceptance Model to a developing country setting by surfacing equity-related barriers that standard adoption frameworks do not capture. The findings point to a clear need for digital literacy programs aimed at female and lower-income students, better integration of chatbots into exam preparation, and policies that make AI tools more accessible across all socio-economic groups in Bangladesh.

INTRODUCTION

Conventional classroom education has been the primary method of learning for centuries. It is centered around a physical environment where teachers serve as the primary sources for knowledge (UoPeople, 2022). Here, this teaching method prioritizes the teacher's role and relies on a well-organized curriculum. It is usually conveyed through lectures, discussions, and collaborative tasks (Iowa State University, 2024). In spite of this approach promoting a robust feeling of community, and facilitates providing feedback through inquiries and conversations, it does have its constraints.

Because of the curriculum's standardization, kids with different learning styles, and speeds may find it difficult to adjust (Parrish, 2019). Some students may fall behind or become bored with this approach, while others may find themselves going beyond the speed of the lesson. In addition to this, conventional classrooms may have barriers, especially in terms of physical resources. Also, it may not provide the adaptability or individualized attention that certain students need to succeed (Adamska, 2023).

Online education has caused significant disruption to the traditional classroom model. It did so by providing a learning experience that is more flexible and easily available (Josep, 2019). Specifically, after the Covid-19 pandemic, the usage of online education was increased significantly. Driven by technological improvement, online platforms enables students to acquire knowledge from any location, at any moment (Drexel University, 2024). This change enables individuals to actively pursue

educational objectives. These may have been impossible by geographical constraints or demanding schedules before (Kasmad *et al.*, 2023).

The digital age has provided a completely new way of learning in many ways, with perhaps the most interesting part of the digital revolution being the integration of AI chatbots into the world of education. These chatbots are providing a paradigm shift of learning (Flack, 2019) and offer a tailor-made learning experience, adapted for each individual according to their strengths, weakness and their preferred style of learning unlike a fixed, traditional classroom (Naoley, 2023). This virtual teacher will explain complicated issues in great detail, be available at all times to answer questions, give feedback on practice work, and adjust teaching styles depending on how quickly a student learns (Thompson, 2023).

However, integrating AI chatbots into education also brings with it several problems (Labadze *et al.*, 2023). Any new piece of technology invariably brings issues such as the privacy and security of data, and the possibility of misusing student data. Additionally, there is a concern that learning solely by the use of technology could have the adverse affect of minimizing the very important human interaction between teachers and students, and AI chatbots should therefore be seen as useful tools to enhance learning, rather than replace teachers (VergeAI, 2024).

LITERATURE REVIEW

Before getting into the specific findings regarding AI chatbots, it is useful to know what theory this study uses in

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order to interpret the observed pattern of adoption. The Technology Acceptance Model (TAM) by Davis (1989) is among the most widely accepted theoretical frameworks, to understand the willingness of users to accept and use new technologies (Ma & Liu, 2005). The fundamental premise of TAM is that for a user to accept a new technology the degree to which one believes the system is useful (perceived usefulness) and the degree to which one believes the system is easy to use (perceived ease of use) determines whether a person would use a new technology (Davis, 1989). TAM has successfully been used in a wide variety of educational tools such as learning management systems and mobile applications (Fathema *et al.*, 2015). TAM is used in this study to account for the importance of factors such as "chatbots give correct answers" and "chatbots are available 24/7" because these essentially measure a users' perceived usefulness.

However TAM alone does not address factors such as the existence of structural barriers, the absence of access to technology, technical discomfort, social pressures that hinder acceptance, etc. The importance of such factors in a developing country context such as Bangladesh where access is clearly gender, income and geo disparity is obvious. TAM is thus used as the basis for the hypotheses for this study but the study continues beyond it to consider other equity factors that may be particularly relevant for the Bangladeshi context.

How Are AI Chatbots Being Used Around the World?

AI chatbots are now used across virtually every industry. For example, in banking, they handle routine tasks like checking account balances, processing bill payments, and activating cards. At the same time, it also gathers feedback from customers. Examples include HDFC's EVA, Bank of America's Erika, and Bank of Australia's Ceba (k, 2020). In the food industry, chatbots take orders, manage reservations, track deliveries, and send customers promotional information. Pizza Hut's Pizza-bot (Gilliland, 2016) and Burger King's chatbot (McQuarrie, 2016) are well-known examples of it. E-commerce brands such as IKEA and Zalando have deployed chatbots for order tracking and PVR Cinemas India and Amtrak USA have employed chatbots for ticketing information.

The healthcare domain is another industry which has been heavily influenced by the introduction of chatbots. Healthcare-focused chatbots such as OneRemission (keenethics, 2024)(for information access to cancer patients), Youper (Youper, 2024)(emotional well-being) and Florence (Florence, 2024)(medication reminders for patients) are examples of the level of personalization that the tools can facilitate. Research has indicated that chatbots can assist with medical decisions, promote physical activity, facilitate cognitive behavioral therapy and even diagnose diseases with a level of accuracy similar to clinicians (Palanica *et al.*, 2019). What is also fascinating is the extent of personal information that some patients may share with chatbots over doctors, as they feel a reduction in judgment. However, perceived

lack of warmth and dependability over human physicians is likely to contribute to low patient adherence to chatbot instructions (Adamopoulou & Moussiades, 2020).

Within education, a problem which has become increasingly prevalent with rising class sizes in university is the struggle of receiving adequate one on one support from lecturers. Chatbots are being utilized to bridge this gap by allowing students to view previously provided lessons if they have missed classes, answering any administrative questions students may have regarding enrollment and scheduling and provide assistance with assignments (Adamopoulou & Moussiades, 2020). One study indicated that the integration of a chatbot to help streamline the registration process led to a significant increase in course enrollment (Hien *et al.*, 2018). These examples hint at the use of chatbots in education going beyond merely convenience; at structural benefits both for the institutions and learners.

AI Chatbots in Education

Since ChatGPT's launch, the education world has been buzzing with debate about what this technology means for teaching and learning. But, Opinions amongst teachers and researchers differ widely. There many advantages: ChatGPT is able to provide clear explanations for difficult topics, it can generate ideas for students, it aids teachers in the generation of teaching materials, and it provides immediate tutoring at students' disposal (Baidoo-anu & Anseh, 2023). In addition, AI tools have been shown to enhance academic performance and self-efficacy by giving individualized feedback and tailored guidance, and providing adaptive content-beyond ease of use. These are actual benefits that may not have been available to students who lack access to private tutoring or one-on-one instruction (katyara *et al.*, 2025).

However, the fears and concerns associated with AI are equally real. One of the issues is "hallucination"-the possibility that AI chatbots can generate convincing yet factually incorrect information (Tang, 2023). There are also the worries about cheating-students using the AI tool to help them pass in work they have not generated themselves, and circumventing the systems that try to detect plagiarism. Each of these problems strikes at the heart of the idea of academia, and institutions are yet to know how to respond; the proposed solutions include altering assignment designs and modes of assessment, and educating both teachers and students on appropriate usage of such tools (Adeshola & Adepoju, 2023).

It is important to remember, though, that not all of these AI chatbots are created equal, in terms of subject matter; a study has found ChatGPT to be adept in economics, adequate in programming, but weak in mathematics (Lo, 2023). Such disparities are concerning, as students could inadvertently be given misinformation, rather than genuine help.

What this research area lacks as much as anything, though, is a thorough look at the applications of these technologies in developing economies. Almost all existing

research focuses on North American, European, or East Asian universities (Khan *et al.*, 2024). In places such as Bangladesh, the prevalence of internet access, device ownership, and digital literacy vary drastically, and as such the nature and trends of chatbot adoption in these environments may look very different than has already been documented.

The Bangladesh Context: Digital Progress and Persistent Inequalities

While Bangladesh has seen tremendous growth in digital infrastructure in recent years, large disparities remain. Studies focusing on the rural digital divide in Bangladesh, show that respondents in urban areas are far more likely to possess a laptop and desktop, and use their smartphone as their sole source of computing (Rashed *et al.*, 2025). On the other hand low-income participants are also more likely to see delays in personal device (Alam & Hossain, 2025). Gender inequalities in the use of technology based upon broader social and economic inequalities are well documented also, with females in Bangladesh less likely to use mobile internet than men (GSMA, 2022). These contextual conditions, rather than just technology driven principles affect both the users of the AI chatbot and the way in which they use it. Using a TAM lens, a university student from Dhaka who owns a laptop and has grown up as a 'digital native' has a fundamentally different perceived ease of use compared to a first generation university student from rural Bangladesh who uses a shared smartphone in house.

It may seem apparent that social class influences access not only to devices, but confidence to use digital devices too. Gender inequalities in Bangladesh are born from lower access to education and technology experienced by women. They provide a structural barrier which a purely technology driven model such as TAM may miss. This paper's hypothesis testing framework attempts to specifically examine these structural inequalities, linking these experiences to global debates about the adoption of technology and the digital divide. By doing so, it aims to contribute to a more complete and globally inclusive picture of how AI chatbots are reshaping education.

MATERIALS AND METHODS

Research Onion

This research uses a mixed methods approach. It combines quantitative and qualitative data collection to gain a better understanding of the topic. This pragmatic strategy prioritizes both valuable insights and real-world data. A deductive theoretical framework is utilized. Theoretically, the study employs a deductive approach, using established frameworks (particularly TAM) to generate hypotheses that are subsequently tested against empirical data. The time horizon is cross-sectional, capturing a snapshot of usage patterns at a single point in time; this means findings may evolve as the technology matures and student familiarity grows.

Table 1: Research Onion

Research Onion	
Philosophy	Pragmatism
Approach to Theory Development	Deduction
Methodological Choice	Mixed Method Complex
Strategy	Survey
Time-Horizon	Cross-Sectional

Exploratory Research

The study began with a comprehensive literature review to acquire a precise understanding of AI chatbots and their global utilization. Subsequently, given the noticeable popularity of AI chatbots in education, it seemed rational to conduct interviews with relevant individuals. It contained students and faculty members in this field, in order to gain an initial knowledge of the reasons behind their usage in Bangladesh.

A qualitative technique was used to establish the fundamental framework of the study, and faculty members and chosen students were contacted and interviewed in a semi-structured manner (see Appendix B). Following initial contact with the interviewees through personal connections, referrals, and email correspondence, the interviews took place in the form of face-to-face meetings. We used semi-structured interviews to better understand the topic, based on what the interviewees shared. The information they gave helped us learn how AI chatbots are being used and what kind of impact they are having on education. Using the qualitative data, a questionnaire was designed to include the essential characteristics needed to streamline the research.

From the interview data, it became clear that collecting more information from a group of people in the target audience could help us better understand not only how AI chatbots affect education, but also why some people feel comfortable using them while others don't.

Hypothesis

For the study, these following hypotheses were tested:

1. H_0 : There is no relationship between the use of AI Chatbots and user's Socio-economic status in Bangladesh.

H_A : There is a relationship between the use of AI Chatbots and user's Socio-economic status in Bangladesh.

2. H_0 : There is no relationship between the use of AI chatbots and owning a Personal computer.

H_A : There is a relationship between the use of AI chatbots and owning a Personal computer.

3. H_0 : There is no relationship between the use of AI chatbots and being comfortable about using a computer.

H_A : There is a relationship between the use of AI chatbots and being comfortable about using a computer.

4. H_0 : There is no relationship between the use of AI chatbots and owning a smartphone.

H_A : There is a relationship between the use of AI chatbots and owning a smartphone.

5.H₀: There is no relationship between the use of AI chatbots and the user's Gender in Bangladesh.

H_A: There is a relationship between the use of AI chatbots and the user's Gender in Bangladesh.

These hypotheses were chosen based on the data provided by the interviewees. In Bangladesh, gender inequality remains a pressing issue in traditional education systems, while socio-economic status significantly influences access to modern technologies. So, these factors will be investigated as part of our hypothesis testing.

Survey

The target population for this study is university students in Bangladesh. So after making a questionnaire about the factors collected through our interviews, primary data was gathered from 306 respondents via a google form, of which 297 were kept after cleaning the data. Convenience sampling method was used to gather data from, top Universities of Bangladesh. It was appropriate given the exploratory nature of the research. The respondents comprised mainly students from 15 to 30 years of age. The respondents consisted of more than 56% males and around 44% females. Of all the respondents, only around 8% didn't have any prior experience of using any AI chatbots.

This questionnaire encompassed demographic variables like education level, socio-economic status, gender etc. so that the research can be more precise. This questionnaire was designed to extrapolate the main purpose of the research, that is the overall impact the AI chatbots have on the education system of Bangladesh. To identify what factors are pushing the users to use the AI chatbots more and more, a regression model was used, and the answers were collected as binary responses.

Workflow of the study

All the data was cleaned in Microsoft Excel and then analyzed using SPSS 26. Three different methods were used for the analysis.

First, descriptive statistics were used to get a general picture of the sample, things like who uses chatbots and how often. Second, Chi-square tests were used to check if there were any meaningful relationships between chatbot usage and the five variables being tested. Where the number of cases in a cell was too small (below five), Fisher's Exact Test was used instead. Chi-square was the right choice here because all the variables in the hypotheses are categorical. Third, binary logistic regression was used to find out what factors predict whether a student improved academically, since the outcome here was simply yes or no. For usage frequency, ordinal regression was used instead, because the responses followed a set order with more than two levels. Before running this, the Test of Parallel Lines was carried out to confirm that ordinal regression was appropriate. All tests were done at a significance level of 0.05.

There are some potential sources of bias worth acknowledging. Since the survey was voluntary, self-selection bias may mean that participants do not fully represent the wider population. Social desirability bias is also a concern, as students were self-reporting on their own academic improvement and may have been influenced by what they felt they should say. Finally, since all data came from the same questionnaire, common method bias is a possibility. These points are discussed further in the Conclusion.

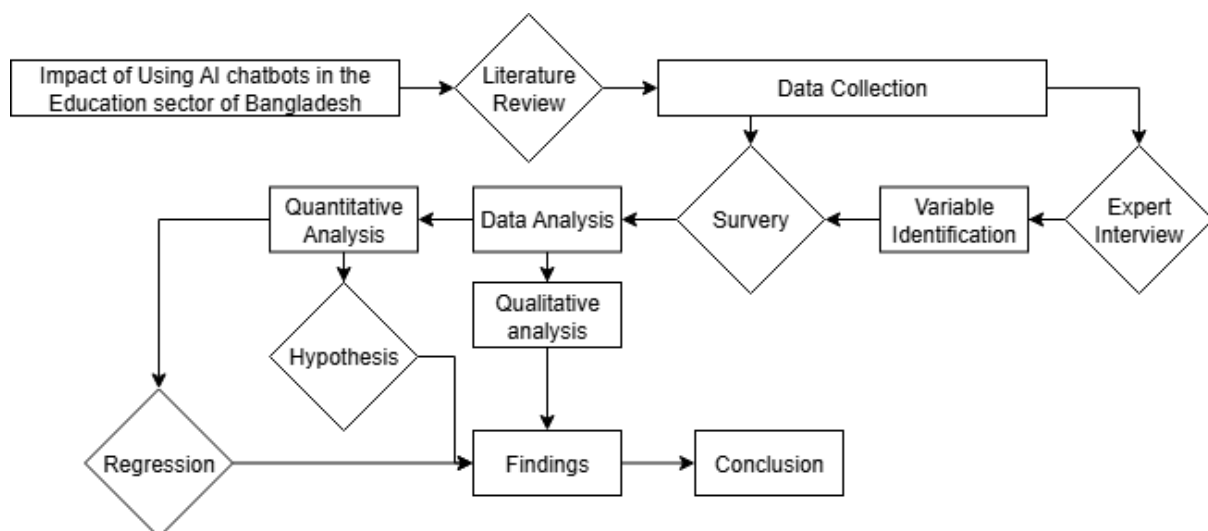


Figure 1: Research workflow of the study

RESULTS AND DISCUSSION

This part of the study analyzes the primary data collected through the questionnaire and interprets it using various types of statistical methods. Out of a total of 306

responses, 9 duplicate data were removed and in total 297 responses were used for the research findings. For some specific findings, like how many students are using AI chatbots for educational purposes, only people who

selected AI chatbots before were used. 275 people out of all the respondents had used some kind of AI chatbots before, which accounts for around 93% of the total respondents.

All the responses were collected through Google forms. Microsoft Excel was used for data cleaning and preparation, and all the statistics were calculated using SPSS 26. The outputs provided in the SPSS 26 were modified slightly for better understanding and representation of the data.

Qualitative Analysis

Majority of the qualitative data gathered for this study was obtained through interviews conducted with students and faculty members from different universities in Bangladesh. The interviewees all agreed that the influence of AI chatbots is very noticeable nowadays and most of the students are using it, and it is expected that the usage will increase even more.

Table 2: Possible reason for using AI Chatbot

Getting Correct Solutions
Ease of getting Informative
Being able to use as a Study Assistant
Ability to learn new skills
Being able to use as a Practice medium
Having a Personalized learning Environment
Being able to use as a 24/7 tutor
Saving time

To assess how many students use AI chatbots and why, interviewees were asked questions about why they use it, what benefits they receive from it, and what challenges they encounter while using it, among other things. All the reasons the interviewees mentioned will be looked at as different factors and used in a detailed quantitative study. In these interviews, Participants all described reasons for using chatbot which were obtaining the correct or informative responses, using it as an academic study helper or a tool for practice before an examination, and having customized learning and on-demand access. These are consistent with existing studies in the general literature on the usefulness of chatbot in higher education ((Adamopoulou & Moussiades, 2020); (Baidoo-anu & Ansah, 2023)).

After defining these motives, they were turned into straightforward questions. And responses to those questions were analyzed again. Interestingly, many students perceived that AI chatbots are assisting their academic achievement and one aspect learned from interviews, many people in Bangladesh perceived negatively of using AI chatbots. They are likely to believe the new technologies require to be really good with computers and gadgets. To identify it, we examined hypotheses of using data collected by questionnaires about how students use AI chatbots and other new technology such as computers and smart phone.

Other than the variable identification, several issues made us curious and possible topics to research also arose. The theme repeatedly mentioned by interviewees was what roles gender plays in learning in Bangladesh in coming future. Many respondents pointed out that female students and those from lower socio-economic status were less likely to use AI chatbots as a learning tool. This is in line with the findings from studies on digital gender divide in South Asia (GSMA, 2022). Faculty members held different opinions. Although they believe in AI chatbot's benefit on students' learning, they also show concerns about academic dishonesty((Lo, 2023); (Adeshola & Adepoju, 2023)).

The socio-economic level in Bangladesh significantly influences individuals' ability to utilize technology, their access to technology, and their ownership of technological products. During the discussions, several individuals noted that the majority of people they know who do not utilize AI chatbots have no personal computers. Additionally, there are numerous other variables that could impact an individual as a result of their socio-economic background. As a result, this was considered a significant problem, and a hypothesis test will be carried out to investigate it more thoroughly.

Another interesting finding from the interviews was that comfort with technology mattered just as much as actually owning a device. Students who said they were not very comfortable using computers also tended to use chatbots less, even if they had access to one. This fits well with what TAM suggests about perceived ease of use being a key factor in whether people adopt a technology (Davis, 1989), and is also supported by research showing that computer self-efficacy plays an important role in whether students take up educational technology tools (Fathema *et al.*, 2015) .

Another noteworthy aspect highlighted in the interviews is that nearly all AI chatbots offer most features for free, with some being completely free of cost. Despite the perceived importance of this factor, no hypothesis regarding this was tested for this study, as interviewees expressed satisfaction with the free versions being sufficient for their needs. Interviewees also mentioned that many people around them who are not accustomed to living in an urban area are less comfortable to use AI chatbots. However, this claim was a bit difficult to assess, as many rural areas nowadays in Bangladesh now have access to modern technology and facilities as well, while some do not. So, it was decided to avoid this topic for now and leave it for future studies.

The interviewees also identified a final reason for the widespread adoption of AI chatbots which was the contribution that AI chatbots could make towards simplifying academic tasks. The interviewees indicated that AI chatbots were capable of assisting them with almost any subject/topic and that detailed and comprehensive answers were accessible provided that care and effort was invested when using the chatbots. Many interviewees also stated that they noticed a grade increase upon using the

chatbot and have consequently found themselves using AI chatbots increasingly. Although the interviewees admitted that the grade increase observed could have a placebo effect to an extent, they identified it as being one of the most significant reasons for the increased use of the AI chatbot recently.

Descriptive Statistics

Before proceeding with further analysis, it's important to check the validity and reliability of the study. This gives us an idea of how accurate and trustworthy the questionnaire's results are. The reliability of the questionnaire was calculated at 0.699. This is an ideal score because it meets the widely accepted threshold, showing that the study's reliability and validity are above the expected standards.

Table 3: Reliability Statistics of Questionnaire

Cronbach's Alpha	N of Items
.699	27

The initial analysis revealed that out of all users surveyed, a total of 275 individuals have used AI chatbots. It represents over 92.6% of the total participants. This remarkable figure is particularly noteworthy given that AI chatbots have been available for just over a year, and is consistent with other similar studies (Lo, 2023).

As found from our interviews and surveys, ChatGPT emerges as the preferred choice among users. Out of the 275 individuals who used any AI chatbot, 265 users reported using ChatGPT. This findings is consistent with ChatGPT's soaring popularity since it's launch (Hetler, 2024). In the second place, Google Gemini, was used by

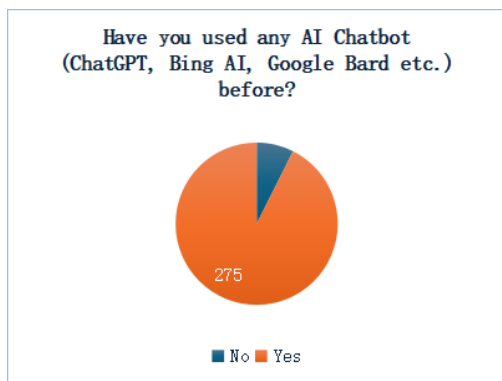


Figure 2: No of Respondents who used AI chatbots before

Looking at the overall percentage of these results, out of 297 respondents, 252 people used AI chatbots at least once for educational purposes alone, which accounts for around 85% of total respondents. However, when we consider people who used AI chatbots before, out of these 275 people, 252 people used AI chatbots for some

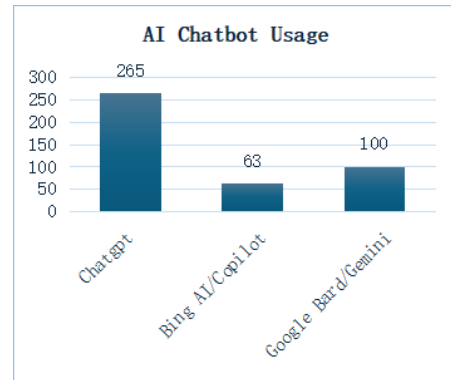


Figure 3: No of respondents who use various chatbots

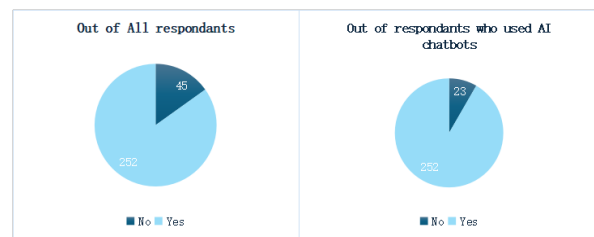


Figure 4: No of People who used Chatbots for educational Purpose

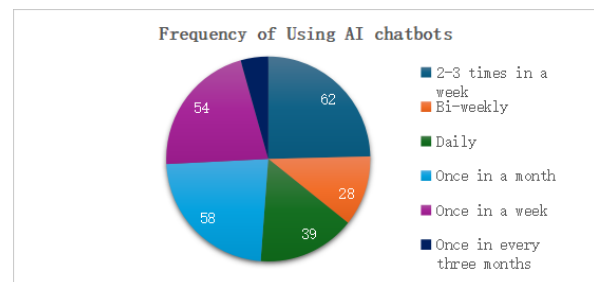


Figure 5: Frequency of Using AI chatbots

sort of Academic purpose (like doing homework or assignments), which accounts a percentage of 92%. Moreover, when examining the frequency of AI chatbot usage solely for educational purposes, particularly during active periods when classes are in session, it becomes evident that many individuals employ them daily. Among the respondents, only a minority opt for using chatbots once every three months, while the majority utilize them more regularly, with the choices evenly distributed.

But when taking a look more closely, by looking at the cumulative percentage, over 61% of the people said that they use AI chatbots at least once a week. This is a surprisingly high usage rate, considering these chatbots are with us for only around a year.

Table 4: Frequency of Using AI chatbots

Usage Frequency	User Number	Percentage of total	Cummulative Percent age
Daily	39	15.48%	15.48%
2-3 times in a week	62	24.60%	40.08%
Once in a week	54	21.43%	61.51%
Bi-weekly	28	11.11%	72.62%
Once in a month	58	23.02%	95.63%
Once in every three months	11	4.37%	100.00%

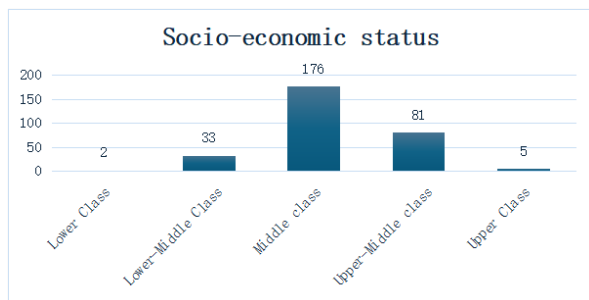


Figure 6: Respondents Socio-Economic Status

Table 5: Frequency of Using AI chatbots

		Do you own any personal Computer/ Laptop?		Total
		No	Yes	
Have you used any AI Chatbot (ChatGPT, Bing AI, Google Bard etc.) before?	No	7	15	22
	Yes	27	248	275
Total	34	263	297	

The table explains the relationship between users owning any personal computer/Laptop and their usage of AI chatbots. The following hypothesis was tested with this crosstab:

Regarding the socio-economic status of the participants, 59% of them identified as middle class, while a combined 29% reported being above middle class. This distribution may appear somewhat skewed, likely due to the convenience sampling method employed. It favoured respondents with internet access and digital device ownership, a characteristic that's more common among higher-income groups. This skew reinforces the importance of the socio-economic hypothesis tested below.

Hypothesis Testing

In hypothesis testing, the crosstabs function of SPSS was employed. This meant generating cross-tabulations between the use of AI chatbots and the variable under examination. Subsequently, the Chi-square test was utilized to assess whether there is significant evidence to reject the null hypothesis. All tests were conducted at the $\alpha = 0.05$ significance level.

To use AI chatbots, a digital device like a computer or a smartphone is necessary, but the computer is more preferred to use the chatbots properly. So, to check if there is any relationship between using AI chatbots and owning a personal computer, a crosstabs were performed.

H_0 : There is no relationship between the use of AI chatbots and owning a Personal computer.

H_A : There is a relationship between the use of AI chatbots and owning a Personal computer.

Table 6: Chi-Square test between Using AI chatbots and Owning personal Computer/Laptop

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	9.726	1	.002
Likelihood Ratio	7.221	1	.007
N of Valid Cases	297		

Null hypothesis is rejected ($\chi^2 = 9.726, p = .002$). Students who own a personal computer are significantly more likely to use AI chatbots. This aligns with TAM's emphasis on access as a precondition for adoption (Davis, 1989) and with research on the digital divide in Bangladesh, which shows that urban populations with higher incomes are far more likely to own personal computers and laptops than their rural counterparts (Rashed *et al.*, 2025; Alam & Hossain, 2025). The result suggests that equitable access to computing hardware remains a structural barrier to AI-

assisted learning in Bangladesh.

Many people might own a personal computer, but they might not be comfortable about using a computer all the time. The opposite can also be true, some people might not own any personal computer, but they are very comfortable with any computer. So, to test this if it is an important factor, another crosstabs was performed between using AI chatbots and being comfortable about using a computer.

Table 7: Crosstabs between Using AI chatbots and comfortability of using a computer

		Are you comfortable about using a computer?		Total
		No	Yes	
Have you used any AI Chatbot (ChatGPT, Bing AI, Google Bard etc.) before?	No	6	16	22
	Yes	19	256	275
Total		25	297	

he following hypothesis was tested with these crosstabs: H_A : There is a relationship between the use of AI chatbots and being comfortable about using a computer.
 H_0 : There is no relationship between the use of AI chatbots and being comfortable about using a computer.

Table 8: Chi-Square test between Using AI chatbots and comfortability of using a computer

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	10.958a	1	.001
Likelihood Ratio	7.590	1	.006
N of Valid Cases	297		

H_0 is rejected ($\chi^2 = 10.958, p = .001$). So, Students who are comfortable using computers are significantly more likely to adopt AI chatbots. This finding extends TAM's perceived ease-of-use dimension to include general digital self-efficacy: even if a student owns a device, discomfort with digital tools can function as an adoption barrier. Research consistently shows that computer self-efficacy is an important indicator of technology adoption in educational settings (Fathema *et al.*, 2015), and that students with greater confidence in their digital skills are

more willing to engage with new technologies (Granić & Marangunić, 2019). Many people might not own a computer or are not comfortable about using one, but most of the people in this day and age own a smartphone. Given that AI chatbots can be accessed from smartphones, another crosstabs analysis was conducted to examine whether smartphone ownership is a significant factor in AI chatbot usage.

Table 9: Crosstabs between Using AI chatbots and Owning a smartphone

		Do you own a smartphone?		Total
		No	Yes	
Have you used any AI Chatbot (ChatGPT, Bing AI, Google Bard etc.) before?	No	1	21	22
	Yes	4	271	275
Total		5	297	

The following hypothesis was tested with crosstabs: and owning a smartphone
 H_0 : There is no relationship between the use of AI chatbots and owning a smartphone. Here, as two cells have value less than 5, we can not use Chi-Square test, we need to use fishers exact test.
 H_A : There is a relationship between the use of AI chatbots

Table 10: Fisher's exact test between Using AI chatbots and Owning smartphone

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.176a	1	.278		
Continuity Correctionb	.050	1	.823		
Likelihood Ratio	.837	1	.360		
Fisher's Exact Test				.321	.321
N of Valid Cases	297				

From Fisher's Exact Test, at 5% level of significance, we cannot reject the null hypothesis. So, it cannot be conclusively said that there is a relationship between using AI chatbots and owning a smartphone. This result needs to be interpreted carefully though. Since the survey was done online, most people who responded likely already owned a smartphone regardless of whether they used chatbots or not. This is visible in the data, where 292 out of 297 respondents owned a smartphone. This kind of ceiling effect would make it very difficult to detect any real relationship. Future research that includes face-to-face surveys, particularly in rural areas, should look at this again with a more varied sample.

From the questionnaire, it was observed that among participants who indicated they did not use any AI chatbots, the majority were female. Additionally, insights from the interviewees suggested that many perceive gender to be a significant factor in AI chatbot usage. Thus, to ascertain whether there is a relationship between AI chatbot usage and gender, the following hypotheses were tested.

H_0 : There is no relationship between the use of AI chatbots and gender in Bangladesh.

H_A : There is a relationship between the use of AI Chatbots and gender in Bangladesh.

H_0 is rejected ($\chi^2 = 4.377, p = .036$). There is a significant

Table 11: Crosstabs between using AI chatbots and Respondents Gender

		Gender		Total
		Female	Male	
Have you used any AI Chatbot (ChatGPT, Bing AI, Google Bard etc.) before?	No	14	8	22
	Yes	112	163	275
Total		126	297	

Table 12: Chi-square test between Using AI chatbots and Gender

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	4.377a	1	.036
Likelihood Ratio	4.326	1	.038
N of Valid Cases	297		

relationship between gender and AI chatbot usage, with female students being less likely to use chatbots. Out of the 22 people who had never used a chatbot, 14 were female and 8 were male. This is quite striking because, as previously mentioned, female respondents represented 42.4% of all participants in the study. Such a finding is in line with other studies investigating digital gender divides in South Asia, where it was established that females were far less likely than men to have access to or to use mobile internet services and other digital resources (GSMA, 2022). In Bangladesh, there is still considerable resistance from social norms in regard to females' use of

technology and this is a key issue of equity. If institutions then proceed to integrate AI chatbots into their teaching methods without bridging such gap, male-female students' learning and abilities are only bound to further diverge.

The issue of socio-economic status also played a key role in the course of the interviews as emphasized by interviewees. In order to pursue this, a hypothesis test was required. This test aimed to investigate any potential correlation between the socio-economic status of the students and their utilization of AI chatbots for educational purposes.

Table 13: Crosstabs between using AI chatbots and Respondents socio Economic status

		What is your socio-economic status?			Total
		Lower Class	Middle class	Upper Class	
Have you used any AI Chatbot (ChatGPT, Bing AI, Google Bard etc.) before?	No	1	11	10	22
	Yes	34	165	76	275
Total		35	176	297	

The above table shows the relationship between the Socio-Economic status of the respondents and their usage of AI chatbots. The following Hypothesis was tested:
 H_0 : There is no relationship between the use of AI

Chatbots and socio-economic status in Bangladesh.

H_A : There is a relationship between the use of AI Chatbots and socio-economic status in Bangladesh.

Table 14: Chi-square test between Using AI chatbots and respondents' socio-economic status.

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	3.634a	1	.163
Likelihood Ratio	4.646	1	.162
N of Valid Cases	297		

Here, H_0 cannot be rejected ($\chi^2 = 3.634, p = .162$). The data do not show a statistically significant relationship between socio-economic status and AI chatbot usage. However, this result should be interpreted carefully. Here, Lower-class respondents were significantly underrepresented in the sample, with only 35 out of 297. This means the data simply did not have enough socio-economic range to detect a real pattern about Bangladesh digital divide (Rashed *et al.*, 2025; Alam & Hossain, 2025). Future studies with a more representative sample, including lower-income and rural populations,

should test this hypothesis again

Regression

Binomial Logistic Regression

Binary logistic regression was used to identify which factors predicted whether students perceived an improvement in their academic results after using AI chatbots. Before running the regression, all the data were modified. "Yes" responses were replaced with 2, and "No"

Table 14: Classification Table

	Observed	Predicted		Percentage Correct
		Do you believe your academic results improved after using AI chatbots?		
		1	2	
Step 1	Do you believe your academic results improved after using AI chatbots?	79	37	68.1
		34	98	74.2
	Overall Percentage			71.4

responses were replaced with 1.

Four factors emerged as statistically significant predictors of perceived academic improvement ($p < .05$), as shown in Table 16. First, students who believed AI chatbots could provide correct answers were 3.103 times more

likely to report academic improvement ($OR = 3.103, p = .005$). This result is aligned with the perceived usefulness component of TAM. It is also consistent with the outputs of article about AI chatbots is the most significant factor influencing students' satisfaction using ChatGPT in

Table 15: Logistic Regression (Variables in the Equation)

	B	S.E.	Wald	df	Sig.	Exp(B)
Do you believe AI chatbots can always provide you correct solutions to your homework/Assignments?(1)	1.132	.401	7.977	1	.005	3.103
Do you always verify the information provided by the AI chatbots?(1)	.629	.371	2.878	1	.090	1.876
Do you modify the responses generated by AI chatbots before using it?(1)	.368	.576	.410	1	.522	1.446
Do you believe AI chatbots to be a good study assistant for you?(eg. You are trying to learn a new topic using chatgpt, for example understanding Capitalism)(1)	1.759	.660	7.102	1	.008	5.808
Do you use AI chatbot to learn any new skill?(eg. You are using ChatGPT to learn how to cook a particular menu or learning to do coding)(1)	.463	.314	2.174	1	.140	1.589
Do you use an AI chatbot to practice before an exam?(1)	.949	.317	8.990	1	.003	2.584
Do you believe AI chatbot give a personalized learning environment?(eg. ChatGPT is giving you the answer based on your set of criteria, for example you ask ChatGPT to explain something to you very slowly)(1)	-.149	.388	.147	1	.701	.862
Do you use AI chatbots as your mentor and teacher's are not available 24/7?(1)	.826	.311	7.048	1	.008	2.284

Do you believe AI chatbots save your time?(1)	2.236	1.206	3.437	1	.064	9.354
Do You think when your Academic performance is judged, your course teacher will penalize you for using AI chatbots?(1)	.134	.315	.181	1	.671	1.143
Constant	-5.819	1.511	14.826	1	.000	.003

higher education (Yu *et al.*, 2024).

Secondly, the use of chatbots as a study assistant is 5.808 times more likely to improve students' learning outcomes (OR = 5.808, $p = .008$). It is the variable that is the most strong predictor in the model. This result is consistent with the study of Hien *et al.* (2018) which showed that assistance with chatbot lead to increases in course enrollment (Baidoo-anu & Ansah, 2023). And there is empirical evidence that the use of ChatGPT has the potential to enhance students learning outcomes as a personalized learning tool (Cayetano *et al.*, 2025).

Thirdly, students who practiced before examinations by using chatbots are 2.584 times more likely to experience improvement (OR = 2.584, $p = .003$). Students might experience more concrete and noticeable gains with exam preparation as it directly relates to learning outcome. Finally, students who were aware of the 24/7 availability of the chatbots and use them as a support tutor have 2.284 times higher likelihood of experiencing academic gain (OR = 2.284, $p = .008$). Assistance available 24/7 could be particularly relevant for institutions with higher teacher-student ratio and low individual teacher

attention, as it is commonly encountered in the context of Bangladeshi universities.

Remarkably, cost-free access, time saving and fear of teacher punishment as variables were not significant predictors of academic gain ($p > .05$). These variables may therefore play a role in why students are likely to use chatbots, but may not be as significant predictors as to whether or not a student experiences an academic benefit from doing so.

Ordinal Regression

To understand to what extent AI chatbots are being used and what are the reasons for the increasing use of AI chatbots, another regression was performed, using a ordinal regression. In this analysis, the frequency of using AI chatbots served as the dependent variable, while several categorical variables were considered as factors to uncover what influences the frequent use of AI chatbots. The proportional odds assumption was first confirmed via the Test of Parallel Lines ($\chi^2 = 59.636$, $df = 52$, $p = .218$), meaning ordinal regression is appropriate. If this assumption had been violated, multinomial regression

Table 17: Test of Parallel Lines

Test of Parallel Linesa				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	634.255			
General	574.619	59.636	52	.218

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

would have been required instead.

From Appendix A, it can be observed that five factors are vital here that are important toward using the AI chatbot more frequently. These factors are students' assumption of: (1) AI chatbots making academics easier ($p = .030$), (2) providing correct answers ($p = .037$), (3) ability to practice before exam ($p = .022$), (4) not needing any payment to use them ($p = .000$), (5) improved academic result ($p = .045$).

These findings suggest that if the motivations are outcome oriented, it can drive sustained and frequent use. Students who experience tangible academic benefits are more likely to integrate chatbots regularly into their routines. This is consistent with research showing that perceived usefulness drives sustained and frequent technology adoption among students (Yu *et al.*, 2024; Fathema *et al.*, 2015). The cost-free factor is particularly noteworthy: students who would stop using chatbots if they became paid services showed significantly lower

usage frequency (coefficient = -1.150, $p = .000$). This highlights the precarious dependence of adoption on free access. It shows if leading providers shift to subscription-only models, adoption rates among Bangladeshi students could decline substantially.

In essence, as students witness tangible benefits such as better grades and increased confidence in their studies due to the assistance provided by AI chatbots, they are likely to integrate these more frequently into their learning routines, thereby potentially solidifying their role in modern education."

CONCLUSION

This study examined AI chatbot adoption and academic impact among 297 university students in Bangladesh using a mixed methods approach. Over 92% of respondents had used a chatbot, with more than 61% doing so at least weekly. ChatGPT was the most popular, followed by Google Gemini and Bing AI. Significant relationships

were found between chatbot usage and computer ownership, comfort with computers, and gender, but not smartphone ownership. Getting correct answers, using chatbots as study assistants, practising before exams, and 24/7 availability were significant predictors of both academic improvement and usage frequency, along with cost-free access.

The study contributes to the educational technology literature in developing country contexts by validating TAM constructs in a Bangladeshi setting and extending the model to include structural access barriers such as device ownership, digital literacy, gender, and cost sensitivity. For administrators, the findings highlight the need for clear policies on acceptable use and academic integrity. For policymakers, subsidised device access and digital literacy programmes for female and lower-income students are recommended. For educators, embedding chatbots into structured tasks like exam preparation is likely to yield the strongest academic benefits. Future research should include rural and lower-income participants and adopt longitudinal designs.

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Appendix

Appendix A

Table 1: Ordinal Regression(Parameter Estimates)

	B	S.E.	Wald	df	Sig.
[HowoftendoyouuseAIchatbots = 1]	-4.877	.953	26.183	1	.000
[HowoftendoyouuseAIchatbots = 2]	-2.630	.894	8.661	1	.003
[HowoftendoyouuseAIchatbots = 3]	-2.037	.889	5.247	1	.022
[HowoftendoyouuseAIchatbots = 4]	-1.076	.884	1.483	1	.223
[HowoftendoyouuseAIchatbots = 5]	.570	.880	.419	1	.517
[DoyouthinkAIChatbotsaremakingyouracademicseasier=1]	-1.183	.546	4.693	1	.030
[DoyouthinkAIChatbotsaremakingyouracademicseasier=2]	0a	.	.	0	.
[DoyoubelieveAIchatbotscanalwaysprovideyoucorrectsolutionstoyourh=1]	-.616	.296	4.336	1	.037
[DoyoubelieveAIchatbotscanalwaysprovideyoucorrectsolutionstoyourh=2]	0a	.	.	0	.
[DoyoualwaysverifytheinformationprovidedbytheAIchatbots=1]	-.503	.289	3.036	1	.081
[DoyoualwaysverifytheinformationprovidedbytheAIchatbots=2]	0a	.	.	0	.
[DoyoumodifytheresponsesgeneratedbyAIchatbotsbeforeusingit=1]	.533	.440	1.470	1	.225
[DoyoumodifytheresponsesgeneratedbyAIchatbotsbeforeusingit=2]	0a	.	.	0	.

[DoyoubelieveAIchatbotstobeagoodstudyassistantforyoueg.Youaretryi=1]	.372	.419	.788	1	.375
[DoyoubelieveAIchatbotstobeagoodstudyassistantforyoueg.Youaretryi=2]	0a	.	.	0	.
[DoyouseAIchatbottolearnanynewskilleg.YouareusingChatGPTtolearnh=1]	.193	.249	.601	1	.438
[DoyouseAIchatbottolearnanynewskilleg.YouareusingChatGPTtolearnh=2]	0a	.	.	0	.
[DoyouseanAIchatbottopracticebeforeanexam=1]	.594	.259	5.237	1	.022
[DoyouseanAIchatbottopracticebeforeanexam=2]	0a	.	.	0	.
[DoyoubelieveAIchatbotgivepersonalizedlearningenvironmenteg.Chat=1]	-.050	.300	.028	1	.866
[DoyoubelieveAIchatbotgivepersonalizedlearningenvironmenteg.Chat=2]	0a	.	.	0	.
[DoyouseAIchatbotsasyourmentorandteacher'sare1tavailable247=1]	.411	.259	2.522	1	.112
[DoyouseAIchatbotsasyourmentorandteacher'sare1tavailable247=2]	0a	.	.	0	.
[DoyoubelieveAIchatbotssaveyourtime=1]	-.861	.606	2.020	1	.155
[DoyoubelieveAIchatbotssaveyourtime=2]	0a	.	.	0	.
[WillyouseAIchatbotsifitispaid=1]	-1.150	.283	16.570	1	.000
[WillyouseAIchatbotsifitispaid=2]	0a	.	.	0	.
[DoyoubelieveyouracademicresultsimprovedafterusingAIchatbots=1]	-.535	.267	4.009	1	.045
[DoyoubelieveyouracademicresultsimprovedafterusingAIchatbots=2]	0a	.	.	0	.
[DoYouthinkwhenyourAcademicperformanceisjudgedyourcourseteacherwi=1]	-.065	.243	.073	1	.787
[DoYouthinkwhenyourAcademicperformanceisjudgedyourcourseteacherwi=2]	0a	.	.	0	.

Appendix B

Semi Structured Interview Questions:

1. Do you know about AI chatbots?
2. What AI chatbots are you familiar with?
3. How often do you use AI chatbots?
4. Why do you use AI chatbots? What might be the important factors?
5. Do you think your classmates use AI chatbots as the same reason as you?
6. Did you notice anything regarding people who do not use AI chatbots?
7. Do you think having technological literacy, or owning technological devices are important driving factors associated with AI chatbots?
8. Where is your hometown? Do you believe that the area where you grew up is an important factor behind your usage of AI chatbots?
9. Would you recommend others to use AI chatbots?
10. Do you face any backlash from your faculties after using AI chatbots?
11. Do you have any particular observation regarding usage of AI chatbots?