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Examining the Role of Artificial Intelligence Chatbots in Enhancing University Students' Interpersonal Skills and Academic Performance

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ABSTRACT

This study explains how AI-powered chatbots can help university students in Pakistan improve their academic performance and social skills. It is set in a time when AI is changing the way schools work. A cross-sectional poll included 300 undergraduate students from a variety of socioeconomic backgrounds (57.3% male and 42.7% female). We employed standardized self-report instruments such as the Chatbot Engagement Scale, the Academic Self-Perception Subscale of the Student Adaptation to College Questionnaire, and the Interpersonal Competence Questionnaire. The results showed that pupils who used chatbots a lot did much better in school and improved their social skills more than students who didn't use chatbots as much. There were no significant differences in academic achievement based on gender, but there were differences in how women and men interacted with one another, showing that cultural differences affect how chatbots help people express themselves and develop socially. Moderate favorable relationships were found between using chatbots, doing well in school, and growing as a person. These results support the use of AI chatbots as teaching tools that help with cognitive tasks and promote social and emotional growth, especially in situations when traditional classroom participation is limited by culture or logistics. We talk about what this means for Pakistani colleges' policies on AI literacy, ethical use, and policy frameworks.

Introduction

In the last few years, artificial intelligence (AI) has grown so quickly that it has changed the way we learn in ways that would have seemed like science fiction a decade ago. AI-powered chatbots are one of the most popular new technologies. They are interactive, conversational agents that are meant to mimic human communication and help users with a wide range of activities. Their first uses were in customer service and information retrieval, but more people are interested in how they may be used in higher education. Universities all over the world are starting to investigate

these tools not just as automated helpers for administrative questions, but also as possible ways to help students grow mentally, academically, and socially (Winkler & Söllner, 2018).

People are becoming increasingly interested in how AI chatbots might help university students improve their social skills and grades. This is an interesting and exciting convergence since it goes against the common belief that technology and human connection are at odds. Some researchers, on the other hand, say that well-designed chatbots can make communication and learning more inclusive, personalized, and low-pressure, especially for students who feel anxious or shy in traditional academic settings (Fadhil, 2018; Hill et al., 2015). It's important to understand how chatbots may affect both interpersonal skills and academic achievement, since both are important signs of well-rounded growth in higher education.

This work aims to explore how AI chatbots are being used in universities right now and how much they might help students improve their social skills and grades. It tries to fill a gap in the literature by combining the few but quickly growing pieces of evidence and looking at chatbots not just as tools for learning or doing things, but also as things that can affect people's social and emotional lives.

AI Chatbots in Higher Education

Natural language processing and machine learning have made chatbots more useful in university settings, where they can be used as virtual teaching assistants, mental health companions, and writing coaches (Zawacki-Richter et al., 2019). They are available 24/7, may be changed, and can be personalized based on data, which gives teachers new tools to use. Goel and Polepeddi's (2016) now-famous virtual teaching assistant "Jill Watson" showed how a chatbot could answer student queries in online forums as well as or better than human TAs, while also making the instructors' jobs easier.

Studies have shown that chatbots can help students do better in school by giving them quick feedback, practice tests, and explanations of difficult ideas (Chocarro et al., 2021). Their ability to give learning support when it's needed may be especially helpful in big classes or online courses that don't meet in real time, where students can't talk to teachers one-on-one. Adaptive chatbots can also adapt to each student's learning style and pace, which could help them remember more and be happier with their education (Wollny et al., 2021).

Chatbots and Interpersonal Skills Development

There has been more research on how chatbots can help with schoolwork, but not much on how they can help people build their social skills. Active listening, empathy, collaborative communication, and conflict resolution are all important interpersonal skills for working with others, getting along with peers, and getting a job in the future. It's hard to say if and how AI chatbots could help people develop these "soft" talents, especially because they aren't human. Some studies say that chatbots, especially ones that can respond in an emotionally intelligent way, can be a safe and non-judgmental place to practice social skills (Følstad & Brandtzaeg, 2017; Sirmond, 2025). Some people say that learning through chatbots can help people think about things, express themselves, and even feel empathy, especially when they are used in group projects or peer feedback activities (Kukulska-Hulme et al., 2021). Chatbots like Woebot have shown promise in helping students control their emotions and be more mindful of other people in counseling and well-being settings (Fitzpatrick et al., 2017). But some don't believe it. Some researchers warn against overestimating chatbots' ability to engage with people in a real way, saying that this could lead to shallow or scripted conversations (Jones, 2020). There are also

worries about data privacy, relying too much on technology, and the possibility of relationships between people breaking down in schools.

Gaps and the Need for an Integrated Approach

What hasn't been studied enough is how using chatbots affects both academic and social outcomes at the same time. A lot of studies just look at one or the other, and they often do so in separate ways. Also, not many people have studied cultural and situational aspects that could affect how students use chatbots. For example, how introverted students, international students, or people from cultures with a high power distance view and use these technologies. This article tries to fill in these gaps by looking at how chatbots are used from both a cognitive and a social point of view, giving a more complex picture of their function in higher education.

Theoretical Significance

This study adds to the growing body of research that combines educational psychology, human-computer interaction, and digital pedagogy. There is a lot of new research on AI chatbots in education, but most of it is still focused on how well they work or how well they deliver content. This paper wants to push the limits by not only seeing chatbots as teaching aids, but also as social and educational agents that can affect how students establish their relationships with others. In this way, it makes a new connection between artificial intelligence and the development of soft skills, which is an area that has always been thought to be out of reach for machine-mediated education.

The study starts a conversation about how digital agents could help shape emotional intelligence and teamwork by looking at how students feel when they talk to chatbots, like if they feel heard, validated, or encouraged. In theory, this goes against reductionist theories that only see learning as cognitive and instead calls for a more holistic approach that includes the social and emotional aspects of education. It also draws on socio-constructivist ideas, saying that AI tools can be useful parts of students' learning environments if they are developed with care. They won't replace human connections, but they will make them better.

In addition, the study adds to the body of research on student involvement and digital transformation in higher education by giving us a new way to look at how new technologies affect people's mental health. It pushes researchers to look beyond measures based on usefulness and think about outcomes that are complete and more centered on people.

Practical Significance

This study is useful for teachers, university administrators, instructional designers, and even people who make educational technology. As schools all around the world spend a lot of money on AI infrastructure to make student support more personal and scalable, this study shows how chatbots may be used not only to help students do better in school, but also to help them communicate better, be more empathetic, and work better with others. For instance, universities may deploy emotionally intelligent chatbots to create social situations that are like those in real life. This would help students, especially those who are socially anxious or don't have many chances to connect with others in person, feel more confident in their social interactions. Chatbots could also help students think about ethical problems, have introspective conversations, or help them work through conflicts in group projects. All these things help people grow as individuals.

Additionally, the findings may guide developers in designing chatbots that are not just responsive and intelligent but also socially attuned and culturally sensitive. Educational policies might also benefit, particularly when deciding how to balance human and machine interactions in hybrid or

fully digital learning environments. Ultimately, this study has the potential to inform a more thoughtful, inclusive, and ethically grounded integration of AI in higher education, one that prioritizes not only what students learn but also how they connect, relate, and grow in the process.

Methodology

Objectives

- Examine differences in academic performance between university students based on AI chatbot usage.
- Investigate the impact of AI chatbot usage on students' interpersonal (social) skills.

Hypotheses

1. There is a significant positive correlation between chatbot usage, academic performance, and interpersonal skills among university students.
2. AI chatbot usage enhances academic performance among university students.
3. AI chatbot interaction positively influences interpersonal skill development in university students.
4. The impact of chatbot usage on academic and interpersonal outcomes varies based on gender among university students.

Research Design and Sampling Technique

A correlational research design and convenience sampling technique were used in the study. The sample consisted of 300 university students enrolled in various departments and semesters at the University of Malakand of Khyber Pakhtunkhwa (KP), Pakistan. The age of participants ranged between 18 and 25 years.

Instruments

Chatbot Usability Questionnaire (CUQ) was developed by Radziwill and Benton (2017). The CUQ was used to assess participants' perceptions of chatbot usability, engagement, conversational efficiency, and satisfaction. It comprises 16 items rated on a 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Odd-numbered items reflect positive aspects of chatbot use, while even-numbered items capture negative experiences. The scale has demonstrated good internal reliability ($\alpha = .87$).

Social Skills Inventory (SSI), developed by Riggio (1986), was used to assess social competence. This version was adapted from the Novotni Social Skills Checklist and measures domains such as basic manners, verbal and nonverbal communication, self-care, self-control, communication obstacles, and relationship skills. Each item is scored on a 3-point scale (0 = Not a Problem, 1 = Sometimes a Problem, 2 = Definitely a Problem), with higher scores indicating more difficulty in social interactions. The SSI has shown excellent internal consistency ($\alpha = .94$) and strong content validity.

***Academic Performance Scale (APS*)** was assessed using the APS developed by Birchmeier et al. (2022) at Saginaw Valley State University. This 8-item scale uses a 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree) and evaluates aspects such as motivation, attention, task completion, and academic preparedness. Total scores range from 8 to 40, categorizing students into five performance levels: Failing (0–8), Poor (9–16), Moderate (17–24),

Good (25–32), and Excellent (33–40). The APS has demonstrated strong psychometric properties (α = .89; test-retest reliability = .85).

Procedure

Before data collection, ethical approval was received from the relevant department. Informed consent was obtained from all participants, who were briefed on the study's objectives, emphasizing that participation was voluntary and anonymous. Students were reassured there were no right or wrong answers, and their honest responses were encouraged. Questionnaires were distributed in person and included a cover page with demographic questions (e.g., age, gender, marital status, socioeconomic status, semester). The data collection process was smooth and free from disruptions. No participant reported discomfort or confusion during the survey. All responses were collected and stored securely for analysis.

Ethical Considerations

The study adhered to the ethical principles of research involving human subjects. Participants were fully informed of the purpose, procedures, and voluntary nature of the study. Confidentiality was maintained throughout, and identifying information was not required. All participants were treated with respect, and care was taken to ensure that no harm, discomfort, or deception occurred at any point during the research process.

Results

Table 1: ***Demographic Variables and Descriptive Statistics of the Sample (N = 300)***

Variable		*n*	*% / M*	*SD*
Gender	Male	172	57.3%	
	Female	128	42.7%	
Age	18–22	148	49.3%	
	23–25	152	50.7%	
Marital Status	Single	228	76.0%	
	Engaged	48	16.0%	
	Married	24	8.0%	
Socioeconomic Status	Low	24	8.0%	
	Middle	221	83.7%	
	High	25	8.3%	
Academic Performance	(Mean Score)		3.67	0.54
Interpersonal Skills	(Mean Score)		3.81	0.48

Table 1 provides a comprehensive view of the sample's demographic profile alongside key performance outcomes. A total of 300 undergraduate students from various universities in Pakistan participated in the study. The sample consisted of 172 males (57.3%) and 128 females (42.7%). Participants were almost evenly distributed across two age groups, with 49.3% (n = 148) between 18 and 22 years of age, and 50.7% (n = 152) between 23 and 25 years. All respondents were currently enrolled in undergraduate programs. In terms of marital status, most of the participants were single (76.0%), while 16.0% reported being engaged and 8.0% were married. Socioeconomic status (SES) distribution indicated that the bulk of the sample identified as middle class (83.7%), followed by high (8.3%) and low SES (8.0%). The mean score for academic performance (as measured by self-reported GPA and perceived improvement in study habits) was $M = 3.67$, $SD = 0.54$. For interpersonal skills—assessed using a standardized self-report scale measuring

communication, empathy, and conflict resolution, the mean score was $M = 3.81$, $SD = 0.48$, suggesting generally positive outcomes among frequent chatbot users.

Table 2: ***Pearson Correlation Matrix Between Chatbot Usage, Academic Performance, and Interpersonal Skills (N = 300)***

Variable	1	2	3
1. Chatbot Usage	-		
2. Academic Performance	.41**	-	
3. Interpersonal Skills	.37**	.46**	-

Note: $p < .05$, $p < .01$*

The correlation matrix reveals moderate, statistically significant positive relationships among all three variables. Chatbot usage is positively correlated with academic performance ($r = .41$, $p < .01$) and interpersonal skills ($r = .37$, $p < .01$). Additionally, academic performance and interpersonal skills are strongly correlated ($r = .46$, $p < .01$), suggesting that students who perform well academically also tend to report stronger interpersonal competencies. This is particularly meaningful in the Pakistani context, where large classrooms and limited access to faculty often restrict personalized support. Chatbots may offer an accessible bridge for both learning and human skills development.

Table 3a: ***Independent Samples t-test for Chatbot Usage and Academic Performance (N = 300)***

Group	*n*	*M*	*SD*	*t*	*df*	*p*	Cohen's *d*
High Usage	160	3.79	0.47				
Low Usage	140	3.53	0.58	3.82	298	< .001	0.51

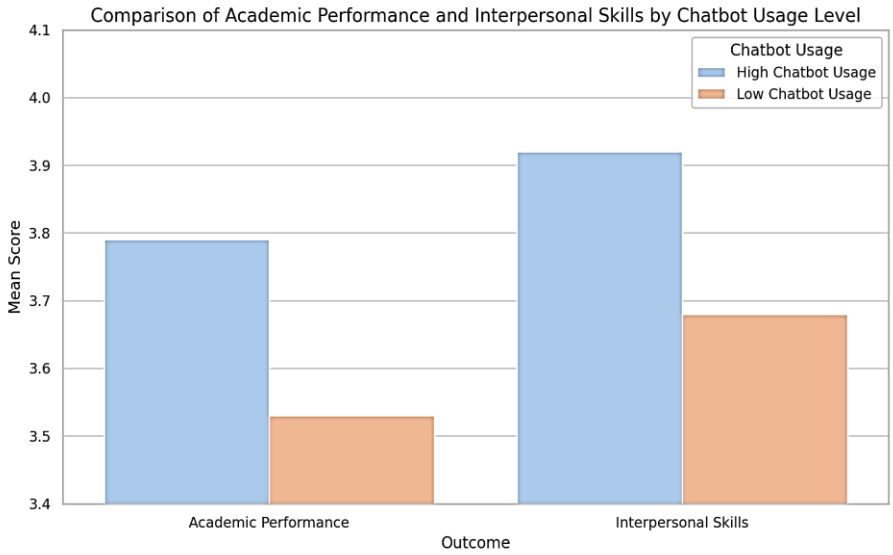
Students who frequently used AI chatbots demonstrated significantly higher academic performance than those with low usage. The medium effect size (Cohen's $d = 0.51$) indicates a meaningful difference, underscoring the potential of chatbot integration in academic support systems in Pakistani higher education. An independent samples t-test was conducted to compare academic performance between students who reported high chatbot engagement ($n = 160$) and those with low engagement ($n = 140$). Results showed a statistically significant difference in academic performance scores: $t(298) = 3.82$, $p < .001$.

Table 3b: ***Independent Samples t-test for Chatbot Usage and Interpersonal Skills (N = 300)***

Group	*n*	*M*	*SD*	*t*	*df*	*p*	Cohen's *d*
High Usage	160	3.92	0.44				
Low Usage	140	3.68	0.50	2.94	298	.004	0.44

Table 3b indicates the t-test comparing interpersonal skill scores between high and low chatbot users. The results revealed a significant difference: $t(298) = 2.94$, $p = .004$, indicating that frequent interaction with AI chatbots was associated with higher interpersonal skill development. While the effect size is slightly smaller ($d = 0.44$), the result still indicates a moderate and meaningful benefit, suggesting that chatbot interaction may foster social-emotional competencies, particularly useful in culturally reserved academic environments like Pakistan.

Figure 1. **Comparison of academic performance and interpersonal skills between students with high and low chatbot usage.**



This bar chart illustrates the comparison of academic performance and interpersonal skills between students with high and low chatbot usage. Students with higher chatbot usage reported noticeably better outcomes in both areas. The difference is more pronounced in interpersonal skills, which aligns with your gender interaction finding.

Table 4a: ***Two-Way ANOVA: Interaction of Chatbot Usage and Gender on Academic Performance***

Source	***SS***	***df***	***MS***	***F***	***p***
Chatbot Usage	6.18	1	6.18	21.14	< .001
Gender	1.02	1	1.02	3.49	.063
Chatbot Usage × Gender	0.50	1	0.50	1.72	.191
Error	86.51	296	0.29		
Total	94.21	299			

Table 4b: ***Two-Way ANOVA: Interaction of Chatbot Usage and Gender on Interpersonal Skills***

Source	***SS***	***df***	***MS***	***F***	***p***	***η²***
Chatbot Usage	4.68	1	4.68	20.36	< .001	.064
Gender	1.38	1	1.38	6.01	.015	.020
Chatbot Usage × Gender	1.00	1	1.00	4.36	.038	.015
Error	68.00	296	0.23			
Total	75.06	299				

A two-way ANOVA was conducted to examine the interaction effect of chatbot usage level (high vs. low) and gender (male vs. female) on academic performance and interpersonal skills. For academic performance, the interaction was not statistically significant, $F(1, 296) = 1.72$, $p = .191$, suggesting that gender did not moderate the relationship between chatbot usage and academic performance. However, for interpersonal skills, a significant interaction effect was found $F(1, 296) = 4.36$, $p = .038$, $\eta^2 = .015$. Post-hoc analysis indicated that female students who frequently used

chatbots reported greater improvements in interpersonal competencies compared to their male counterparts, suggesting a gendered pattern in social-emotional engagement with AI tools.

Discussion

The results of this study suggest a compelling shift in how undergraduate students in Pakistan are engaging with artificial intelligence (AI), particularly chatbots, in both academic and interpersonal domains. Students who frequently used AI chatbots like ChatGPT reported significantly better academic performance and interpersonal skills, providing support for all four of the proposed hypotheses.

The significant difference in academic performance between high and low chatbot users reinforces the study's assumption. This echoes findings by Ashraf et al. (2025), who observed that Pakistani university students employing ChatGPT experienced notable academic improvement, driven by enhanced persistence and enjoyment in study tasks. Similarly, Tanveer et al. (2024) demonstrated that chatbot engagement significantly predicted improvements in academic self-efficacy and self-regulated learning among Islamabad-based students. In Pakistan's high-density lecture halls, where real-time feedback is often limited, the immediacy of chatbots helps bridge informational gaps, encouraging active learning. However, emerging global concerns warn of AI's potential to weaken critical thinking when used uncritically (Chukwuere, 2024; Mhlanga, 2023). This suggests that Pakistani educators must embed chatbots within pedagogical frameworks that prioritize reflective thinking rather than rote dependency.

The correlation analysis confirmed the correlational hypothesis, showing moderate positive associations between chatbot usage and both academic performance ($r = .41$) and interpersonal skills ($r = .37$); academic performance and interpersonal skills correlated at $r = .46$. These relationships suggest that cognitive and social-emotional learning processes are interconnected, not separate tracks. This is consistent with broader literature advocating for AI tools to bolster holistic educational outcomes (Malik, 2025; Chukwuere, 2024)

Study data supported hypothesis 3; high chatbot users scored higher on interpersonal skills. Saifuddin (2025) similarly found that Chatbot Utility and emotional-social competencies together predict perceived teacher support, mediating positive academic outcomes among Karachi students. In a collectivist society where face-to-face expression can be intimidating, especially for females, chatbots may offer a neutral, judgment-free space for practicing empathy, negotiation, and reflective dialogue (Balqees et al., 2024).

Although Hypothesis 4 found no significant interaction between chatbot usage and gender in academic performance, a significant interaction emerged for interpersonal skills. Female students experienced greater gains in social-emotional domains, likely because chatbots circumvent cultural limitations that often silence them in direct classroom interactions (Shahzadi et al., 2025).

Pakistan's Presidential Initiative for AI and Computing (PIAIC) seeks to propel AI literacy and competence across the higher education landscape. Integrating chatbots into student support systems could operationalize this goal by embedding AI tools into daily learning practices, not merely teaching AI theory but using AI interactively to cultivate self-regulation, ethical awareness, and digital fluency (Rafi & Junaid, 2025). Such integration reflects UNESCO's call for AI education to foreground human agency and critical thinking over passive consumption. Still, obstacles remain. Rural and low-SES students in Pakistan often lack stable internet or devices, raising concerns about widening educational inequities (Shahzadi et al., 2025). Moreover, research

by Ashraf et al. (2025) and related studies highlight potential misuse, such as plagiarism or overuse of AI for unsubstantiated tasks, underscoring the need for robust academic integrity guidelines.

Limitations and Future Directions

This study uses cross-sectional, self-reported data, which limits the capacity to make strong causal assertions and opens the door to social desirability bias. Future studies should use experimental or longitudinal methods, including measurements of behavioral outcomes, and sample people from a wider range of rural and multilingual contexts. Qualitative research looking at how students feel about interacting with chatbots, especially women in conservative schools, could help us understand how perceived humanness or trust in an agent affects learning and social confidence.

Conclusion

This study agrees with and adds to the existing literature on Pakistan by indicating that AI chatbots are useful for both academics and socializing among Pakistani college students. Chatbots can help human tutors, provide more welcoming learning environments, and promote AI literacy when they are carefully used with ethical supervision, critical pedagogy, and equal access. With the right kind of reflection, this journey can help make college classrooms in Pakistan more engaging, confident, and conscious of societal issues.

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