Research Article

Examining the Challenges and Opportunities of Integrating Chatbots into Educational Settings

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ARTICLE INFO	ABSTRACT
	The chatbot usage has been extended to multiple fields to resolve the queries of customers and provide service all the time. These chatbots are equipped with tools to replicate the services exactly like humans with anthropomorphism. The current study was designed by adopting the TAM model to understand the students' perception of utilizing chatbots in their education life. The chatbot services are evaluated via anthropomorphism and conversation quality, as a mediator of students' perceived ease of use and perceived usefulness. The study has utilised quantitative data collected from college and university students in the Punjab region from the selected colleges and universities a total of 722 responses have been received. The quantitative study results indicate significant results except for students' perceived usefulness, no conclusive results were found regarding the continuous use of chatbots in their education life and future studies are needed to guide this research based on students' engagement and students suggestions for improvement. **Keywords:** Chatbot, Education, Ease of use, Percieved Usefulness, Usage Intention

Introduction:

Social interaction and rapport between teachers enhanced student learning and students have been showing positive vides with education research (Dorbransky & Frymier, 2004). The current classroom settings, student guidance modelling system and teacher interaction with students have taken a huge leap ultimately focusing on student learning outcomes. Additionally, there has been a recent increase in students, self-paced learning. Where the student focus has been shifted to online learning options like Coursera, Udemy, and Udacity, which have grown its popularity, due to their ability to support different learning speeds and styles (Okonkwo & Ade-Ibijola, 2021). Furthermore, modern society is constantly evolving, with technological advancement and the COVID-19 crisis having highlighted the need for change in the way the teaching-learning process is designed and implemented. This change, among others, focuses on the use of technological advances, specifically the use of the IOT and the application of blended learning methodology has created an interactive learning management system. These systems have allowed faculty to interact with students and provide valuable resources to students. Blended learning experiences, with both student/teacher interactions and self-paced learning experiences, may offer the best of both options but still present time challenges for instructors with many students. How then, as instructors, can provide needed interactions without working overtime?

AI has provided promising opportunities for addressing important problems in education and society while also provoking considerations about the unintended consequences associated with risk. AI techs like conversation tools such as chatbots have been leveraged to assist student life in education (Hagendorff, 2020; Peters et al., 2020; Atkins et al., 2021). Students are trying to leverage their student life in education with AI tools such as chatbots. These chatbots are initially designed to make conversation with humans in online platforms to handle and resolve customer issues at first step, launched initially early 1980s, but did not receive much attention due to lack of infrastructure until recently due to advancements in AI-related studies and research. Currently, chatbots are used on commercial websites for many applications including answering

frequently asked questions, product info, and service inquiries. Studies in the information systems field have mainly invested in the benefits of chatbots in facilitating interactive and timely support in a business context while focusing on collaboration, collection of research data e-workforce enhancement, and fostering health and well-being. In recent years the studies related to chatbot applications in education have been growing, while several studies have revealed the benefits of using chatbots in school settings, including providing users with a pleasant learning experience by allowing for real-time interaction (Kim et al., 2019), enhancing users with a pleasant learning experience by focusing on real-time interaction, enhancing peer to peer communication skills (Hill et al., 2015) and improving learning efficiency (Wu et al., 2020).

The current study trying to understand the role of chatbots in education, student perceptions, and their intention to use them. The current study has applied TAM (technology acceptance model) to understand the role of chatbots in students' education lives. No study has explored the following path which is challenging. The current study will provide literature for future studies to understand the modified chatbots to better assist students.

Literature review:

The term chatbot refers to a computer program that provides services through dialogue (Brennan, 2006; Chopra et al., 2016). Early chatbots used keyword-matching mechanisms or natural language processing mechanisms (Brennan, 2006). Later due to the advancement of computer and speech recognition technology, voice interactive interfaces began to appear (Guttormen et al., 2011). Chatbots can be used for various purposes, such as chatting, entertainment, data queries, answering questions, and dialogue exercises (Copulsky, 2019). Chatbot can play the role of an agent to collect information from conversations to complete a form-filling task such as booking air tickets or purchasing goods (Moriuchi et al., 2020). As one application of AI, the chatbot interacts with users in the form of a conversation, interprets users' natural language questions and responds with the most suitable answers (Nirala et al., 2022). Depending on its functionalities, a chatbot may enable a wide range of technologies such as natural language processing, machine learning, deep learning, artificial neural networks etc. Chatbots are interactive and cost-effective, which has led to a growth in their popularity and an increase in application in multiple industries, primarily for customer service (Behera et al., 2021).
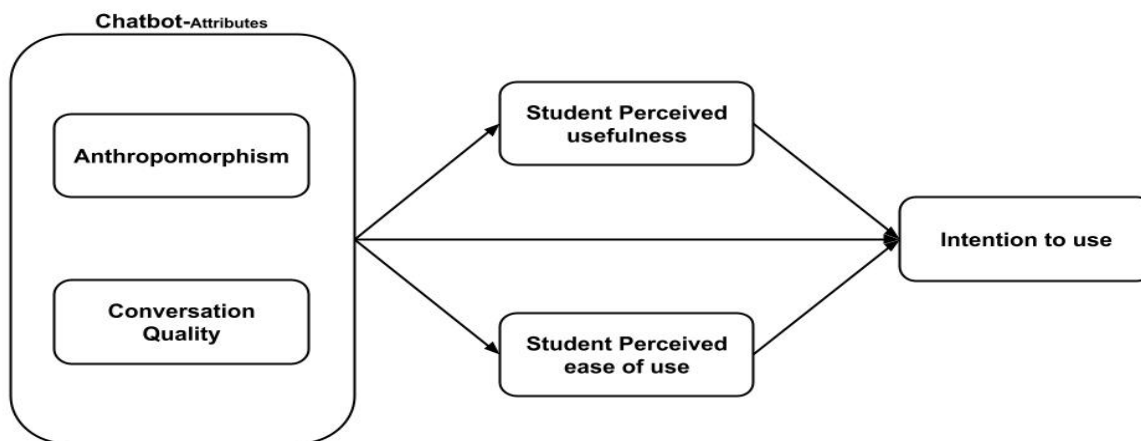

Fig 1: Conceptual model

Chatbots have emerged as a valuable tool in various industries, including education. These AI-powered assistants are increasingly being used to support teaching and administrative tasks in educational institutions (Smuty & Schreiberova, 2020). They play a crucial role in improving the student education experiences by offering personalized assistance and access to important information. Through chatbots, students can easily access information related to the admission process, scholarship opportunities, tuition fees, and other administrative matters (Perez et al., 2020). Additionally, chatbots are being utilized by students' assessments, providing support for administrative tasks as well as assessments (Ashok et al., 2021). Chatbots in the field of education have revolutionized the way students interact with technology and access information. In summary, Chatbots have become valuable assets in student education by enhancing accessibility to information and providing support 24/7.

Chatbots in education have revolutionized the way students access information and interact with technology. They have streamlined the process of accessing important information and receiving support for administrative tasks and assessments. The user-friendly interface and round-the-clock availability, of chatbots, have made it

easy for students to navigate through various educational processes and acquire the help to continue their academic life in university or college (Smutny & Schreiberova, 2020). Furthermore, the personalized assistance provided by the chatbot enhances overall student performance, making it more convenient and efficient to obtain the necessary information and support. This integration of chatbots into the education system has indeed transformed the way students engage with technology and access educational resources (Wollny et al., 2021). Chatbots in education have significantly impacted students' experience by providing personalized assistance and easy access to important information. chatbots in education have revolutionized the way students access information and interact with technology (Perez et al., 2020). They have become valuable assets in education systems by improving accessibility to information, streamlining administrative tasks, and facilitating student assessments. Chatbots in education have transformed the student experience by providing personalized assistance, easy access to information, and efficient support for administrative tasks and assessments (Okonkwo & Ade-lbijola, 2021). Chatbots have proven to be beneficial in the education sector by improving accessibility to information, streamlining administrative tasks and enhancing student assessments. Gupta et al., 2019 explored the relationship between students' perceived usefulness of chatbots and their intention to use them for academic support. The findings revealed that students who perceived chatbots for accessing course materials, receiving academic guidance, and obtaining administrative informative information expressed a positive intention to use them in their student education journey (Almahri et al., 2020). The personalized assistance provided by chatbots influences students' perceptions of their usefulness and their intention to engage with the technology (Smutny & Schreiberova, 2020). The results indicated that for students who received personalized support and guidance from the chatbots, the academic endeavours provided support to them for various educational purposes (Al-Abdullatif et al., 2023). Furthermore, a meta-analysis by Almahri et al., (2020) highlighted the significant impact of perceived usefulness on students' intention to use chatbots in education. The meta-analysis underscored the importance of student's perceptions of the practical benefits and helpfulness of chatbots in shaping their willingness to incorporate these tools into their learning processes. An overview of the analysis can be found below analysis.

Research Methodology

The study has utilized a quantitative data set collected from college and university students, the questionnaires in the current study were designed in a way to get students' perception and their intention to use chatbots based on that questionnaire design. These questions were deployed by providing an introduction to the chatbots and their use in a detailed video. Students have actively participated in the survey without any financial compensation. The data has been collected only from college and university students; no working professionals have been included in the survey. The main aim is to understand the student's perception, the lower age limit is 16 and the upper age limit of 25 years has been set and collected data from students who are perceiving degrees currently. Before the study approval has been obtained from the universities by explaining to the panel to collect information. subsequently, students were informed of the aims of the study and written consent was obtained from those who agreed to participate. Through purposive sampling and empirical research design using the TAM model to understand the student's perception. The collected data has been analysed using SmartPLS 4.0.

Analysis:

As discussed, the current study has utilised SmartPLS 4.0 to apply SEM to the construct model and obtain maximum output from the data set to get accurate prediction (Sarsetedt et al., 2018). PLS offers reliable statistical power and parameter estimation and is widely used statistical software in all Scholarly studies (Hair et al., 2017; Sarstedt et al., 2018; Bangun et al., 2023; & Jadhav et al., 2023). Table 1 shows the reliability of the study, which exhibits high collinearity of study all factors are above the threshold values showing high predictivity and reliability of the data set (Hair et al., 2017).

Table no:1 Construct Reliability

constructs	Items	Outer loading	AVE	CR	Cronbach's alpha	rho_A
Anthropomorphism	AP1	0.841	0.683	0.866	0.769	0.772
	AP2	0.816				
	AP3	0.823				
conversation quality	CQ1	0.826	0.686	0.867	0.771	0.77
	CQ2	0.85				
	CQ3	0.808				
Student Perceived Ease of Use	SPE1	0.833	0.67	0.89	0.836	0.842
	SPE2	0.768				
	SPE3	0.86				
	SPE4	0.81				
Student Perceived Usefulness	SPU1	0.882	0.686	0.867	0.77	0.784

Intention to Use	SPU2	0.775	0.67	0.859	0.755		0.763
	SPU3	0.824					
	IU1	0.795					
	IU2	0.821					
	IU3	0.839					

To assess the validity of the data set the study has conducted discriminant validity utilizing HTMT (Heterotrait-Monotrait) has a threshold value of less than 0.85 and the current shows that values of the constructs are less than the threshold value of 0.85 which illustrates the construct model is discriminant. Furthermore, the Fornell-Larcker Criterion (FLC) assess the low sensitivity which means largely unable to detect the lack of discriminant (Henseler et al., 2015) can be observed in the table 2 below (Henseler et al., 2015).

Table no: 2 Discriminant Validity

HTMT Ratio					
Constructs	Anthropomorphism	Intention to Use	Student Perceived Ease of Use	Student Perceived Usefulness	conversation quality
Anthropomorphism					
Intention to Use	0.52				
Student Perceived Ease of Use	0.642	0.762			
Student Perceived Usefulness	0.445	0.461	0.744		
conversation quality	0.559	0.638	0.687	0.517	
FLC					
Constructs	Anthropomorphism	Intention to Use	Student Perceived Ease of Use	Student Perceived Usefulness	conversation quality
Anthropomorphism	**0.827**				
Intention to Use	0.4	**0.818**			
Student Perceived Ease of Use	0.516	0.613	**0.819**		
Student Perceived Usefulness	0.343	0.361	0.606	**0.828**	
conversation quality	0.433	0.489	0.558	0.403	**0.828**

Assessment of the structural model:

After establishing the reliability and validity of the measurement model the study assessed the proposed hypothesis (Hair et al., 2017). To ensure that the study construct has no multi-collinearity problem, all the VIF indicators are above the threshold value indicating a tolerance level in the prediction of the construct model.

Fig: 2 Bootstrap model
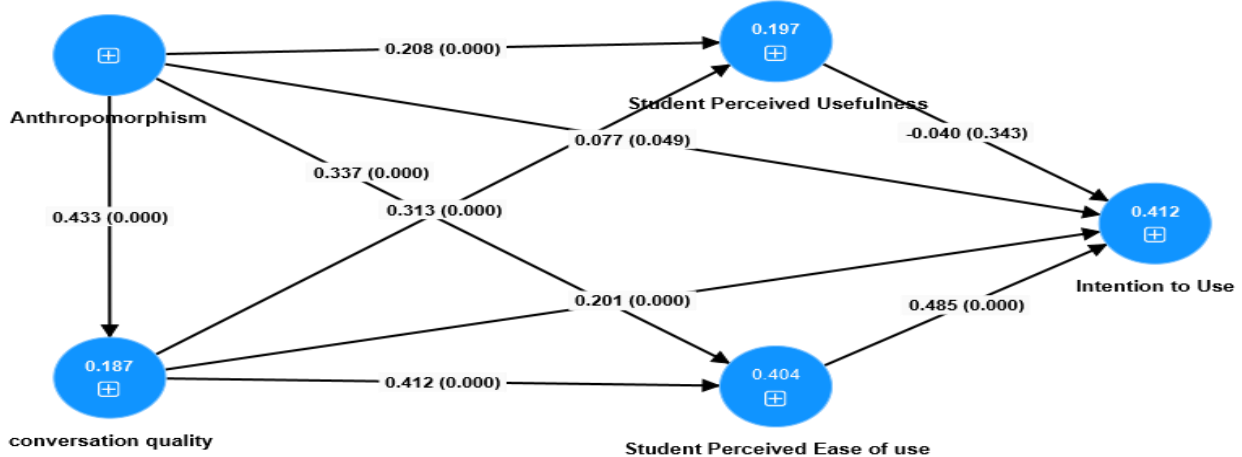
The structural model has evaluated the significance of the path coefficient, the R-square (Chin et al., 2020), and the predictive relevance, Q-square (Geisser, 194; Stone, 1974).

Table no: 3 Model Fitness

Endogenous latent constructs	R-Square	R-Square Adjusted	Q² _predict	RMSE	MAE
Intention to Use	0.412	0.408	0.155	0.924	0.671
Student Perceived Ease of Use	0.404	0.402	0.261	0.864	0.604
Student Perceived Usefulness	0.197	0.195	0.113	0.947	0.668
conversation quality	0.187	0.186	0.184	0.908	0.661
Q² Value effect size. 0.02 = Small; 0.15 = Medium; 0.35 = Large					

The results of the structural model assessment are presented below in Table no: 4 all the constructs of the hypothesis support except for students' perceived usefulness to intention to use H5. Based on Hair et al., (2017) study a proposed criterion t-value of more than 1.96 and p-value of less than 0.05 (t < 1.9; P > 0.05).

Table no: 4 Direct Assessment

Hypothesis	Path	Path Coefficient	SE	t-statistics	p-values	Decision
H1	AP -> SPU	0.208	0.045	4.661	0	Supported
H2	AP -> SPE	0.337	0.037	9.229	0	Supported
H3	CQ -> SPU	0.313	0.051	6.132	0	Supported
H4	CQ -> SPE	0.412	0.044	9.478	0	Supported
H5	SPU -> IU	-0.04	0.042	0.947	0.343	Not Supported
H6	SPE -> IU	0.485	0.051	9.441	0	Supported
H7	AP -> CQ	0.433	0.036	12.188	0	Supported
H8	AP -> IU	0.077	0.039	1.969	0.049	Supported
H9	CQ -> IU	0.201	0.049	4.125	0	Supported

To assess the mediation analysis study conducted mediation analysis as suggested by 5000 subsamples was used to estimate the 95% biased-corrected confidence interval of the indirect effect. The study proposed by Nitzl et al., (2016) for the classification of mediation. Through Table no: 5 the results indicate students' perceived usefulness doesn't act as a mediator through the results it can observe. Students perceived ease of use acts as a mediator in between anthropomorphism and conversation quality to intention to use through the direct assessment it could be observed that students perceived ease of use acts as a partial mediator.

Table no: 5 Indirect Assessment

Hypothesis	Path	Path Coefficient	SE	t-statistics	p-values	Decision
H10	AP -> SPU -> IU	-0.008	0.009	0.912	0.362	Not Supported
H11	AP -> SPE -> IU	0.164	0.026	6.414	0	Supported
H12	CQ -> SPU -> IU	-0.013	0.014	0.922	0.357	Not Supported
H13	CQ -> SPE -> IU	0.2	0.032	6.288	0	Supported

Discussion and Conclusion:

The results of the study indicate the importance of students' perceived usefulness, though all the students utilised the chatbot services in their education none of them found it relevant to their career enhancement. It indicates that students know that it wouldn't help them in excelling their careers, for getting feedback students find it more useful and rated it as a good conversation tool suggesting that it is easy to use. There were also significant differences in students' perceived ease of use of the chatbots in all dimensions, with maters and graduate students except for the perceived usefulness which referred to resolving the most important issues and the chatbot's help in clarifying students' questions there was no significant difference in student perceived usefulness as a mediator in between anthropomorphism and conversation quality to intention to use. It is also important to bear in mind that the kinds of questions that were answered by the students were mainly cognitive

questions and a few planning questions. Finally, the results of the study indicated a mixed research methodology which focuses on completing the test spectrum will broaden the research knowledge and illuminate future research.

This research, comprised of two sequential studies, explores student perspectives on the potential of chatbots as intelligent learning companions. The findings reveal positive student sentiment towards the interactive, responsive, and conversational nature of chatbots in facilitating content acquisition. Additionally, students perceive chatbots as potentially valuable study partners. However, the research also identifies limitations, such as student concerns about chatbots' inability to fully replicate the natural flow of human conversation and express human emotions. The current study provides a major contribution to chatbots in education research by identifying the student's perceived usefulness in the use of chatbots and examining the use of chatbots in students' education lives. Additionally, open-ended questions were found to be more effective in soliciting original and detailed responses. Future studies can be focused on instructor-based points of view and mainly of ethical issues related to the use of chatbots.

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