

AI Powered Chatbots in Education - A Survey on Benefits and Challenges

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Abstract – With the rise of artificial intelligence (AI), machine learning (ML), and chatbot technology, the education sector has under gone a major transformation. recent development in AI chatbots, such as ChatGPT, have shown many advantages for both students and teachers. however these benefits also brings certain challenges that can affect student learning and create difficulties for educators. This study aims to examine both the advantages and challenges of using AI chatbots in educational environment; with the goal of understanding ho they can help overcome current learning barriers. The paper first explains the historical development of chatbots and key complements that makeup their architecture. It

then discusses the main challenges and limitations related to integrating AI chatbots into education. Findings from this narrative review highlight several benefits of using AI chatbots in teaching and learning. Chatbots like ChatGPT can act as virtual tutors, supporting personalized learning by helping students with different activities such as learning new languages, programming, understanding difficult concepts, assisting in research, and providing instant feedback. Teachers can also use chatbots to prepare course content, design assessments, evaluate student performance, and conduct data analysis and research. Despite these advantages, there are serious concerns about data privacy, security, academic integrity, and

overdependence on technology.

Keywords— AI chatbots; generative AI; education; benefits and challenges; learning technology.

I. Introduction:

In education, finding each student's preferred learning style can help them learn better and improve their performance. Before modern AI chatbots were developed, many creative and innovative methods were used to make learning more interesting for students. These included game-based learning, and musical learning, work-based learning, and visual learning. In the same way, AI chatbots are now becoming another powerful tool to create a fun, creative, and interactive learning environment. They use generative AI to make new content for students.

AI chatbots not only make learning more engaging for students, but they also support teachers and other stakeholders in many educational tasks. However, the impact of AI chatbots can be positive or negative depending on how they are used and the rules and policies around their use.

There are many advantages of using AI chatbots in education. For example, they can act as personal tutors and career advisers for students, increase student engagement and academic performance, support students' mental health and well-being, collect feedback from students and teachers, help teachers with their teaching and professional development, and assist in admission and administrative work.

Even with these advantages, there are also some challenges in using AI chatbots in education. This includes a decrease in students' critical thinking and problem-solving skills, lack of understanding and learning context, chances of bias and unfairness, inaccuracy and misinformation, the "uncanny valley" effect (when chatbots seem almost human but not quite), and privacy and security issues.

This paper will explore both the benefits and challenges of using AI chatbots in education. First, it will discuss the benefits of modern AI chatbots in education. Then, it will examine the challenges they bring. Finally, the paper will give a summary

and suggest some ideas for future work.

II. Use case: Hubert Chatbot

Hubert chatbot is an AI-powered chatbot designed to replace traditional survey methods by engaging participants in conversational feedback. It is currently applied in three domains: customer experience, human resources, and education. The system consists of two components—chatbot interface and a dashboard. Through the dashboard, educators can select a domain, customize pre-defined questions, and then share the chatbot link via email or other means. Participants access a chat-style window where Hubert initiates the conversation.

To illustrate its role in education, Hubert was used in a practical study to collect student feedback on a machine learning course during the middle of the semester. For this, the informal need-semester course evolution version of Hubert was applied. This allowed teachers to gather real-time input on aspects such as what was working well, what needed improvement, and how the course could be refined. The chatbot

then analyzed the responses and presented structured insights to the instructor.

Hubert's educational domain provides multiple feedback models tailored for teachers' needs, including:

1. Stop/start/continue evaluation (for mid-term reviews)
2. Student self-reflection templates (beginning, middle, or end of the semester)
3. Informal course evaluations (During or after the semester)
4. Customized templates developed through the Edubots project.

By simplifying the process of collecting and analyzing student feedback, Hubert demonstrates how AI chatbots can serve as valuable tools to support teaching effectiveness and enhance the overall learning experience.

III. Benefits of using AI chatbots in education:

1. Assisting Students as a Personal Tutor and Career Advisor:

One of the most powerful applications of AI chatbots in education is their role as personal tutors and career advisors. These chatbots can guide students through a wide range of learning and career-related activities such as preparing for subjects, helping with assessments, answering queries, improving academic skills, managing time effectively, and even offering general counselling and career guidance.

Since every student learns at a different pace, AI chatbots can analyze individual responses to understand how each student studies and processes information. Based on this analysis, they are able to design personalized learning plans tailored to each student's unique needs. This ensures that learners can progress at their own speed, access the knowledge they require anytime and anywhere, and build confidence in their learning journey. The constant accessibility and availability of AI chatbots as tutors offers a major advantage. Students can not only learn new concepts but also reflect on their learning and track their own progress regularly without the stress of reporting to a teacher. This independent and stress-free mode of learning supports better self-evaluation and continuous growth.

2. Increasing Student Engagement and Academic Role:

Education becomes truly effective only when students remain actively engaged in the learning process. Maintaining motivation and interest requires continuous interaction with students and involving them in stimulating activities that connect them with their learning journey as well as with the institution. Research has shown that when students are disengaged or disconnected, their academic performance suffers significantly.

To address this, educators have experimented with innovative learning methods such as game-based learning, work-based learning, visual learning, and music-based learning. Each of

these approaches has proven effective in certain contexts but also comes with its own limitations.

Today's generation of students, however, are deeply familiar with digital devices, computers, and online platforms, which they use daily for studying, gaming, communication, and social networking. Because of this, AI chatbots fit naturally into their learning habits. Unlike traditional resources, chatbots provide an interactive and adaptive learning tool that feels familiar and engaging to students, making adoption easier and more widespread.

3. Collecting Feedback from Students, Teachers, and Stakeholders:

Feedback from students, teachers, and other stakeholders plays a critical role in improving the quality of teaching, learning resources, digital tools, and institutional services. The reputation and branding of any educational institution largely depend on the effectiveness of its education system and facilities, which in turn are shaped by the feedback it receives from its community.

AI chatbots make the feedback collection process far more efficient and dynamic compared to traditional methods. They can gather input in multiple ways: by generating custom questionnaires, conducting online surveys or forms, directly interacting in real-time conversations, or even by analyzing the sentiments expressed in messages and interactions.

This continuous and streamlined approach allows institutions to capture early and regular feedback, making it possible to adapt strategies promptly. By acting on feedback quickly, schools and universities can save time, money, and resources, while also reducing the risks of financial, legal, or reputational challenges.

In this way, AI chatbots not only simplify feedback collection but also empower educational institutions to respond proactively to the needs of their stakeholders, ensuring continuous growth and sustained trust.

IV. Challenges OF using AI chatbots in education:

Despite their potential, AI chatbots face several challenges that limit their effectiveness in education. These challenges can be grouped into language-related issues, implementation difficulties, and education-specific barriers.

1. Language Challenges

Chatbots are developed in many languages, including English, Arabic, French, and others. However, each language comes with unique sentence structures, punctuation rules, and spacing conventions, which can make chatbot development and interaction difficult.

For English-based chatbots, one of the key issues lies in the inability to accurately recognize grammatical errors or to handle semantically similar questions. For example, two questions may be phrased differently but hold the same meaning, and current chatbots often fail to interpret them as equivalent. This makes information retrieval from databases less realistic and often inaccurate without advanced similarity measures.

Arabic chatbots face even more complexity due to the nature of the language. Arabic consists of multiple variants, including Modern Standard Arabic (used formally) and diverse dialects used in daily communication. Additionally, writers frequently make spelling mistakes with problematic letters such as Alf Hamza and Ta Marbuta. The morphological richness of Arabic also creates challenges, as words are influenced by features such as gender, number, and tense, leading to greater difficulty in natural language processing compared to languages with simpler structures.

2. Implementation Challenges:

Another set of difficulties lies in the implementation of chatbots, which often affects their accuracy and user experience. One common issue occurs when users begin a conversation with a chatbot in one domain and then suddenly switch to a different topic. Such domain switching can significantly reduce the chatbot's accuracy and

relevance of responses.

The performance of a chatbot is also highly dependent on the quality and size of its knowledge base. Larger and more accurate databases generally improve chatbot responses. However, problems arise when the system cannot identify semantically similar questions. For instance, if a user phrases a question differently but with the same intent, the chatbot may fail to recognize it unless equivalent terms and synonyms are included in its terminology database.

Another challenge is the lack of chatbot personality, which can make interactions feel robotic and disengaging. This risk can be reduced by designing chatbots with names, avatars, or human-like traits, which help create a sense of familiarity for users. Similarly, chatbots often struggle with time and gender recognition. For example, a chatbot may reply with "Good morning" regardless of whether the user interacts at night, reflecting its inability to adapt to contextual cues.

3. Educational Challenges:

In many educational institutions, implementing chatbots comes with its own set of challenges. Over time, students often lose interest in interacting with them, as conversations can become repetitive and monotonous. This highlights the need to make chatbots more engaging and closer to human-like chat agents. Additionally, current chatbot systems often struggle to understand students' emotions, such as satisfaction or frustration. They also lack the ability to provide personalized advice or actively ask questions, which limits their effectiveness in creating meaningful interactions. Addressing these issues is essential for making chatbot technology more valuable in the educational space.

V. Conclusions and Future Recommendations

The integration of AI-driven chatbots into educational platforms presents a wide range of opportunities for both educators and learners.

However, along with these benefits come significant risks and challenges that must be addressed. AI chatbots, such as ChatGPT, can act as virtual assistants, enabling new learning approaches and offering interactive, personalized experiences. They have the potential to break communication barriers, strengthen learners' communication skills, and provide continuous educational support. By automating administrative tasks, chatbots can also offer a cost-effective solution for institutions.

ChatGPT can help learners grasp complex concepts, learn programming languages, increase engagement in flipped classrooms, and even function as a research assistant. It can also be a valuable assistive tool for students with disabilities. When integrated into Learning Management Systems (LMS), ChatGPT can foster a collaborative and dynamic learning environment. It could further support assessments to evaluate student performance and progress, allowing educators to make data-driven decisions to design course content tailored to students' needs and objectives. Students interact with AI chatbots differently depending on factors such as age, academic level, digital literacy, field of study, and cultural background. Younger students or those with lower digital fluency often prefer simple, step-by-step guidance, while university-level and tech-savvy students engage in more nuanced discussions. STEM students frequently use chatbots for problem-solving, while humanities students lean on them for brainstorming and writing support. Multilingual learners benefit from language assistance, and students with accessibility needs gain from personalized guidance. Socioeconomic factors also matter: resource-limited students may rely heavily on chatbots for free educational support, while wealthier students tend to integrate them alongside other tools.

Despite these benefits, integrating AI chatbots with LMS platforms requires careful consideration of security and privacy risks. Issues such as AI hallucinations, over-reliance on technology, and ethical concerns need to be addressed. Educators must ensure academic integrity and adopt strategies to use AI responsibly. Since ChatGPT is still relatively new in education, research is limited,

especially regarding technical integration with LMS and security protocols for AI chatbots. To ensure the ethical and effective use of AI in education, case studies, thorough research, awareness initiatives, and training for educational administrators are essential. These steps will help maximize the potential of AI chatbots while safeguarding the future of education.

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