Examining the Use of AI-Powered Chatbots in Education

Yapay Zekâ Destekli Sohbet Robotlarının Eğitimde Kullanımının İncelenmesi

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Abstract

Purpose: Understanding the perspectives of pre-service teachers on the use of chatbots in education, while balancing the opportunities and risks these technologies offer, can provide a more comprehensive understanding of their future potential uses. This study aims to explore the opinions of pre-service teachers about AI-powered chatbots.

Design/Methodology/Approach: In this study, a case study method was adopted, enabling the analysis of educational, socio-cultural, and individual interactions. An open-ended questionnaire was administered to 34 pre-service teachers. The data were analyzed using descriptive analysis and categorized under four main themes.

Findings: The analysis revealed that pre-service teachers generally hold positive views about the use of AI-powered educational technologies in various areas. However, some participants expressed concerns about the systems' insufficiencies in fostering motivation and enhancing teacher-student interaction.

Highlights: The findings indicate that participants were particularly satisfied with the ability of AI-powered chatbots to provide clear and concise information. They identified quick and organized access to information as the most significant advantage of chatbots. The study also suggests experimental applications to enhance the potential of chatbots in providing motivation and emotional support, enabling them to play a more complementary role in classroom interactions.

Öz

Çalışmanın amacı: Öğretmen adaylarının eğitimde sohbet robotlarının kullanımına dair görüşleri, bu teknolojilerin eğitimde sunduğu fırsatlar ve riskleri dengeli bir biçimde ele alarak, gelecekteki potansiyel kullanımlarını daha kapsamlı bir şekilde anlamamızı sağlayabilir. Bu çalışma, öğretmen adaylarının yapay zekâ destekli sohbet robotları hakkında görüşlerini incelemeyi amaçlamaktadır.

Materyal ve Yöntem: Bu çalışmada, eğitsel, sosyo-kültürel ve bireysel etkileşimlerin analizine olanak tanıyan bir durum çalışması yöntemi benimsenmiştir. Açık uçlu sorular ile hazırlanan anket formu, 34 öğretmen adayına uygulanmıştır. Veriler betimsel analiz ile 4 tema altında incelenmiştir.

Bulgular: Yapılan analiz sonucu, öğretmen adaylarının yapay zekâ destekli eğitim teknolojilerini birçok alanda oldukça olumlu karşıladıklarını göstermektedir. Buna karşın, katılımcılar arasında, yapay zekâ destekli sistemlerin motivasyon sağlama ve öğretmen-öğrenci etkileşimini artırma konusundaki yetersizliklerine dair bazı görüşler de dile getirilmiştir.

Önemli Vurgular: Araştırmada elde edilen bulgular, katılımcıların yapay zekâ destekli sohbet robotlarının açık ve net bilgi sağlama yeteneğinden memnun olduklarını ortaya koymuştur. Katılımcılar, bilgiyi hızlı ve derli toplu bir şekilde edinebilmelerini sohbet robotlarının en önemli avantajı olarak görmektedir. Araştırmada, yapay zekâ destekli araçların motivasyon sağlama ve duygusal destek sunma potansiyelini artırmaya yönelik deneysel uygulamalar, sınıf içi etkileşimlerde daha tamamlayıcı bir rol üstlenebilmesi için öneriler sunulmuştur.

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INTRODUCTION

Problem Statement

The rapid advancements in artificial intelligence technologies in recent years have revealed a significant potential for transformation in the field of education. The opportunities offered by these technologies in reshaping modern educational processes are noteworthy, particularly in terms of enriching teaching materials and more effectively supporting students' individual learning pathways. However, there remain various uncertainties regarding the integration of such innovative technologies into educational systems. Educators often hesitate about the extent to which and how they can utilize AI-powered tools, as the meaningful contribution of these tools to student achievement has yet to be fully demonstrated. Indeed, studies suggest that AI tools provided to educators are still in the experimental stage and that their applications are far from being fully established, as they continue to evolve (Triberti et al., 2024). Addressing these uncertainties necessitates more in-depth and comprehensive research to make educational processes more efficient and effective with AI technologies.

The integration of AI technologies into educational processes has the potential to reshape the traditional roles of teachers. This potential could shift teachers' roles from being merely conveyors of information to becoming guides, supporters, and facilitators in the learning process. However, there is yet no consensus in the field of education about the direction and extent to which AI-powered tools will alter teachers' roles. Significant uncertainties remain regarding how teachers' professional roles and responsibilities will evolve in response to these new technologies. Particularly, AI applications like chatbots that directly interact with students have the potential to take over some of the traditional tasks of teachers. Yet, there is no clear framework for understanding how this shift will affect teacher-student relationships and pedagogical processes (Tzenov, 2023). Therefore, it is crucial to conduct in-depth research on whether AI-powered chatbots will serve as supportive tools for teachers or take over certain aspects of their roles.

Another critical question is the extent to which AI can replace teachers in the emotional, social, and cognitive dimensions of education, further amplifying existing uncertainties. Understanding how AI will transform teachers' professional development and classroom activities is strategically important for both educational policy and classroom practice. Clarifying the role and impact of AI-powered chatbots in education is vital to better evaluate teachers' perceptions of these technologies and their roles in instructional processes. The willingness and motivation of pre-service teachers to work with AI are directly linked to how much they embrace this technology in their professional lives. Therefore, exploring the views of pre-service teachers on AI-powered educational applications is crucial for predicting how future educational systems might take shape. The limited number of studies on AI-powered educational applications for teachers and pre-service teachers indicates that this field is still in its infancy. For AI to be effectively utilized in education, it is essential to first assess educational attitudes and professional competencies toward these technologies. Conducting more comprehensive research to address existing uncertainties will enhance educators' awareness of these technologies and contribute to their effective use.

Literature Review

Pre-service teachers' opinions on the use of chatbots in education can help us gain a more comprehensive understanding of their potential future applications by evaluating the opportunities and risks these technologies offer in a balanced manner. Chatbots like ChatGPT are believed to offer significant potential for providing learning support and delivering quick feedback (Bettayeb et al., 2024). By supporting personalized learning and offering content tailored to individual student needs, chatbots enable a student-centered approach in the teaching process. Similarly, they contribute significantly to administrative efficiency, helping teachers make more effective use of instructional materials. Research indicates that the scope of AI applications in education is expanding daily (Guan et al., 2020; Ouyang et al., 2022). In this context, AI applications in education provide a solid foundation for the integration of chatbots into educational processes. Chatbots alleviate teachers' workload in instructional management and student guidance, allowing them to dedicate more time to pedagogical efforts (Mashinchi, 2024).

Alongside these advantages, certain risks associated with chatbots have also been identified. Concerns have been raised about their potential negative impacts on critical thinking and creativity (Mustroph & Steinbock, 2024; Pesce & Blanco, 2024). It is particularly feared that students' over-reliance on such technologies could hinder the development of critical thinking skills. Additionally, there are concerns that chatbots like ChatGPT might lead to academic ethics issues, such as increasing the risk of plagiarism and undermining academic integrity (Pesce & Blanco, 2024). Studies focusing on such ethical issues in literature facilitate a better understanding of these concerns. Similarly, a study by Yiğci et al. (2024) examined the potential impacts of large language models in higher education. This study explored the effects of using chatbots in fields such as education, engineering, and healthcare, highlighting the innovative contributions these technologies could make, such as providing personalized learning experiences and supporting asynchronous learning. However, the study also emphasized that risks associated with these technologies—such as their potential negative impact on academic integrity, the spread of misinformation, biases, and other ethical and legal issues—have yet to be fully resolved.

The use of AI technologies in education is supported by research on employing machine learning and deep learning algorithms to enhance the functionality of chatbots (Guan et al., 2020; Ouyang et al., 2022). Studies in this field show that machine learning and deep learning improve chatbots' ability to provide intelligent responses and enhance user interactions. Research published in journals like the *International Journal of Artificial Intelligence in Education* offers valuable insights into the functionality and

user-friendliness of chatbots in education. The expanding role of AI in education is evident in the existing literature. Systematic reviews indicate that chatbots are actively used in areas such as teaching, management, and counseling, offering advantages like providing students with quick access to content and encouraging engagement in learning processes (Okonkwo & Ade-Ibijola, 2021). On the other hand, the main challenges related to implementing chatbots in education include ethical issues, difficulties in assessment and evaluation, and the need for monitoring and maintenance. These challenges underscore the importance of preserving education as a process enriched by human interaction and ethical values. The need for further research on issues such as ethical challenges and assessment-related difficulties associated with chatbots in education is emphasized.

Comprehensive analyses by Guan et al. (2020) reveal that the focus areas of AI applications in education have shifted over the past two decades. While the early 2000s research focused on AI-supported online learning systems, the 2010s saw a shift toward personalized learning systems and student profiling models. Since 2019, there has been increased interest in innovative technologies such as chatbots and augmented reality. This shift demonstrates the continuous evolution of AI applications in education, offering solutions tailored to different needs over time. Regarding the integration of AI applications in education, factors such as enhancing the existing technological infrastructure, processing more data, and designing more robust algorithms are essential considerations. These elements are critical for successfully integrating AI into education.

The benefits of chatbots in education include increasing student motivation, providing instant and rapid feedback, and facilitating content integration (Wollny et al., 2021). Research indicates that models like ChatGPT often surpass human instructors in generating detailed and consistent feedback when summarizing student performance (Dai et al., 2023). This capability can facilitate the development of students' learning skills. Moreover, chatbots streamline the educational process and guide students in their learning journeys while providing administrative and logistical support to reduce teachers' workloads. A study by Mokmin and Ibrahim (2021) found that chatbots developed for health literacy were considered beneficial by users and provided effective communication. These findings suggest that chatbots can be effective tools for information sharing not only in education but also in other fields.

Research shows that while chatbots offer many advantages in education, it is also crucial to address some ethical and pedagogical concerns. For chatbots like ChatGPT to be effectively utilized in education, an approach that considers the limitations of the technology, ethical concerns, and pedagogical requirements is essential. To ensure that students develop critical thinking skills and maintain academic integrity, various control mechanisms must be implemented during the integration of these tools into education. Existing literature provides valuable insights into how chatbots can be used in education and the risks associated with their use, but the development of these technologies continues. Increasing research on the potential future uses and benefits of chatbots in education is necessary to fill gaps in the literature. Conducting more in-depth studies on the effects of chatbots on critical thinking, ethical issues, and long-term educational outcomes will contribute to the healthy use of these technologies in education.

Within this framework, pre-service teachers' opinions on AI-supported educational processes may play a decisive role in determining the extent to which these technologies will penetrate education in the future. This study aims to examine pre-service teachers' opinions about AI-powered chatbots.

METHOD

Research Design

In this study, a case study method, which enables the analysis of educational, socio-cultural, and individual interactions, was adopted (Yin, 2009). Case studies require a clear definition of the main case to be examined and the identification of related topics to be excluded from the study to ensure the reliability of the research. In this context, the opinions of pre-service teachers were examined solely in terms of the extent to which the requirements of teaching were fulfilled. Other elements of teaching were excluded from the study. Accordingly, the use of AI-supported chatbots in education was selected as the single case for investigation.

Data Collection Tools

As a data collection tool, a survey form containing open-ended questions was developed. Through open-ended questions, the use of AI-supported chatbots in education was examined in depth. To analyze chatbots in terms of the requirements of teaching, the survey questions were created based on the four elements outlined in Perkins' (1992) Smart Schools. In this context, four questions were prepared to understand pre-service teachers' opinions on AI's ability to provide meaningful, clear, and understandable information, design and implement meaningful exercises, provide feedback, and maintain motivation. The prepared survey form was reviewed by an academic from the Department of Computer Education and Instructional Technology. Based on the feedback, questions under the interaction theme were removed, and the study continued under four main headings. The interviews were conducted during the fall semester of the 2024-2025 academic year, and participants were asked to answer the questions in detailed and lengthy paragraphs. Ethical approvals were obtained prior to the data collection process (Decision No. 17).

Participants

The participants consisted of pre-service teachers selected through purposive sampling. The study was conducted in the faculty of education at a university. A total of 34 pre-service teachers voluntarily participated in the study. The identities of all participants were kept confidential, and pseudonyms such as Beyza and Sena were used. The study included pre-service teachers who were either final-year students or graduates from various disciplines such as philosophy, art design, business, and child development, and who were enrolled in a pedagogical formation certificate program during the fall semester of the 2023-2024 academic year. Among the 34 participants, 27 were women and 7 were men, with ages ranging from 24 to 47. Participants were informed about ethical guidelines and the voluntary participation process. Purposive sampling was used to ensure the inclusion of individuals with diverse academic backgrounds who could provide rich and relevant insights into the research focus.

Data Analysis

Descriptive analysis was employed to analyze the responses to the open-ended questions in this study. During the analysis process, Creswell's (2015) outlined steps -organizing, transcribing, interpreting, and reinterpreting data- were followed. The four main themes identified before the study (clear and explicit information, meaningful exercises, feedback, and motivation) were used as the basis for the analysis. The participants' responses were organized using Microsoft Excel 2016, coded according to these themes, and classified under the relevant themes. To visually distinguish the themes, each was color-coded differently. To enhance the validity of the research, member checking was conducted through interviews with participants. Based on the feedback received, the validity of the themes was ensured, and statements that were misunderstood or needed to be expressed under different themes were excluded from the analysis.

FINDINGS

Most participants believe that AI-supported chatbots are successful in providing clear and accurate information. Nursema emphasized the facilitating effect of AI on accessing information in her comment supporting this view. Nursema stated: *"I think AI-supported chatbots are excellent teachers. They just aren't alive. Thanks to AI, I can prepare excellent slides. I don't get lost in books. I can easily obtain information on the topic I need, and all I need is an internet connection"*. This highlight how AI-supported tools simplify the process of accessing information. Participants generally found AI's ability to present information positive and noted that its quick access to various types of information facilitates students' learning processes. Neslihan, another participant, drew attention to AI's superiority in providing diverse information, describing it as a teacher with every kind of knowledge. She explained her perspective as follows: *"I think AI is a highly capable teacher. It possesses all kinds of knowledge—subject-specific knowledge, technological knowledge, pedagogical knowledge. The best part is that it has permanent knowledge; we humans forget what we learn".* According to Neslihan, AI is valued as a resource because it acts as a teacher equipped with pedagogical and technological knowledge.

Another participant, Nur, stated that AI-supported chatbots are not only effective in providing information but also successful in producing meaningful content. She elaborated:

> *"Do you want to prepare lecture notes for your students? Just tell AI the topic, and it will create an excellent cover and content for you, paying attention to principles like coherence, balance, and emphasis. If the generated content is not suitable for the students' level, you can use the 'regenerate' option to have new notes prepared. This way, information can be easily transferred to students' long-term memory".*

Nur highlighted the usefulness of AI-supported tools in the process of preparing teaching materials, noting their ability to produce content suitable for students' levels and revise it as needed. These views underscore AI's ability to automate and personalize teaching materials, making it a valuable aid for teachers in the instructional process.

Some participants also emphasized the effectiveness of chatbots in providing instant feedback. Yaren highlighted the cognitive load-reducing aspect of AI in this regard, stating:

> *"Its ability to answer all my questions instantly shows that it can be less cognitively demanding than a teacher. It has access to digital information on various topics. I use ChatGPT for many of my assignments and even for ideas I need to consult on. I also know that I can find these answers in its cloud memory when I look back later".*

Participants appreciated AI's rapid response capability and noted that it allowed them to complete academic tasks more efficiently. Moreover, AI's ability to provide access to past data was also regarded as a positive feature. Beyza, another participant, described AI as a well-equipped teacher capable of providing feedback, stating:

> *"AI is so well-equipped that it's like an amazing teacher. Thanks to ChatGPT, lessons can be taught to millions of students simultaneously. At the end of the lesson, it can provide evaluation questions, analyze responses as soon as they are submitted, and generate feedback. Since AI doesn't need to sleep or eat, it can access information anytime. This ability would give it a significant status in education from a student's perspective".*

These opinions indicate that participants see AI as having various advantages over human teachers in providing feedback and conducting analyses.

However, some participants expressed concerns about the limitations of AI-supported systems in fostering motivation and enhancing teacher-student interactions. Participants believed that AI cannot provide emotional support, which is intrinsic to human nature. Canan articulated this view, saying:

> *"There is something that distinguishes robots from humans, and that is emotions. What keeps humans spiritually strong is these emotions. When explaining a topic, looking into a child's eyes to sense whether they understand and explaining again without hurting them, and seeing their eyes light up when they finally get it—these moments make all the exhaustion worth it. For AI, this may not mean anything, but for me, it's an invaluable feeling. AI may understand a student who has lost their parent, but it cannot feel it. Saying 'it will pass' while patting their back and looking into their eyes creates an unforgettable memory. I don't think education without emotional support will be beneficial".*

Similar comments reveal participants' belief in the importance of emotional support in education. Zehra, reflecting on her observations, stated: *"I don't think schools will end. I believe lessons are more productive when students receive face-to-face instruction in schools, and I have personally experienced this".* Hakan also emphasized the importance of the human factor, saying:

> "Sometimes understanding a student means comprehending all their human aspects, being aware, not judging, and approaching them with empathy. Even if no solution is offered, just feeling understood—the emotional dimension—is what the person really needs. Being human might be too complex for AI".

Similarly, Senem argued that AI should not replace teachers, stating:

> *"I believe AI should not be the subject of learning, scientific research, or artistic activities. AI can assist teachers in finding resources. It can enable them to teach lessons more creatively. But it cannot take over the role of a human teacher; it should remain a tool in education and teaching. This is because AI makes mistakes that a human teacher would never make. AI takes its information from the internet or at least from a database whose source is challenging to control. Thus, it presents the information assuming the source is accurate. This can jeopardize a student's education because, even if the source seems logical, it lacks human reasoning".*

These views reflect the participants' perspectives that AI-supported systems are valuable as tools in teaching processes but have limitations in supporting teacher-student relationships.

DISCUSSION

Research findings indicate that pre-service teachers have a highly positive outlook on AI-supported educational technologies in many areas. Participants particularly highlighted AI's success in providing clear and precise information, generating meaningful exercises, and delivering effective feedback. One possible reason for participants' positive views on AI could be its ability to convey even complex topics in a simple and understandable manner, thanks to its advanced natural language processing capabilities. This allows students to access the information they need quickly and comprehensively. Furthermore, AI-supported tools' ability to provide personalized exercises suitable for students' levels enhances the learning process by facilitating a deeper understanding of concepts. The automatic feedback mechanisms offered by AI make it possible to provide instant responses to students, helping them quickly identify and address their shortcomings. These features position AI as a powerful support tool in students' educational journeys.

While participants viewed AI as a useful tool in the presentation of information and practice processes, they also emphasized that teachers' human qualities still play a complementary role, particularly in providing motivation and one-on-one communication with students. These views could be based on several reasons. Since AI systems cannot fully simulate human emotional responses and empathy, they may fall short in enhancing students' intrinsic motivation. As identified in the findings and supported by similar research (Dai et al., 2023), although AI can provide rapid feedback, delivering this feedback in a way that considers individual needs can be challenging. Therefore, feedback from teachers, who closely monitor students' developmental processes, may be more effective. Students may find encouragement and motivation from a real teacher more genuine, and they may not establish the same level of trust with AI guidance.

AI can use advanced algorithms to identify areas where students struggle; however, it lacks the intuitive approach of a teacher who can understand students' concerns and provide moral support when necessary. A long-term relationship with a teacher plays a significant role in keeping students motivated. In contrast, AI cannot form an emotional, long-term bond with students. Teachers can adjust their teaching methods flexibly based on students' immediate needs, using more engaging and motivational strategies. As highlighted in participants' views, AI lacks this kind of flexibility. Human teachers serve not only as knowledge providers but also as role models. Students can adopt traits like work discipline and empathy observed in their teachers, whereas AI lacks the capacity to serve as a model. Teachers' excitement and passion for teaching can be felt by students, positively influencing their motivation. AI systems, on the other hand, cannot convey such emotional reflections. A teacher who notices students losing interest in a topic can try a new approach or offer additional support. AI, usually operating within programmed methods, is limited in this regard. Some students may feel more supported and motivated even through small human interactions, such as a teacher's physical presence or reassuring gaze. AI cannot provide these nuanced experiences.

Findings from the research reveal that participants were satisfied with AI-supported chatbots' ability to provide clear and precise information. Participants viewed the ability to access information quickly and systematically as one of the chatbots' most significant advantages. For example, Nursema emphasized the convenience and time-saving aspects of AI-supported systems in accessing information. Similarly, Neslihan highlighted the diversity of information that AI can offer. This finding demonstrates the positive impact of technology's ability to present information directly, simply, and understandably on students. This aligns with the results of various studies in literature (Mashinchi, 2024). Participants' positive views on AI technologies for meaningful practice are related to the technology's capability to generate student-appropriate content and support repetition-based learning processes. Nur noted that AI could prepare lesson notes tailored to students' levels, contributing to the retention of knowledge in long-term memory. In this regard, AI offers opportunities to personalize and enrich educational processes compared to traditional methods. This finding is consistent with the results of Mashinchi's (2024) study.

Although opinions under the feedback theme varied, the ability of chatbots to provide immediate and continuous feedback was largely viewed positively. Yaren noted that AI's ability to deliver rapid and accurate answers reduces the cognitive load during learning processes, while Beyza emphasized its capacity to interact with and provide feedback to millions of students simultaneously. Participants indicated that the advantages of AI in feedback processes could positively influence students' learning experiences. This finding aligns with various studies (Dai et al., 2023; Pesce & Blanco, 2024).

However, participants also addressed the limitations of AI-supported chatbots in providing motivation and strengthening human interaction. Canan stated that AI could not replace emotional support, highlighting the importance of teachers' ability to maintain eye contact and provide emotional support during the learning process. Similarly, Zehra and Senem argued that AI could not be as emotionally motivating as a teacher and should remain solely as a tool in education. This finding is consistent with many studies (Sipahioglu, 2024; Tzoneva, 2023; Yiğci et al., 2024). As AI tools advance rapidly, their integration into education appears to require thoughtful oversight. These tools should aim to empower educators and learners rather than replace them.

CONCLUSION AND RECOMMENDATIONS

In future studies, participants from different educational levels could be included to examine the perceptions and impacts of AI-supported educational tools. This would provide more comprehensive data on how the role of AI in education is perceived differently among student and teacher groups.

Experimental applications aimed at enhancing the potential of AI-supported tools to provide motivation and emotional support could be explored. This would allow for the development of recommendations for AI to play a more complementary role in classroom interactions.

Comprehensive studies with pre-service teachers from various countries could be conducted to understand perceptions of AI-supported educational tools in different cultural contexts. The impact of cultural differences on the acceptance and implementation processes of such technological innovations should be investigated.

Quantitative studies could be carried out to examine the impact of the speed and accuracy of AI tools in providing in-class feedback on the learning process. Such studies could determine the relationship between the quality of feedback and learning performance, thereby solidifying the value of AI tools in education.

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Statements of publication ethics

I hereby confirm that this study adheres to ethical standards, with no ethical concerns involved, and that all research and publication ethics have been duly observed.

Researchers' contribution rate

The study was conducted and reported by the researcher himself.

Ethics Committee Approval Information

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