Are AI-Powered Chatbots Helpful in Teacher Training?
Pre-service Teachers' Perspective

Alpona Shirin, Tampere University, Finland

Abstract
In recent years, there has been a noticeable increase in interest in the use of AI-powered chatbots and AI tools in academic contexts. This study examined preservice teachers' perceptions to explore the opportunities and challenges of AI-powered chatbots in teacher training. The study was conducted in Finland's higher education universities, and twelve faculty members participated in the semi-structured qualitative interviews. Thematic content analysis was used to analyze participants' responses. The results showed a wide range of opportunities for AI-powered chatbots as learning assistants, language, text, efficiency, as well as productivity enhancement, and pointed out challenges such as adapting to AI, reliability issues, educational impact, evaluation, and ethical challenges. The implications of the findings highlight how AI chatbots might be integrated into teacher training programs for both students and teachers. Thus, future research directions include examining and comparing the impacts and barriers of implementing AI chatbots in teaching and learning.

Keywords: AI Chatbots, Artificial Intelligence, Teacher Training, ChatGPT, AIED

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Introduction

Recent advances in AI have accelerated a rising curiosity regarding artificial intelligence's (AI) possible uses and consequences, in different socio contexts, including across education (Sallam, 2023). The attention was sped up by the publishing of an AI-powered chatbot, ChatGPT, published by OpenAI, which attracted millions of users within a few days (Biswas, 2023). The diversified uses and potentiality of this AI-powered chatbot have led to crucial debates leading researchers to suggest that this innovation will bring paradigmatic change to education (Bozkurt, 2023), while others argued about the ethical challenges of this kind of technology (Sardana et al., 2023). As there are already some similar types of chatbots like Bard, Ernie, and Bing Chat (Rudolph et al., 2023b), it is crucial to thoroughly assess their potential opportunities and drawbacks.

Initial studies emphasize the opportunities of ChatGPT for education purposes (Liebermen, 2023; Zhai, 2022). Zhai (2022) conducted a study that piloted the use of ChatGPT to write an academic paper where the findings suggested that ChatGPT can assist researchers with literature review, necessary information, and efficient writing. In parallel, Liebermen (2023) suggested some guidance to implement ChatGPT for students such as utilizing the technology as a tool to investigate the potential and constraints of online information sources and knowing the fundamentals of how it functions. However, it is unclear if ChatGPT will alleviate or exacerbate the concerns raised by earlier chatbots. Therefore, a more advanced chatbot like ChatGPT needs a more thorough investigation in the education context.

There was a case when ChatGPT was banned from educational networks by Los Angeles Unified Schools, Baltimore and New York City (Shen-Berro, 2023; The Guardian, 2023). The reason for the banning is explained as ChatGPT provides students with an "easy out" by allowing them to input prompts and use machine learning to generate answers. Teachers and officials from schools also perceived ChatGPT as a risk to students' growth in writing and critical thinking skills (Reuters, 2023). However, this may result in a significant and immediate defensive response to the potential opportunities. Therefore, to ensure safe use, it is crucial to investigate the possible opportunities and challenges of using AI-powered chatbots in teaching-learning. This study focused on exploring the possible opportunities and challenges in teacher training from a university teacher's perspective. The overall aim of the study was to contribute to the education sector by empirical findings of opportunities and drawbacks of AI-powered chatbots from the pre-service teacher's perspective. This will also add to the literature by highlighting innovative ways in which chatbots can be integrated into teacher education and other faculties and how chatbot features and interactions can overcome challenges and have a positive impact on both the teaching process and learning outcomes.

The present study answers two primary research questions:
1. What are the challenges pre-service teachers are experiencing regarding AI-powered chatbots?
2. What are the possible opportunities of AI chatbots in teacher training?

Theoretical Framework

In light of constructivism theory, recent research such as Ulla, Perales, and Busbus (2023) and Rasul and colleagues (2023) employed content analysis in their review work. Rasul and colleagues (2023) identified five important benefits and also five challenges addressed by experienced practitioners for which they also suggested propositions. Constructivism learning

theory served as a framework for explaining how technology might be used for personalized, active, and collaborative learning in higher education. In line with this, the current study selected constructive learning theory as a framework to explore the opportunities and challenges of AI-powered chatbots in teacher education.

However, the thing that set this study apart from the others is that it wasn't a literature review; instead, it involved in-person interviews with university teachers who are both active in teacher training and developing AI-related policy. Interviews and constructivism are related because they both place a strong focus on comprehending people's subjective experiences and viewpoints. The constructivist theory emphasizes the significance of individual meaning-making in the learning process by arguing that knowledge is created via interactions with the environment and social situations. This is in line with qualitative research techniques like interviews, which aim to capture participants' complex perspectives (Byrne, 2001; Rasul et al., 2023). Interviews can also able to reveal how teachers and students use AI chatbots to shape their knowledge and learning by offering rich data that can be used to adjust educational practices, including the integration of AI tools, to better promote learner engagement and development within a constructivist framework in teacher training.

Methodology

The study is rooted in a qualitative and exploratory research design and has employed individual interviews as the sole method for constructing data on teachers' perceptions. For exploring teachers' perceptions, this study chose the thematic analysis of the interviews. A semi-structured questionnaire for key informative interviews (KII) was developed to collect the data with open-ended endings like why and how to explore the opportunities and challenges of AI-powered chatbots from teachers' perspectives. The questions asked to the participants was about their perception of AI and AI-powered chatbot, their experience in using the chatbots, how they find it useful in their teaching strategy and what could be the possible challenges in integration in teacher training. The participants of this study were the faculty members connected to disciplines in teacher education training at higher education universities in Finland. Participants were chosen based on purposive sampling. The criteria include who are teaching pre-service teachers in the degree program of teacher education and are possibly aware of the diversified uses of Artificial Intelligence.

After preparing the transcript from the interviews the data was coded for the analysis. The coding process includes five steps. Firstly, every interview transcript had gone through an open coding process. The entire text was carefully read through word by word to develop open codes. For example, from the text "*I think they are capable of synthesizing large amounts of data, so that's their largest strength, it manages to inform you about something in a very synthetic way, even if it's a complex phenomenon,*" the code retrieved was "make complex idea simple", "synthesizing large data" "inform synthetically." Following the open coding process, draft codes were created. Then the researcher formulated some preliminary codes out of the data supported by the software ATLAS.ti. A new code was added to any data that did not fit into the preexisting preliminary codes. The next two steps include data coding and revising codes. Similar codes were combined into a single category. Finally, categories were revised to be placed in broader categories and finalized into main themes based on the research questions.

Findings and Discussion

The data exhibit pre-service teachers' perception of the challenges and opportunities of AI-powered chatbots in teacher training. Five themes emerged from the data that represent the challenges, and six themes represent the opportunities of AI chatbots in teacher training.

Challenges of AI Chatbots

Interviewees voiced concerns over the difficulties associated with implementing AI chatbots in teacher training. From their discussion, five themes emerged as challenges they are experiencing regarding AI chatbots in teacher training.

Reliability and Concerns

Every participant expressed apprehension about the way in which the dependability of AI chatbots is called into question. Since it withholds the source, the text cannot be trusted. There are instances where ChatGPT provides incorrect references as well.

> "It gives you citations or references, but most of the time they say those references are not correct actually."

The challenges of "writing a good prompt" and giving "repetitive instructions" to AI chatbots like ChatGPT were also brought up by the participants. All the interviewees acknowledged that they need to always double-check the language to ensure the meaning is expressed correctly. Participants also expressed concerns about students' privacy and their improper usage of AI for various purposes.

Adaptation With AI Tools

One of the most significant challenges noted by the participants was the challenges regarding adaptation to AI tools. According to the participants' statement, the three primary barriers to adopting AI tools are time requirements, teachers' negative attitudes, and "affordance."

The participants indicated that "it is more work" and "further preparation" is needed for embracing AI. They emphasized that there are so many AI tools for education now and it is also a challenge to select one and how to use it. Along with that, the participants also addressed the preparedness and attitude of teachers toward AI tools as a crucial obstruction. Out of the twelve ten participants expressed a lack of preparation and negative attitudes towards AI tools in the teacher training program. Some described it as "scared to use," "fear of replacing teachers," "not enough literature," "not trained enough" and "uneagerness."

> "Well, I have some colleagues that they are even more interested about AI than myself, and when they bring up the AI in every discussion, I can see some of the colleagues are rolling their eyes and saying oh no, not again."

Threat to Learning and Skill Development

One more crucial challenge identified by the participants was skepticism about students' learning and their capacity for skill development. All the participants raised concerns about the educational impact of AI tools. The inhibition of cognitive functions was the main issue

discussed. "Higher order skills" like "problem-solving," "critical thinking," "argumentative skills," and creative writing are being suppressed, and this is concerning. Participants also mentioned AI chatbots as "risk for learning," "easy way to get answers" "not substitution of creativity."

Challenges in Assessment and Evaluation

All the participants expressed challenges in evaluating academic texts. They noted that unrecognized textual sources and students' unethical applications are concerning. Additionally, they asserted how difficult it is to distinguish between students' texts and texts produced by AI. Participants also pointed out the difficulties of not having plagiarism detection for AI texts. Additionally, one participant brought up the lack of plagiarism detectors for the Finnish language,

> "Well, at the moment we don't have any system that detects plagiarism of AI, and those we have don't detect very well, especially we don't have it in Finnish."

Ethical Challenges

All the participants raised their concerns about ethical issues. One of the most important challenges brought up by the participants was the privacy issues with the AI tools. Participants clarified that almost all of the AI tools are for commercial use and personal information is required for login purposes. AI chatbots are still external tools in some universities, and students must use caution when providing the chatbots with personal data. According to pre-service teachers, the university's policies and guidelines are somewhat ambiguous. The issue with the policy is that the allowable percentages of artificial intelligence are not properly mentioned.

> "And that area has no particular guidelines there like to what extent, what percentage can be written by AI or not, and then who do you award the degree to at the end of the day."
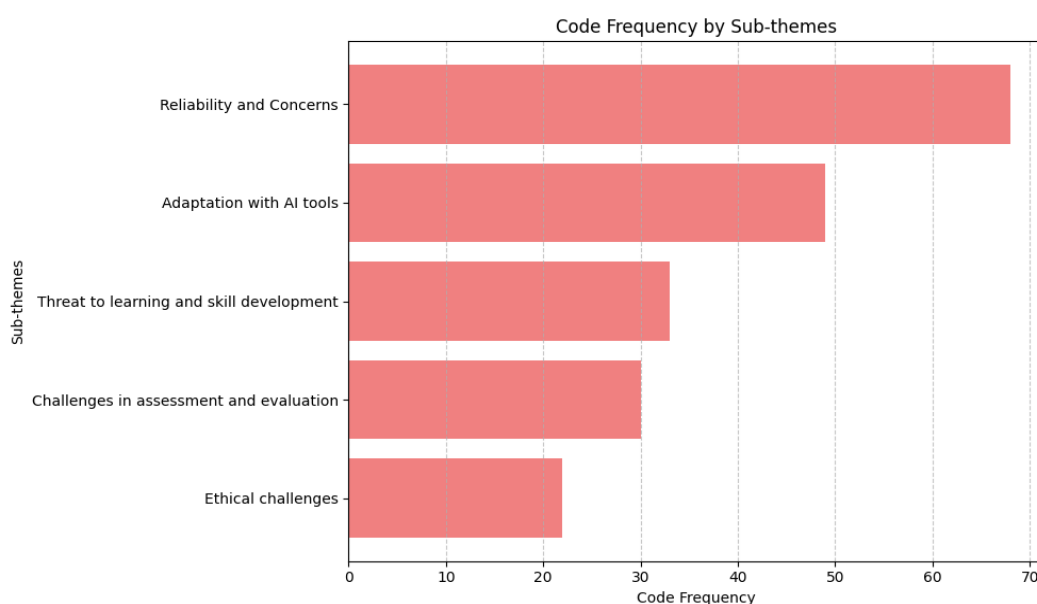

Figure 1: Challenges of AI Chatbots in Teacher Training

The concerns about lacking creativity, ethical challenges, and challenges in evaluation are supported by Rudolph and colleagues (2023) and Rasul and fellows (2023). The participants mentioned that AI chatbots lack creativity, often deliver incorrect references, and don't reveal sources. The statements are congruent with Rasul et al. (2023) who indicated that the inaccuracy of the information that ChatGPT's technology frequently delivers and the inadequacy to assess and enhance graduate skill sets are some significant problems. Rudolph et al., (2023) also expressed concerns regarding assessment and evaluation because AI-generated answers could outdate traditional approaches. The study was a literature review with selected articles, however, participants of the present study reported similar findings regarding teacher training. In addition, our participants expressed concerns about the time required to adjust to new technology, discouraging teacher trainees from adopting new educational tools. This anxiety highlights the difficulties associated with incorporating technology into educational processes, as the perceived time burden may lead to reluctance among educators already dealing with the complexities of their training. Addressing these concerns is critical to creating a more favorable environment for technology adoption in teacher education programs.

In the study, Rasul and colleagues (2023) also mentioned that graduate-level skills like critical thinking, problem-solving, cooperation, and teamwork require social interactions, contextual inputs, and real-world experiences—all of which ChatGPT cannot fully provide. The pre-service teachers also mentioned that AI chatbots suppressed cognitive functions and argumentative writing still requires students' active efforts. However, when some countries like Italy, and the United States are banning ChatGPT from educational institutions (Browne, 2023); Ogugua and colleagues (2023) mentioned that ChatGPT has both positive and negative effects and suggested some effective ways to integrate ChatGPT in educational settings.

They mentioned defining the specific goals and objectives to be achieved using ChatGPT in classes, establishing clear guidelines and boundaries for using ChatGPT; and emphasizing the importance of critical thinking and independent problem-solving skills with ChatGPT. The findings are similar to the opinion of the preservice teachers while the proposal of including AI chatbots indicated not only ChatGPT but also any available registered chatbots for teachers and future teachers from the IT department of the university. In addition, the data also reflects the concerns about students' plagiarism where preservice teachers are in dilemma about the educational impact of these AI chatbots. Participants suggested clear guidelines about the percentages and declaration of using AI chatbots for both teachers and students. According to Tate and colleagues (2023), preservice education is needed to provide the necessary pedagogical information and practical skills to incorporate AI in their lessons. Thus, there is a need to learn more about the benefits and drawbacks of AI chatbots, foster a more positive attitude towards integrating AI tools in teaching-learning, and consequently digital competency in teacher training programs.

Opportunities of AI Chatbots

Based on the experience of using AI-powered chatbot, each participant outlined several opportunities. This thematic category is composed of six central ideas (Figure 2). In the following sections, each of the sub-themes is explained in detail to assist with illustrating the concepts underpinning this topic.

Learning Assistant

Most of the participants perceived AI-powered chatbots as a learning assistant for students. Some participants suggested AI tools as guidance and support and others pointed it as a friend to assist in learning. Then, participants also suggested some forms of learning where using AI tools will mostly benefit students, such as "learning a second language," "vocabulary learning," "generating thesis ideas," "template for presentation" and so on.

All the participants recognized that AI chatbots like Chat GPT are "full of resources" and summarize things with "very good text," so both teachers and students can use it to learn new topics and generate different sorts of knowledge. Regarding the potential of AI in students' learning, participants share an understanding that by helping students to summarise large amounts of text into small pieces and quickly access information, AI increases their productivity and efficiency in learning processes. It is noticeable that the idea of productivity linked to optimizing time becomes an asset of AI.

Transformation of Teaching Strategies

During the discussion about the possibilities of using AI tools in education, the pre-service teachers pointed out several opportunities to transform their regular teaching materials into technology-enhanced ones. In their opinion, AI tools can be used both in planning and preparing teaching materials. In terms of classroom activities, participants also specified some tasks where AI-powered chatbots can be utilized effectively, for example, creating "visual material images," "pictures for slides," "games for courses," "videos for contents." Participants stated:

> "If I'm making some sort of images, for example for PowerPoint presentations, it's more likely that I try to make them fit AI like ChatGPT, Dall-E or Adobe projects and so on."

Another important issue discussed during the interviews was the ways of formulating assessment exams in a way that students can't use AI to directly answer the questions. For instance, participants suggested that teachers could plan the assignments and then ask AI for the answer for them and then make some changes to the assignments so that AI doesn't give the straight answer to the question.

Efficiency and Productivity Enhancement

Participants acknowledged that employing AI in the workplace is clearly advantageous regarding working hours and accessing information. Yet, selecting the right instance of use and executing AI impeccably in the workplace may lead to even greater benefits.

Language and Text Enhancement

Each participant explained how AI-powered chatbots enhance students' and teachers' use of written texts. Four participants assured that the text provided by language-based popular AI like ChatGPT is "clear," "good," "improved" and "well-developed" and mostly they are using it to simplify texts. Furthermore, it has been noted that students use ChatGPT to improve their written tasks like "reviewing and summarizing articles" and writing text in different ways.

Data Optimization and Analysis

Among twelve participants, six participants mentioned the possibilities of AI tools as for data optimization and analysis. For instance:

> "I would include AI only when there is a need for optimizing some sort of data for understanding very specific concepts in a variety of fields. So, for example, when there is a need for optimizing this search, optimizing this gathering of information, I think AI could be used."

AI tools, therefore, offer the opportunity to be integrated into teacher training in the form of optimizing data since it can classify data based on specific attributes and predict solutions quickly.

Fascinating Factors of AI Chatbots

During the discussion regarding the rationale behind using AI tools, participants acknowledged that they began using ChatGPT and other AI tools out of "curiosity," "interest" and so on. Also, information about ChatGPT was "available both online and in newspapers." Again, most of the participants also agreed that AI has a "vast field" and its limit is "boundless" and "possibly a big societal and global change." The language-based AI model ChatGPT was notably brought up by participants, by pointing out how "popular," "easy to learn," and "usable for average people" it is, making it accessible to all users and occasionally even able to "substitute human in some fields."

In summary, when discussing the potential applications of AI-powered chatbots for teacher training, participants noted the abundance of opportunities they are already experiencing and their optimism for future uses of AI in the classroom. Therefore, these technologies are indeed empowering learners to acquire and increase knowledge.
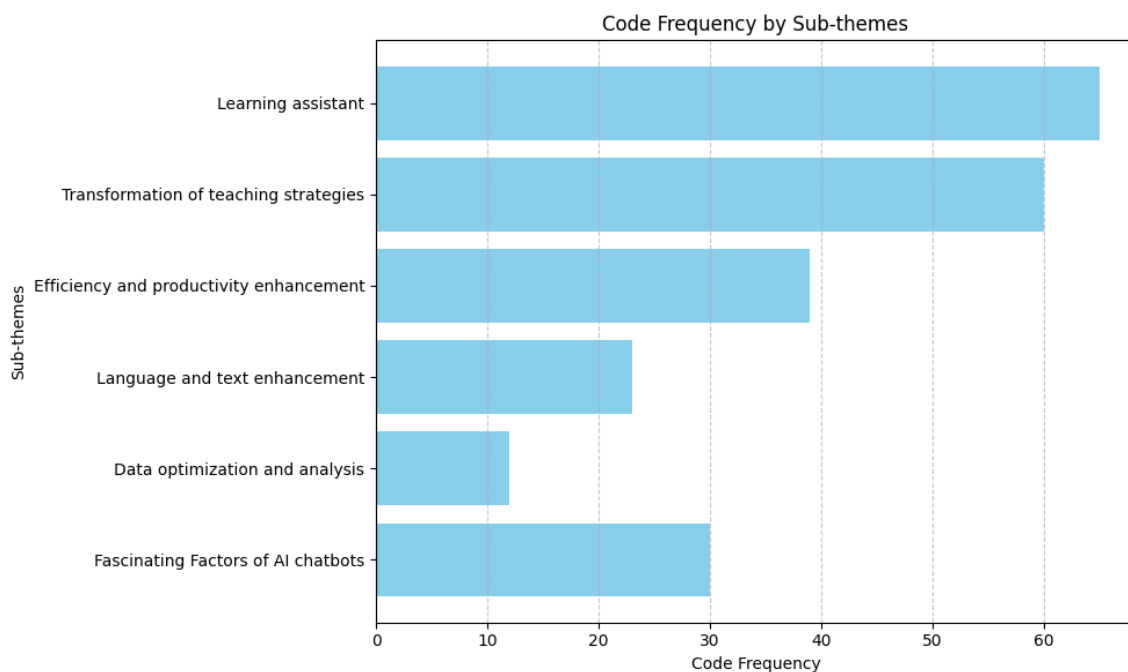

Figure 2: Opportunities of AI Chatbots in Teacher Training

Overall, results suggest that teacher educators recognize learning potential in using AI generative tools. Our participants enumerated different potential positive implications of AI use which are aligned with previous studies. For example, AI can be a valuable tool in data analysis. Similar ideas have been reported in studies addressing ChatGPT, where scholars and students have observed the use of ChatGPT and identified ways in which AI technologies can facilitate individualized learning experiences to student's individual needs, enhance writing abilities, and highlight the significance of digital literacy (Firat, 2023; Nazari et al., 2021; Rasul et al., 2023). It is important to emphasize, however, that how the learning materializes (ways in which the interaction with AI affords learning) is still an open discussion. All research done so far have addressed the phenomenon through self-report of perceived learning or user experiences. A critical analysis of learning processes is still to be done.

In this study, the opinions of preservice teachers are in line with these findings as they expressed that AI tools can support research by classifying data from specific features and also able to predict solutions from databases. Nazari and colleagues (2021) examined how various AI-powered writing tools have been created to support users' self-directed learning and assist with English writing, especially in higher education. The study looked into the efficacy of an AI-powered writing tool for postgraduate students prior to the launch of ChatGPT. This is aligned with our results, which expressed the same opportunities regarding AI-powered chatbots like ChatGPT, Microsoft Bing (now Copilot), and AI chat. In addition, our participants mentioned the potential of AI chatbots in data optimization of education and research. Also, from the constructivist perspective, tailoring learning experiences to each learner's needs and learning environments is emphasized. According to constructivism, knowledge is created via interactions with peers and the environment; as a result, by seeing trends in student performance, engagement, and feedback, data-driven insights can help to improve this process. Teachers can design tailored learning pathways that promote critical thinking and active engagement by examining a variety of data sources. Additionally, by refining data collection techniques, researchers can investigate the dynamics of collaborative learning and build settings where students can co-create knowledge. In addition to improving educational outcomes, this alignment of data practices with constructivist principles also improves the state of research, opening the door to more significant and impactful learning opportunities.

Furthermore, preservice teachers mentioned that AI chatbots can reduce workload by simplifying texts and providing solutions faster. Also, AI is an evolving and intriguing process (Chennupathi,2024). Therefore, the evolution of AI requires the utmost competency for teachers. Also, productivity and efficiency are being understood as a good trade in learning processes. In a study, Trust and colleagues (2023) suggested that preservice teachers need to interact with AI technologies in their teaching. And the data reflects that preservice teachers are using AI chatbots for brainstorming ideas, planning lessons, preparing course material, translating texts, and sometimes giving feedback to students which is similar to the findings of Trust and colleagues (2023). Moreover, to keep pace with the updated AI tools, participants expressed the ideas of personalized AI for teaching and anticipated AI to be integrated into all software. Therefore, the insights of the participants to use AI tools in their teaching such as assisting to focus on students' urgent needs, simulating challenging situations in a classroom, and immediate translation of speech during online meetings advances the desired role of integrating AI chatbots in teacher training.

Conclusion

This research aimed to explore the opportunities and challenges of AI-powered chatbots in teacher training. The goal of the study was achieved by identifying the most notable opportunities and challenges through thematic analysis. AI chatbots like ChatGPT, Bing (now Copilot), and AI chat have the ability to support research by data optimization and analysis, enhance productivity, upgrading teaching material and learning experiences by helping in brainstorming ideas, providing so many learning resources, and summarize articles. On the other hand, the challenges of academic dishonesty, unreliable sources, and inadequate assessment design might hinder the growth of critical cognitive skills and encourage superficial learning. Consequently, teachers, students and administrators need to be clear about guidelines and their role in ensuring the ethical, dependable, and efficient use of AI chatbots for teaching-learning. This study concludes by suggesting that teachers need to prioritize teaching students how to use generative AI technologies responsibly and ethically. New assessment strategies also need to be employed to ensure that students can answer critically and participate in collaborative learning. Integrating AI literacy in teacher training education can improve the competency and preparedness of future teachers for evolving educational technology. In conclusion, by providing students' argumentative cognitive skills top priority, it is necessary to achieve a balance between reducing academic misconduct and encouraging academic innovation.

Regardless of this study's insightful findings, it is important to acknowledge its limitations. The sample size was limited to 12 preservice teachers and the findings were only about teacher training education. Participants' diversity from other faculties like the health and engineering sector can expand the understanding of the implications of AI chatbots. Therefore, the findings cannot be generalized as a whole opportunity and challenges of AI chatbots in education. The study recommends a critical examination of AI chatbots more organically into the entire curriculum of teacher education to best prepare future teachers for integration of AI tools into their curricula and practices, given its rapid development and adoption to impact nearly every aspect of society and education. Further longitudinal and experimental research are recommended to better understand the long-term implications of AI integration and its impact on teachers, students, and stakeholders in both teacher education and overall higher education. In addition, future research may examine how authenticating systems are developed to acknowledge and validate skills and knowledge obtained by AI-supported learning.

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