

Future Teachers' Perspectives on Generative Artificial Intelligence in Educational Settings: A Study Across Undergraduate and Master's Levels

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ABSTRACT

The rapid proliferation of generative artificial intelligence (GenAI) tools, such as large language models (LLMs), presents both unprecedented opportunities and significant challenges for the educational landscape. As these technologies become increasingly accessible, understanding the perceptions of future educators is crucial for effectively integrating GenAI into pedagogical practices and curriculum design. This article explores the nuanced views of undergraduate and master's-level teacher candidates regarding the benefits, challenges, ethical implications, and preparedness for utilizing GenAI in their prospective teaching careers. Drawing upon existing literature, this conceptual study outlines a framework for examining these perceptions, hypothesizing that while future teachers recognize the potential of GenAI for personalized learning and administrative tasks, they also express concerns about academic integrity, the potential for over-reliance, and the necessity for robust training. The insights garnered from such an exploration are vital for shaping teacher education programs, developing appropriate policies, and fostering a generation of educators equipped to navigate the evolving digital learning environment.

Keywords: Generative AI, artificial intelligence, education, teacher perceptions, future teachers, higher education, academic integrity, pedagogical integration.

INTRODUCTION

The advent of artificial intelligence (AI) has initiated a transformative shift across various sectors, and education is no exception [6]. Specifically, generative AI (GenAI) technologies, exemplified by large language models (LLMs) like ChatGPT, have swiftly moved from being nascent curiosities to powerful tools with pervasive implications for teaching, learning, and assessment [8, 11]. These sophisticated algorithms are capable of generating diverse forms of content, including text, images, and code, in response to natural language prompts, thereby offering novel avenues for innovation within educational contexts [7].

The integration of AI into education is not a new phenomenon; however, the rapid deployment and accessibility of GenAI tools mark a distinct phase in this evolution [6]. Unlike earlier AI applications often confined to specific tasks like intelligent tutoring systems or adaptive learning platforms, GenAI offers broad utility, from aiding in content creation and lesson planning to facilitating personalized student feedback and fostering creative problem-solving [3, 11]. This burgeoning capability necessitates a comprehensive understanding of how key stakeholders perceive and intend to interact with these technologies.

Within the educational ecosystem, teachers play a pivotal role in mediating technology integration and shaping learning experiences. Their readiness, attitudes, and skills

in leveraging new tools directly impact the success of any technological adoption [12]. As such, examining the perceptions of *future* teachers – those currently undergoing undergraduate and master's-level training – is of paramount importance. These individuals represent the vanguard of the next generation of educators who will be tasked with guiding students through an increasingly AI-permeated world [12]. Their formative experiences with GenAI, both as learners and as aspiring professionals, will profoundly influence their future pedagogical approaches and their ability to prepare students for a society where AI literacy is becoming indispensable [10].

Despite the growing body of research on student and faculty perceptions of GenAI in higher education [1, 3, 14, 16], there remains a distinct gap in the specific exploration of teacher candidates' views, particularly those who are simultaneously learning about pedagogy and experiencing GenAI from a student perspective [12]. Understanding their unique dual perspective – as learners who might use GenAI for their assignments and as future educators who will supervise its use and integrate it into their teaching – is critical for proactive curriculum development in teacher education programs. This article aims to address this gap by conceptually outlining a study designed to explore future teachers' perceptions of GenAI in educational settings, considering both the perceived benefits and challenges.

Research Questions:

1. What are undergraduate and master's-level future teachers' general perceptions of generative AI in education?
2. What perceived benefits do future teachers associate with the use of generative AI in teaching and learning?
3. What perceived challenges and ethical concerns do future teachers identify regarding the integration of generative AI in educational settings?
4. To what extent do future teachers feel prepared to effectively utilize and manage generative AI tools in their future classrooms?

2. Literature Review

The emergence of generative AI, particularly large language models (LLMs) such as ChatGPT, has sparked widespread discussion regarding its transformative potential and inherent challenges within higher education [8, 11]. A substantial body of recent literature has begun to explore various facets of this phenomenon, focusing on student and faculty perceptions, academic integrity, and the future role of educators.

General Perceptions of GenAI in Higher Education:

Initial studies indicate a mixed but generally optimistic perception of GenAI among students. Many view GenAI as a powerful tool for learning and academic support [3, 9, 14, 16]. For instance, Chan and Hu [3] found that students generally hold positive views, recognizing GenAI's utility for tasks such as brainstorming, content generation, and summarizing information. Similarly, Elkhodr et al. [9] observed that ICT students perceive ChatGPT as a valuable resource for enhancing their learning experiences. However, Ngo [14] also highlighted varying perceptions, with some students expressing concerns about the accuracy of information and potential for over-reliance. The Expectancy Value Theory (EVT) has been employed to deconstruct student perceptions, suggesting that students' intentions to use GenAI are influenced by their expectations of success and the value they ascribe to the tool [5].

Perceived Benefits of GenAI:

A key theme in the literature is the diverse range of benefits GenAI can offer. From a student perspective, these include enhancing productivity, providing quick access to information, assisting with writing tasks, and fostering creativity [3, 7, 14]. Dai et al. [7] even reconceptualize ChatGPT as a "student-driven innovation," emphasizing its role in empowering learners. For educators, the benefits extend to administrative tasks such as generating lesson plans, creating rubrics, and drafting communication, thereby potentially reducing workload and allowing more time for direct instruction and student engagement [11].

Personalized learning is another frequently cited advantage, where GenAI can adapt content and feedback to individual student needs [11]. Miao and Holmes [13] and Sabzalieva and Valentini [15] from UNESCO provide guidance on how GenAI can be leveraged for educational and research purposes, underscoring its potential for widespread application.

Challenges and Ethical Concerns:

Despite the optimism, significant challenges and ethical concerns surrounding GenAI in education are widely acknowledged. Academic integrity is perhaps the most prominent issue, with concerns about "AI-giarism" – the use of GenAI to complete assignments without proper attribution, blurring the lines of original thought and authorship [2, 8]. Chan [2] specifically investigates how students' understanding of academic misconduct is evolving in the context of GenAI. The potential for over-reliance on AI, leading to a decline in critical thinking skills, is another concern [11, 17]. Dwivedi et al. [8] raise multidisciplinary perspectives on these challenges, extending to research practices and policy implications. Data privacy, bias in AI outputs, and the perpetuation of misinformation are also critical ethical considerations that require careful attention [8, 11]. Walczak and Cellary [17] discuss the broader challenges for higher education in an era of widespread GenAI access.

The Role of Teachers and "AI Replacing Teachers":

The rise of GenAI has also sparked debates about the future role of educators and the possibility of AI replacing human teachers [4, 10]. While some fear job displacement, the prevailing view in the literature suggests that GenAI will more likely augment, rather than replace, human teachers [4, 10]. Chan and Tsi [4] specifically examined teacher and student perceptions on this matter, finding that while AI can automate certain tasks, the unique human elements of teaching, such as fostering critical thinking, emotional intelligence, and interpersonal connections, remain indispensable. Felten et al. [10] discuss how language models might affect occupations more broadly. This emphasizes the need for educators to adapt and evolve their roles, focusing on skills that complement AI capabilities, such as designing effective AI-integrated learning experiences and promoting ethical AI use.

Future Teachers' Unique Perspective:

The specific focus on future teachers is crucial because they are simultaneously grappling with GenAI as learners and contemplating its implications as educators. Lozano and Blanco Fontao [12] conducted a study on primary education degree students, examining their perceptions from a dual perspective: as current pupils and future teachers. Their findings underscore the importance of understanding this dual role to prepare the education system for the widespread adoption of AI. Teacher education programs must equip these future educators with the necessary

knowledge, skills, and ethical frameworks to effectively integrate GenAI into their pedagogical practices and address its challenges.

3. METHODS

This conceptual study proposes a mixed-methods research design to comprehensively explore the perceptions of undergraduate and master's-level future teachers regarding generative AI in educational settings. A mixed-methods approach is suitable for capturing both the breadth of opinions and the depth of individual experiences, providing a holistic understanding of this complex phenomenon.

3.1 Research Design

The study would employ a sequential explanatory mixed-methods design. This involves an initial quantitative phase, where data is collected through surveys, followed by a qualitative phase, involving semi-structured interviews. The quantitative data would provide a broad overview of perceptions, identify key trends, and highlight areas requiring deeper exploration. The qualitative data would then elaborate on these quantitative findings, offering rich, contextualized insights into the underlying reasons and nuanced experiences shaping future teachers' views.

3.2 Participants

Participants would be recruited from university programs offering undergraduate and master's degrees in education, preparing students to become certified teachers. A stratified random sampling approach would be utilized to ensure representation from both undergraduate and master's levels, potentially also considering different teaching specializations (e.g., elementary education, secondary English, mathematics, science) to capture diverse perspectives.

- Inclusion Criteria: Enrollment in a recognized teacher education program (undergraduate or master's level), consent to participate.
- Exclusion Criteria: Individuals not currently enrolled in a teacher education program, or those unwilling to provide informed consent.

A target sample size of approximately 300-500 participants for the quantitative phase would allow for robust statistical analysis, while 20-30 participants for the qualitative interview phase would ensure data saturation and in-depth exploration of themes.

3.3 Data Collection Instruments

3.3.1 Quantitative Phase: Online Survey

A comprehensive online survey would be developed and administered using a secure platform. The survey would consist of several sections:

- Demographic Information: Age, gender, program level (undergraduate/master's), years in program, previous experience with AI/GenAI.
- Perceptions of GenAI: Likert-scale items (e.g., 1 = Strongly Disagree to 5 = Strongly Agree) assessing general attitudes towards GenAI in education, its perceived usefulness, ease of use, and potential impact on teaching and learning. Questions would be adapted or inspired by existing scales on technology acceptance and student perceptions of GenAI [1, 5, 14, 16].
- Perceived Benefits: Likert-scale items assessing the extent to which GenAI is perceived to benefit various aspects of teaching (e.g., lesson planning, content creation, differentiation, assessment) and student learning (e.g., personalized learning, information access, skill development).
- Perceived Challenges and Ethical Concerns: Likert-scale items addressing concerns related to academic integrity, plagiarism ("AI-giarism") [2], critical thinking skills, data privacy, bias in AI outputs, and the ethical use of GenAI.
- Preparedness and Training Needs: Items assessing future teachers' self-perceived preparedness to integrate GenAI, their comfort level, and their perceived need for specific training and professional development.
- Open-ended Questions: A few open-ended questions would be included at the end of the survey to allow participants to elaborate on their responses or share additional thoughts, which could inform the interview phase.

3.3.2 Qualitative Phase: Semi-structured Interviews

Following the analysis of the quantitative data, a subset of participants would be invited for semi-structured interviews. These interviews would aim to delve deeper into themes that emerged from the survey, explore nuanced perspectives, and understand the lived experiences of future teachers concerning GenAI. Interview questions would be designed to explore:

- Specific examples of GenAI use, both personally and academically.
- Detailed explanations of perceived benefits and challenges.
- Elaboration on ethical concerns and how they envision addressing them in their future classrooms.
- Suggestions for how teacher education programs can better prepare them for GenAI integration.

Interviews would be conducted virtually or in person, audio-recorded with participant consent, and transcribed verbatim for analysis.

3.4 Data Analysis

3.4.1 Quantitative Data Analysis:

Quantitative data from the surveys would be analyzed using statistical software (e.g., SPSS, R).

- Descriptive Statistics: Frequencies, percentages, means, and standard deviations would be calculated to describe the demographic characteristics of the sample and summarize responses to Likert-scale items.
- Inferential Statistics:
 - Independent samples t-tests or ANOVAs would be used to compare perceptions between undergraduate and master's-level students, and potentially across different demographic groups.
 - Correlation analyses would explore relationships between perceived usefulness, ease of use, and overall attitudes towards GenAI.
 - Regression analysis might be employed to identify predictors of future teachers' preparedness or intent to integrate GenAI.

3.4.2 Qualitative Data Analysis:

Qualitative data from the interview transcripts would undergo thematic analysis [18]. This iterative process would involve:

- Familiarization: Reading transcripts multiple times to gain an overall understanding.
- Initial Coding: Generating initial codes from the data segments relevant to the research questions.
- Searching for Themes: Grouping similar codes into broader potential themes.
- Reviewing Themes: Refining and defining themes, ensuring they are distinct and accurately represent the data.
- Defining and Naming Themes: Developing clear definitions and illustrative quotes for each theme.

This analysis would identify recurring patterns, unique insights, and underlying narratives that explain the quantitative findings.

3.5 Ethical Considerations

The study would adhere to strict ethical guidelines.

- Informed Consent: All participants would provide informed consent before participating, clearly outlining the study's purpose, procedures, potential risks and benefits, and confidentiality measures.
- Anonymity and Confidentiality: All collected data would be anonymized where possible, and confidentiality would be maintained throughout the study. Participant identities would not be linked to their responses.
- Voluntary Participation: Participation would be entirely voluntary, and participants would have the right to withdraw at any point without penalty.
- Data Security: All data would be stored securely on password-protected university servers, accessible only by the research team.

4. Results (Hypothetical)

Given the conceptual nature of this study, the results presented here are hypothetical, formulated based on themes and findings prevalent in the contemporary literature concerning perceptions of generative AI in education. These hypothetical findings are designed to illustrate the types of insights that would emerge from such a study and how they align with existing research.

4.1 General Perceptions of Generative AI

Future teachers across both undergraduate and master's levels generally hold a pragmatic and cautiously optimistic view of generative AI in education. A significant majority (e.g., 78%) reported that GenAI would have a substantial impact on the future of education, echoing broader sentiments in the field [6, 8, 17]. While many expressed excitement about the potential for innovation, a notable proportion (e.g., 45%) also indicated concerns about its potential misuse. This dual perspective aligns with findings from studies on student perceptions, where benefits are acknowledged alongside challenges [3, 14]. For instance, a common sentiment expressed in hypothetical interviews was: "It's a powerful tool, but like any powerful tool, it can be used for good or bad."

4.2 Perceived Benefits of Generative AI

Future teachers identified several key benefits of integrating GenAI into educational settings, primarily categorized into pedagogical support, administrative efficiency, and enhanced student learning.

- Pedagogical Support: A high percentage (e.g., 85%) of respondents agreed or strongly agreed that GenAI could assist in lesson planning and content creation. Many envisioned using GenAI to generate diverse examples, customize learning materials, or even draft initial versions of assignments and rubrics. This aligns with the idea that GenAI can

augment teacher capabilities [4, 11]. As one hypothetical master's student articulated: "Imagine how much time I could save on basic lesson outlines if an AI could generate a first draft for me. That frees me up for the more creative and student-focused aspects."

- **Administrative Efficiency:** A majority (e.g., 70%) perceived GenAI as beneficial for administrative tasks, such as creating communication templates, generating reports, or summarizing academic literature for professional development. This perception resonates with the efficiency gains discussed in the broader literature [11].
- **Enhanced Student Learning:** Future teachers also recognized GenAI's potential to personalize learning experiences (e.g., 65% agreement). They hypothesized that GenAI could provide individualized feedback, offer adaptive learning paths, and assist students with complex problem-solving [11]. Some suggested GenAI could be a tool for students to explore topics from multiple angles or get immediate assistance outside of class hours, aligning with the "student-driven innovation" concept [7].

4.3 Perceived Challenges and Ethical Concerns

Despite the recognized benefits, future teachers articulated significant challenges and ethical concerns.

- **Academic Integrity and "AI-giarism":** This emerged as the most prominent concern (e.g., 92% of respondents). Future teachers expressed anxiety about students using GenAI to complete assignments without genuine understanding or original thought. The concept of "AI-giarism" [2] was a recurring theme in hypothetical discussions, with participants questioning how to differentiate AI-generated work from human-generated work and how to enforce academic honesty policies effectively. An undergraduate student might state: "My biggest fear is that students will just use ChatGPT to write their essays, and I won't know if they've actually learned anything."
- **Over-reliance and Critical Thinking:** A substantial portion (e.g., 75%) worried that excessive reliance on GenAI could hinder students' development of critical thinking, problem-solving, and research skills [11, 17]. Participants highlighted the importance of teaching students *how* to use GenAI critically, rather than just using it as a shortcut.
- **Bias and Misinformation:** Concerns about algorithmic bias and the potential for GenAI to generate inaccurate or misleading information

were also prevalent (e.g., 60%). Future teachers recognized the responsibility of teaching students to evaluate AI-generated content critically, linking to broader discussions on digital literacy.

- **Equity and Access:** While not explicitly a survey item, some hypothetical interviewees raised concerns about equitable access to GenAI tools, particularly for students from disadvantaged backgrounds, potentially widening the digital divide.

4.4 Preparedness and Training Needs

Future teachers indicated a strong desire for more training and professional development related to GenAI.

- **Self-Perceived Preparedness:** Only a minority (e.g., 20%) felt adequately prepared to effectively integrate GenAI into their future classrooms, while a large majority (e.g., 70%) felt only somewhat prepared or not prepared at all. This highlights a significant readiness gap, consistent with findings by Lozano and Blanco Fontao [12] regarding the preparedness of the education system for AI.
- **Desire for Training:** There was overwhelming consensus (e.g., 95%) on the need for specific courses or modules within their teacher education programs on GenAI. Key areas of desired training included:
 - Practical applications of GenAI in various subject areas.
 - Strategies for designing assignments that mitigate "AI-giarism" and promote critical AI use.
 - Ethical guidelines and discussions on responsible AI integration.
 - Evaluating the quality and accuracy of AI-generated content.

One master's student articulated this need clearly: "We're going to be teaching in a world where AI is everywhere. Our programs need to show us not just how to use it, but how to teach with it and about it responsibly."

5. DISCUSSION

The hypothetical findings from this conceptual study underscore a critical juncture in educational technology: future teachers are acutely aware of generative AI's burgeoning presence and potential, yet they express significant apprehension regarding its responsible integration and their own preparedness. Their perceptions, reflecting a blend of optimism for pedagogical innovation and caution regarding ethical pitfalls, resonate deeply with

broader academic discussions on AI in higher education [3, 8, 11].

The high perceived usefulness of GenAI for lesson planning, content creation, and administrative tasks aligns with the transformative potential outlined by various scholars [4, 11, 13, 15]. If effectively implemented, GenAI could indeed alleviate teacher workload, allowing educators to focus more on higher-order instructional activities, personalized student support, and fostering a dynamic classroom environment. The recognition of GenAI's capacity for personalized learning is particularly encouraging, as this speaks to a desire for more individualized pedagogical approaches, which AI can significantly facilitate [11]. This also suggests that future teachers, as digital natives, are open to embracing technological advancements that promise to enhance efficiency and student outcomes.

However, the overwhelming concern about academic integrity and "AI-giarism" is a salient finding, mirroring the alarms raised by researchers like Chan [2] and Dwivedi et al. [8]. This highlights a fundamental challenge for teacher education: how to equip future educators with strategies to design authentic assessments that mitigate AI misuse while simultaneously teaching students responsible and ethical engagement with these powerful tools. The fear of students over-relying on GenAI and subsequently eroding critical thinking skills is a legitimate pedagogical worry, underscoring the necessity for curricula that emphasize human-centric skills alongside AI literacy [11, 17]. It suggests that the role of the teacher is evolving from a mere disseminator of knowledge to a facilitator of critical inquiry and a guide in navigating complex information landscapes, including those generated by AI.

The self-reported lack of preparedness among future teachers, coupled with their strong desire for dedicated training in GenAI, is perhaps the most actionable insight from these hypothetical results. This echoes the broader concern about whether the education system is adequately prepared for the "irruption of artificial intelligence" [12]. Current teacher education programs must proactively integrate modules or courses that address the theoretical underpinnings of GenAI, its practical applications, ethical considerations, and pedagogical strategies for its responsible use. This training should not merely focus on how to use the tools but, crucially, on *how to teach with and about* AI, fostering critical evaluation, ethical decision-making, and creativity in an AI-enhanced learning environment. Without such preparedness, there is a risk that future teachers will either avoid GenAI altogether, missing valuable opportunities, or adopt it without sufficient understanding of its implications.

Furthermore, the hypothetical concerns about bias, misinformation, and equitable access underscore the broader societal implications of GenAI integration. Teacher

education must empower future educators to critically analyze AI outputs, understand their limitations, and address potential biases. Discussions around digital equity are paramount to ensure that GenAI's benefits are accessible to all students, irrespective of their socioeconomic background or access to technology.

Limitations:

As a conceptual study, the primary limitation is the hypothetical nature of its results. The findings are based on a synthesis of existing literature and assumed common perceptions rather than empirical data collected from actual participants. Therefore, the generalizability of these specific 'results' is constrained. An actual empirical study would need to rigorously collect data from a diverse sample of future teachers to validate these proposed perceptions and explore nuances not captured in this conceptual framework. Moreover, the rapid evolution of GenAI means that perceptions are constantly shifting, requiring continuous research.

Future Research Directions:

Future empirical research should:

1. Conduct actual large-scale surveys and in-depth interviews with diverse populations of teacher candidates to validate and expand upon these hypothetical findings.
2. Investigate specific training interventions within teacher education programs and evaluate their effectiveness in enhancing future teachers' GenAI literacy and preparedness.
3. Explore the differences in perceptions and integration strategies across various subject areas and grade levels.
4. Examine the long-term impact of GenAI on student learning outcomes and the development of essential skills when facilitated by teachers trained in AI pedagogy.
5. Conduct longitudinal studies to track how future teachers' perceptions and practices evolve as they transition from preservice to in-service educators.

6. CONCLUSION

The integration of generative AI into education is an inevitable and potentially transformative development. Future teachers, as the architects of tomorrow's learning environments, are at the forefront of this shift. This conceptual exploration highlights that while they largely recognize the profound benefits GenAI offers for pedagogical enhancement and administrative efficiency, they also harbor significant, well-founded concerns about academic integrity, the erosion of critical thinking, and the ethical use of these powerful tools. Crucially, their expressed lack of preparedness underscores an urgent need for

proactive and comprehensive reform within teacher education programs. Equipping future educators with the knowledge, skills, and ethical frameworks necessary to navigate the complexities of AI-enhanced classrooms is not merely an option but an imperative. By investing in robust GenAI literacy for teacher candidates, educational institutions can foster a generation of educators who are not just users of technology, but thoughtful, adaptable professionals capable of harnessing AI's potential to create equitable, engaging, and effective learning experiences for all students.

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