Generative AI in Teacher Education: Student Teachers' Use and Perspectives in Bhutan

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Abstract

Generative artificial intelligence (AI) tools such as ChatGPT, Gemini and NotebookLM are transforming teaching and learning in higher education. This study examines how student teachers at Paro College of Education, Royal University of Bhutan, use generative AI and perceive its value in education.

Survey data from 336 student teachers were analysed to explore patterns of AI use and the factors influencing support for AI integration in education. The findings show that generative AI is widely used to understand difficult concepts, complete assignments and prepare for examinations.

Students generally viewed AI positively, recognising its potential to improve learning efficiency, deepen understanding and increase academic productivity. They also acknowledged important challenges, including the need to verify AI-generated information, uphold academic integrity and avoid excessive reliance on these tools.

Regression analysis revealed that AI competence and critical evaluation skills were the strongest predictors of support for educational AI integration, followed by awareness of ethical issues and responsible AI use. The findings highlight the importance of strengthening AI literacy, critical thinking and ethical awareness within teacher education programmes.

As AI becomes increasingly embedded in education, Bhutanese institutions should ensure that future teachers are equipped to use these technologies confidently, critically and responsibly.

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1. Introduction

Generative artificial intelligence (AI) is transforming how people learn, work and access information. In higher education, tools such as ChatGPT, Gemini, Copilot and NotebookLM have rapidly become part of students' everyday learning.

Within seconds, these applications can explain complex concepts, summarise lengthy readings, generate ideas, draft written work and provide instant feedback. Their speed, accessibility and ease of use have made them increasingly popular among university students worldwide (Baidoo-Anu & Ansah, 2023).

Research suggests that generative AI can enhance learning by providing personalised support, improving conceptual understanding and encouraging self-directed learning (Baidoo-Anu & Ansah, 2023; Chan & Hu, 2023; Chiu, 2023). Many students now view AI as an interactive learning companion rather than merely a search tool.

However, its rapid adoption has raised important educational and ethical questions. Concerns remain regarding the accuracy of AI-generated information, academic integrity, over-reliance on AI, and the possibility that students may engage less in critical thinking and independent problem-solving (Ahmad et al., 2023; Perkins et al., 2024; Tlili et al., 2023; Zhai et al., 2024). These issues have prompted universities around the world to consider how AI can be used to enhance learning while maintaining academic standards.

These questions are particularly significant in teacher education. Student teachers are not only current users of AI but also future educators who will shape how these technologies are introduced and used in schools.

Beyond technical skills, they will need the ability to evaluate AI-generated information critically, make ethical decisions and guide learners in using AI responsibly. Recent studies indicate that student teachers generally recognise the educational potential of AI while emphasising the need for

institutional guidance, ethical awareness and responsible use (Ng et al., 2025; Tlili et al., 2023).

Interest in generative AI has grown rapidly in Bhutan. Student teachers increasingly use AI to support coursework, lesson preparation, research and assessment tasks.

Despite this growing use, little empirical evidence exists on how they are engaging with these technologies or how they perceive their opportunities and challenges. Existing discussions in Bhutan have focused mainly on academic integrity and assessment (Dorji, 2026), leaving limited evidence on student teachers' experiences and their readiness to integrate AI into future teaching.

Understanding these perspectives is important for informing teacher education, institutional policy and AI literacy initiatives. As AI becomes more widely embedded in education, teacher education programmes must ensure that future teachers can use these technologies confidently, critically and responsibly.

Drawing on Social Cognitive Theory (Bandura, 1986), this study examined how student teachers at Paro College of Education, Royal University of Bhutan, use generative AI and perceive its role in education. Specifically, the study addressed the following research questions:

1. How are student teachers using generative AI in their academic learning?
2. What benefits and challenges do student teachers associate with the use of generative AI?
3. What factors influence student teachers' support for the educational use and governance of generative AI?

2. Literature Review and Theoretical Framework

This study draws on Social Cognitive Theory (SCT) (Bandura, 1986), which explains human behaviour as the result of reciprocal interactions among personal, behavioural and environmental factors.

Within the context of generative AI, personal factors include students' perceptions of AI, ethical awareness and confidence in using AI tools. Behavioural factors relate to how students use AI to support learning, while environmental factors include institutional policies, access to technology and guidance on responsible AI use. SCT provides a framework for understanding how these factors influence student teachers' attitudes towards AI and their willingness to integrate it into future educational practice.

Generative AI has rapidly become an important feature of higher education. Tools such as ChatGPT, Gemini, Copilot and NotebookLM enable students to generate text, summarise information, answer questions and support a wide range of academic tasks.

Research indicates that these tools can enhance personalised learning by providing immediate feedback, clarifying difficult concepts and encouraging independent learning (Baidoo-Anu & Ansah, 2023; Chan & Hu, 2023; Evmenova et al., 2024). Students also use AI to organise ideas, prepare for assessments, support research and improve academic writing, contributing to its growing adoption across universities.

At the same time, the increasing use of generative AI has prompted important educational and ethical discussions. Studies consistently report that AI can improve learning efficiency, engagement and productivity by providing timely and personalised support (Baidoo-Anu & Ansah, 2023; Chiu, 2023; Lee et al., 2023).

However, concerns remain about the reliability of AI-generated information, responsible use in academic work and the possibility that over-reliance on AI may reduce opportunities for critical thinking and independent problem-solving (Ahmad et al., 2023; Perkins et al., 2024; Tlili et al., 2023; Zhai et al., 2024).

These findings highlight the need for students to develop the ability to evaluate AI-generated information critically and use these technologies responsibly.

These issues are particularly relevant to teacher education. Student teachers are expected not only to use AI effectively in their own learning but also

to prepare for its responsible integration into future classrooms. Recent research suggests that they recognise AI's potential for lesson planning, content development, assessment design and differentiated instruction while emphasising the importance of AI literacy, ethical awareness and institutional guidance (Ng et al., 2025; Tlili et al., 2023).

Although interest in generative AI is increasing in Bhutan, empirical evidence on its use in teacher education remains limited. Existing research has focused primarily on academic integrity and assessment-related issues (Dorji, 2026), leaving little understanding of how student teachers use AI, the opportunities and challenges they perceive, and the factors influencing their support for its educational use.

Guided by Social Cognitive Theory, this study therefore examines how perceptions, responsible AI use and AI competence shape student teachers' attitudes towards the educational integration and governance of generative AI.

3. Methods

3.1 Research Design

This study employed a cross-sectional survey design to examine student teachers' use of generative AI and their perceptions of its educational value. A structured questionnaire collected data on AI use, perceived benefits and challenges, responsible AI practices, AI competence, and perceptions of the educational use and governance of AI.

3.2 Participants and Data Collection

The study involved 336 student teachers enrolled in different teacher education programmes at Paro College of Education, Royal University of Bhutan. Participation was voluntary, and data were collected through an anonymous questionnaire administered during the study period.

3.3 Data Analysis

Quantitative data were analysed using descriptive statistics to summarise patterns of AI use and participants' perceptions. Multiple linear regression analysis was conducted to identify the factors associated with support for the educational use and governance of AI. Responses to the open-ended

questions were analysed thematically to complement the quantitative findings.

3.4 Ethical Considerations

Participants were informed about the purpose of the study and assured that their responses would remain confidential and anonymous. Data were used solely for the purposes of this research, and participation was voluntary.

4. Results

4.1 Patterns of Generative AI Use

Generative AI was widely used among student teachers. More than two-thirds of respondents (68.1%) reported using AI often or very often for academic purposes. ChatGPT was the most frequently used platform (72.0%), followed by Gemini (52.4%) and NotebookLM (41.1%). Students primarily used AI to understand difficult concepts (59.8%), complete assignments (50.0%) and prepare for examinations (39.9%), indicating that AI has become an important learning support tool.

Table 1: Patterns of Generative AI Use Among Student Teachers (N = 336)

Variable	Category	n (%)
Frequency of AI Use	Often/Very Often	229 (68.1)
Most Used AI Tools*	ChatGPT	242 (72.0)
	Gemini	176 (52.4)
	NotebookLM	138 (41.1)
Main Uses of AI*	Understanding concepts	201 (59.8)
	Assignment completion	168 (50.0)
	Examination preparation	134 (39.9)

**Multiple responses were permitted.*

4.2 Student Teachers' Perceptions of Generative AI

Student teachers expressed generally positive views of generative AI. Perceived benefits received the highest average rating (M = 4.19, SD = 0.59), followed by educational use and governance (M = 4.04, SD = 0.57). Respondents also reported strong awareness of ethical issues and responsible AI use. AI competence and critical evaluation skills recorded

the lowest mean score (M = 3.89, SD = 0.54), although responses remained positive overall.

4.3 Factors Influencing Support for Educational AI Integration

Multiple regression analysis was conducted using 335 complete responses. The model explained 61.4% of the variation in support for the educational use and governance of AI (R^2 = .614, F(4,330) = 131.27, p < .001).

As shown in Table 2, AI competence and critical evaluation skills were the strongest predictors of support for AI integration (ß = .471, p < .001), followed by awareness of ethical challenges (ß = .341, p < .001). Learning behaviour and responsible AI use also had a significant positive influence (ß = .121, p = .036). In contrast, perceived benefits alone did not significantly predict support for AI integration after accounting for the other factors.

Table 2: Predictors of Support for Educational Use and Governance of AI

Predictor	ß	p
Perceived Benefits	.028	.574
Challenges and Ethical Concerns	.341	< .001
Learning Behaviour and Responsible AI Use	.121	.036
AI Competence and Critical Evaluation Skills	.471	< .001

Model Fit: R^2 = .614; Adjusted R^2 = .609; F(4,330) = 131.27, p < .001.

5. Discussion

This study shows that generative AI has become an integral part of learning for many student teachers at Paro College of Education. Most respondents reported using AI regularly to understand complex concepts, complete assignments and prepare for examinations.

These findings are consistent with international research showing that generative AI is increasingly being used as a learning companion rather than simply an information retrieval tool (Baidoo-Anu & Ansah, 2023; Chan & Hu, 2023; Chiu, 2023). The widespread use of AI among student teachers suggests that these technologies are becoming embedded in

everyday learning and are likely to play an increasingly important role in future classrooms.

While students recognised the educational benefits of AI, they also demonstrated awareness of its limitations. Respondents acknowledged concerns about the reliability of AI-generated information, responsible academic use and the need to maintain independent thinking.

Rather than discouraging AI use, this balanced perspective suggests that student teachers appreciate both the opportunities and the responsibilities associated with these technologies. Similar concerns have been reported in studies from other higher education contexts, highlighting that responsible AI use depends not only on access to technology but also on ethical awareness and informed judgement (Perkins et al., 2024; Tlili et al., 2023).

One of the most important findings is that AI competence and critical evaluation skills were the strongest predictors of support for educational AI integration.

This suggests that students are more likely to embrace AI when they feel confident in their ability to assess the quality, accuracy and appropriateness of AI-generated information. Simply recognising the benefits of AI was not enough to predict support for its educational use. Instead, competence and critical evaluation emerged as the foundations of responsible AI adoption. This finding reinforces growing evidence that AI literacy should be regarded as a core graduate competency rather than an optional digital skill (Ng et al., 2025).

The findings also support Social Cognitive Theory (Bandura, 1986), which proposes that behaviour is shaped through interactions between individual capabilities, behaviour and the learning environment.

Students with stronger AI competence and greater ethical awareness were more likely to support the responsible integration of AI into education. This highlights the importance of creating learning environments that not only provide access to AI technologies but also develop the knowledge and confidence needed to use them effectively and responsibly.

The study has important implications for teacher education in Bhutan. As future educators, student teachers will influence how AI is introduced and used in schools.

Teacher education programmes should therefore move beyond familiarising students with AI tools and place greater emphasis on AI literacy, critical evaluation, ethical decision-making and responsible classroom practice. Clear institutional guidance and opportunities to use AI in authentic learning activities can help future teachers develop the confidence and professional judgement needed to integrate these technologies effectively.

Although this study focused on one teacher education institution, the findings provide timely insights into the opportunities and challenges associated with generative AI in Bhutanese higher education. As AI continues to evolve, educational institutions will need to balance innovation with academic integrity and ensure that future teachers are equipped to use these technologies thoughtfully, critically and responsibly.

6. Conclusion

Generative AI is becoming an increasingly important part of higher education, and this study shows that student teachers at Paro College of Education are already using these technologies extensively to support their learning. AI is valued for helping students understand complex concepts, complete assignments and prepare for examinations. At the same time, participants recognised that its effective use requires critical judgement, ethical awareness and responsible academic practice.

A key finding of this study is that support for educational AI integration depends more on students' AI competence and critical evaluation skills than on their perceptions of AI's benefits alone. Students who felt confident in assessing and using AI-generated information responsibly were more likely to support its educational use. This highlights the importance of developing AI literacy alongside ethical awareness within teacher education programmes.

For Bhutan, these findings have important implications as schools and universities increasingly adopt AI technologies. Preparing future teachers for an AI-enabled education system requires more than introducing new

digital tools. It requires equipping them with the knowledge, skills and professional judgement to use AI critically, ethically and effectively.

By strengthening AI literacy and promoting responsible AI use, teacher education institutions can help ensure that future educators harness the benefits of generative AI while safeguarding academic integrity, critical thinking and quality learning.

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