ISSN (Print): 2959-4391 ISSN (Online): 2959-4405

JOURNAL OF SOCIAL SCIENCES DEVELOPMENT

www.jssd.org.pk editor@jssd.org.pk

PERCEIVED BENEFITS OF AI-ENHANCED TEACHING AND RESEARCH: A GENDER-BASED COMPARISON AMONG STUDENT OF TEACHER TRAINING PROGRAM

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KEYWORDS

Artificial Intelligence, Teacher Training, Student-teachers, Perceived Benefits, Gender Differences

ARTICLE HISTORY

Date of Submission: 11-09-2026
Date of Acceptance: 10-10-2026
Date of Publication: 12-10-2026

ABSTRACT

The introduction of Artificial Intelligence (AI) is penetrating our environment and education as well, resulting in potential benefits for teaching preparation and research activities. Therefore, this study aimed to help investigate the perceived benefits by student-teachers towards an AI for teacher training and how perceptions may be different from each other based on gender. The methodology, which includes the target population, participants, sampling method and data collection procedure with instrument details consisting of a self-developed questionnaire was made up of two dimensions: AI-enhanced teaching benefits and AI-enhanced research benefits that were collected from student-teachers. The data was analysed using both descriptive and inferential statistical techniques. The results indicate that student-teachers generally perceived AI positively for research and teaching purposes but more so concerning research activities. In teaching, the highest perception of benefit was for developing assessment questions and feedback; whilst in research, it was speeding up access to academic information. The results also highlighted some notable gender differences across both domains, with female student-teachers perceiving greater potential benefits of AI-enhanced teaching and research compared to male student-teachers. Overall, the study anticipates that AI is considered an entry point for assisting student-teachers in term of professionalism and academic works. It advises on embedding applied AI training into teacher education programmes, especially regarding lesson planning, literature reviews and the critical evaluation of information provided by AI tools as well as responsible use of these technologies. These findings highlight the importance of strengthening AI literacy to prepare future teachers for the responsible and effective integration of AI into educational practice.

2026 Journal of Social Sciences Development

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DOI https://doi.org/10.59075/jssd.v5i8.365

Volume/Issue 5(8), 2026, 199-205

Introduction

Artificial Intelligence (AI) has gradually developed into an important technological innovation in education, resulting in new pathways for teaching, learning, assessment and teacher training. The increasing availability of generative AI tools has further enhanced the opportunities for educators to produce instructional materials, receive feedback, arrange information and support learning activities. The OECD (2023) points out that artificial intelligence can be a support for teaching and learning if it is used appropriately and with sufficient digital competencies. Thus, the teacher education programs play a large role in preparing the future teachers to understand and use AI in an effective manner in their professional practice.

Artificial intelligence can offer various potential benefits for teacher training such as supporting lesson planning and preparation of teaching materials, assessment and feedback, elucidating difficult concepts, and access to educational resources. UNESCO (2024) states that teachers need to have sufficient AI competences to use these technologies effectively and responsibly. Almasri (2024) stated that AI has great potential to support various educational processes, but effective use of AI depends on its proper pedagogical integration.

The perceived usefulness of AI is especially relevant for teacher education because student-teachers will be future users of these technologies in schools and other educational contexts. Their perception of the benefits of AI will determine their willingness to explore and integrate AI into their teaching practices. A recent scoping review identified AI literacy in teacher education as one of the emerging areas in need of more focus on preparing future teachers (Salas-Pilco et al., 2024). Therefore, understanding student-teachers' perceptions can be useful evidence for designing teacher-training programs responding to the changing technological environment. At the same time, AI in education should be used responsibly and in a human-centric manner. UNESCO (2023) stressed the importance of privacy, equity, ethical use, and appropriate pedagogical application in the use of generative AI in educational contexts. Therefore, the exploration of perceived benefits is an opportunity to understand how future teachers perceive the contribution of AI to their professional training without assuming that AI is helpful in all contexts.

Despite the rapid growth of research on AI in education, empirical evidence on the perceived benefits of AI in teacher training is important, particularly in developing educational contexts. Hence, this study investigates the perceptions of student-teachers regarding the advantages of Artificial Intelligence for teacher education. In addition to the evaluation of the degree of perceived benefits, the present study also analyzes whether the perception of benefits is gender-differentiated. The findings could provide useful evidence for teacher education institutions that are interested in integrating AI-related knowledge and skills in teacher preparation programs.

Objectives of the Study

1. To assess the perceived benefits of Artificial Intelligence for teacher training among student-teachers.
2. To examine the comparison of gender perceptions in student-teachers' perceived benefits of Artificial Intelligence for teacher training.

Methodology

A quantitative descriptive survey design was employed to assess student-teachers' perceived benefits of Artificial Intelligence (AI) for teacher training and to examine differences in perceptions according to gender. The population comprised student-teachers enrolled in teacher education programs at five public-sector universities in South Punjab, Pakistan. A sample of 400 student-teachers was included in the study. A self-constructed likert scale questionnaire was used to collect the data. This scale was comprised of 12 items, 6 items to measure the AI-Enhanced Teaching Benefits while the next 6 items to measure the AI-Enhanced Research Benefits.The questionnaire was reviewed by experts in education and educational technology to establish content validity and was pilot-tested before the final administration. The internal consistency of the instrument was assessed using Cronbach's alpha (.760).

The data were analyzed using SPSS. Descriptive statistics, including mean and standard deviation, were calculated to determine the level of perceived benefits for the overall scale and its two factors. To address the second objective, an independent-samples t-test was conducted to determine whether statistically significant differences existed between male and female student-teachers in their overall perceived benefits of AI, statistical significance was assessed at the 0.05 level.

Data Analysis and Findings

The quantitative data was presented and examined by utilizing Statistical Package for Social Science SPSS type 26.0. The simple percentages, mean score and independent t-test were calculated. The result was presented in tabulated form by their total number of frequencies, percentage, mean, standard deviation, t-value and significance .And their description is also given below.

Table 1 Factor 1: AI-Enhanced Teaching Benefits

#	Statements	SA + A		DA + SDA	
		f	%	*f*	%
1	AI helps student-teachers prepare lesson plans more efficiently.	273	72	106	28.0
2	AI helps student-teachers develop relevant teaching and learning materials.	255	67.3	124	32.7
3	AI provides useful ideas for classroom activities and learning tasks.	284	75	95	25
4	AI helps student-teachers explain difficult concepts in different ways.	257	67.8	122	32.2
5	AI helps student-teachers develop assessment questions and feedback.	306	84.7	58	15.3
6	AI improves the quality of student-teachers' teaching preparation.	250	66.0	129	34.0

	Average percentage	71.5	28.5

Table 1 exhibit student-teachers' conceptions about AI based teaching benefits. On the whole, 71.5% of the respondents agreed and strongly agreed that AI applications benefits teaching whereas 28.5% disagreed and stronglydisagreed with it. The highest agreement (84.7%) was with developing assessment questions and feedback, the lowest (72.0%) about lesson planning. All in all, these results suggest that there is a positive outlook about the use of AI to prepare for teaching and class.

Table 2 Factor 2: AI-Enhanced Research Benefits

#	Statements	SA + A f	SA + A %	DA + SDA f	DA + SDA %
1	AI helps student-teachers access relevant academic information efficiently.	356	93.9	23	6.1
2	AI helps student-teachers organize and summarize academic information.	301	79.4	78	20.6
3	AI supports student-teachers in developing academic presentations and assignments.	346	91.3	33	8.7
4	AI assists student-teachers in conducting literature reviews for academic work.	262	69.2	117	30.9
5	AI supports student-teachers in improving the clarity of academic writing.	306	80.7	73	19.3
6	AI helps student-teachers organize and manage references for academic work.	282	74.4	97	25.6
	Average percentage	81.486		18.513	

Table2 shows the results From Student-Teachers on AI-Supported Research Benefits. Perceptions of student-teachers on benefits of research supported by AI In general, 81.49% of the respondents agreed or strongly agree that AI gives advantages on research whereas 18.51% disagree or strongly disagree. The highest degree of agreement was reported for accessing relevant academic information efficiently (93.9%) and the lowest for conducting literature reviews (69.2%). Collectively, the results show a very positive impression of AI as supportive to academia/research.

Table 3 Gender-Wise Comparison of student-teachers' Perception about the AI-Enhanced Teaching Benefits

Gender	N	Mean	SD	T	Sig.
Male	180	22.4066	3.76077	6.311	0.00
Female	220	25.2838	2.24231		

The above Table 3 displays the gender-wise comparison of student-teachers' perceptions about AI-enhanced teaching benefits. Results demonstrated that female student-teachers (N = 220, M = 25.28, SD = 2.24) were perceived as benefiting more from using AI-enhanced teaching than male student-teachers (N = 180, M = 22.41, SD = 3.76). Results of the independent-samples t-test (t = 6.311, p <. 001). An even more interesting finding was that the female student-teachers (n=258) had much more significantly positive perceptions about these teaching benefits of AI than their male counterparts (n=208).

Table 4 Gender-Wise Comparison of student-teachers' Perception about the AI-Enhanced Research Benefits

Gender	N	Mean	SD	T	Sig.
Male	180	22.4030	3.76079	6.201	0.00
Female	220	25.3840	2.24238		

As shown in Table 4, student-teachers were separated by gender on their comparisons of the perceived benefits AI-assisted research has on them. Females (N=220, M=25.38, SD =2.24) scored significantly higher than males (N = 180, M = 22.40, SD = 3.76), who perceived the benefits of AI for research-related activities to be lower than those of female student-teachers; [F(1)=26.7404,p<0.01]. Male student-teachers were more variable (SD = 3.76) than female student-teachers (SD = 2.24), indicating that while male students had broad responses, much less so among female students who responded in a far more consistent manner. Results Independent-samples t-test revealed a t-value of 6.201 and significance value of 0.000 (p 001). It means that male and female student-teachers have significant differences in perceiving AI-enhanced research benefits.

Discussion and Conclusion

The results of the current investigation showed that student-teachers regarded Artificial Intelligence (AI) to be useful for both teaching and research activities. There is a particular emphasis on developing assessment questions and feedback through AI, as well as quickly accessing relevant academic information. Though slightly lower were perceptions of lesson planning and literature reviews, which suggested greater need for training in applying AI to more complex instructional and research tasks. The results show that AI has some potential to support practicum supervision and academic editing of student-teachers work, but even these applications have varying levels of perceived usefulness among our participant pool. These findings are generally in line with Baek et al. (2024), who studied university students' utilization of and attitudes toward generative AI, cited its use in a variety of academic tasks. Similarly, Stöhr et al. (2024) conducted a study exploring the use of AI chatbots in higher education, and found that students had a generally favorable perception of these tools. The current finding that

students acknowledge the potential advantages of AI in learning settings is corroborated by these studies. The current study goes beyond by separately analyzing the teaching-related and research-related benefits among student-teachers which supports AI literacy in teacher education.

For the second aim, results indicated that there were statistically significant gender differences in student-teachers' perceptions of AI-based teaching and research benefits. Both domains showed that student-teachers perceived female student-teachers more positively than male student-teachers. These results indicate that males and females differ on perceptions of the potential contribution which AI can make to teacher training. However, other studies have found slower and conflicting effects of gender stereotypes in AI. Stöhr et al. Male university students, as opposed to female students, generally expressed more favourable attitudes towards AI chatbots and used these bots more frequently (2024) However, a research study conducted by Liang and Mao (2025) however reported that female students attitudes towards generative Ai in educational settings were more positive. These conflicting results imply gender differences in perception of AI may also differ by education level, general population and type of application. Hence, the results of current study should be considered cautiously in terms of sample context rather than generalized for all male and female students.

In sum, the results show that student-teachers saw AI as a potentially useful tool for teaching preparation and research tasks, but female respondents in both groups had higher perception of using AI than males. Key takeaways from the research call for a more practical approach in training teachers, across lesson design, assessment development, literature reviews, evaluating AI-generated information and academic integrity. This training should be available to all student-teachers and focus on responsible use, independent critical thought, and checking of outputs generated by AI. As the study focused on perceived benefits rather than actual performance, follow up studies tracking the actual acquired competency levels of student-teachers and their effective use of AI in teaching and research based on prior training and previous AI experience are warranted.

Recommendations

1. Teacher education institutions should embed practical training on artificial intelligence into their programs to support teaching and research activities.
2. Training of student-teachers should include the use of AI for planning lessons, creating assessments and providing feedback.
3. AI training should enable student-teachers to retrieve academic information, and to do literature reviews.
4. Equal access to AI tools and training opportunities should be provided to male and female student-teachers.
5. Student teachers should be encouraged to use AI responsibly, upholding academic integrity, critical thinking and professional judgment.

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