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Secondary School Teachers' Attitude Towards Learning AI Technology and their Professional Development in District Khushab, Punjab

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ABSTRACT

Artificial Intelligence (AI) is reshaping the future of learning environments, paving the way for personalization, creativity, and immersive experiences. Research objectives of the study were to examine secondary school teachers' attitudes towards adopting and learning AI technology in their teaching practices and also identify the challenges secondary school teachers face in integrating AI technology into their professional growth. The study followed quantitative approach to evaluate the attitude of secondary school teachers (SSTs) in Tehsil Khushab. The descriptive correlational survey design was utilized to investigate the relationship between Attitude of SSTs and their professional development (PD). Quantitative data were collected using a structured questionnaire incorporating scales adopted. A stratified random sampling technique was used to select the sample. Out of the total population of the 404 teachers (228 females and 176 male), 30 percent of the teachers were sampled. In line with this, 122 teachers (79 females and 43 male teachers) were selected in 20 high schools in Tehsil Khushab. The findings revealed that SSTs showed positive attitude towards learning AI technology. The results indicated that the attitude of secondary school teachers toward AI significantly influence their professional development. It is recommended that further researchers investigate various district of Punjab to understand teachers' attitude towards learning AI technology in diverse teaching settings.



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1. Introduction

In current era, AI is reframing the students learning experiences and their work style are hinges on teacher perceptions, reactions, and interactions with AI (Zhai X. &, 2024). Therefore, Teachers' attitudes toward AI have been identified as the clear top driver of its use in education, even more than infrastructure, policy and resources (Zancanaro, 2022). Furthermore, Secondary school teachers are likely to deal with a wide range of students' high stakes tests, and content area requirements whereas encountering the pressure of implementing AI tools without the proper training or institutional support, which can lead to tension among teachers and directly influence their attitudes toward technology (Li, 2026).

Notably, Attitudes of secondary school teachers towards AI are generally positive, but there is a lack of uniformity across the world. For instance, the survey of 289 teachers with the Extended Educational Technology Acceptance Model revealed that digital competence, perceived usefulness, and attitude toward AI are the most significant factors in predicting actual AI use, with attitude serving as the most proximal variable (Tomczyk, 2025). Teachers who see AI as a tool that can assist them in personalizing instruction and thus, ease the burden of their teaching develop more positive attitudes and integration confidence (Karakaya, 2021). On the other hand, according to Çayak, (2024), some teachers are becoming resistant towards AI and data technologies, and this resistance also stems from their lack of data literacy which acts as a catalyst for lack of interest in data literacy, directly affecting their professional growth (Khalid & Abbas, 2026). There are also attitudinal differences between genders, work experiences, school type and locality which further influence the attitude towards learning AI technology (Sehjal, 2021).

Whereas, secondary school teachers with positive attitudes towards AI usage in teaching embrace professional development and maintain their use of AI over time, whilst those holding negative attitudes lose interest in AI, resulting in a widening gap in competency between schools (Aravantinos, 2026). In Pakistan specifically, the teachers who used AI in their teaching practice

reported that they observed better learning outcomes (60%), less workload (73%) and more student engagement (67%), but also had concerns about inequitable access for the students without devices (Raza, 2026). Thus, the results are consistent with the view of secondary school teacher attitudes toward AI as active, developing professional positions, rather than as passive responses, and influenced by experience, context, and institutional realities.

Perspective of Pakistan and District Khushab

Pakistan's secondary school system is a setting that significantly influences teachers' attitudes toward AI. The National AI Policy 2025 and the dedicated teacher training initiative at UNESCO highlight the government's commitment to AI education (Sarwar, 2026). However, only 51.2% of secondary schools have computer labs and, internet access was still very limited and most teachers not had any formal AI training (Raza, 2026). Although the government of Pakistan has made a commitment to the transformation of education through AI, the attitudes of the teachers in the secondary schools of semi-urban areas of Punjab towards AI technology and professional development have not been empirically studied. Therefore, it is expected that Pakistan national policies should be implement in district Khushab as well despite limited digital infrastructure, little or no AI-specific professional development, and no locally developed training programs for its government and private secondary school teachers. While AI holds promise, its demands are largely being left to teachers to figure out and there's room for growth with increasing smartphone access. The study is both academic and practical, as no study has yet explored the attitude of secondary school teachers in District Khushab towards the use of AI. Therefore, a comprehensive investigation is required for the special infrastructural, institutional and sociocultural environments of district Khushab cannot be ignored without addressing the local realities of the educators that educational policies aim to serve.

2. Literature Review

In a large-scale review of AI in K-12 settings,

Holmes et al. (2022) identified that the gains in learning that occurred as a result of AI tools that supported personalization and formative feedback were more related to the extent of teacher mediation than to the complexity of the technology. This discovery moves the attention towards the teacher cognition and agency in the context of AI-supported learning environments. The researcher highlighted the lack of evidence on the effective use of AI in low-resource, non-Western school contexts, which the present study directly addresses.

Survey responses from over 1,200 teachers across Europe to examine the affective reactions to AI (e.g., anxiety and discomfort), and revealed that this type of reactions was in fact more negative than the TAM cognitive beliefs around the ineffectiveness of AI, countering the more rationalist previous TAM research (Scherer et al. 2020). In their study on secondary school teachers, Celik (2023) revealed that teachers who felt that AI was increasingly reported significantly lower intentions towards the use of AI than those who felt that it was increasingly benign. This cognitive affective dissonance is an important phenomenon not much discussed in Pakistani educational context which might require that attitude instruments in this context must go beyond the usefulness-ease of use dimension. Additionally, hands-on exposure to tools, or prior functional experience, better predicted positive attitudes than theoretical exposure to tools, suggesting that functional engagement with AI tools is more critical than theoretical exposure (IHY Yim, R Wegerif 2024).

Consequently, there is a prevailing perception that training gaps and infrastructure gaps are reinforcing and are both important constraints in low resource settings and can be tackled simultaneously. There is an empirical basis for the perceived mutual reinforcement between training and infrastructure gaps and the fact that these gaps can be addressed simultaneously in low resource settings. Technological gaps were more common in rural areas while urban under-resourced schools had training deficits in instruction, a difference that is relevant to the semi-urban environment of District Khushab (Arranz-García et al., 2025). Crompton and Burke (2023) also noted that schools with no distributed leadership systematically failed to continue using AI after

investing in professional learning, indicating that the existing institutional conditions and the lack of continuity in policies at government-controlled secondary schools in Pakistan are not suitable for continuing to use AI. The instructor and the Pakistani evidence are made use of the teacher and the evidence from Pakistan is used.

An integrated study, showed that technical training alone does not always lead to a successful technology adoption, and pedagogical knowledge of the development, reinforcement of positive attitudes, organizational support, and continuous training cycles are critical elements to consider (Aravantinos et al., 2026; Pacurar & Abbas, 2015). Study on SSL classrooms in Pakistan, Saleem et al. (2025) also noted that while even AI tools that resulted in learning gains, the infrastructural disparities and lack of teacher training remained as a compounding barrier. The national AI policies which are largely dependent on those of high-income countries (HICs), do not consider specific socioeconomic and infrastructural contexts of school in low and middle-income countries (LMICs) and thus lead to policy-practice gaps that are directly relevant to Pakistan's secondary education sector (Landa-Blanco 2026).

The adoption of artificial intelligence (AI) in education is becoming increasingly common as a tool for assisting teachers with lesson planning and teaching. This has led to a higher demand for Secondary School teachers to build a positive attitude towards AI technology in education. Thus, this study investigates the attitudes of secondary school teachers towards learning AI and the link between their attitudes and their professional development. This study investigates secondary school teachers' attitude towards the use of AI in teaching, their relationship to professional development, teachers encounter when incorporating AI in their professional development. Now, research questions were formulated in accordance with research objectives of the study. That the one is what are secondary school teachers' attitudes towards adopting and learning AI technology in their teaching practices? and the other one is what is the relationship between teachers' attitudes towards AI and their engagement in professional development activities?

3. Research Methodology

This study used a quantitative research approach and descriptive-correlational survey design to explore secondary school teachers' attitudes towards the adoption and learning of AI technology in their instruction. School data was retrieved from the official government website of Census School Data Record (<https://sis.pesrp.edu.pk/>). The total schools of the district and Tehsil khushab was 38 females and 27 male secondary schools in District Khushab. Followed a 30% school selection criterion, 11 schools for girls and 8 schools for boys were selected through lottery method. Total 228 female and 176 male teachers in District and Tehsil Khushab were included in the population. The samples participants were selected by a stratified random sampling technique. A total sample of 122 secondary school teachers was drawn from the entire population, representing about 30% of the population.

After a careful study of the relevant literature, a research instrument was developed based on adapted scales. The questionnaire was comprised

of 42 items measured on a 5 point Likert scale. The attitude of teachers toward learning AI technology was assessed using scales adapted from Davis (1989) and Ajzen (1991), comprising perceived usefulness, perceived ease of use, behavioral intention, and interest in learning AI, along with the Teacher Artificial Intelligence Competence Self-Efficacy (TAICS) Scale developed by Chiu et al. (2024) to assess AI competency. Teachers' professional development was measured using the teacher professional development scale developed by Soine & Lumpe (2014).

4. Results

The data was analyzed by using descriptive statistics, correlation and regression analysis. The aim of this study was to measure the effect of attitude of SSTs towards learning AI technology and their professional development. Therefore, frequency distribution was calculated in table 1 for the demographic information of the respondents to study the representation of the sample for population.

Table 1: Demographic information of the participants

Variables	Category	Frequency	Percentage
Gender	Male	43	35.2
	Female	79	64.8
Age	20–30 years	10	8.2
	31–40 years	60	49.2
	41–50 years	34	27.9
	51 years and above	18	14.8
Area	Urban	109	89.3
	Rural	13	10.7
Academic Qualification	BA/BS	13	10.7
	MA/MS	79	64.8
	M.Phil.	28	23.0
	PhD	2	1.6
Work Experience	1–5 years	7	5.7
	6–10 years	26	21.3
	11–15 years	32	26.2
	15 years or more	57	46.7

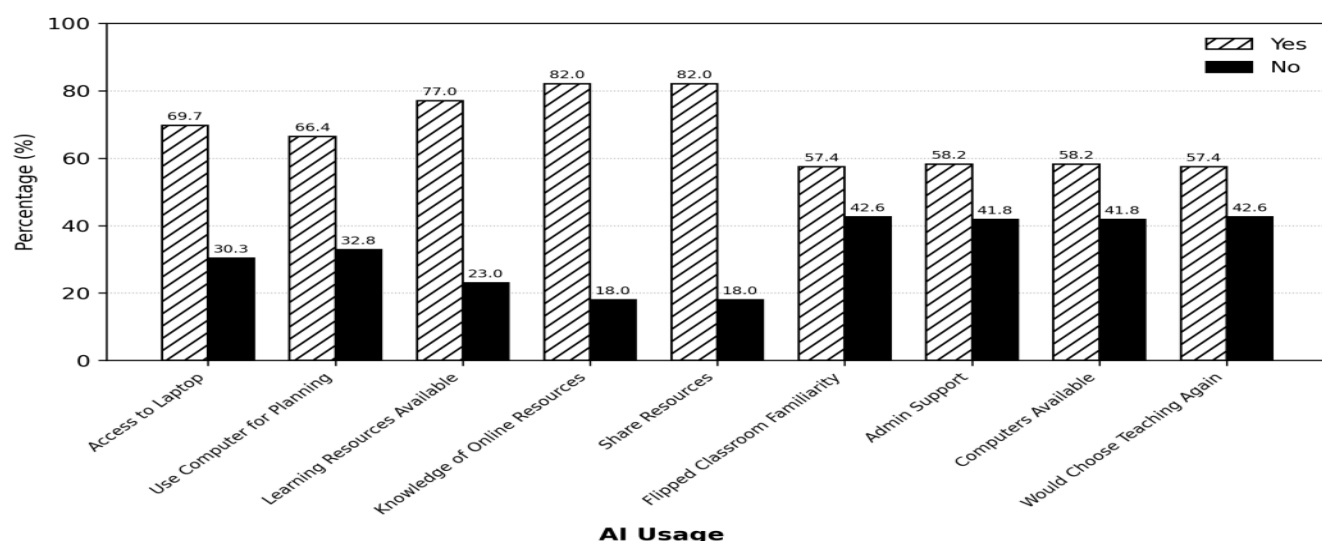
Total	122	100%
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Figures in table 1 showed the demographic profile of respondents. The findings indicated that most of the respondents are female (64.8%) and the male respondents were (35.2%). In age session, the majority of the respondents were aged between 31 and 40 years (49.2%), then 41 to 50 years (27.9%). With respect to area, most of the respondents were urban residents (89.3%), with 10.7% of the respondents bring rural dwellers. Data on academic qualifications disclosed that

majority of the respondents had MA/MS degree (64.8%), and then M.Phil (23%). In term of work experience, most of the respondents had a work experience of 15 years and above (46.7%), then 11-15 years (26.2).

Further, to measure the usage of technology and AI tools, questions about various usage of AI tools were inquired. The percentages responses are presented in figure 1 below.

Figure 1: Graphical Presentation of purpose of AI usage



As Figure 1 illustrated in the graph, the majority of teachers knew about online resources and shared resources (82.0%) and 77.0% mentioned that they had access to learning resources. Approximately 69.7% had access to laptops and 66.4% used their computers for planning. The use

of flipped classrooms (57.4%), administrative support, and computer availability were relatively low, however. The overall results suggest adequate access to Digital Resources and a need for more technological support and professional development.

Table 2: Mean, standard deviation and correlation coefficient of the variables

Variables	N	Mean	Std. Deviation	1	2	3	4	5	6
1. AI Competency	122	3.5799	1.10748	—					
2. PU	122	4.0369	.82301	.371***	—				
3. PEOU	122	3.8053	.86155	.529***	.711***	—			
4. Interest towards learning AI	122	4.0656	.87599	.349***	.680***	.636***	—		
5. Behavioral Intention	122	3.8443	1.71416	.214**	.285***	.340***	.312***	—	

6. Professional development	122	3.7746	1.04467	.391***	.456***	.478***	.481***	.288***	—
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Note. *** $p < .001$, ** $p < .01$ & * $p < .05$

Table 2 shows that overall, the mean scores suggest that the level of the variables measured in the study is in a positive direction, with moderate variability indicated by the standard deviations of the teachers' responses. Therefore, the means offer a good approximation of the general perceptions of the respondents. Furthermore, the table show the correlation between variables of the study. There is a statistically significant, moderate positively relationship between interest towards learning AI technology and professional development. This result suggests that teachers, who hold more positive attitude towards learning AI, tend to also perceive professional development as more effective. The strongest relationship was found between Interest towards learning AI and Professional Development ($r = .481$, $p < .01$), followed by PEOU ($r = .478$, $p < .01$), PU ($r = .456$, $p < .01$), AI Competency ($r = .391$, $p < .01$), and Behavioral Intention ($r = .288$,

$p < .01$). For the correlation table, “.288***” means that the correlation between Behavioral Intention and Professional Development was positive and statistically significant at the 0.01 level (two-tailed).

Regression Analysis

It was used multiply linear regression for the prediction of a criterion variable from two or more predictor variables. The Attitude of secondary school teachers towards the use of AI technology (adopt or not) was considered as independent variable, while professional development of secondary school teachers in learning AI technology were used as dependent variables in the present study. Multiple regression analysis was used to explore how much Attitude of learning AI technology accounted for variation in professional development among secondary school teachers.

Table 3: Multiply regression analysis

Variable	Regression coefficients (B)	95% CI
Constant (PD)	10.169	[-0.691, 21.029]
AI competency	1.783	[-0.323, 3.888]
Perceived usefulness (PU)	5.072 **	[1.307, 8.838]
Perceived ease of use (PEOU)	3.056	[-0.679, 6.790]
Interest towards AI	0.876	[-2.368, 4.121]
Behavioral intention	0.289	[-0.949, 1.527]
R ²	0.367*	
F	13.454*	
ΔR^2	0.367*	

Note. * $p < .05$; ** $p < .01$; *** $p < .001$.

Multiple linear regression analysis was performed to examine the relationships between teachers' professional development and the five sub variables of Attitude (AI competency, perceived usefulness, perceived ease of use, attitude, and behavioral intention). The overall regression model was statistically significant, $F(5, 116) =$

13.454, $p < .001$ and explained for 36.7% of the variance in professional development ($R^2 = .367$, adjusted $R^2 = .340$). Only one of the five predictors, perceived usefulness, was a statistically significantly positive predictor of professional development ($B = 5.072$, $\beta = .309$, $p = .009$, 95% CI [1.307, 8.838]). AI competency (B

= 1.783, $\beta = .146$, $p = .096$), perceived ease of use ($B = 3.056$, $\beta = .195$, $p = .108$), interest and attitude ($B = .876$, $\beta = .057$, $p = .594$), and behavioral intention ($B = .289$, $\beta = .037$, $p = .645$) were not statistically significant predictors. The collinearity diagnostics showed that there was no serious multicollinearity as the VIF values ranged from 1.152 to 2.649. The non-significant regression was likely attributable to the fact that teachers' professional development was influenced by multiple factors beyond their attitudes toward AI. While teachers showed positive attitudes towards AI, factors such as less training opportunities, heavier workloads, weak technological infrastructure, and low institutional support could have impeded the realization of these positive attitudes in real teacher development.

5. Discussions

The results indicated that overall, secondary school teachers were not only familiar with but also positive about the application and learning of AI technology. The teachers' positive attitudes toward the usefulness, ease to use, interest, and intention to use AI in teaching were reported. This result aligns with Tomczyk (2025), who found that perceived usefulness, digital competence, and attitude are factors that contribute to teachers' adoption of AI. In the same way, Karakaya (2021) concluded that teachers' attitudes toward AI became more positive when they believed that AI could help them in teaching and alleviate their workload. The results also corroborated Holmes et al.'s (2022) finding that teachers' perceptions and mediation played a significant role in the effective incorporation of AI in the education sector.

Overall, the regression suggested that positive attitudes toward AI technology alone were not enough to yield significant improvements in teachers' professional development. Other factors, such as limited teacher professional development opportunities, workload, lack of infrastructure, institutional support, and limited access to continuous professional learning, probably had an impact on teachers' professional development. This interpretation aligned with Crompton and Burke (2023) and Aravantinos et al. (2026), highlighting the need for organizational support, ongoing training, and institutional factors to ensure the long-term uptake of AI.

The findings also indicated that while some respondents were willing to use AI, others were not equipped for professional development using AI. Teachers' positive attitudes towards AI were observed, but challenges they faced during teaching could have hampered the development of these attitudes. This aligns with Saleem et al. (2025) who noted that the lack of infrastructure and inadequate teacher training hindered the use of AI effectively in Pakistan's educational setting.

Overall, the results showed that teachers in District Khushab were mostly positive towards the use of AI technology; however, a positive attitude was not enough to ensure meaningful professional development of teachers. Hence, having positive attitudes of teachers was not enough, they also needed to be trained, provided the necessary infrastructure, institutional support, and professional development opportunities in order to be effective in using AI to enhance teaching and learning.

6. Conclusion

This study aimed to explore the attitudes of secondary school teachers (SSTs) towards learning AI technology and professional development in district Khushab. The results showed a general positive attitude towards learning and AI technology among the SSTs, aligning with the global evidence that teacher attitude is the most important factor to consider when evaluating the integration of AI in classrooms. The quantitative study's results showed that the majority of secondary school teachers in District Khushab had a positive attitude toward learning and using AI in their teaching. Teachers exhibited positive attitudes on competency, perceived usefulness, perceived ease of use, interest/attitude, and behavioral intention towards the use of AI tools. The results also showed that there were positive relationships among teachers' attitudes to AI and their professional development, suggesting that the more competent teachers became in AI, the more positive they were in their attitudes.

The comparative analysis revealed that there was no significant difference between teachers according to gender, locality and academic qualifications in terms of their attitudes and professional growth. But significant differences were found with respect to professional

development and work experience. Altogether, the findings revealed that the secondary school teachers were positive towards the acceptance of the technology, but differences were found among some specific demographic groups, which calls for context-sensitive professional development and institutional support that will enable them to integrate AI into secondary education effectively and sustainably.

7. Recommendations

Based on the findings of the study, Schools need to dedicate adequate resources, revise curricula and offer ongoing professional development for their teachers based on current worldwide

educational shifts. Additionally, faculty members should be provided with ongoing professional development training opportunities, and safeguarded from ethical issues arising from the use of AI. It is recommended that policy makers create comprehensive policies to integrate AI technology in secondary schools, to ensure teachers have the technical and pedagogical skills needed. The researchers were also urged to investigate the long-term impact of AI on teachers through a longitudinal study, and to carry out case studies in other Tehsil of District Khushab and various districts of Punjab to understand the challenges and opportunities faced by teachers in the context of teaching in diverse settings.

Conflict of Interest

The authors showed no conflict of interest.

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