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Integration of Artificial Intelligence in Secondary Education: Competencies, Attitudes and Ethical Awareness

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ABSTRACT In secondary education, Artificial Intelligence (AI) is quickly changing the teaching and learning practices. The present paper examines the ICT skills, attitudes, integration competency, and ethical awareness of teachers in introducing AI in nine hill areas of Manipur. The study adopted a descriptive survey approach, where a population of 450 teachers in secondary and higher secondary schools was used where data were collected using a self-administered questionnaire. The results have shown that most teachers have either basic or moderate ICT competencies and most of them have not received formal training on ICT-related skills. The use of AI was significantly linked to education and ICT proficiency. Despite the generally positive views of teachers towards AI, it was observed that there were differences in competency and ethical awareness integration in a district-specific way. The paper focuses on the fact that professional training and norms can help to achieve the responsible and fair use of AI in the educational process.

INTRODUCTION

Artificial Intelligence (AI) stands out as a groundbreaking educational technology that has transformed teaching, assessment, and communication between teachers and pupils in the 21st century. The available literature reported the increased use of AI-based systems, including intelligent tutoring systems and automated assessment tools, in improving the instructional efficiency (Holmes et al. 2019; Zawacki-Richter et al. 2019). The advent of generative AI software such as ChatGPT in 2022 created impetus in introducing AI to the educational sector to allow creating material, lessons, feedback, and tailored learning (UNESCO 2023; OECD 2023). As the current events in the world prove, the popularity of using generative AI by educators and other individuals to learn and teach material is increasing at a rapid pace (UNESCO 2023). Teachers' levels of knowledge of computer literacy and pedagogical preparedness greatly affect AI adoption by teachers in the teaching-learning process.

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The use of AI in educational institutions is linked to the ICT skills and training of teachers. More ICT-proficient teachers are also better positioned to use emerging technologies (Tondeur et al. 2017; Instefjord and Munthe 2017), and lack of training and inadequate infrastructure make implementation in the under-resourced or remote areas more problematic (Ertmer and Ottenbreit-Leftwich 2010). The frequency of AI usage and the purpose of this usage including access and capabilities depicts the level of educational integration. Research evidence reveals that educators, in the beginning, use AI-based tools either to prepare or administer information, and later apply such tools into interactive learning processes (Luckin et al. 2016).

Teacher attitude is one of the important elements during AI integration. Positive perceptions increase the exploration and innovation, whereas the concern limits integration (Teo 2011; Chiu 2023). Besides, the integration of AI is not only based on expertise in technology, but also on ethical understanding. The data privacy issues, algorithmic bias, misinformation, and lack of academic integrity are just some examples of how important it is to use AI responsibly in education (Williamson and Eynon 2020; UNESCO 2023).

The National Education Policy (NEP) 2020 focuses on the digitalisation of the country and the

development of the skills of teachers in India (Government of India 2020). Although, there are still inequalities in infrastructure and capacity-building in rural and hilly regions. Even though AI is increasingly being incorporated into the higher education sector, the need to conduct empirical research on the variables is present since the preparedness, competency, and understanding of ethical issues among secondary teachers at the district level remain gaps, thus requiring the present study.

Research Objectives

The study aimed to achieve the following objectives:

1. Evaluate instructors' ICT competencies and training in relation to AI devices in teaching and learning.
2. To analyse the frequency and purposes of teachers' use of artificial intelligence tools in teaching and learning.
3. To determine the attitude of educators towards the application of artificial intelligence in teaching and learning.
4. To examine the competence of teachers to integrate artificial intelligence with teaching and instructing students on its proper use.
5. To investigate the ethical awareness, concerns, and the general attitude of the teachers towards.

Research Hypotheses

H_{01}: There is no significant relationship between teachers' ICT skill levels, ICT-related training, and their use of artificial intelligence tools in teaching and learning.

H_{02}: There is no significant difference in the frequency and purposes of teachers' use of artificial intelligence tools in teaching and learning.

H_{03}: Teachers do not differ significantly in their attitude towards the use of artificial intelligence in teaching and learning.

H_{04}: There is no significant difference in teachers' competence in integrating artificial intelligence into teaching and in guiding students in its responsible use.

H_{05}: There is no significant difference in teachers' ethical awareness, concerns, and overall attitude towards the future use of artificial intelligence in teaching and learning.

Review of Literature

The studies of technology incorporation after 2010 have all been focused on the fact that the ICT competence, professional training, beliefs, and institutional support of teachers contribute to their adoption of digital innovations (Ertmer and Ottenbreit-Leftwich 2010). Research on teacher education also shows that increased digital competence increases readiness of teachers to implement imminent technologies in the classroom practice (Tondeur et al. 2017; Instefjord and Munthe 2017). Digital readiness has been skewed in the Indian context, especially in the rural and geographically isolated areas, where infrastructural constraints and a lack of professional developmental opportunities limit successful adoption of technology (Government of India 2020).

In education, scholarship started to pay attention to Artificial Intelligence (AI) by the end of the 2010s. The increasing application of AI-powered systems like smart tutoring programs and automated evaluation systems was celebrated in the reviews, but governance and ethical issues were voices of concern (Zawacki-Richter et al. 2019; Holmes et al. 2019). In 2022 with the launch of generative AI tools such as ChatGPT, the classroom began to experiment with this technology, making educational policy respond to it. According to UNESCO (2023) and OECD (2023), the key to responsible AI integration is developing the capacity of teachers and ensuring their ethical protection.

According to the empirical research since 2023, although there are many teachers who believe that AI increases the efficiency of instruction, the difference in self-efficacy and competence in relation to AI is significant (Chiu 2023). Ethical issues, such as plagiarism, misinformation, data privacy, and algorithmic bias, have been addressed as the key topics of the educational debate (Williamson and Eynon 2020; UNESCO 2023). In India, the National Education Policy (NEP) 2020 promotes the digital transformation and learning that is facilitated by technologies. However, the problem is that, in comparison to the north-eastern region, the region with the lowest level of economic development, digital infrastructure and access to training is not homogeneous.

Although AI has gained global and national interest, there is a paucity of empirical studies on the skills, attitudes, competence, and ethical consciousness of teachers in the AI at a district level in secondary education and specifically in Manipur. The gap highlights the topicality of the current study.

RESEARCH METHODOLOGY

This study employs a descriptive survey research approach to examine the ICT abilities, attitudes, integration skills, and ethical awareness of teachers about the utilisation of artificial intelligence (AI) in secondary and higher secondary schools. The design was considered suitable as the study aimed to investigate the existing conditions and the relationships among variables without control.

The population consisted of 4197 teachers teaching at higher secondary level in nine hill districts of Manipur. Pherzawl district was not included in the study due to poor response from the teachers. The stratified random sampling method was used, allowing sufficient representation on the level of districts and gender. The sample of 450 teachers was chosen, and every district included about 50 teachers, and the gender balance was observed to make the sample more representative and comparable.

A self-made structured questionnaire was used to collect data and measure five dimensions, (i) ICT competence, (ii) AI usage patterns, (iii) attitude towards AI, (iv) AI integration competence, and (v) ethical awareness related to AI. The measure comprised several items evaluated on a five-point Likert scale from strongly disagree to strongly agree.

To ensure content validity, the instrument was assessed by specialists in educational technology and teacher education, and necessary modifications were implemented based on their feedback. The Cronbach alpha coefficient was employed to assess the instrument's reliability, yielding a result over 0.70, indicative of acceptable internal consistency.

The data analysis was conducted using IBM SPSS software, employing both descriptive and inferential statistics. The data were summarised utilising descriptive statistics, encompassing frequency, percentage, mean, and standard deviation. The inferential analysis included Chi-square tests to assess associations between categorical variables and one-way ANOVA to evaluate differences among districts. The significance level was established at 0.05. The ethical principles were rigorously observed, encompassing voluntary participation, informed consent, anonymity, and confidentiality of responders.

RESULTS

Objective 1: Evaluate instructors' ICT competencies and training in relation to AI devices in teaching and learning

Interpretation

Table 1 shows the percentage of teachers according to their level of ICT skills and training status with their frequency of using AI tools. The results show that most of the teachers have basic (53.1) or moderate (45.6) ICT skills and very few teachers (1.3) have advanced skills. Besides, over two-thirds (68.7) of teachers never had formal training on ICT-related issues.

The chi-square analysis showed the statistically significant relationship between the level of ICT skills and the use frequency of AI tools, $\chi 2\ (8) = 35.096$, $p = .001$. On the same note, ICT-related training was also very much connected with the frequency of AI use, $\chi 2(4) = 32.157$, $p < .001$.

Table 1: ICT skills, ICT training, and their association with frequency of AI tool use

Variable	*Category*	*n (%)*	χ^2	*df*	*p-value*
ICT Skill Level	Basic	239 (53.1%)			
	Moderate	205 (45.6%)			
	Advanced	6 (1.3%)	35.096	8	.000
ICT Training	Yes	141 (31.3%)			
	No	309 (68.7%)	32.157	4	.000

Source: Computed from Primary data

These findings indicate that ICT competence and exposure to training have a significant role to play in determining the teachers use of artificial intelligence tools in teaching and learning. The more skilled and formally trained teachers were found to be using AI more comparatively.

Objective 2: To analyse the frequency and purposes of teachers' use of artificial intelligence tools in teaching and learning

Interpretation

Table 2 demonstrates how the teachers use artificial intelligence, its frequency, and purpose. The results show that most teachers use AI tools in some instances (32.2%) and in most instances (31.1) which is a moderate engagement. However, 12.2 percent of them have never used AI technologies, which is an indication that integration of AI into practices is not a common occurrence.

With regards to purpose, nearly half of the respondents (45.8) indicated that they used AI tools to address various academic requirements, and 33.8 percent indicated that they used AI tools on a personal basis. The smaller percentages of 8.7 percent and 3.8 percent and 2.7 percent used AI in assisting research or creating content or lesson planning, respectively.

Chi-square test showed that the frequency and the purpose of AI usage were statistically significant, $\div^2(24) = 304.526$, $p < .001$. This means that the rate at which AI tools are used depends largely on the purpose of its use.

These results suggest that teachers largely utilise AI tools for general or preparatory purposes, with limited emphasis on specialised pedagogical applications.

Objective 3: To determine the attitude of educators towards the application of artificial intelligence in teaching and learning

Interpretation

Table 3 shows the average attitude of teachers towards artificial intelligence integration at the district level. The general mean score of attitude was 3.40 (SD = 0.64), which suggests that the attitude towards AI use in teaching and learning was moderately positive.

Table 3: District-wise comparison of teachers' attitude towards AI

District	*N*	*Mean*	*SD*
Chandel	50	3.547	0.596
Churachandpur	50	3.214	0.659
Kamjong	50	3.330	0.645
Kangpokpi	50	3.452	0.623
Noney	50	3.464	0.693
Senapati	50	3.437	0.542
Tamenglong	50	3.397	0.624
Tengnoupal	50	3.363	0.852
Ukhrul	50	3.374	0.406
Total	450	3.398	0.637

Source: Computed from Primary data

The one-way ANOVA demonstrated that there was no statistically significant difference in the attitude scores between the different districts, $F(8, 441) = 1.099$, $p = .362$ though some slight differences were observed among the different districts.

Table 2: Frequency and purpose of AI tool use among teachers

Variable	*Category*	*n (%)*	χ^2	*df*	*p-value*
Frequency of AI Use	Never	55 (12.2%)			
	Rarely	63 (14.0%)			
	Sometimes	145 (32.2%)			
	Often	140 (31.1%)			
	Very often	47 (10.4%)			
Purpose of AI Use	All of the above	206 (45.8%)			
	Personal use	152 (33.8%)			
	Research support	39 (8.7%)			
	Content generation	17 (3.8%)			
	Lesson planning	12 (2.7%)			
	Others	24 (5.3%)	304.526	24	.000***

Source: Computed from Primary data

This result implies that there is a comparably similar perception and attitude of teachers in the nine hill districts to the use of artificial intelligence in secondary schools.

Objective 4: To examine the competence of teachers to integrate artificial intelligence with teaching and instructing students on its proper use

Interpretation

Table 4 shows the mean scores of their competence in incorporating artificial intelligence into teaching and mentoring students on its ethical use by district. The general average score of competence was 3.32 (SD =0.69), which represented a moderate competence of teachers in regard to AI integration.

The one-way ANOVA indicated that the difference in the level of competence between districts was significantly different, $F(8, 441) = 2.491$, $p = .012$. This implies that there is wide disparity between teacher competence in the integration of AI across districts. Competence had a relatively high score in Tengnoupal (M = 3.475) and Chandel (M = 3.470), and the lowest in Ukhrul (M = 3.040).

The results show that the general levels of competence are decent, but the differences at the district level are present regarding the readiness of teachers to successfully implement AI in the instruction process.

Objective 5: To investigate the ethical awareness, concerns, and the general attitude of the teachers towards

Interpretation

Table 5 gives the mean scores of the ethical awareness and concerns of the teachers in the districts on the integration of artificial intelligence. The general average of the ethical awareness score was 3.57 (SD = 0.79), which implies a fairly high level of ethical concern and awareness among the teachers.

Table 4: District-wise comparison of teachers' AI integration competence

District	*N*	*Mean*	*SD*
Chandel	50	3.470	0.735
Churachandpur	50	3.240	0.794
Kamjong	50	3.175	0.605
Kangpokpi	50	3.435	0.766
Noney	50	3.415	0.714
Senapati	50	3.410	0.624
Tamenglong	50	3.250	0.621
Tengnoupal	50	3.475	0.802
Ukhrul	50	3.040	0.430
Total	450	3.323	0.695

Source: Computed from Primary data

The one-way ANOVA showed that there was a statistically significant difference among the districts, $F(8, 441) = 2.128$, $p = .032$. It means that the ethical perception of teachers of AI can differ greatly depending on the district.

Chandel (M = 3.840) was the highest ethical awareness, and Tengnoupal (M = 3.248) was comparatively a little lower in concern. Although there is relatively high ethical awareness in general, the differences in the district level indicate an uneven level of preparedness to handle ethical issues connected to the AI application in education.

Table 5: District-wise comparison of teachers' ethical awareness and concerns regarding AI

District	*N*	*Mean*	*SD*
Chandel	50	3.840	0.730
Churachandpur	50	3.540	0.824
Kamjong	50	3.552	0.738
Kangpokpi	50	3.688	0.802
Noney	50	3.536	0.837
Senapati	50	3.628	0.717
Tamenglong	50	3.456	0.700
Tengnoupal	50	3.248	1.079
Ukhrul	50	3.612	0.553
Total	450	3.567	0.795

Source: Computed from Primary data

Testing of Hypotheses

To test the relevance of the statistical significance of relationships and differences between the variables of the study, the formulated null hypotheses (H_{01}-H_{05} …) were tested with the Chi-square tests of association and one-way ANOVA with the level of significance equal to 0.05. Table 6 summarises the results.

Interpretation

The findings reported in Table 6 suggest that the level of ICT skills and ICT-related training can be regarded as the strong predictors of the use of AI tools among teachers (H_{01}). Likewise, the rate of AI application also significantly depends on its purpose (H_{02}). Nevertheless, there was no indica-

Table 6: Summary of hypothesis testing results (N = 450)

Hypothesis	*Statistical test*	*Test statistics*	*p-value*	*Decision*	*Conclusion*
H_{01}: No significant relationship between ICT skill, ICT training, and AI tool usage	Chi-square Test	$\div^2$ = 35.096; $\div^2$ = 32.157	.000*	Rejected	ICT skill level and ICT training significantly influence AI tool usage
H_{02}: No significant difference in frequency and purpose of AI usage	Chi-square Test	$\div^2$ = 304.526	.000*	Rejected	Frequency of AI usage significantly varies by purpose
H_{03}: No significant district-wise difference in teachers' attitude toward AI districts	One-way ANOVA	F(8,441) = 1.099	.362	Not rejected	Teachers' attitudes toward AI do not differ significantly across
H_{04}: No significant district-wise difference in AI integration competence	One-way ANOVA	F(8,441) = 2.491	.012*	Rejected	AI integration competence differs significantly across districts
H_{05}: No significant district-wise difference in ethical concerns toward AI	One-way ANOVA	F(8,441) = 2.128	.032*	Rejected	Ethical awareness and concerns differ significantly across districts

Source: Computed from Primary data

tion of a significant difference in the attitude of teachers to the practice of AI integration (H_{03}), based on district, which means that perception is relatively homogeneous.

Conversely, the differences in the AI integration competence (H_{04}) and ethical awareness (H_{05}) of the teachers at the district level were statistically significant. These results show that the attitude of teachers towards AI is not different, but competence and ethical readiness vary across districts.

DISCUSSION

The findings of this research provide crucial key insights into teachers' preparedness of artificial intelligence (AI) integration in secondary schools. The prevalence of low-to-moderate ICT competence and lack of access to training among teachers is consistent with recent evidence of structural and capacity barriers to the integration of AI (Chiu 2023; UNESCO 2024). More recent evidence also indicates that AI literacy, which includes technical, pedagogic and ethical skills, is a crucial factor impacting teachers' readiness to effectively integrate AI in teaching (Dehen 2026). However, unlike studies in technologically advanced settings where readiness levels are higher (Holmes et al. 2019; OECD 2026), the findings in this study reveal persistent gaps based on disparities in access to training and support. This suggests that AI competence not only depends on individual factors but also on environmental factors.

The moderate level of AI use (typically for general academic and basic purposes) suggests integration is still in its early stages. This aligns with global studies that indicate that teachers initially use AI tools for teaching efficiency purposes and then move towards advanced pedagogical purposes (Kasneci et al. 2023; Zhai et al. 2024; OECD 2026). Recent studies in the secondary level also indicate that the use of AI is influenced by teachers' existing knowledge, professional development and data literacy (López-Costa 2025). Moreover, the limited use of AI for pedagogical design and student-centred learning in the current study highlights a significant gap between access and pedagogic use of AI. Theoretically, this practice gap can be explained via the Technological Pedagogical Content Knowledge (TPACK) framework that highlights the importance of integrating technological, pedagogical and content knowledge for effective teaching practices (Mishra and Koehler 2006).

While teachers' attitudes towards AI were generally positive, the absence of statistically significant differences in districts' attitudes and moderate integration competence suggests an attitude-

practice gap. This is in line with recent literature, which suggests that even when teachers have positive attitudes towards AI, it does not guarantee classroom integration without the support of training and resource base (Chiu 2023; Holmes et al. 2024). On the other hand, the significant district-wise differences in integration competence and ethical awareness noted in this study highlight the impacts of contextual differences. These findings resonate with key perspectives that suggest that AI integration may perpetuate educational inequities without the support of inclusive policy frameworks (Selwyn 2024; OECD 2026).

Despite relatively high levels of ethical awareness among teachers, the identified variation across districts suggests uneven readiness to tackle emerging ethical issues such as data privacy, misinformation and data bias. Recent international guidelines stress that ethical competence needs to be developed in tandem with technical skills to ensure responsible for AI integration (UNESCO 2024; 2025). In addition, contemporary research across school education levels highlights that ethical AI literacy remains underdeveloped within teacher education systems, thereby constraining responsible classroom integration (Cukurova et al. 2025). The research demonstrates that the integration of AI is a multifaceted process influenced by skill, training, and contextual disparities, necessitating targeted and context-specific interventions.

CONCLUSION

The current research investigated the eagerness of teachers regarding the introduction of artificial intelligence (AI) in secondary education through measuring ICT competence, attitudes, integration competence and ethical awareness of the hill districts of Manipur. The results show that teachers show a rather positive attitude to AI, though their preparedness is moderate, especially regarding ICT competence and access to formal education. The fact that ICT proficiency, training, and the use of AI have significant associations implies the importance of professional development in meaningful technology integration.

The research also indicates that AI use among teachers is extensively limited functional use, revealing a notable gap between attitudinal readiness and operational proficiency, especially regarding integration capabilities and ethical preparedness. Districts' differences in competence and ethical awareness reveal the effects of the contextual differences, indicating that eagerness is not uniform across regions. The findings highlight the necessity of the context-specific intervention that should target teacher training, digital infrastructure, and ethical orientation. These areas should be enhanced to bring about responsible, fair, and practical implementation of AI in secondary school.

RECOMMENDATIONS

Based on the study results, it can be suggested that Systematic Effort should be done to enhance the willingness of teachers toward the integration of artificial intelligence (AI) in secondary education. The ICT training programmes need to be continuous and based on necessity to increase the level of digital competence of teachers and their skills in implementing AI into classroom use. This training must not focus only on theoretical knowledge but prioritise the practical skills, such as lesson planning, assessing students, and interactive teaching with the help of AI tools. Moreover, the institutions are encouraged to establish effective ethical principles to ensure responsible AI use, and, in this regard, the key issues are data privacy, academic integrity, and misinformation.

Moreover, the noted disparities in the competence and ethical consciousness, district-wise require the interventions that would be context-specific, especially in hilly and resource-constrained areas. There is a dire need to build up digital infrastructure in schools, particularly in hilly and resource-straddled regions, in order to facilitate meaningful and equitable AI implementation. Additionally, collaborative learning can be facilitated by the formation of professional learning communities so that teachers could exchange experiences, best practices, and innovative methods of teaching using AI. Taken together, these actions may help the integration of AI in secondary school in a progressive, responsible and sustainable way.

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