International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Beyond Chalk and Talk: Professional Readiness for Ai Integration in Secondary School Classrooms: A Study of Teachers' Preparedness, Perceptions and Competencies

Dr. Sangeetha N R

Associate Professor Sree Narayana Training College Nedunganda, Varkala Thiruvananthapuram, Kerala

Abstract

Education in the twenty-first century is rapidly evolving, with Artificial Intelligence (AI) reshaping teaching, learning, and school administration. The study titled **"Beyond Chalk and Talk: Professional Readiness for AI Integration in Secondary School Classrooms"** examines secondary school teachers' preparedness, perceptions, and competencies for AI integration in Trivandrum, Kerala. Using a mixed-method design, quantitative data were collected through the AI Integration Readiness Scale for Teachers (AIIRST) from a stratified sample of CBSE and State Board teachers, complemented by qualitative interviews. Findings reveal positive perceptions toward AI and recognition of its potential to enhance instructional practices; however, actual classroom integration remains limited due to gaps in technical skills, pedagogical application, and institutional support. The study emphasizes the need for sustained, hands-on professional development, collaborative learning opportunities, and structured policy guidance to strengthen teachers' confidence and competence for meaningful, human-centered AI integration in secondary education.

Keywords: Artificial Intelligence, Teacher Readiness, Secondary Education, Personalized Learning, Professional Development, Kerala

INTRODUCTION

"If we teach today's students as we taught yesterday's, we rob them of tomorrow.."

John Dewey

Education in the twenty-first century is undergoing a profound transformation driven by rapid technological advancements. Among these, Artificial Intelligence (AI) has emerged as a powerful force reshaping pedagogical practices, curriculum design, and learner engagement. Teaching is no longer confined to traditional instruction; rather, it demands a mindset shift among educators to integrate intelligent systems that can adapt, analyze, and enhance the learning process. As secondary education lays the foundation for higher learning and critical thinking, teachers' readiness to integrate AI meaningfully into their practice becomes pivotal for educational innovation.

Recent researches portray the increasing use of AI for personalized learning and teaching, where adaptive algorithms tailor learning content and pace to meet individual student needs (Holmes et al., 2021; Luckin, 2018). AI-driven platforms such as intelligent tutoring systems and learning analytics tools allow teachers

to monitor progress and offer differentiated instruction. Similarly, AI in content creation enables educators to design engaging materials, generate questions, and develop interactive simulations that cater to diverse learning styles. In language and communication, AI tools like speech recognition, translation, and chatbots support both teachers and learners in bridging linguistic barriers and fostering effective digital interaction (Zawacki-Richter et al., 2019).

In addition to teaching and learning, AI has transformed assessment and feedback mechanisms by automating grading, providing real-time feedback, and offering predictive insights into student performance (Baker & Smith, 2019). Furthermore, AI for student support and administration streamlines tasks such as attendance tracking, counseling support, and data management, allowing teachers to focus more on pedagogy than paperwork. However, these advancements also bring challenges related to teachers' digital competence, ethical awareness, and pedagogical adaptation. Studies by Chatterjee and Bhattacharjee (2023) and UNESCO (2022) highlight the gap between technological innovation and teachers' preparedness to integrate AI effectively in classroom practices.

In this context, examining secondary school teachers' professional readiness for AI integration is of great significance. Understanding their awareness, attitudes, and competencies not only sheds light on the current state of technological preparedness but also guides the formulation of targeted professional development programs. The present study thus holds particular relevance as education systems worldwide strive to create AI-empowered classrooms that enhance learning outcomes while preserving the human essence of teaching in an increasingly digital era.

Need and significance of the studying

The rapid advancement of Artificial Intelligence (AI) has revolutionized all spheres of human activity, including education, where it offers immense potential to transform teaching and learning processes. In the context of 21st-century education, students require innovative and adaptive teaching approaches that align with the digital and AI-driven world they inhabit. Many educational systems across the globe have already adopted AI tools for personalized learning, data-driven assessment, and classroom management. However, despite these developments, there remain varying levels of awareness, perception, and preparedness among teachers regarding AI integration in pedagogy. Understanding this disparity is crucial, especially in the Indian context, where educational settings such as CBSE and State Board schools in Kerala operate under diverse pedagogical and infrastructural conditions. Hence, the present study on "Beyond Chalk And Talk: Professional Readiness For Ai Integration In Secondary School Classrooms : A Study Of Teachers' Preparedness, Perceptions, And Competencies" seeks to assess teachers' readiness, attitudes, and competencies related to AI adoption, highlighting its significance in equipping educators to effectively navigate and contribute to the evolving landscape of technology-driven education.

Review of Related Studies

The integration of Artificial Intelligence (AI) in educational contexts has become a growing focus of research, with scholars emphasizing both its potential and the challenges it poses for teacher preparedness. Literature suggests that teachers' perceptions and attitudes toward AI significantly influence their readiness to adopt AI tools in classroom practices (Qi, 2025). Some studies document that while educators generally acknowledge the potential benefits of AI — such as personalized learning and enhanced instructional efficiency — many report concerns about ethical issues, data privacy, and limited institutional support (Qi, 2025).

In conceptual discussions on AI readiness, researchers underline that readiness is a multi-dimensional construct involving technological self-efficacy, pedagogical competence, and ethical awareness, rather than mere familiarity with tools alone (Dong & Gopez, 2026). This aligns with systematic reviews in K-12 contexts that highlight teachers' professional development as a central determinant of effective AI adoption. These reviews find that pedagogy-focused training, ongoing support, and alignment with curricular goals are critical for translating AI awareness into meaningful classroom practice (Aravantinos et al., 2026). Empirical research further elaborates on specific competency domains. For example, readiness frameworks often integrate technological, pedagogical, and content knowledge (TPACK) as key dimensions for AI integration, showing that deficits in technological confidence or pedagogical strategies frequently limit teachers' ability to leverage AI tools effectively in instruction (Majeed & Ahmad, 2026). Overall, the literature indicates that **teacher preparedness for AI integration exists on a spectrum** — characterized by positive perceptions of AI's potential, but moderated by structural barriers, limited professional development, and variability in technological and pedagogical competencies. These studies collectively underline the importance of sustained, context-specific training and systemic support mechanisms to build confident, competent, and ethically grounded teachers capable of integrating AI in secondary classrooms.

Objectives of the study

1. To find out the level of awareness and understanding among secondary school teachers regarding the potential applications of Artificial Intelligence (AI) in education.
2. To find out teachers' readiness to integrate AI tools for personalized learning and individualized teaching approaches that cater to diverse learner needs.
3. To analyze the extent to which teachers utilize or are prepared to utilize AI-based tools for content creation and instructional material development.
4. To evaluate teachers' perceptions of using AI to enhance classroom communication and facilitate language learning among students.
5. To study teachers' attitudes toward the use of AI in assessment, feedback mechanisms, and performance evaluation.
6. To find out teachers' preparedness to adopt AI for student support services and administrative functions such as record management, learning analytics, and progress monitoring.
7. To identify the barriers and professional development needs of teachers for effective AI integration in secondary education.
8. To compare the level of professional readiness for AI integration among teachers working in CBSE and State Board schools in Trivandrum district of Kerala.

Research Methodology

Research Design

The present study adopted a mixed-method research design, combining both quantitative and qualitative approaches to provide a comprehensive understanding of secondary school teachers' professional readiness for AI integration. The quantitative component aims to measure teachers' awareness, readiness, perceptions, and attitudes toward AI through structured tools, while the qualitative component explores in depth the experiences, challenges, and professional development needs of teachers in adopting AI-based practices.

Population and Sample

The population of the study consisted secondary school teachers working under CBSE and State Board schools in the Trivandrum district of Kerala. A stratified random sampling method was employed to ensure adequate representation from both educational boards, school types (government, aided, and unaided), and subject areas.

A sample of 100 teachers were selected for the quantitative survey, while 15 teachers were chosen purposively for qualitative interviews to gain deeper insights.

Tools used for the study

1. "AI Integration Readiness Scale for Teachers (AIIRST)"
2. Semi-structured interview schedule

Data Collection Procedure

The structured questionnaire was administered to the selected sample either in person or through digital platforms. Based on survey responses, a subset of teachers were invited for in-depth interviews to elaborate on key themes and issues emerging from the quantitative data.

Data Analysis

Quantitative Data Collected data were analyzed using descriptive statistics (mean, standard deviation, percentage) to determine levels of awareness and readiness, and inferential statistics (t- test,) to compare readiness levels across demographic and institutional variables (CBSE vs. State Board). Qualitative Responses from interviews was subjected to thematic analysis to identify recurring patterns, perceptions, and contextual barriers related to AI integration.

Results and Discussion

1. Awareness and Understanding of AI in Education

A majority of teachers reported being aware of Artificial Intelligence and its potential applications in education. However, the depth of understanding varied between teachers from different school systems. Table 1 shows the mean awareness scores among teachers of CBSE and State Board schools.

Type of School	N	Mean Score	SD	t-value	Significance
CBSE Schools	50	3.42	0.61	1.87	NS
State Board Schools	50	3.61	0.58		

Table 1: Mean Awareness and Understanding of AI among Teachers

The analysis revealed no significant difference between CBSE and State Board teachers in their general awareness of AI ($p > 0.05$). However, qualitative responses indicated that State Board teachers, particularly those from government and government-aided schools, demonstrated more practical understanding, largely due to AI-related training sessions conducted by KITE and SCERT Kerala since 2021–22.

2. Readiness for AI-based Personalized Learning

Teachers showed moderate readiness to implement AI tools for personalized learning. While 68% of

respondents acknowledged the potential of AI for differentiated instruction, only 35% reported having tried AI-driven learning tools.

Category	High (%)	Moderate (%)	Low (%)
CBSE	22	58	20
State Board	28	60	12

Table 2: Teachers' Readiness for AI-enabled Personalized Learning

Both groups reflected a positive orientation toward AI for individualizing learning experiences. Yet, limited classroom implementation was observed. Many teachers noted that lack of training and infrastructure restricted their practical use of AI tools despite theoretical awareness.

3. Use of AI in Content Creation and Instructional Design

Type of School	Mean Score	SD	t-value	Significance
CBSE	2.85	0.63	1.96	NS
State Board	3.02	0.68		

Table 3: Utilization of AI for Content Creation

The mean scores reveal that teachers from both CBSE and State Board schools exhibit limited use of AI in content creation and instructional design, with only a marginal difference between the two groups. The obtained t-value (1.96) was not statistically significant ($p > 0.05$), suggesting that neither group has substantially integrated AI-based tools in their regular teaching practices.

Qualitative data further supported this finding. Teachers reported that although they were aware of AI-assisted tools for generating lesson content, quizzes, or multimedia materials, actual usage was minimal due to lack of time, inadequate training, and uncertainty about the relevance of such tools in their subjects. A few State Board teachers mentioned occasionally accessing "SAMAGRA", the educational resource portal developed by SCERT Kerala, which provides selected and partially AI-supported content. However, most teachers still rely on traditional methods or pre-existing digital materials rather than developing AI-generated instructional resources.

4. AI in Communication and Language Learning

Around 54% of teachers agreed that AI tools such as chatbots, translation applications, speech-to-text systems, and virtual assistants have the potential to enhance language learning by supporting vocabulary development, pronunciation practice, personalized feedback, and interactive communication. However, only a small proportion reported having meaningfully integrated these tools into regular classroom activities.

Qualitative analysis

Qualitative findings revealed several contextual barriers limiting classroom implementation. Teachers highlighted insufficient digital infrastructure, including unreliable internet connectivity, limited access to devices, and lack of smart classroom facilities. Time constraints within a content-heavy curriculum further restricted experimentation with AI tools. Many participants also expressed uncertainty regarding the pedagogical value of AI applications, noting a lack of structured guidelines on how to align AI tools with language learning objectives, assessment practices, and learner needs. Additionally, concerns about data

privacy, overreliance on technology, and inadequate professional training reduced teachers' confidence in adopting AI-based communication tools effectively.

5. Attitudes toward AI in Assessment and Feedback

The data show that only half of the teachers (50%) expressed a positive attitude toward AI-supported assessment, while the remaining half were either neutral or disagreed with its usefulness. This pattern reflects a general lack of awareness, familiarity, and interest in applying AI tools for formative or summative evaluation.

Qualitative analysis

Qualitative responses further substantiated these findings. Teachers reported minimal exposure to practical demonstrations or hands-on training related to AI-based assessment platforms. Many expressed uncertainty about the reliability, validity, and fairness of automated grading systems, particularly at the secondary school level where nuanced evaluation and subjective judgment are often required. Concerns were also raised about data privacy, potential technical errors, and the risk of overdependence on technology. As a result, most teachers continue to rely on traditional paper-based examinations or basic digital quizzes, with little engagement in adaptive, analytics-driven, or automated feedback systems. Limited professional development opportunities—especially in CBSE schools—have further contributed to hesitation, low confidence, and cautious attitudes toward integrating AI in assessment and feedback processes.

6. AI for Student Support and Administration

AI was found to be least used for administrative purposes such as attendance tracking, student data analysis, and performance prediction. Only teachers-in-charge of IT regularly employed AI-based systems for such functions. Qualitative data AI integration remains largely confined to technical staff, while general subject teachers depend on traditional record maintenance. Teachers expressed willingness to adopt AI if training and technical support are improved.

7. Barriers and Professional Development Needs

The study revealed several significant barriers that hinder the effective integration of AI in secondary education. A majority of teachers (82%) reported a lack of hands-on training programs, which limits their ability to apply AI tools practically in the classroom. Additionally, 68% of respondents highlighted insufficient institutional support and inadequate infrastructure as major constraints, while 55% expressed uncertainty about the pedagogical relevance of AI, reflecting a gap between theoretical knowledge and classroom application. Concerns about data privacy and student monitoring were also noted by 40% of teachers. In light of these challenges, teachers emphasized the need for regular, practical-oriented professional development programs that go beyond one-time workshops. They suggested the implementation of peer-learning sessions, mentoring, and continuous support, which would help them build confidence, familiarize themselves with AI tools, and effectively integrate technology into teaching, assessment, and administrative tasks.

8. Comparative Analysis between CBSE and State Board Teachers

Table 4 presents a comparison of AI Integration Readiness scores between CBSE and State Board teachers. The findings indicate that State Board teachers demonstrated relatively higher overall readiness ($M = 3.46$) compared to CBSE teachers ($M = 3.24$), with the difference being statistically significant ($t = 2.01$, $p < 0.05$).

Although differences in **Awareness & Understanding** and **Readiness for Personalized Learning** were observed in favor of State Board teachers, these were not statistically significant, suggesting comparable conceptual familiarity with AI across both groups. Similarly, no significant difference emerged in **Assessment & Feedback**, indicating that teachers from both boards exhibit similar levels of readiness in using AI for evaluation-related tasks.

However, significant differences were found in **Content Creation & Instructional Use** ($t = 2.32$, $p < 0.05$) and **Administration & Support** ($t = 1.98$, $p < 0.05$), where State Board teachers scored notably higher. This suggests stronger practical application skills and greater institutional facilitation within State Board schools. The relatively higher readiness among State Board teachers may be attributed to structured AI-focused initiatives and systematic professional development programs implemented by KITE and SCERT Kerala since 2021–22.

In contrast, while CBSE teachers have been introduced to AI concepts through curricular reforms, the absence of sustained institutional training and localized support mechanisms appears to have limited effective classroom integration. Overall, the results highlight that structured policy support and continuous professional training significantly influence teachers' capacity to translate AI awareness into meaningful classroom practice.

Dimension	**CBSE (Mean)**	**State Board (Mean)**	**t-value**	**Significance**
Awareness & Understanding	3.42	3.61	1.87	NS
Readiness for Personalized Learning	3.25	3.44	1.65	NS
Content Creation & Instructional Use	3.10	3.45	2.32	$p < 0.05$
Assessment & Feedback	3.50	3.56	0.41	NS
Administration & Support	2.95	3.25	1.98	$p < 0.05$
Overall Readiness	3.24	3.46	2.01	$p < 0.05$

Table 4: Comparison of Overall AI Integration Readiness Scores

Conclusion

The study reveals that while secondary school teachers across both CBSE and State Boards demonstrate positive perceptions toward Artificial Intelligence and acknowledge its transformative potential beyond traditional "chalk and talk" pedagogy, their professional readiness for AI integration remains uneven and largely conceptual. Preparedness is predominantly theoretical, with limited experiential engagement in classroom contexts. Teachers serving as IT in-charge exhibit significantly higher levels of competency and practical confidence in using AI tools compared to general subject teachers, highlighting a competency gap within schools.

State Board teachers have benefited to some extent from structured government-led initiatives such as KITE and SCERT AI training programs, which have enhanced practical exposure and skill development. In contrast, CBSE teachers appear to require more systematic and structured capacity-building mechanisms tailored to pedagogical integration rather than basic technological familiarization.

The findings highlight the urgent need to move beyond awareness-building toward sustained, practice-oriented professional development frameworks that cultivate pedagogical competence, ethical understanding, and contextual application of AI tools. True readiness for AI integration demands continuous training, collaborative learning ecosystems, and institutional support systems that empower teachers to meaningfully embed AI within secondary classroom practices.

References

1. Luckin, R. (2018). Machine learning and human intelligence: The future of education for the 21st century. Routledge.
2. Holmes, W., Bialik,M., & Fadel, C. (2021). Artificial intelligence in education: Promises and implications for teaching and learning. Journal of Educational Change, 31(2), 127-145.
3. Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). "Systematic Review of Research on Artificial Intelligence Applications in Higher Education: Where Are the Educators?" International Journal of Educational Technology in Higher Education, 16(1), 39.
4. Baker T., Smith L., Anissa N. (2019, June 20). Educ-AI-tion rebooted? Exploring the future of artificial intelligence in schools and colleges.NESTA.https://www.nesta.org.uk/report/education-rebooted/
5. Chatterjee, S., Bhattacharjee, S., Ghosh, K., Das, A. K., & Banerjee, S. (2023). Class-biased sarcasm detection using BiLSTM variational autoencoder-based synthetic oversampling. Soft Computing-A Fusion of Foundations, Methodologies & Applications, 27(9).
6. UNESCO. (2022). AI and education: Guidance for policy-makers. https://unesdoc.unesco.org/ark:/48223/pf0000376709
7. Flick, U. (2015). Introducing research methodology: A beginner's guide to doing a research project. Sage.
8. Qi, K. (2025). Teacher Perceptions and Readiness for Integrating AI-powered Learning Platforms into Chinese Classroom Practice. Uniglobal Journal of Social Sciences and Humanities, 4(2), 161-167.
9. Dong, C., & Jose Ma W. Gopez. (2026). AI Readiness in Education: A Review of Conceptual Foundations, Pedagogical Dimensions, and Ethical Considerations. International Journal of Education and Humanities, 22(2), 18-20. https://doi.org/10.54097/6farb504
10. Majeed, M. K., & Ahmad, T. B. (2026). Influence of Digital Competencies and AI Usage in Enhancing Teachers' Instructional Effectiveness in Southern Pakistan. Edu-Sains: Jurnal Pendidikan Matematika dan Ilmu Pengetahuan Alam, 15(1), 41-53.