

AI Readiness in Education: A Review of Conceptual Foundations, Pedagogical Dimensions, and Ethical Considerations

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Abstract: The rapid integration of artificial intelligence (AI) into educational systems has intensified scholarly interest in understanding educators' preparedness to adopt AI technologies effectively and responsibly. This review paper synthesizes existing literature on AI readiness in education, conceptualizing it as a multidimensional construct encompassing technology self-efficacy, pedagogical capacity for student interaction, and ethical awareness. Drawing on international and Chinese studies, with particular attention to higher education and vocational training contexts, the review highlights how individual, institutional, and socio-demographic factors shape teachers' readiness for AI integration. The analysis reveals that while research on AI acceptance and intention is expanding, empirical studies employing holistic and validated readiness frameworks-especially in non-Western and vocational settings-remain limited. By integrating fragmented strands of research, this review advances a more comprehensive and context-sensitive understanding of AI readiness and identifies directions for future research and policy development aimed at supporting responsible, human-centered AI adoption in education.

Keywords: AI Readiness, Artificial Intelligence in Education, Technology Self-Efficacy, Ethical Awareness, Student Interaction, Vocational Education.

1. Introduction

Artificial intelligence (AI) is rapidly transforming educational systems worldwide, influencing teaching practices, curriculum design, assessment, and institutional governance. As educational institutions increasingly adopt AI-driven tools, the concept of AI readiness has emerged as a critical lens for understanding how well educators and organizations are prepared to integrate these technologies effectively and responsibly. Rather than focusing solely on access to technology, AI readiness encompasses teachers' competencies, beliefs, pedagogical orientations, and ethical awareness. This review paper synthesizes existing literature on AI readiness in education, with particular attention to higher education and vocational training in China. It examines key dimensions of readiness-technology self-efficacy, student interaction, and ethical awareness-while identifying research gaps and future directions. By consolidating fragmented findings, this review aims to contribute to a more coherent and multidimensional understanding of AI readiness in non-Western and vocational education contexts.

2. Conceptualizing AI Readiness in Education

AI has become an integral component of global education reform, reshaping pedagogical practices and institutional priorities. AI readiness is commonly conceptualized as a multidimensional construct reflecting the preparedness of educators and institutions to adopt AI tools effectively in teaching and learning. Early conceptualizations emphasize the integration of technological competence, pedagogical adaptability, and ethical awareness [1]. At the institutional and national levels, AI readiness has also been associated with

governance structures, strategic vision, digital infrastructure, and research capacity [2].

Within teacher education, readiness extends beyond technical skills to include beliefs, attitudes, and willingness to engage with AI technologies. These affective and cognitive factors are widely recognized as critical determinants of successful technology integration [3]. This holistic view positions AI readiness as a foundational condition for sustainable and meaningful AI adoption in higher education and vocational training institutions.

3. AI in Chinese Higher Education and Vocational Training

China has positioned AI at the core of its educational modernization agenda, promoting the integration of intelligent technologies into teaching, curriculum design, and assessment systems [4]. Higher education institutions, particularly vocational colleges, play a strategic role in this transformation as they are expected to align talent cultivation with the needs of an AI-driven economy.

Empirical studies indicate that Chinese teachers' acceptance and use of AI are shaped by both institutional factors (e.g., policy support, infrastructure, professional development) and individual characteristics, including beliefs, demographic variables, and perceived usefulness of AI [5]. Vocational educators face distinctive challenges, such as balancing industry-oriented competencies with pedagogical and ethical responsibilities. Consequently, assessing AI readiness among vocational teachers is especially important for informing policy implementation and professional development strategies within China's education system.

4. Technology Self-Efficacy as a Core Dimension of AI Readiness

Technology self-efficacy is widely recognized as a central component of AI readiness. It refers to teachers' beliefs in their ability to successfully use AI-based tools and platforms for instructional purposes. This construct is grounded in Social Cognitive Theory, which posits that perceived capability strongly influences motivation, persistence, and performance [6].

Teachers with high levels of technological self-efficacy are more likely to experiment with AI-driven systems, adopt innovative pedagogical approaches, and overcome technical challenges [3][7]. Conversely, teachers with low self-efficacy often perceive AI as overly complex, intimidating, or misaligned with their professional roles [8]. The rapid evolution and data-driven nature of AI technologies further heighten the importance of self-efficacy, as teachers are expected not only to operate AI tools but also to interpret AI-generated insights to inform instructional decisions [9].

Research also suggests that self-efficacy levels vary across demographic groups, with factors such as gender, teaching experience, and subject specialization playing significant roles [10][11]. Identifying disparities in technology self-efficacy is therefore essential for designing targeted professional development initiatives that support equitable AI integration.

5. Student Interaction and Pedagogical Readiness

Another critical dimension of AI readiness is teachers' capacity to leverage AI for meaningful student interaction. Student interaction refers to the use of AI to enhance engagement, collaboration, personalization, and feedback in the learning process. AI-powered platforms can adapt instructional content to individual learners, automate feedback, and support differentiated instruction [12][13].

Readiness in this domain reflects not only technical proficiency but also pedagogical flexibility. Teachers must be able to integrate AI tools in ways that complement, rather than replace, human interaction and relational aspects of teaching. In the Chinese context, where large class sizes often limit individualized support, AI offers opportunities to improve interaction by reducing administrative workload and enabling more formative assessment and mentoring [14]. However, realizing these benefits requires a shift toward student-centered pedagogies that intentionally employ AI for adaptive learning, collaboration, and inclusivity [15].

Recent measurement frameworks, such as responsible AI awareness scales, have begun to capture teachers' perceptions of how AI influences human relationships and interaction in the classroom, further underscoring the pedagogical dimension of AI readiness [16].

6. Ethical Awareness and Responsible AI Use

Ethical awareness has emerged as an indispensable element of AI readiness. As AI systems increasingly influence educational decision-making, they raise ethical concerns related to data privacy, algorithmic bias, transparency, and fairness [17]. Teachers play a pivotal role in mediating these risks, particularly when student data are collected, processed, or analyzed.

Ethical readiness extends beyond compliance with regulations; it involves the capacity to recognize ethical dilemmas, promote digital equity, and apply principles of responsible AI use in educational settings [18][19]. In China, ethical awareness is especially salient due to public concerns surrounding surveillance technologies, data governance, and unequal access to AI-enhanced learning environments [2][20]. Without sufficient ethical literacy, educators may unintentionally perpetuate bias or misuse AI-supported systems [21].

Assessing ethical awareness alongside technological and pedagogical dimensions allows for a more comprehensive understanding of teachers' readiness to integrate AI responsibly.

7. Future Research Perspectives

Despite the growing body of literature on AI in education, several research gaps remain. First, much existing research emphasizes technology acceptance or behavioral intention rather than multidimensional readiness encompassing self-efficacy, student interaction, and ethical awareness [10][14]. Second, empirical studies in non-Western and vocational education contexts-particularly those employing validated, multidimensional instruments-are still limited. Third, few studies have examined how ethical awareness and expectations for AI-enhanced student interaction mediate or interact with teachers' technology self-efficacy in shaping overall readiness.

Addressing these gaps requires methodological diversification, including longitudinal and mixed-methods designs that capture changes in readiness over time and provide deeper contextual insights. Such approaches are particularly valuable in vocational education settings, where institutional missions, industry demands, and cultural expectations intersect.

8. Conclusion

This review highlights the multifaceted nature of AI readiness in education, emphasizing the interrelated roles of technology self-efficacy, student interaction, and ethical awareness. The literature demonstrates that teachers' readiness to integrate AI is shaped by individual beliefs, pedagogical orientations, ethical considerations, and socio-demographic characteristics, all of which are further mediated by institutional and cultural contexts. In China, vocational educators occupy a critical position in advancing AI-driven educational reform, yet they also face distinctive challenges that warrant closer scholarly attention.

By synthesizing existing research, this review underscores the need for more comprehensive and context-sensitive frameworks of AI readiness that move beyond technical adoption to include pedagogical and ethical dimensions. Future research grounded in mixed-methods and vocational education contexts can contribute to an understanding of how educators can be supported in adopting AI responsibly and effectively. Such efforts are essential for ensuring that AI integration in education promotes innovation, equity, and human-centered learning.

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