

Practical Challenges and Optimization Strategies for Enhancing Preschool Teachers' Literacy in Intelligent Applications: A Case Study of Z Kindergarten in Yinchuan

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Abstract

As artificial intelligence drives rapid advancements in early childhood education, preschool teachers' competency in utilizing AI technologies is fundamental to improving educational quality. Using Z Kindergarten in Yinchuan, Ningxia Hui Autonomous Region, as a case study and employing a mixed-methods approach—including classroom observations and in-depth interviews—this research investigates preschool teachers' literacy in the intelligent application of technology. Specifically, it examines their proficiency in operating various types of intelligent teaching equipment, such as AR exploratory sand tables, age-specific coding games, intelligent picture-book reading desks, and creative interactive floors. The results reveal significant discrepancies in teachers' instructional performance when using different intelligent devices. Overall, their capacity to adopt AI-enabled teaching tools needs considerable improvement, while practical obstacles continue to hinder the implementation of digital technologies in early childhood education and care. First, teachers often hold biased perceptions of intelligent tools; most view such facilities merely as auxiliary teaching aids and lack a thorough understanding of their deeper value in supporting children's personalized development. Second, practitioners are deficient in the practical skills for leveraging digital tools effectively. Although most can perform basic operations, they are unable to analyze children's learning data via smart systems or design individualized instructional plans. Third, some educators lack ethical awareness regarding digital tool usage. Several practitioners overly depend on smart devices to substitute face-to-face interactive guidance and fail to safeguard young children's data privacy. Lastly, the institutional support framework remains insufficient. Burdened with heavy daily routines, the kindergarten's existing AI training program has inherent flaws, leading to uneven training outcomes. To address these issues, this paper proposes targeted and feasible optimization strategies. First, a hierarchical and categorized training framework should be established to deliver comprehensive, tiered, and immersive training centered on real-world AI use cases. The sessions will cover basic operations, data analysis, and individualized instructional design. Second, a practical community integrating digital tools and pedagogical research should be fostered. Rooted in kindergarten-based educational research, educators are encouraged to draw on their professional insights and pursue self-directed learning via various online platforms to explore innovative uses of smart devices. Next, AI-aided instruction should be embedded into children's daily routines to combine AI support with preschool education and care, thereby enhancing instructional consistency and routine alignment. Finally, standardized ethical codes for the adoption of digital resources need to be revised to clarify appropriate boundaries for technology use and to raise educators' awareness of protecting children's data privacy.

Keywords

Preschool Teacher AI Literacy, AI-enhanced Instruction, Intelligent Teaching, Kindergarten-based Training, Ethical AI Use