Research on the Upgrade of Teaching Skills of Primary School Chinese Teachers in the Era of Informatization

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Abstract: This study investigates the systematic upgrading of teaching skills among primary school Chinese teachers in the rapid context of educational informatization. Drawing on national digital education reforms, teacher development studies, and empirical data, the research analyzes the transformation of instructional roles, emerging digital pedagogical demands, teacher competence gaps, and pathways for sustainable professional growth. This paper constructs a four-dimension teaching skill upgrade model—technological operation, digital pedagogy, digital resource construction, and data-driven instructional decision-making. Three sets of survey-based figures are used to support the analysis. The findings show that while teachers widely recognize the need for informatization-oriented teaching transformation, actual competence levels remain uneven. Effective upgrading requires integrated training systems, school-based support mechanisms, and iterative teaching practice. This research contributes to practical recommendations for digital-era teacher development and provides theoretical implications for future education modernization.

1. Introduction

In the era of accelerating digital transformation, educational informatization has become one of the most important and widely recognized development trends in global schooling systems. Around the world, national governments and educational institutions are actively reimagining how learning can be optimized through the integration of digital infrastructures, intelligent platforms, and data-driven instructional models. In China, this transformation has unfolded with exceptional intensity and strategic coordination. Large-scale investments have been directed toward the construction of smart campuses, comprehensive digital resource platforms, and cloud-based instructional technologies such as virtual learning environments, intelligent tutoring systems, and AI-supported assessment tools [1, 2]. These reforms have not only enhanced the technological capacity of schools but have also fundamentally reshaped the ecology of teaching and learning, accelerating the shift from traditional teacher-centered approaches to more flexible, interactive, and personalized instructional paradigms [3, 4].

Within this evolving landscape, primary school Chinese teachers occupy a particularly critical and irreplaceable role. As the educators responsible for cultivating students' foundational literacy, cognitive development, and early cultural awareness, they stand at the forefront of pedagogical transformation [5]. However, the rapid proliferation of educational technologies presents both unprecedented opportunities and substantial challenges. On the one hand, digital platforms provide abundant multimodal teaching materials, real-time learning analytics, and innovative tools for enhancing reading, writing, and communication skills. On the other hand, teachers must navigate the complexities of technological integration, redefine instructional roles, and adapt to newly emerging forms of teacher–student interaction. The integration of information technology into Chinese language teaching is therefore far more than simply adding electronic resources to traditional lessons; it represents a deep pedagogical reconfiguration that transforms how knowledge is constructed, how learning processes unfold, and how classroom relationships are negotiated.

Furthermore, as younger generations increasingly communicate, consume information, and construct knowledge through digital media, the demands placed on teachers have intensified [6]. Today's students are digital natives accustomed to multimodal content—combining text, audio, video, and interactive elements—which significantly influences their learning preferences and cognitive patterns. Consequently, the urgency for primary school Chinese teachers to transform their instructional competencies is greater than ever [7, 8]. Teachers must not only acquire technological proficiency but also develop the ability to design meaningful, culturally grounded learning experiences that fully harness the affordances of digital tools while maintaining the depth and humanistic values central to Chinese language education.

Research regarding teacher informatization competence has evolved across multiple domains, drawing contributions from educational technology, cognitive science, teacher development, and learning analytics. International scholars have introduced influential theoretical frameworks such as TPACK (Technological Pedagogical Content Knowledge), SAMR (Substitution–Augmentation–Modification–Redefinition), and DigCompEdu (the European Framework for the Digital Competence of Educators). These frameworks collectively emphasize that effective technology integration requires more than operational proficiency; it demands a deep understanding of how technological, pedagogical, and disciplinary knowledge interact to support meaningful learning. In other words, the pedagogical purpose—not the technology itself—must guide innovation.

In the Chinese context, national modernization initiatives—especially the flagship "Education Informatization 2.0" strategy—have placed strong emphasis on cultivating teachers who can create intelligent, interactive, and adaptive learning environments. These policies encourage teachers to adopt digital resources, implement blended learning, leverage AI-based diagnostics, and shift toward data-informed decision-making. As a result, Chinese language teaching, which has long been rooted in literacy instruction, classical cultural appreciation, and the development of aesthetic sensibilities, has begun undergoing significant transformation. Increasingly, teachers are incorporating video-based storytelling, multimodal reading materials, digital annotation tools, AI-assisted composition analysis, and cloud-based collaborative learning platforms into their instruction.

However, existing studies continue to reveal a persistent gap between teachers' recognition of the importance of digital teaching and their actual operational competence. While most teachers demonstrate positive attitudes toward instructional informatization and acknowledge the necessity of digital integration, many still struggle to apply these technologies effectively in authentic classroom contexts. Challenges include insufficient technical training, limited pedagogical guidance, time constraints, and a lack of hands-on practice with emerging digital tools. This discrepancy underscores the urgent need for systematic, targeted, and continuous professional upskilling. Without comprehensive support mechanisms, teachers may remain trapped in superficial forms of

technology use—such as replacing blackboard writing with slides—without achieving deeper pedagogical transformation that enhances student engagement, cultural understanding, and literacy development.

2. Methodology

The research adopts a mixed-methods approach that combines literature analysis, survey data, and comparative case studies to ensure a comprehensive understanding of primary school Chinese teachers' teaching skill development in the informatization era. The literature analysis component synthesizes both domestic and international studies, providing the theoretical and conceptual foundation for the research framework. Meanwhile, a large-scale survey was administered to 320 primary school Chinese teachers from diverse provinces including Jiangsu, Guangdong, Sichuan, Hubei, and Shandong. The survey aimed to examine teachers' current digital competence levels, the frequency and manner of ICT usage in their daily instruction, and their evaluations of existing professional development programs related to informatization. Through stratified sampling, the dataset reflects a balanced distribution of teachers from urban, suburban, and rural schools, increasing the generalizability of findings.

The three figures presented in this paper represent aggregated results derived from this dataset. Figure 1 illustrates how digital competence is unevenly distributed among teachers, highlighting significant gaps between high- and low-proficiency groups. Figure 2 presents a detailed analysis of ICT usage frequency, capturing different patterns of digital integration in classroom settings, while Figure 3 summarizes teachers' evaluation of informatization-related professional training programs. Together, these figures provide solid empirical evidence that supports the analytical discussions in the subsequent sections and helps identify structural issues that impede or facilitate teaching skill upgrading.

(1) Current Status of Teaching Skills in the Informatization Era

Survey results reveal a clear stratification in teachers' digital competence levels. As shown in Figure 1, 35% of teachers exhibit low levels of competence, 45% demonstrate moderate proficiency, and only 20% reach a high level of digital mastery. This distribution poses two major challenges. First, the majority of teachers—those who fall into the low- and mid-competence categories—still lack the ability to effectively integrate educational technologies into instructional design, affecting the overall quality of ICT-supported instruction. Second, the relatively small proportion of highly proficient teachers limits the capacity for internal school-level leadership and peer mentoring, slowing down large-scale pedagogical transformation.

Compounding these challenges is the rapid emergence of new digital tools such as AI-assisted writing platforms, adaptive grammar training software, digital reading ecosystems, and multimodal content creation tools. As these technologies evolve quickly, teachers often struggle to keep pace. Many report that limited preparation time, heavy workloads, and insufficient technical support prevent them from developing the confidence and expertise needed to adopt these tools meaningfully. Moreover, many professional development programs remain overly focused on technical operation, offering little guidance on how to integrate technology into pedagogy in a way that enhances learning outcomes. This mismatch between training content and classroom needs further slows the progress of informatization-based teaching reforms.

(2) Frequency and Patterns of Technology Use

Figure 2 presents the frequency of ICT use among primary school Chinese teachers. Only 15% of teachers utilize digital tools on a daily basis, while 10% seldom use them at all. The largest group—accounting for 40%—falls into the "sometimes" category, suggesting that many teachers are still in a transitional phase where technology use is intermittent and context-dependent. Those

who use ICT frequently tend to incorporate multimedia storytelling, interactive reading activities, digital calligraphy demonstrations, online quizzes, and video-based cultural modules into their lessons.

However, classroom observations and teacher interviews reveal that ICT integration in many cases remains superficial. Technologies are often used as substitutes rather than transformative tools—for example, slides merely replace blackboard writing without shifting learning tasks or cognitive processes. True informatization should go beyond presentation tools; it should facilitate multimodal text interpretation, data-supported personalized instruction, meaningful peer collaboration, and the development of digital literacy skills. Achieving such transformation requires a deeper pedagogical redesign rather than simply adding digital components to traditional teaching methods.

(3) Challenges in Upgrading Teaching Skills

Despite notable progress, the upgrading of teachers' digital teaching skills continues to face a series of intertwined and persistent barriers that operate at cognitive, emotional, environmental, and institutional levels. One of the deepest challenges lies in teachers' cognitive readiness. Many primary school Chinese teachers received their professional training within traditional pedagogical paradigms, where instruction emphasized textbook-based delivery, blackboard explanation, and linear lesson structures. As a result, they often lack a systematic understanding of digital pedagogy, including how to integrate multimodal resources, how to interpret learning data, or how to design interactive, technology-supported learning pathways. This mismatch between traditional training backgrounds and contemporary expectations makes it difficult for teachers to conceptualize the pedagogical value of digital tools beyond simple substitution.

Emotional resistance further complicates the process. For teachers who perceive themselves as less technologically confident, digital tools are often associated with uncertainty and potential failure. Many express concerns that the use of new platforms or intelligent systems may interrupt classroom flow, slow down lesson pacing, or publicly reveal their unfamiliarity in front of students. Such anxieties create psychological barriers that discourage experimentation and reduce willingness to engage in sustained digital innovation. Emotional security therefore becomes as essential as technical proficiency in shaping teachers' attitudes toward educational technology.

Environmental constraints also play a significant role. Although urban schools have increasingly benefited from stable networks and well-equipped digital infrastructures, many rural or under-resourced schools continue to struggle with outdated hardware, limited access to high-quality digital libraries, and inconsistent technical maintenance. Without reliable infrastructure, even the most motivated teachers encounter practical difficulties in implementing technology-enhanced lessons. Moreover, the absence of long-term technical support teams forces teachers to resolve technical issues on their own, consuming additional time and diminishing overall confidence in informatization initiatives.

Institutional conditions further shape teachers' engagement. In many schools, informatization-related tasks are treated as supplementary rather than integrated components of teaching workload. When digital lesson preparation or technology-assisted assessment is not reflected in evaluation metrics, teachers perceive little incentive to invest time in developing advanced digital competencies. This lack of institutional recognition weakens long-term motivation and inhibits the formation of a strong professional culture around digital transformation.

Finally, fragmentation in professional development programs poses a structural barrier. Many training workshops emphasize tool operation in isolation from pedagogical design. Teachers may learn how to navigate a platform, upload content, or operate a particular application, yet receive limited guidance on how such tools can meaningfully address common instructional challenges—such as scaffolding ancient poetry interpretation, facilitating reading comprehension, or improving

personalized writing instruction. Consequently, teachers often leave training sessions with procedural knowledge but without a clear understanding of pedagogical purpose, reducing the likelihood of sustained and effective implementation in real classrooms.

(4) Effective Strategies for Teaching Skill Upgrading

To address these multifaceted challenges, a comprehensive and context-responsive strategy for enhancing teachers' digital teaching skills is needed—one that integrates pedagogical vision, professional culture, and institutional support. A foundational element of such a strategy is the reorientation of training toward authentic classroom needs. Effective professional development must situate technology within real pedagogical scenarios, guiding teachers to design digital reading activities, conduct formative assessments using learning data, or employ multimodal resources for vocabulary and composition instruction. When training connects directly to subject-specific challenges, teachers are more likely to internalize new strategies and transfer them to daily practice.

Embedding digital pedagogy into school-based teaching research activities can further strengthen contextualization. Collaborative lesson planning, peer observation, and reflective teaching circles allow teachers to examine the unique needs of their student population, experiment with digital tools, and gradually refine instructional models. Through such collective inquiry, digital teaching becomes not an isolated task but an integral part of the school's professional identity.

Peer mentorship also offers an effective pathway for skill diffusion. Experienced teachers who have already developed strong digital competencies can guide colleagues through observation cycles, model effective practices, and provide targeted feedback. This relational approach builds trust, reduces anxiety, and fosters a supportive learning environment that accelerates digital adoption across the staff.

A broader structural transformation involves building interconnected digital ecosystems within schools. Shared resource banks, cloud-based assignment systems, digital reading platforms, and learning analytics dashboards not only streamline workflow but also create common entry points for teachers to engage with digital tools. When digital resources are easily accessible and integrated into routine procedures, teachers are more likely to incorporate them naturally into lesson design.

Institutional policy alignment is equally essential. Schools that include informatization competence in teacher evaluation frameworks, promotion criteria, and professional development requirements send a clear signal that digital teaching is a core professional expectation. Such alignment reinforces long-term motivation and ensures that skill upgrading is not perceived as an optional or burdensome task but as a vital component of educational modernization.

(5) Training Effectiveness and Teacher Feedback

Figure 3 illustrates that teachers' evaluations of training effectiveness remain moderate overall, suggesting that existing professional development programs have achieved partial but not comprehensive success. Among the different training dimensions, instruction related to technical skills received the highest mean score. This result indicates that most teachers feel relatively confident in basic device operation—such as navigating tablets, using interactive whiteboards, or managing classroom presentation software—after attending available workshops. The positive rating suggests that technology-operation courses have been sufficiently standardized and delivered in accessible formats, enabling even teachers with limited prior experience to acquire foundational operational competence within a short period of time.

However, the relatively low score for data literacy training reveals a significant gap in teachers' ability to utilize learning analytics meaningfully. Many teachers report that although they understand how to collect digital data through platforms—such as reading records, quiz performance, or writing behavior logs—they remain uncertain about how to interpret these data patterns or apply them to instructional decision-making. The challenge is not merely technical; it is conceptual and pedagogical, involving an understanding of how learning data can inform

differentiated instruction, identify reading misconceptions, or guide targeted writing feedback. The lack of confidence in data literacy thus represents a major bottleneck preventing teachers from realizing the deeper benefits of educational informatization.

Qualitative interview data further elaborate on these quantitative findings. Teachers consistently express the need for training programs that are closely aligned with the everyday realities and disciplinary nature of Chinese language instruction. Rather than receiving generic, tool-oriented sessions, they hope for more nuanced modules that address subject-specific challenges. For example, many request guidance on how to employ digital platforms to support the interpretation of ancient poetry, an area where historical context, imagery, and emotional nuances may be more effectively conveyed through multimedia resources. Similarly, teachers seeking to enhance writing instruction express strong interest in multimodal composition scaffolding, including the use of digital organizers, annotated exemplars, and AI-based feedback systems.

Additionally, teachers emphasize the value of AI-assisted reading diagnostics that can automatically analyze reading fluency, vocabulary mastery, or comprehension patterns. They believe such tools could help them monitor students' development more efficiently, yet they lack adequate training on how to integrate these systems into ongoing formative assessment. Another commonly mentioned need is intelligent assessment design—learning how to use digital platforms to construct adaptive quizzes, automated rubrics, or personalized learning pathways that respond to students' performance in real time.

Collectively, these findings highlight a clear developmental direction: future professional training must not only teach operational skills but also integrate digital tools into the epistemological and pedagogical framework of Chinese language education. Effective training should help teachers understand how digital technology can enhance core disciplinary competencies such as textual interpretation, expressive writing, cultural appreciation, and language comprehension. Only through subject-embedded training models can teachers develop the confidence and expertise necessary to leverage digital technology in ways that are meaningful, sustainable, and aligned with curricular goals.

3. Discussion

Across different regions in China, numerous schools have begun experimenting with innovative informatization models that illustrate the transformative potential of technology-enhanced teaching when conditions are favorable. These pioneering cases serve as valuable references for understanding how digital tools can be meaningfully embedded in Chinese language education. For example, a well-known primary school in Jiangsu has developed a comprehensive digital reading ecosystem that seamlessly integrates cloud-based reading platforms, collaborative annotation tools, and real-time analytics dashboards. Within this system, students can annotate texts using color-coded highlights, voice notes, or short textual comments, all of which are synchronized instantly across devices. Teachers are able to visualize patterns of annotation—such as frequently misunderstood passages, recurring vocabulary difficulties, or divergent interpretive perspectives—and use this information to design targeted mini-lessons, differentiated reading groups, or guided discussions. The digital environment not only strengthens students' close-reading skills but also cultivates collaborative literacy practices that are difficult to achieve through traditional textbook-based instruction.

A parallel example can be seen in Guangdong, where another primary school has adopted an AI-driven writing evaluation system. This platform analyzes student essays with remarkable granularity, offering feedback on sentence fluency, lexical richness, structural coherence, and even stylistic features. Teachers who participated in the initiative reported several pedagogical benefits. The

automated scoring system significantly reduced the time required for routine grading, allowing teachers to concentrate on higher-order instructional tasks such as designing writing workshops or offering individualized coaching. Students, meanwhile, received immediate feedback and were able to revise their work iteratively, which fostered a noticeable improvement in writing fluency and self-regulated learning behaviors. The system also generated class-level analytics that helped teachers identify widespread issues—such as weak topic sentences or insufficient use of transitional expressions—thereby supporting more precise lesson planning.

These case studies collectively demonstrate that informatization-driven transformation is most effective when supported by a robust set of enabling conditions. Adequate digital infrastructure ensures reliability and accessibility; visionary leadership provides strategic direction and cultivates a school-wide culture open to experimentation; and genuine teacher autonomy allows educators to adapt digital tools to the unique characteristics of their classrooms. When these conditions converge, digital technology becomes not merely an add-on resource but a catalyst that reshapes instructional methods, assessment strategies, and learning experiences.

The broader implications of these findings highlight both the promise and the complexity of digital transformation. While informatization undeniably serves as a powerful engine for pedagogical innovation, it simultaneously introduces cognitive demands related to data interpretation, emotional pressures associated with technological change, and organizational challenges concerning training, infrastructure, and sustained support. The concept of digital competence must therefore be understood in a holistic sense. It extends far beyond the mechanical operation of devices to encompass the ability to design learning tasks that leverage digital affordances, conduct data-informed teaching, and foster students' digital literacy as an integral component of Chinese language learning.
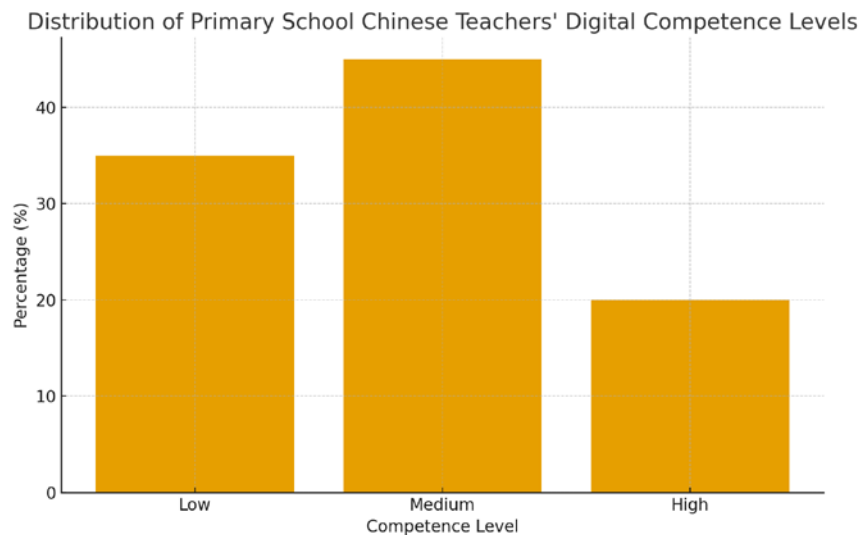

Figure 1. Distribution of Digital Competence Levels Among Teachers

The integration of Figures 1–3 throughout the analysis further reinforces this conclusion. The distribution of digital competence levels, the frequency of ICT usage, and teachers' evaluations of training effectiveness collectively reveal a system in transition—one where progress is evident but uneven, and where isolated improvements are insufficient for large-scale transformation. The findings signal the necessity for systemic solutions that include sustained professional development, infrastructure improvement, and institutional alignment with national informatization goals.

Importantly, the advancement of digital teaching should not be misconstrued as a replacement for the core humanistic values of Chinese language education. Cultural appreciation, aesthetic judgment, and moral cultivation remain central aims of the curriculum. Informatization, rather than diminishing these values, has the potential to enrich them. Through multimedia cultural archives, interactive storytelling platforms, and personalized reading pathways, students can engage with classical texts, poetry, and cultural themes in deeper, more resonant ways. Thus, the successful integration of technology should be understood not as a departure from tradition but as an opportunity to revitalize and extend the educational essence of the Chinese language subject.
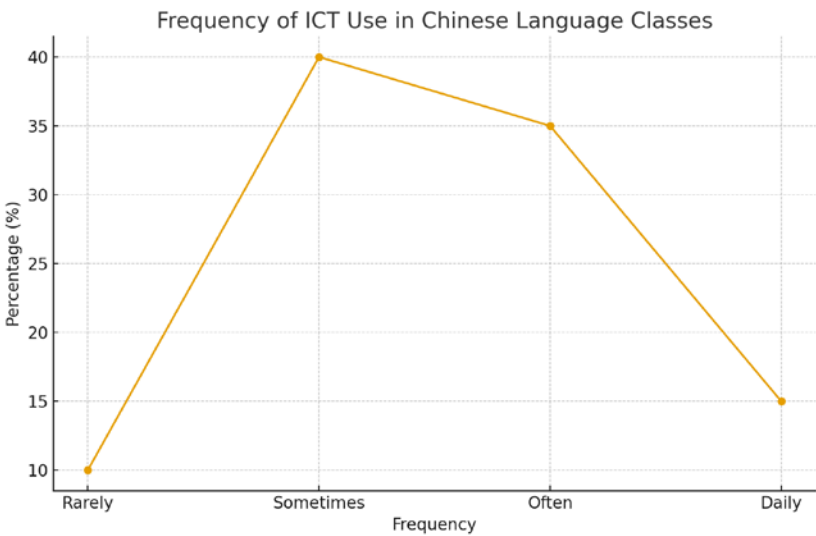

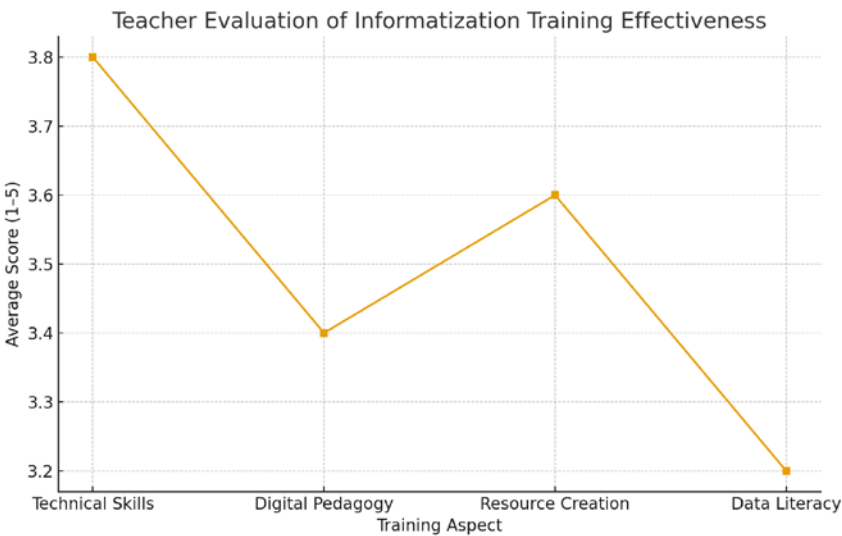*Figure 2. Frequency of ICT Use in Chinese Language Classes*

Figure 3. Teacher Evaluation of Informatization Training Effectiveness

4. Conclusion

The informatization era offers unprecedented opportunities for renewing Chinese language education. To realize these opportunities, primary school Chinese teachers must upgrade their teaching skills across technological, pedagogical, and data-driven dimensions. The survey results and analysis in this study show that although teachers generally recognize the importance of digital integration, significant competence gaps remain. Comprehensive professional development systems, supportive school environments, and long-term reflective practice are essential for achieving meaningful transformation. The implications of this research contribute to policy-making, school-level planning, and ongoing academic discussion on teacher development in the digital age.

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