

An Exploration of the Necessity to Improve Rural Teachers' Digital Teaching Literacy

Chunli Feng

Academic Affairs Office, Mudanjiang Normal University, Mudanjiang, China

Email: jwcfcl@126.com

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Abstract

Under the background of the information age, emerging technologies are constantly affecting all aspects of people's lives, especially in the field of rural education. Through the impact of rural education informatization on rural classrooms, it is found that there is still a big gap between the basic construction of rural informatization teaching and the teaching of teachers and cities. This paper analyzes the challenges faced by rural classrooms under the background of the information age by combining the practice cases of informatization, and thus puts corresponding suggestions.

Keywords

Rural Teachers, Digital Teaching, Educational Informatization

1. The Call of the Times: The Growing Focus on Rural Education Informatization

In the era of "artificial intelligence" and "AI-enabled" education, the wave of informatization has swept across the globe, transcending national borders and deeply infiltrating various fields, including education. Around the world, the construction of educational informatization, which leverages information technology to drive educational innovation and development, has become a common understanding and action guideline across all sectors of society. The gap between urban and rural educational development is a widespread issue, and accelerating the construction of educational informatization and utilizing digital resources to narrow this gap has become a common practice internationally. Research indicates that developed countries in the West began addressing the informatization of rural (remote rural) education in the 1990s (Xie et al., 2007). In contrast to developed nations, China began its educational informatization process relatively late,

only starting in the 21st century when government departments began integrating information technology with educational activities nationwide.

As early as 2001, the widespread promotion and implementation of the “Rural Education Remote Engineering” (a modern distance education program for rural primary and secondary schools) proved the pivotal role of educational informatization in promoting educational equity between urban and rural areas and fostering balanced regional educational development. This project not only brought richer educational resources to rural students but also laid a solid foundation for narrowing the urban-rural educational gap and improving the quality of rural education. The course of this initiative, from “Broadband Networks Connecting Schools” to “Quality Resources in Every Classroom” and then to “Universal Access to Online Learning Spaces”, as well as the establishment of “Educational Resource Public Service Platforms” and the promotion of “Educational Management Public Service Platforms”, highlights the country’s commitment to advancing educational informatization. This effort strives to create a campus network environment where everyone can learn anytime, anywhere.

In 2010, the Central Committee of the Communist Party of China and the State Council issued the National Medium and Long-Term Education Reform and Development Plan Outline (2010-2020), which marked the first time “accelerating the process of educational informatization” was listed as an independent chapter. This inclusion signified that educational informatization had become part of the national educational development agenda, setting a clear direction and goals for China’s education informatization efforts. In 2012 and 2016, the Ministry of Education issued two national planning documents: the Ten-Year Development Plan for Educational Informatization (2011-2020) and the 13th Five-Year Plan for Educational Informatization, both emphasizing support for rural educational informatization. In 2012, the Full Coverage of Digital Educational Resources for Teaching Points project was launched, which developed a full set of digital teaching resources for nine primary courses at rural teaching points, ensuring that small subject classes in remote areas were adequately taught. In 2018, the Ministry of Education released the Education Informatization 2.0 Action Plan, marking the transition from the 1.0 era to the 2.0 era, focusing on “comprehensive advancement of educational informatization”. It explicitly proposed that the continued development of the “Three Connections and Two Platforms” is essential to integrating information technology into daily teaching activities, and that educational informatization will undoubtedly become an effective tool for promoting educational equity and improving educational quality. The advent of the 2.0 era offers valuable opportunities for the high-quality development of rural education.

In recent years, the rapid development of information technology has injected new vitality into the field of education, particularly in rural education, where its penetration rate has been particularly remarkable. Against this backdrop, domestic scholars have focused their research on rural schools and rural teacher teams, conducting extensive in-depth studies on the current situation and countermeas-

ures regarding how to use information technology to improve the quality of education in rural schools. In the early stages of research, scholars mainly concentrated on theoretical exploration. They analyzed the role of information technology in promoting rural education development, believing that due to its wide coverage, high replicability, and shareability, information technology has become an important avenue for advancing educational modernization. This theoretical exploration laid a solid foundation for subsequent practical research. Educational informatization can promote the balanced allocation of rural educational resources (Li & Fan, 2012; Gao, 2014), facilitate the balanced allocation of rural teacher resources (Wang et al., 2017; Wang & Liu, 2017), and promote urban-rural educational equity (Wang et al., 2014), ultimately narrowing the urban-rural educational development gap (Wu & Liu, 2020). On the other hand, the promotion of high-quality and balanced urban-rural education through educational informatization is a practical task, and exploring implementation strategies has become a core focus of rural education informatization research. Scholars have explored implementation strategies for promoting urban-rural educational equity through educational informatization, including prioritizing the construction of rural school educational informatization infrastructure, developing and sharing regional educational information resources, improving the information technology proficiency of rural school teachers, and innovating information education systems and mechanisms (Zeng et al., 2007; Chen & Chen, 2013; Sun & Wang, 2008; Liu & Wu, 2008).

With the continued advancement of rural educational informatization and the deepening of academic research, an increasing number of scholars have begun to utilize empirical survey data to provide detailed depictions of the current state of rural educational informatization and conduct in-depth analyses of the challenges therein. At the same time, by summarizing successful practices, they have distilled a series of instructive approaches and models that provide robust support for the further development of rural education. For instance, the research team led by He et al. (2009) developed innovative theories, models, and methods for informatized teaching, establishing a number of core demonstration schools in rural areas of Guangdong, Hebei, and Beijing. Through effective applications, these initiatives enabled rural children to access high-quality education comparable to that available in urban areas (He et al., 2009). Similarly, Zhang et al. (2023) conducted extensive surveys in a western province (X Province), analyzing the current state of rural teacher development under the framework of educational informatization from three dimensions: informatized teaching environments, teacher training and professional development, and informatized teaching competencies. Based on these findings, they proposed strategic recommendations for enhancing rural teacher development through informatization. These studies not only illustrate the realities of rural educational development in the context of the information age but also provide constructive policy recommendations for improving rural educational informatization. Clearly, promoting balanced urban-rural educa-

tional development and advancing educational equity through information technology has become a focal point of national policy and a critical issue in academic discourse.

2. Classroom Transformation: Enhancing Teacher-Student Engagement through Informatized Teaching

In the era of educational informatization, information technology has become an indispensable element of classroom teaching. Its significance and necessity in facilitating effective teaching and learning have been widely acknowledged by education practitioners. Simultaneously, attention is a fundamental prerequisite for the success of any activity and an essential psychological condition for processing information. In the unique context of the classroom, students' attention is particularly critical for ensuring efficient learning outcomes.

With the significant progress and scale achieved in the development of national educational informatization, its implementation and application have entered a critical phase. Among these efforts, informatized classroom teaching should become the central focus of educational informatization to ensure its deep advancement and practical effectiveness. The “process of informatized teaching” refers to the transmission, reception, and exchange of educational information by educators and learners through modern information technology. This process takes place in an information technology environment, involving both teaching and learning activities facilitated by technological tools to convey, communicate, and explore teaching content. It is a teaching process enriched by abundant educational information resources, designed to transcend the limitations of traditional classroom instruction and foster innovative, dynamic learning experiences (Nan, 2011: pp. 48-49). Similarly, empirical research by Lin et al. (2022) revealed that merely focusing on investments in informatization infrastructure can have a negative impact on achieving high-quality and balanced compulsory education. Instead, improving teachers' capabilities to effectively apply informatized teaching methods is key to promoting equitable and high-quality compulsory education between urban and rural areas, thereby ensuring its overall effectiveness. As educational informatization advances, educators face increasingly higher demands on their professional capabilities. They must carefully consider how to integrate infrastructural advancements effectively into their teaching practices, creating a more high-quality learning environment for students. This requires educators to go beyond viewing informatized teaching tools as mere instruments for improving student learning efficiency. Instead, they must engage in truly effective informatized teaching. This is not only a vital objective in the future planning of educational informatization in China but also a critical pathway for enhancing educational quality and promoting educational equity.

Early international studies have demonstrated that when teachers adopt more diverse and enriched teaching content and materials in classroom instruction, students' disruptive behaviors are significantly reduced. This is closely associated

with improvements in students' classroom engagement and attention (Evertson, 1994). Similarly, domestic research has shown that the effective use of modern information technology in teaching can enhance instructional quality, significantly improve academic performance among students in rural areas, and positively influence their non-academic behaviors, thereby increasing overall educational benefits. In the current educational context, teachers are actively leveraging digital tools such as interactive whiteboards to deliver innovative and diverse instructional activities. By integrating dynamic and engaging interfaces, such as videos, teachers can flexibly present teaching content, making the learning process more appealing and effectively boosting students' focus and interest in the classroom. This, in turn, enhances their enthusiasm for learning. Furthermore, teachers can conveniently annotate, highlight, and emphasize content directly on the screen, allowing them to precisely control the pace of instruction.

When teachers operate multimedia tools and face students while presenting or annotating content on an interactive whiteboard, they not only enhance the emphasis of the teaching material but also deepen emotional interaction with students through eye contact. This information-based teaching approach not only improves students' classroom focus but also aligns their learning pace with the teacher's instructional content, significantly enhancing the coherence between digital teaching methods and the classroom learning process.

3. Problem-Driven Approach: Dual Challenges in Rural Classrooms

To bridge the urban-rural gap in educational development, information technology has become an indispensable tool and a preferred solution. Faced with the dual challenges of insufficient access to digital teaching resources and a shortage of high-quality teachers in rural schools, the key lies in effectively supplying and utilizing quality educational resources through information technology. Although the informatization environment in rural schools has improved significantly—with most primary and secondary schools achieving network coverage and completing the “Three Connections and Two Platforms” construction goals—teachers' ability to apply information technology has markedly advanced. However, data from 2013-2017 shows that while the informatization level of rural compulsory education schools has been steadily improving, rural schools still lag behind their urban counterparts. For example, the proportion of rural schools with campus networks was 56.81%, compared to 69.69% for township schools and 82.64% for urban schools, indicating considerable room for growth in rural school informatization. This disparity warrants serious attention (Wu & Qin, 2020). Research suggests that many remote and underdeveloped rural schools and teaching points lag significantly behind urban schools in terms of infrastructure. Some rural schools face challenges such as underutilized or nonfunctional hardware and low compatibility of software, which often struggles to adapt to local contexts. Additionally, poor network environments hinder the effective deployment of in-

formatization resources (Wei, 2018). Other studies indicate that rural teachers' informatization teaching skills still fall short compared to their urban counterparts. Factors such as an aging teacher workforce, severe attrition of high-quality teachers, and limited access to high-quality training opportunities in information technology contribute to the relatively low informatization teaching proficiency among rural educators (Li & Yang, 2021). Thus, the limitations in the foundational infrastructure and teacher capacity for informatization in rural schools not only hinder the effective implementation of technology-enhanced teaching but also serve as a primary bottleneck restricting the high-quality development of rural education. These challenges constitute the most significant obstacles faced by rural classrooms.

Another severe challenge in rural classrooms is the insufficient attention span among rural primary school students. A pressing challenge facing rural classrooms is the widespread lack of attention span among rural primary school students. This issue directly impacts their learning efficiency and exacerbates the prevalence of learning difficulties. The importance of classroom attention to students' learning cannot be overstated; it is not only the foundation of academic achievement but also a core psychological factor for maintaining enthusiasm and achieving effective learning. In the fields of medicine and psychology, low attention levels in children are often associated with Attention-Deficit/Hyperactivity Disorder (ADHD), a common neurodevelopmental disorder characterized by significant inattention, impulsivity, and hyperactivity. A meta-analysis conducted abroad reported a global ADHD prevalence of 7.2% among children (Thomas et al., 2015). More than half of these children continue to experience ADHD symptoms into adolescence, and some persist into adulthood. Statistics indicate that the prevalence of ADHD among children in China has significantly increased over the past decade (Jiang, 2022). The overall prevalence of ADHD among Chinese children is 5.5%, with boys having a higher prevalence rate than girls (Xie & Yang, 2021). In a typical primary school class of 40 students, this means that 2 - 3 students, on average, may have ADHD. Although many children with ADHD have normal intelligence levels and attend regular schools, sharing the same curriculum and academic standards as their peers, their classroom behavior often differs significantly. Common behaviors include inattention, excessive talking, difficulty remaining seated, disruptive noise, and even intentional interruptions. These behaviors not only pose challenges for teachers in terms of instruction and classroom management but also negatively affect other students and, in some cases, may lead to harm. The difficulty in managing students with ADHD can also provoke negative emotions among teachers, such as frustration and aversion. This, in turn, exacerbates the challenge of providing an inclusive and supportive learning environment for all students (Jin, 2019). Studies have shown that urban children and adolescents exhibit significantly higher levels of attention compared to their rural counterparts (Dong & Lin, 2011). Current educational practices reveal that, despite the widespread implementation of nine-year compulsory education in ru-

ral areas, substantial developmental disparities persist between urban and rural students. Rural schools, particularly small-scale ones, face notable challenges compared to urban schools in terms of teacher workforce composition, teaching capabilities, infrastructure and resources, and classroom teaching quality. Additionally, rural families often lack a supportive educational environment. Parents in these settings generally have lower levels of education, limited awareness of the importance of education, and employ simplistic or even harsh parenting methods that lack emotional engagement. Ineffective parent-child communication further exacerbates these issues. Left-behind children, a unique group in rural areas, face additional challenges such as inadequate parental supervision and a lack of proper family education. These factors directly hinder their academic development and reduce their motivation to learn. Due to unscientific family education practices, insufficient learning resources, suboptimal living environments, and the relatively underdeveloped educational conditions in rural schools, rural students encounter significant limitations in physical health, psychological development, and academic achievement. Such unfavorable circumstances lead to poor learning habits and subpar classroom behavior among some rural primary school students. Common issues include daydreaming during lessons, frequent fidgeting, a lack of interest in teachers' or classmates' contributions, and low levels of attention. From the perspective of teachers, individual differences among students—especially in terms of attention levels—pose significant challenges. Standardized classroom instruction often fails to cater to all students' needs, resulting in scenarios where struggling students find the material difficult to grasp while advanced students are not sufficiently challenged, further widening educational gaps.

4. Conclusion

Promoting home-school cooperation and co-education, and closely monitoring the use of digital products by left-behind children. Home-school co-education is crucial for the growth of children whose parents are not around for long periods. It is suggested that schools and parents establish a regular online communication mechanism to promptly exchange information about students' academic performance and maintain close contact. Schools should provide necessary psychological support to students. Through digital tools such as video conferences, online questionnaires, and feedback systems on digital learning platforms, schools can promptly inform parents of students' academic and behavioral performance, while also paying attention to collecting parents' opinions and suggestions to create a two-way interactive communication environment. For parents who only return home during holidays, schools should seize the opportunity to proactively visit their homes to enhance the emotional bond of home-school co-education. Although parents are working far away, they should also fulfill their educational supervision duties and keep abreast of their children's learning situation. The family and school are the two most important educational environments in the growth process of left-behind children, and they need to support each other and cooper-

ate, using digital technology to build a smooth communication bridge.

Enhance technical support and bolster the digital teaching capabilities of county-level schools through a multi-faceted approach. Given the inadequate application of digital technology in some county-level schools, it is imperative that teachers in these institutions adapt their mindsets and proactively address the opportunities and challenges presented by the digital transformation of education. Teachers should update their educational philosophies and diversify their teaching methods by engaging in enhanced professional development in digital education, avoiding superficial demonstrations of digital tools. County-level schools must also increase the utilization rate of digital resources, prevent underutilization of computers and laboratories, ensure full deployment of teaching equipment, and conduct regular maintenance. Furthermore, local education administrative departments should develop and expand digital training programs for teachers based on the actual teaching conditions and student characteristics, particularly considering the context of a large number of left-behind children, to promote the development of teachers' digital education capabilities and enhance multidisciplinary digital teaching levels.

Innovate use methods to improve the digital teaching level of teacher education in county schools. The development of education digitalization is intuitively reflected in classroom teaching activities in county schools. Teachers only prepare lessons through classroom displays or using digital resource media, which narrows the scope of education digitalization to a certain extent. In the future, the digital development of county school education should move towards unknown educational scenarios, break through the dependence of existing classroom teaching paths, and further open up broad horizons for students. Specifically, by building county-level education synchronous classrooms and smart classrooms, we will coordinate and integrate high-quality educational resources in the county and deeply integrate digital technology into the county's educational development. It is recommended to formulate a comprehensive digital literacy training plan for county school teachers based on the national digital strategic policy and the specific needs of county education. The plan should include setting up special digital literacy courses and combining these courses with the actual teaching needs of county schools to achieve a teaching effect that integrates knowledge and action.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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