

# The Appeals, Dilemmas, and Pathways of Enabling Rural Teachers' Professional Development Through Emerging Technologies

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**Abstract:** With the rapid advancements in technology, especially in digitalization and intelligence, numerous modern technologies have poured into rural schools, effectively improving their informatization conditions. Nevertheless, these technologies remain detached from rural teachers, failing to significantly enhance the quality of education and teaching in rural areas. Rural education is a crucial aspect of ensuring balanced development in education. The question of how to enhance rural teachers' technological application abilities and fully leverage the positive role of technology in rural education and teaching has become a significant topic of current research on rural education issues. To better address this question, this study conducted a thorough examination of the specific appeals of rural teachers in the process of technology enablement. It was discovered that rural teachers generally face dilemmas such as insufficient technological application abilities, difficulties in obtaining quality teaching resources, and the lack of continuous technical support and update mechanisms. Based on these findings, specific pathways such as strengthening rural teacher training, optimizing the allocation of educational resources, and establishing mechanisms for continuous technical support and updates are proposed to aid in the high-quality development of rural education.

**Keywords:** Teacher professional development; Emerging technologies; Lifelong learning

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## 1. Introduction

With the advent of the digital and intelligent era, the education sector is experiencing tremendous changes. Technology empowerment is playing an increasingly significant role in improving education quality and promoting educational equity in this process. Especially in rural areas, where high-quality educational resources are scarce, the application of technological means is seen as an effective way to narrow the gap between urban and rural education. The introduction of technology not only implies the optimization and innovation of educational resource allocation but also signifies the broadening of teachers' professional development paths. As the main force in rural education and teaching, the professional development level of rural teachers directly

affects the quality of rural education <sup>[1]</sup>. For rural teachers, technology empowerment can help them access a broader range of teaching resources, enhance their teaching abilities, and promote the sharing of experience and mutual assistance among peers through online communication platforms. This has a significant impact on improving the professional quality of rural teachers and the quality of education and teaching. However, despite the overall improvement in the professional abilities of rural teachers, there are still many difficulties in the technology empowerment of rural teachers' professional development <sup>[2]</sup>. To actively promote the technology empowerment of rural teachers' professional development, it is necessary to deeply understand the specific needs of rural teachers in the process of technology empowerment, analyze the various difficulties they currently face, and explore feasible solutions to ensure that rural teachers can keep up with the pace of the times and continuously improve their professional level.

## **2. Appeal for professional development of rural teachers enabled by technology**

Professional development has become a major issue for rural teachers <sup>[3]</sup>. Enabling rural teachers' professional development through technology is the key to achieving educational equity and improving the quality of rural education. It is an important task of current rural education reform to deeply understand the appeal for technological professional development of rural teachers and provide them with the necessary support and resources. Only by doing so can we ensure that rural teachers can better adapt to the requirements of the digital and intelligent era, provide high-quality education for rural students, and further promote the modernization of the entire national education system.

### **2.1. The need to eliminate the “last mile” for balanced urban-rural education development**

As a strategic goal of national educational development, balanced development of education is of great significance to improving the overall quality of education and promoting social equity. However, the gap between urban and rural education has always been one of the difficulties that restrict the balanced development of education. The development of technology is the key to bridging the “last mile” of balanced urban and rural education development.

Through online education platforms, distance teaching, and other means, rural teachers can access rich teaching resources, improve their teaching level and ability, and thus narrow the gap with urban teachers in terms of educational resources. Secondly, through technological empowerment, rural teachers can access advanced educational concepts and teaching methods and means, so as to continuously update their teaching philosophy and improve their teaching ability. This not only helps stimulate rural students' learning interest and motivation but also promotes the comprehensive and balanced development of rural students, further improving the overall quality of rural education. Lastly, through technological empowerment, teachers from urban and rural areas can achieve various forms of interactive communication such as online discussion, resource sharing, and teaching cooperation, breaking geographical restrictions and promoting the sharing and integration of educational resources between urban and rural areas. This interactive communication can not only improve the professional level and teaching ability of rural teachers but also help promote the coordinated development of urban and rural education and achieve the goal of balanced development of education.

In addition, by empowering rural teachers' professional development through technology, it can also promote deep cooperation and joint development of urban and rural education in resource sharing, talent training, social services, and other aspects. This will help build a fairer, more open, and sustainable educational ecology, providing strong support for the long-term development of the country and the comprehensive progress of society.

## **2.2. Urgent need for comprehensively promoting rural revitalization**

Rural revitalization is a major strategy for national development, which involves not only economy, culture, ecology, and other fields, but also the revitalization of education <sup>[4]</sup>. Education is the foundation of rural revitalization, and rural teachers are the backbone of education <sup>[5]</sup>. The technological empowerment of rural teachers' professional development helps to improve the quality of rural education. On the one hand, rural teachers can continuously improve their professional quality and teaching ability, thereby enhancing their sense of identity and belonging to rural education. This endogenous driving force not only helps to promote the sustainable development of rural education but also provides a strong talent guarantee and intellectual support for rural revitalization. On the other hand, the technological empowerment of rural teachers' professional development helps to promote the comprehensive progress of rural society. Education is the foundation of national development and an important force driving social progress. By enhancing the professional quality and teaching ability of rural teachers, more rural students with innovative spirit and practical skills can be cultivated, providing strong talent support for the development of rural society in economy, culture, ecology, and other fields. At the same time, the professional growth of rural teachers will also drive the cultural atmosphere and civilization level of rural communities, promoting comprehensive progress and harmonious development in rural society.

## **2.3. The personal development needs of rural teachers**

In the current educational environment, teachers' professional development has become an important force in improving the quality of education and promoting educational reform. For rural teachers, professional development is not only the inevitable path for their career growth but also the key to satisfying their independent development needs. The rapid development of technology has provided unprecedented opportunities and possibilities for the professional development of rural teachers. Technology empowerment has provided rural teachers with diversified learning paths and resources <sup>[6]</sup>. Rural teachers can use the Internet, mobile devices, and other tools to access teaching resources anytime and anywhere, participate in online discussions, and communicate and share with peers, thus continuously improving their professional quality and teaching abilities.

Secondly, technology empowerment provides rural teachers with personalized learning experiences and feedback. For example, the application of learning analytics technologies such as big data and artificial intelligence can provide rural teachers with precise learning suggestions and resource recommendations, helping them better meet their own learning needs, understand their learning progress and problems in a timely manner, and thus adjust their learning strategies and improve learning outcomes. Furthermore, technology empowerment provides rural teachers with broader development opportunities and spaces. Rural teachers can communicate and collaborate with educational experts and peers nationwide and even globally through online platforms, thus constantly expanding their horizons and knowledge base. This cross-regional and cross-field communication and collaboration can not only bring broader development opportunities and spaces for rural teachers but also help stimulate their internal motivation for independent development and innovative spirit.

Lastly, technology empowerment provides rural teachers with more convenient self-evaluation and reflection tools <sup>[7]</sup>. These tools can also help teachers monitor their teaching process in real time, detect problems promptly, make adjustments and improvements, help improve the teaching quality and efficiency of rural teachers, and promote the development of their sense of self-reliance and the enhancement of their ability.

### **3. Difficulties in the professional development of rural teachers through technology empowerment**

Despite the huge potential and value of technology empowerment in promoting the professional development of rural teachers, there are still many practical difficulties in its implementation. These difficulties not only hinder the personal development of rural teachers but also directly affect the quality of rural education and the achievement of educational equity.

#### **3.1. Insufficient technological literacy of rural teachers**

Effective application of technology requires teachers to possess a certain level of technological literacy. However, in rural areas, due to various reasons such as history, geography, and economy, rural teachers often have weak knowledge and skills in information technology. Many rural teachers lack systematic information technology training before and after employment, making them struggle when facing new technologies<sup>[8]</sup>. This lack of technological literacy makes rural teachers feel overwhelmed when facing the increasing demand for digital education. They may be unable to effectively use modern educational technology to assist in teaching and guide students to master necessary information skills. On the other hand, some rural teachers still adhere to traditional teaching concepts and methods, holding skeptical or resistant attitudes toward new technologies. They believe that traditional teaching methods are sufficient to meet teaching needs and there is no need to introduce new technologies<sup>[9]</sup>. The existence of such beliefs creates psychological barriers for rural teachers in adopting new technologies, making it difficult for them to take the initiative to learn and apply them.

#### **3.2. Unequal distribution of educational resources**

While the introduction of technology has broken geographical limitations to some extent, enabling rural teachers to access more educational resources, the distribution of high-quality educational resources remains uneven. High-quality educational resources and advanced teaching equipment are often concentrated in urban schools, while rural schools struggle to obtain equal levels of educational resources due to insufficient funding and policy support. This uneven distribution makes it difficult for rural teachers to access the latest educational concepts and teaching methods, thus limiting their professional growth. Even when some digital teaching resources are available, they are often not effectively utilized due to their low quality or unsuitability for rural students. The uneven distribution of educational resources not only affects the teaching quality and efficiency of rural teachers but also widens the gap between urban and rural education.

#### **3.3. Lack of sustained technical support and updates**

The effective application of technology requires continuous technical support and updates. Although there may be some technical training and introduction of resources in the initial stage, these are often insufficient to meet long-term needs. Over time, technology continues to progress, software needs to be updated, hardware may be damaged or become outdated, and teachers in rural areas may encounter difficulties and problems in obtaining necessary technical support and equipment updates due to remote geographical locations, limited resources, and poor information access. This results in rural teachers often encountering difficulties and problems when applying new technologies, and being unable to fully leverage the advantages of technology.

In addition, rural teachers may encounter various technical issues in their daily teaching work, such as unstable network connections and unfamiliar equipment operations. If these issues are not promptly resolved, they can affect teachers' enthusiasm and effectiveness in using technology for teaching. Moreover, with the continuous development of educational technology, new teaching tools and platforms emerge endlessly. If rural teachers cannot continuously obtain professional development opportunities, they may lag behind the

times and be unable to effectively utilize the latest educational resources and methods. This makes it difficult to sustain the application of new technology in rural schools and limits the pace of rural teachers' professional development.

## **4. Approaches to empowering rural teachers' professional development through technology**

Issues such as insufficient technological literacy among rural teachers, uneven distribution of educational resources, and a lack of continuous technical support and updates have severely hindered the modernization process of rural education and teachers' professional development. To address these issues, a comprehensive set of measures needs to be taken, including enhancing teachers' capabilities, optimizing resource allocation, and improving support systems, among others, to form a multipronged approach to the resolution strategy.

### **4.1. Enhancing technical training for rural teachers**

In response to the current situation where rural teachers have varying levels of technological application ability, it is necessary to start with basic skills training and comprehensively enhance teachers' technological literacy through regular technical training activities. These training sessions should cover key areas such as basic computer operations, network applications, multimedia teaching, data analysis techniques, and human-machine collaboration, ensuring that every teacher can master basic technical skills and apply them flexibly in daily teaching. The training content should be closely integrated with teaching practice, emphasizing practicality and operability, so that teachers can truly acquire useful skills during the training. Additionally, it is important to consider the individual differences and needs of teachers. Different teachers may have varying difficulties and questions regarding the application of technology, thus the content and approach of training should exhibit a certain degree of flexibility and targeted focus. We should also establish a feedback mechanism to promptly understand the issues and needs encountered by teachers in the process of technological application, allowing for timely adjustments to be made to the training content and methods to ensure the maximization of training effectiveness.

### **4.2. Optimizing high-quality teaching resources**

Firstly, the government should play a leading role in ensuring the fair allocation of educational resources between urban and rural areas through the formulation of relevant policies. For example, special funds can be established to improve the teaching facilities and technological equipment of rural schools, keeping them synchronized with the development of urban schools. Secondly, urban and rural schools can be paired for assistance, realizing resource sharing. Urban schools can provide technical support and teaching resources to rural schools, while rural schools can contribute fresh teaching concepts and practical experience to urban schools. Next, encouraging enterprises and social forces to participate in rural education by providing technical support and resource donations can effectively alleviate the problem of insufficient educational resources. Lastly, it is important to improve the regulatory mechanism for the allocation of educational resources to ensure the effective implementation of various policies and the rational allocation of resources. By conducting regular assessments and feedback, the allocation of educational resources can be continuously adjusted and optimized to meet the professional development needs of rural teachers.

### **4.3. Establishing sustainable technical support and updating mechanisms tailored for the professional development of rural teachers**

Firstly, a dedicated technical support team composed of experienced technical personnel should be established

to provide continuous technical guidance and assistance to rural teachers. This team can ensure that the problems encountered by rural teachers when using educational technology are promptly resolved through online platforms, phone calls, regular on-site guidance, and other means. Secondly, it is necessary to establish a sound mechanism for technology updating. This includes regularly updating the teaching software and equipment of rural schools to ensure that they keep pace with the latest educational technology. Next, it is necessary to provide rural teachers with the necessary training to help them master the use and advantages of new technologies. Lastly, an online technical support platform can be established to provide rural teachers with comprehensive technical resources and learning opportunities. This platform can include user guides for teaching software, frequently asked questions, technology updates, and other content, making it convenient for rural teachers to access and learn at any time.

## **5. Conclusion**

Technological empowerment holds significant importance for the professional development of rural teachers. The implementation of strategies such as increasing technical training and guidance, optimizing the technical application environment, establishing a comprehensive support system for teachers' professional development, and encouraging innovative practices, will effectively promote the professional quality and teaching abilities of rural teachers, providing strong support for the modernization process of rural education. At the same time, this also requires the joint efforts and continuous investment of the government, schools, and all sectors of society to form a joint force to promote technological advancements in rural teachers' professional development and the improvement of educational teaching quality.

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