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Harnessing Digital Resources for Rural Education Transformation: A Media-Centric Pathway Exploration

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Abstract. China is advancing digital education alongside rural revitalization. Rural schools now have more devices and better connectivity, yet classroom outcomes remain uneven. This study adopts a media and communication perspective and conceptualizes rural digitalization as a chain thatconnects content production, channel dissemination, and feedback-driven iterative optimization. Guided by Media Education Theory, Communication Effects Theory, and a reframed Digital Divide that shifts from access to use and content, the analysis examines four issues: the fit of urban-oriented content with local needs and with the levels of teachers and students; infrastructure gaps that limit reach; missing feedback and evaluation loops; and the misalignment between media logic and pedagogical aims. Findings show that the main barriers are a supply–demand mismatch, one-way channels, and broken feedback rather than simple scarcity. The paper proposes demand-led localization with layered development for students and for teachers, and upgrades to connectivity, devices, and maintenance. It also recommends context-based delivery through short videos and live streams, community groups, and offline access points, and a multi-party mechanism that links feedback, evaluation, and incentives. Access does not equal impact. Teacher workload and curriculum structure shape outcomes. The conclusions apply mainly to typical township schools.

Keywords: Rural Education, Digital Resources, Media Education Theory, Communication Effects Theory, Digital Divide

1. Introduction

Rural education plays a crucial role in China's rural revitalization strategy and is fundamental to achieving educational equity and modernization. The China Education Modernization 2035 initiative emphasizes the need to accelerate educational reform in the digital age by building smart campuses and developing integrated platforms for teaching, management, and services [1],—thus providing a clear policy framework for leveraging digital resources to transform rural education.

The large-scale application of digital resources constitutes one of the primary approaches to overcoming the constraints faced by rural education, including spatial and temporal limitations as well as resource shortages. However, to fully realize their potential, it is necessary to evaluate whether the integration of media achieves its intended impact within rural educational contexts. The deployment of digital resources in rural education essentially forms a complete communication

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cycle—ranging from content production and channel dissemination to feedback and iterative optimization. Currently, this chain exhibits structural disruptions, which impede digital resources from meeting the actual demand of rural education.. The paper will, examine structural contradiction born of media intervention into rural education, aiming at advocating the construction of a new educational environment based upon intelligent communication.

2. Theoretical framework

2.1. Media education theory

Theory of Media Education, which has its roots in media society studies, states that media has transformed from an educational tool into a fundamental force reconstructing education's form, process, and relationships. In the information age, media-intensive education increasingly relies on media technologies and their underlying logic. Media serves as an indispensable vehicle for the instructional delivery of learning resources, teacher-student interaction, and educational assessment, and it is deeply integrated into all facets of educational activities [2].For rural education, Media Education Theory is effective along two lines. First, geographic boundaries are broken by media, such that even rural students have access to quality teachers and curriculum grounded in urban centers. China's Smart Education Platform, for example, integrates courses from best cities like Beijing and Shanghai with rural ones. The second part is breaking the "teacher-as-transmitter-of-knowledge mould," transforming rural teacher's job, making them "learning guides and digital resource integrators." This serves to compensate somewhat for the shortage of quality teachers and grapple with many other problems of rural education, and overall improve the learning process of pupils.

2.2. Application of communication effects theory in rural education

Communication Effects Theory is one of the most important methods of studying digital resource dissemination effects, and Agenda-setting Theory and Uses and Gratifications Theory are particularly suitable for rural education. Agenda-setting theory posits that media can shape public attention by selectively highlighting specific issues. In rural education, this involves the utilization of digital platforms to put weaker topics, such as science practices and traditional beliefs, at the forefront. Such topics are then pushed forward among students and teachers, with the aim of redressing the resource imbalance inherent with traditional instructional approaches.

Uses and Gratifications Theory recognizes that effective communication is one that meets the needs of the audience. The needs of rural education audiences are unique: teachers need "localized, easy-to-use" material that is commensurate with their digital literacy and classroom environments, and students need "engaging and practical" material that is commensurate with their cognitive abilities. Parents need "clear and practical" guidance on home education due to having to overcome their own educational shortcomings. Communication effectiveness is contingent on aligning digital resources with these differentiated needs [3]. Needs-resource mismatch, even when the quality of resources is high, can cause a "supply-demand mismatch," which limits the effectiveness of the resources.

2.3. A new dimension of the digital divide theory

Classic Digital Divide Theory centers around the "access divide" and media devices and internet access disparities. Through programs such as "Broadband for Villages" and "Internet for Schools,"

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access in rural areas has sharply narrowed, with 99.5% internet penetration for rural schools by 2023. As a result, the Digital Divide Theory now includes new dimensions, namely the "usage divide" and "content divide," which reflect challenges in digital resource usage and adaptation to rural education needs.

The "usage divide" refers to rural teachers and students having low digital literacy and limited use of digital resources, creating a gap with urban teachers [4]. A 2024 Ministry of Education survey found that 45% of rural teachers only master basic skills like "playing videos" and "downloading materials," while more complex tasks like "resource integration" and "student performance analysis" are poorly performed. Additionally, 30% of rural students cannot fully use online resources at home due to a lack of digital devices.

The "content divide" refers to the gap between digital resources and rural education needs [5]. Over 70% of educational resources are designed for urban students, often featuring scenarios like "subways" and "skyscrapers," which rural students cannot relate to. This misalignment makes them hard to understand. Both the "usage divide" and "content divide" are major barriers to effective use of digital resources in rejuvenating education in rural areas.

3. Structural contradictions in media intervention

3.1. Dilemma in content production: supply-demand mismatch and lack of localization

From a production perspective, most of the digital resources are authored by urban schools and technology companies and are typically built under a model that merely re-creates the experiences of the urban world without taking into account the specific dimensions of rural education. For example, a leading learning platform released a junior middle school Chinese writing course with such subjects as “urban waste sorting,” “community volunteer work,” and so on. But to rural children who do not gain direct experiences of such urban subjects, these exercises are hard to associate and complete. Likewise, certain maths courses include exercises such as “working out discounts of shopping malls” and “calculating subway fares,” which are irrelevant to the rural children's lives, and make them lose more interest and will to learn. When these education providers stick to strictly urban-focused models of production without taking into account the individual challenges and realities of rural education, these otherwise valuable digital resources fail to achieve the desired effect and are incapable of satisfying the learning needs of rural children.

In terms of localization, existing information resources are not effective in incorporating rural culture and practical experiences. On one hand, rural traditional culture is largely absent from these resources, preventing them from serving as a medium for cultural transmission. On the other hand, the content does not adequately address practical skills or knowledge pertinent to rural development, nor does it align with the core objective of rural education: “cultivating talent for rural revitalization.” A teacher from a western rural school pointed out, “Most of the courses on the platform focus on 'urban entrepreneurship,' yet there isn’t a single course on 'rural farming.' Most of my students remain in the local area after graduation. How are these resources relevant to them?” The failure to reflect the real-life production conditions and challenges of rural areas in the content further exacerbates the disconnect between what is being offered and what is needed, hindering the effectiveness of digital resources in transforming rural education.

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3.2. Bottlenecks in communication channels: infrastructure gaps and limited channel forms

In terms of infrastructure, three primary challenges exist. First, the network bandwidth is insufficient. While some remote rural schools are connected to the internet, the bandwidth is often as low as 10-20 Mbps, preventing the smooth delivery of high-bandwidth digital resources such as 4K HD lessons or virtual simulation experiments. Second, there is a lack of terminal devices. A large number of rural schools lack multimedia-equipped classrooms and essential supporting devices, which results in students being unable to fully access and engage with digital resources in the instructional process. Finally, there is an insufficient capacity for equipment maintenance. Rural schools often lack specialized technical staff, making it difficult to repair faulty equipment in a timely manner and disrupting the continuity of digital resource usage.

Regarding communication channels, most digital resource dissemination still follows a one-way push model, which is ill-suited for rural contexts. Many platforms rely on a web + app model, but rural students often lack access to digital devices at home, making it difficult for them to utilize these resources after school. Additionally, newer forms of media, such as short videos and live broadcasts, are underutilized in rural education. However, these “fragmented” media forms are more engaging and better align with rural students’ learning preferences, providing a valuable opportunity for more dynamic, accessible content delivery [5].

3.3. Lack of feedback mechanism: broken loops and missing evaluation

To optimize communication effectiveness, a robust feedback-adjustment loop needs to be established. However, the lack of such a mechanism in the media applications within rural education impedes the continuous updating and optimization of digital resources.

On one hand, feedback channels are often not user-friendly. Most digital resource platforms do not have specific feedback modules designed for rural users. Even when such modules do exist, they are often difficult to find, making it hard for rural teachers and students to provide feedback. Additionally, some platforms only allow users to submit written feedback. However, many rural teachers, especially those who are older, and younger students, face challenges with written communication, which limits their ability to clearly express their needs and concerns.

On the other hand, even when feedback is collected, there is often a lack of professional teams to analyze this data, making it difficult to extract meaningful insights to guide improvements. Moreover, there is no established mechanism for linking feedback with content adjustments. For example, a platform may receive feedback indicating that “content localization is insufficient,” but without a channel for collaboration with local education departments, it cannot quickly develop localized resources. As a result, such feedback often goes unnoticed, leading to minimal impact on improving the platform’s offerings.

4. Optimization path: building a new educational ecosystem through intelligent communication

4.1. Content adaptation strategy: demand-driven localization and layered development

To support localized content development, it is essential to establish a collaborative production mechanism involving multiple stakeholders [6]—including local education authorities, rural schools, agricultural experts, cultural institutions, and internet enterprises. This collaborative approach will ensure that digital resources are developed specifically for rural contexts. It includes incorporating

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rural culture into various subjects, such as adding "appreciation of rural folk songs" and "local prose writing" in Chinese lessons, discussing "local customs" in history lessons, and teaching "folk art" in art classes. Additionally, practical courses like "rural e-commerce," "agricultural techniques," and "rural tourism planning" should be offered to middle school students, aligning with the goals of rural revitalization and fostering skills for local development.

For layered development, content design should align with the cognitive levels of rural students and the digital literacy of teachers. For students, material should be separated into "lower grades, middle grades, and higher grades." Learning resources for lower-grade students should incorporate "animations and interactive games"—for instance, an animation clip themed "Understanding Crops"—to facilitate the acquisition of biological knowledge. For middle-grade students, learning resources ought to integrate "real-life scenarios," such as the task of "measuring farmland area," to support the learning of geometry concepts. Higher-grade material should involve "inquiry-based learning," such as a digital activity of "rural environmental surveys" to cultivate research capabilities. For teachers, material should be separated into "basic, advanced, and innovative" levels. Foundational training resources should focus on "digital device operation" and "instructional preparation" to foster digital literacy, whereas advanced training resources ought to emphasize "resource integration" and "online interaction design" to achieve more effective integration into instructional practices. Innovative material should involve "big data analysis" and "virtual teaching scenarios" to encourage educational innovation.

4.2. Channel innovation plan: improving infrastructure and expanding contextual channels

The government should further increase investment in the development of infrastructure resources and assume a leading role in facilitating their accessibility. Firstly, the "Rural Education Network Quality Improvement Project" should be advocated, with the purpose of extending the bandwidth of remote rural schools above 50 Mbps, so that high-traffic digital resources are transmitted smoothly. Second, the "Terminal Equipment Supplementation Program" should be implemented, leveraging government procurement and corporate donations as channels, to ensure the provision of multimedia classrooms, tablet computers, and other related equipment to rural schools—with a minimum allocation standard of one device per two students. Thirdly, a "Long-term Equipment Maintenance Mechanism" should be implemented, so that local education departments and technology companies collaborate with one another and become specialized maintenance teams. These teams would regularly inspect and repair equipment in rural schools, providing technical support and solving the issue of "broken equipment with no one to fix it [7]."Innovating communication channels should align with the habits of rural users to expand contextual channels. First, short video platforms should be used to design "micro-courses," breaking down knowledge into 5 to 8-minute videos. For instance, platforms like Douyin (TikTok) can host a "Rural Math Classroom" series, featuring bite-sized, 5–8-minute videos that cater to students' fragmented learning patterns and reduce device dependency barriers. Second, a "community-based communication channel" should be established, creating "rural teacher communities" and "parent communities" by township. Designated personnel can be responsible for daily digital resource distribution, answering questions, and encouraging teachers to share teaching experiences, thus achieving "resource dissemination + interactive communication." Finally, continuous exploration of "offline + online" integrated channels should take place by setting up "digital resource experience points" in rural cultural stations and village committees, equipping them with terminal devices and internet access to address the lack of digital devices in students' homes after school.

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4.3. Governance system upgrade: building a multi-party collaborative feedback and evaluation mechanism

A convenient and diverse feedback channel should be established, along with a linkage mechanism for applying feedback data. First, a dedicated "Rural User Feedback" section should be set up on the homepage of the digital resource platform, offering multiple feedback forms such as "text, voice, and images" to meet the needs of different users. Furthermore, a"feedback response time system" should be formulated, ensuring that the platform replies within 3 working days after receiving feedback and develops an optimization plan within 15 working days. Lastly, the "feedback-adjustment" link should be promoted, with local education departments taking the lead in establishing a "platform-school" communication meeting system. This system would collect feedback from rural schools on a regular monthly basis, coordinate collaboration between the platform and local institutions, and facilitate adjustments to content and channels.

In terms of building the evaluation mechanism, a "multi-dimensional, result-oriented" communication effectiveness evaluation system should be established. First, "student learning outcomes" should be the core indicator. For example, by comparing students' academic performance and overall development before and after using digital resources, the actual value of the resources can be estimated. Second, an indicator for "teacher teaching capacity improvement" should be added, assessing the usage rate of digital resources by teachers and their ability to integrate these resources. Lastly, independent evaluations should be conducted by universities or professional assessment agencies to ensure objective and fair results. Meanwhile, the evaluation results should be linked to platform incentives. Platforms with excellent evaluation results should be rewarded with priority in government procurement, policy subsidies, etc further encouraging platforms to prioritize the needs of rural education and continuously optimize their services.

5. Conclusion

From a media studies perspective, this paper examines the structural contradictions inherent in the digital transformation of rural education, with its analysis underpinned by three core theories: media education theory, communication effects theory, and the digital divide theory. It further examines the structural issues that arise when applying digital resources to rural education and proposes scientifically grounded and feasible solutions to create a smarter communication environment within educational systems. The research shows that media involvement in rural education presents significant structural contradictions, primarily due to the mismatch between the logic of media and the actual needs of rural education. The primary issue lies in how media and digital resources fail to meet the specific needs of rural areas. If digital resources are tailored to the realities of rural education and the existing difficulties—such as content localization, innovative feedback channels, and governance system upgrades—are addressed, these contradictions can be resolved. This will change the existing model from that of one-way information delivery to a two-way exchange. The emphasis will no longer be solely placed on urban-centric education; instead, efforts will be made to better adapt online resources to rural-specific needs. This will consequently drive the educational rejuvenation of rural areas and facilitate the more effective integration of digital resources into rural classrooms. Overall, this will foster a more dynamic and efficient rural education system, while enabling skill development to contribute to rural rejuvenation.

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