

The Digitization in The Application in Literacy Teaching among Students from Primary School in Nanning City of Guangxi, China

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Abstract: This study explores the application and impact of digitization in literacy instruction for primary school students in Nanning, Guangxi, China. As digital technologies are increasingly integrated into educational practice, it is particularly important to understand their role in literacy instruction. Using a combination of qualitative and quantitative research methods, we examined the various digital tools and resources used by teachers and students and the effectiveness of these technologies in promoting literacy skills. The results show that the integration of digital platforms not only promotes personalized learning experiences but also enhances student engagement. In addition, we discuss the challenges faced by educators in adapting to these new approaches, including the need for professional development and adequate technological infrastructure. This study contributes to the ongoing discussion of educational innovation and highlights the importance of adapting literacy instruction strategies to the requirements of the digital age. Ultimately, our study highlights the need to embrace digitization as a key component of literacy education development in primary schools in Nanning and beyond.

Keywords: Digitization; Literacy Instruction; Primary Education; Nanning; Guangxi; Educational Technology.

1. Introduction

With the rapid development of digital technology, educational reform and innovation has become a hot topic globally (Vlachos, Zisimopoulos, & Tsoulfas, 2024). In China, especially in Guangxi Nanning City's primary schools, the promotion and application of digital education have not only opened up new horizons for students' literacy teaching, but also improved teaching efficiency and learning outcomes (N et al., 2024). Research shows that the application of digital means in education is becoming increasingly common, including its comprehensive use in primary school Chinese teaching (Kavčič Čolić & Hari, 2024). This process has been driven by technological progress, social needs, and policy support, providing a strong support for the cultivation of students' reading and writing literacy (Jiaxin Gao, Gu, & Yang, 2024).

Firstly, the background of digital transformation can be analyzed from multiple dimensions (Eckstein, Shrestha, & Russo, 2024). Technologically, the rapid development of modern information technologies such as the internet, cloud computing, and big data has led to a shift in educational methods from traditional classroom teaching to intelligent and personalized learning modes (Davidaviciene & Maciulyte-Sniukiene, 2024). This not only changed the way knowledge is acquired, but also optimized the allocation of educational resources through the use of digital teaching tools, driving innovation in teaching methods (Arif, Mirza, & Hamid, 2024). Therefore, with the help of digital technology, teachers can flexibly arrange teaching content, allowing students to deepen their understanding at their own learning pace, thereby promoting their learning motivation (Akinola, Oso, Shorunke, & Oyadele, 2024).

Secondly, changes in social needs have provided impetus for the digital transformation of education (Rane, Abhyankar, Kirkire, & Agrawal, 2023). Under the influence of

globalization and information technology, governments and educational institutions in various countries are facing new requirements such as improving education quality, promoting educational equity, and achieving lifelong learning. In this context, the primary education in Guangxi Nanning City also needs to adapt to the rapid changes in the social environment and strive to achieve digital teaching to enhance students' overall competence (Islam, Ahmed, & Sayed, 2023). Moreover, the outbreak of COVID-19 has accelerated this process, with traditional teaching methods being restricted, and the popularization of online learning and distance education making digital education an indispensable part of the educational system (Lafia, Bleckley, & Alexander, 2023).

Policy support is an important guarantee for digital education transformation. In 2022, the Ministry of Education in China proposed implementing the National Education Digitization Strategic Action Plan, which provided direction for digital transformation in education across various regions (Nahid & Sarker, 2023). In the context of this policy, Guangxi Nanning's primary education has actively carried out practices of digital literacy teaching, striving to improve educational quality and promote fairness in educational resources (Makhlouf & Alani, 2024). The implementation of this policy not only strengthened confidence in educational reform from all sides, but also provided a solid foundation for the effective use of digital tools in classroom teaching (Malhotra, 2024).

In terms of the specific application of digital means, Guangxi Nanning's primary schools face many advantages in literacy teaching (Nartey, 2024). Firstly, digital education can break through the constraints of time and space, allowing students to be freed from the constraints of traditional teaching modes (Rebière & Braun, 2024). Teachers can arrange teaching content flexibly using digital tools, while students can engage in autonomous learning based on their individual needs, thus improving their learning efficiency and

effectiveness (Singh, Sehgal, Chakraborty, & Phanden, 2024). At the same time, digital education can effectively stimulate students' learning interest and change the traditional rote learning method, enabling students to enhance their reading literacy and comprehension skills in an interactive and interesting way (Theiri & Hadoussa, 2024).

Furthermore, the use of digital tools can enrich teaching resources and help students better understand and grasp knowledge (Trubetskaya, Ryan, & Murphy, 2024). The application of modern educational technology makes digital textbooks include multimedia elements, enhancing students' perception of knowledge and achieving a three-dimensional presentation of knowledge (Wang, Gu, & Hong, 2024). In this way, the teaching effect is significantly improved and students' applied ability is cultivated accordingly (Xia, Zhu, Tan, & Xie, 2024). Research shows that the digital transformation of education has had a positive impact on students' learning habits, helping them form good learning habits and laying a solid foundation for their future learning and career development (Wesche & Handke, 2024).

However, there are still some challenges to be overcome in the actual process of digital literacy education (Matysek-Jędrych, Mroczek-Dąbrowska, & Kania, 2024). For example, the fast pace of technological advancement may lead to insufficient adaptability of teachers and students to new tools; many schools and students in remote areas face unequal access to technology and the internet; moreover, the degree to which teachers' digital literacy and course content match with technology directly affects the effectiveness of digital education (Ma, Chen, Liu, & Wang, 2024). To address these issues, the government and educational institutions need to strengthen policy support, improve technological conditions, and enhance the digital literacy of teachers and students to ensure that all students have equal access to the convenience brought by digital education (Kemal & Shah, 2024).

In an international context, many countries are also actively exploring and practicing digital education (Humbel et al., 2024). For example, European countries have conducted diverse research and practices in the field of educational digitization. These international experiences not only provide valuable lessons for China's education informatization process, but also show how effective digital teaching methods can enhance students' reading and writing skills (Hentati & Boulila, 2024). In summary, the current situation of digitization application in primary literacy education in Guangxi Nanning reflects the profound changes brought about by technological progress, social needs, and policy push (Jing Gao, Gao, Guan, Liu, & Ma, 2024). This process is not only a necessary means to address the existing challenges in education, but also an important path to achieve educational equity and innovative development (Xie, Zhang, & Zhao, 2023). In the future, with the continuous progress of technology and the sustained support of policies, digital education will play a more significant role in primary Chinese language teaching (Mustafa Ali & Ebaidalla, 2023).

2. Literature-view

2.1. The Concept of Digitization

Digitization is a multidimensional concept that involves information, processes, structures, and business domains (Palumbo, 2021). Its core is the conversion of analog forms of information such as sound, text, and images into binary code that computers can recognize. This process is not only

an extension of informationization, but also represents the rebuilding of information, data, and knowledge in structure and distribution, thereby driving the transformation and upgrading of traditional industries (Skøtt, 2022). Digitization is not only a technical means, but also an important driving force for social and economic development (Islam et al., 2023). It creates unique products and services and reshapes industrial models, making them more efficient and better suited to the needs of the digital society (Niziers & Richard, 2023). The advancement of digitization involves several key stages: the transition from analog to digital, technological breakthroughs, changes in people's behavior and attitudes, lowering of entry barriers, and support from substantial amounts of venture capital (Rani, 2023). This transformation has had profound impacts on the economy, including increased labor productivity, enhanced corporate competitiveness, reduced production costs, and the creation of new job opportunities (Arif et al., 2024). However, digitization has also brought new challenges such as information security issues, the risk of mass unemployment, and digital inequality (Gull, Parveen, & Sridadi, 2024).

In the business world, digital transformation is seen as a systematic approach to help companies cope with the rapid changes brought about by digitization. During the transformation process, companies typically need to assess their current state, set strategic goals, and develop a road-map to achieve those goals (Joshi et al., 2024). The impact of digitization extends beyond the boundaries of the enterprise and extends to the entire society, including infrastructure development, individual behavior patterns, and innovations in social governance (Makhlouf & Alani, 2024). Overall, digitization is a complex and multifaceted phenomenon that not only changes the way information is expressed and transmitted, but also profoundly impacts various aspects of the economy and society. To understand and effectively advance digitization, it is necessary to consider a range of factors, including technology, economics, society, and culture (N et al., 2024).

2.2. Figures

Digitization plays a crucial role in transforming China's education system and is an important measure to achieve high-quality education development in the new era. The digitization of education is not just the introduction of technological tools, but a systemic transformation involving teaching practices, infrastructure, management, and the learning environment (Pettersson, Siljebo, Wolming, & Ferry, 2024). In this context, primary schools in Guangxi Nanning City are gradually introducing digital technologies to enhance students' reading and writing skills and improve teaching efficiency (Davidaviciene & Maciulyte-Sniukiene, 2024). In the reading and writing instruction at primary schools in Nanning, the application of digital tools has multiple benefits. Firstly, digital tools provide teachers with means to design more engaging and intuitive teaching content (Olçum & Gülova, 2023). Compared to traditional teaching methods, digital devices such as interactive whiteboards and online tools can attract students' attention and make reading and writing instruction no longer limited to paper-based and textbook delivery, but rather a more vivid and diverse process (Davidaviciene & Maciulyte-Sniukiene, 2024). For example, teachers can integrate rich text, pictures, and video resources through digital platforms to help students better understand the meaning of words and their use (Pettersson et al., 2024).

This digital approach greatly enhances students' learning interest and helps cultivate their language comprehension and expression skills (Nandiasoka Annisawati & Ika Oktora, 2024).

Secondly, digital technology has facilitated personalized learning in reading and writing instruction (Luque-Martínez, Doña-Toledo, & Faraoni, 2024). Due to the differences in learning progress and comprehension ability among students, the traditional classroom teaching model is difficult to meet the needs of all students. Through digital platforms, teachers can adjust teaching content based on students' learning situations (Kalarikkal, Thamilvanan, & Kaluvilla, 2024). For example, some reading software can recommend different levels of reading materials based on students' reading speed and comprehension ability, helping students gradually improve. In addition, digital platforms provide real-time learning feedback, allowing teachers to understand students' learning status in a timely manner and provide personalized guidance (He, He, & Nie, 2024). This personalized learning approach effectively solves the problem of "individualized instruction" in traditional teaching, making reading and writing instruction more efficient (Akinola et al., 2024).

During the COVID-19 pandemic, the advantages of digitalization in education were more fully demonstrated (Nicholas, Palmer, Lindsay, Lawrence, & Reid Lawson, 2023). To meet the needs of "continuous teaching and learning without class suspension," Nanning City's primary schools introduced a large number of digital means in remote teaching to ensure that students could receive high-quality reading and writing instruction at home (Alsaghir, 2023). Through online platforms, teachers can give real-time explanations and interact with students, and students can also raise questions at any time. This hybrid teaching model, which combines online and offline teaching, has been continued after the pandemic and has gradually become an important part of the digital transformation of education (Mohammadian, 2022b).

In addition to the reform of teaching methods, the digital transformation of primary education in Nanning also manifests itself in the upgrading of educational infrastructure and technical support (Martínez-Usarralde & Espejo-Villar, 2022). To ensure the smooth implementation of digital reading and writing teaching, the school has strengthened the construction of information and communication technology infrastructure, and many schools have equipped with smart devices, broadband networks, and learning software, providing excellent hardware and software support for teachers and students (Balogun & Kalusopa, 2021). At the same time, the local education department has also increased its efforts to train teachers in information technology, improving their digital teaching ability and ensuring that they can use digital technologies to teach effectively (Lischer-Katz, 2022).

Problems in the application of digital education

Although educational digitization has shown remarkable results in teaching innovation and efficiency improvement, its application process also brings a series of challenges. One of the major issues is the digital divide (Mohammadian, 2022a). As the digitization process deepens, the gaps between different groups become more and more obvious (Şener, 2022). This gap is not only reflected in differences in hardware equipment and network access, but also in students' ability to master and use information technology. In resource-rich areas, students have easy access to advanced digital

devices and tools and enjoy rich online resources, thus showing higher proficiency and adaptability in the use of information technology (Balogun, 2023). However, in low-resource areas, students struggle to effectively connect to the digital world due to a lack of equipment and network support (Jain, Seth, Sood, & Grima, 2023). This imbalance in resources and technical capabilities has exacerbated the digital divide in the education field and seriously hindered educational equity among different groups (Javed, 2023).

In addition, the popularity of smart technology has also triggered a new "smart gap." Even among students who are exposed to digital devices, there is a clear gap in the ability to use smart devices due to differences in family background and educational support, further widening the learning gap between groups (Baloch & Jomezai, 2024). The emergence of this gap not only affects students' experience in digital learning, but is also related to their competitiveness in future society (Blanco González Tejero, Ulrich, & Ribeiro-Navarrete, 2024). In an era of rapid advances in smart technology, the problem of educational inequality is no longer limited to differences in hardware equipment, but has gradually evolved into a new inequality caused by "technology usage capabilities." As a deepening manifestation of the digital divide, the smart divide has become a major obstacle restricting the equitable development of education (A. Sharma, Dean, & Bezjian, 2024).

In order to narrow this gap, coordinated efforts from multiple parties are needed to eliminate the digital divide in the process of education digitization (Sibiya, 2024). Governments and educational institutions should increase policy support and financial investment in underdeveloped areas to ensure that students in these areas have basic digital devices and network resources (Markoc, 2024). At the same time, schools should strengthen digital literacy education, especially providing appropriate digital skills courses and resource support for students with weak technical skills to improve their adaptability to digital technology (Di Vaio, Latif, Gunarathne, Gupta, & D'Adamo, 2024). Education departments at all levels should also formulate differentiated digital education policies based on the characteristics of different groups so that all students have equal learning opportunities in the process of educational digitization, thereby fundamentally narrowing the digital divide and promoting equity and inclusiveness in Educational Develop (Dauda, Oladiran, Sutherby, & Adebayo, 2024).

In short, although digitization has shown significant application advantages in education, the digital divide, intelligent divide and other issues in its development process need urgent attention and resolution (Acquah, Agyabeng, & Mensah, 2024). In the process of promoting the digitalization of education, it is necessary to effectively respond to these challenges through multi-level and multi-angle strategies to ensure that digital technology can effectively improve the quality of education and achieve equitable educational opportunities (Mokhtar Azizi, Cochrane, Thurairajah, & Mokhtar Azizi, 2023).

3. Conclusion and Suggestions

This study focuses on "the application of educational digitization in the reading and writing teaching of primary school students in Nanning, Guangxi". Starting from the concept of digitization, combined with a literature review, this study discusses the specific application, effectiveness and

challenges of educational digitization in reading and writing teaching (Hearn, Williams, Rodrigues, & Laundon, 2023). The results show that educational digitization has played a significant role in the reading and writing teaching of primary schools in Nanning, which not only enriches the teaching methods, but also improves the interactivity of the classroom and the learning interest of students (Rashid & Ratten, 2022). With the support of digital platforms, the implementation of personalized learning is more convenient, and teachers can teach students in accordance with their aptitude and provide appropriate content and feedback for students with different learning progress (Ciasullo, Lim, Manesh, & Palumbo, 2022). During the epidemic, the advantages of educational digitization are particularly prominent. The online platform ensures that "classes are suspended but learning continues", which effectively guarantees the continuity of students' learning. However, this study also found that educational digitization faces many problems in the application process, including the digital divide, the intelligence divides and the lack of education quality supervision (Abdi, Suharti, Usmanij, & Ratten, 2022). Due to regional resource differences, some students find it difficult to obtain sufficient technical support, and the effects of educational digitization are unbalanced. The popularization of intelligent technology has further aggravated the "intelligence divide" between groups, and insufficient education quality supervision makes it difficult to guarantee teaching results (Gavrila Gavrila & de Lucas Ancillo, 2021).

The application of digital technology in reading and writing teaching in primary schools in Nanning demonstrates the potential of technology-driven education reform (Modiba, 2024). Through tools such as electronic whiteboards, online interactive platforms, and personalized reading software, traditional classroom teaching has been enriched and teaching effects have been significantly improved (Huang, He, Lian, & Yang, 2024). At the same time, Nanning has also achieved results in the construction of educational infrastructure and the cultivation of teachers' information technology capabilities, laying a good foundation for the smooth promotion of digital reading and writing teaching (S. Sharma & Munjal, 2023). With the support of national policies, primary schools in Nanning have obtained rich digital resources through smart education platforms, providing effective support for educational equity. However, the promotion process of digital education still faces significant resource and technical differences. Especially in underdeveloped areas, due to the lack of hardware equipment and network resources, students find it difficult to obtain sufficient digital education support (Schivavone, Pietronudo, Sabetta, & Ferretti, 2023). In addition, although the popularization of intelligent technology has brought innovative teaching methods, it has also exacerbated the differences in technology use capabilities among educational subjects and brought about health problems that may be caused by students' long-term use of digital devices (Hermina G. B. Angheliescu, Patrick Lo, & Bradley Allard, 2022). In addition, due to the imperfect regulatory mechanism, the comprehensive promotion of digital education still faces many challenges (Hermina G. B. Angheliescu, Partick Lo, & Bradley Allard, 2022).

Based on the conclusions and analysis of this study, the following suggestions are put forward to promote the digital development of primary school reading and writing teaching in Nanning and promote the realization of educational equity:

First, the construction of digital infrastructure should be strengthened. The government and education departments need to increase support for underdeveloped areas and provide necessary hardware equipment and network resources to narrow the digital divide caused by resource imbalance (Skøtt, 2021). Through policy tilt, ensure that all students have equal resources and technical support in the process of education digitalization. Second, promote the improvement of teachers' information technology capabilities. The smooth implementation of education digitalization is inseparable from the professional quality and technical ability of teachers (Okeji & Mayowa-Adebara, 2021). It should strengthen digital teaching training for teachers so that they can master technical tools and improve their application ability in personalized teaching. At the same time, encourage teachers to innovate teaching methods in the classroom, ensure that digital means are truly integrated into the teaching process, and improve the quality of education. Third, improve the quality supervision mechanism of digital education (May, 2021).

It is recommended that the education department establish an effective digital education quality evaluation system, conduct comprehensive supervision on the content, methods and effects of digital teaching, ensure that the teaching content meets the education standards, and establish an appropriate evaluation and feedback mechanism so that teachers can continuously optimize digital teaching methods according to the teaching effect (Gupta, Singh, & Gupta, 2022). Fourth, pay attention to students' mental and physical health. In order to reduce the negative impact of long-term use of digital devices on students' health, schools should set a reasonable duration for the use of digital devices in the classroom and encourage students to exercise after class (Ahel & Schirmer, 2023). The education department can promote relevant research, explore digital learning models suitable for the healthy development of students, and balance students' academic development and physical and mental health (Corona, 2023). Finally, promote intelligent education technology and narrow the intelligence gap. In the process of promoting the application of intelligent technology, special attention should be paid to the differences in the ability of different groups to use technology (Dimian, Aceleanu, & Mindrican, 2023). By designing teaching content suitable for different levels and providing adaptive digital learning support, students with weak technical ability can gradually adapt to the intelligent learning environment, thereby narrowing the "intelligence gap" and promoting educational equity (Jogezai & Baloch, 2023).

With the in-depth implementation of the national education digitalization policy and the continuous advancement of technology, the application potential of education digitalization in primary school reading and writing teaching will continue to be released (Pandya & Gohil, 2023). Nanning's primary education can learn from the experience of education digitalization in developed countries, continuously optimize digital infrastructure, improve teachers' technical literacy, and improve teaching content and evaluation system, so that digital education can truly become a powerful tool for improving students' reading and writing ability (Zhou & Wang, 2023). In the future, through the collaborative efforts of all parties, the digitalization process of primary education in Nanning will continue to advance on the track of fairness, efficiency and innovation, providing a solid guarantee for the realization of high-quality development of education (Lilley,

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