



Research on Digital Divide Caused by Regional Differences in China Under the Context of Education Digitisation

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Abstract. In recent years, with the transformation of traditional education in China, the impact of online education on students has sparked great controversy in society. This study explores the digital divide due to regional disparities, aiming at the impact of the urban-rural gap on distance education in China. Using previous data analysis, this study examines the internal and external causes of the digital divide resulting from the widespread adoption of digital education across the country. It is found that exogenous factors, specifically material differences, have an adverse impact on students' access to educational resources. And endogenous factors manifested in the form of cognitive differences also had a negative impact on students' access. These findings indicated that the promotion of equity in online education requires a combination of interventions from both the individual and the community. To narrow the material gaps result from external factors such as economic level, regional differences and unequal distribution of educational resources. Simultaneously, efforts should be made to mitigate the awareness gap caused by personal factors such as limited cognition or the absence of proper guidance.

Keywords: Digital Divide; Online Education; Region Differences; Educational Inequity.

1 Introduction

The digital divide has exacerbated inequities in Chinese education. Following the COVID-19 pandemic's onset, online education has become more prominent. A lot of people believe that it can offer more advantages to students and teachers, such as the fact that online educational resources are accessible and publicly available. However, in reality, the digital divide phenomenon was more pronounced than anticipated during the epidemic [1]. This can be primarily attributed to regional disparities that further widen educational inequities. In China, There is an education gap as a result of the growing social and economic divide between urban and rural communities [2]. The implementation of large-scale online education has the potential to widen the achievement gap between urban and rural students. In this context, this study will

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conduct a comprehensive analysis of the specific causes of the digital divide phenomenon contributed by regional differences in China. This can provide valuable suggestions and references for China and other countries seeking to address and improve digital inequality. This paper therefore seeks to address two issues: to identify specific factors that exacerbate the phenomenon of the digital divide and to propose feasible recommendations that can bridge the digital divide.

This study enhances the understanding of factors that cause the digital divide based on previous literature. It is delved into the specific causes of this divide and categorizes them into two types: material and spiritual. Then, it is necessary and important to propose corresponding recommendations for the different causes.

2 Connotation and Current Situation of Digital Divide

2.1 Definition and Characteristics of the Digital Divide

The term "digital divide" originated in the late 1990s and was initially defined as the digital gap between those who had computers and those who did not [3]. It is also known as the "first level of the digital divide". Several academics contended up until the start of the twenty-first century that the "digital divide" should be reinterpreted as the accessibility of online content and people's capacity to engage with the digital world [4]. This shifts from a difference between the "haves" and "have nots" to a "second level of the digital divide". The digital divide is thus characterized by two main dimensions: access to physical technology and the ability and opportunity to participate in the digital realm. For instance, different groups and regions are limited by disparities in hardware infrastructure, due to inadequate internet connectivity in certain areas; and the uneven distribution of opportunities for online learning and work in different regions leads to substantial discrepancies in accessing resources for digital education.

2.2 Specific Manifestations of the Digital Divide

In China, the number of Internet users has exceeded 731 million since 2016, and the phenomenon of digital divide has become increasingly conspicuous [5]. Studying the specific manifestations of the digital divide is conducive to conducting analyses of the causes of the digital divide, thereby narrowing the digital gap between the regions and different groups of people. Studies have revealed that, on the one hand, the digital divide is specifically manifested in discrepancies in digital accessibility. Digital accessibility disparity refers to unequal access to digital resources resulting from varying economic levels and regional development. As more tangible examples, because the growing economic gap between urban and rural areas has led to an urban orientation of online education resources, lots of high-quality online educational resources are predominantly found in urban regions[2]. The discrepancy in access to digital resources can be determined by the e-learning context, which includes Internet accessibility and the provision of electronic devices [6]. The other aspect is reflected in the variation in digital usage, which primarily arises from individual factors. Specifically,

an individual's awareness and attitudes towards the Internet play a crucial role. For instance, certain educators present a resistant attitude in the face of educational reform because of the influence of traditional thinking; older people or middle-aged possess limited manipulation and acceptance of new technologies owing to inadequate technical support; and certain disadvantaged groups find it difficult to embrace this new mode of learning from variety factors, such as parental absence, lack of consciousness, and low self-control [7].

3 Causes of the Digital Divide

3.1 Impact of Regional Differences on Digital Education

In recent years, driven by the global trend of digitization, digital learning in the field of education has become increasingly prominent in China. The transformation of traditional education to digitalization aims to mitigate educational inequalities and bridge the education gap. However, the pervasive issue of the digital divide has brought many challenges for different regions and students. Firstly, there are obvious income disparities between regions.

Specifically, household incomes in rural areas are significantly lower than those of urban residents. As a result, tools and materials for online learning are not available to certain disadvantaged groups [6]. According to statistics, 83.38% of low-income families in China are currently able to barely support their student's participation in online education, leaving 16.62% of families still unable to bear the costs associated with electronic devices and Internet access [7]. This situation adversely affects rural children's access to digital education and their proficiency in using communication technologies [8]. Secondly, Internet availability in remote areas is relatively limited compared to urban areas. In some families and schools located in remote regions, the infrastructure of Internet access is comparatively backward, which is reflected in sluggish network speeds and subpar user experiences [1]. For example, frequent network disconnections and lagging phenomena occur in the process of online education, which greatly affect students' concentration and diminish their enthusiasm and learning efficiency. Finally, there is a dearth of equity and universality of online educational resources between regions. Despite the Chinese government's great efforts in the last decade, a lot of schools in rural areas still suffer from insufficient computers and no access to the Internet. According to a survey, the percentage of rural areas without Internet connection is 11 percent, compared to only 3 percent in urban areas [9]. Students attending rural schools are at a distinct disadvantage in terms of accessing information technology resources.

In sum up, the material dimension constitutes a primary determinant of the digital divide in various regions. These include the disparity in income levels between different regions, the development of infrastructure, and the unequal distribution of online educational resources. These factors pose great challenges to accessing digital educational resources among diverse regions and groups.

3.2 Impact of Attitudes Towards Digital Education

On the other hand, the awareness and attitude of teachers, parents, and students towards online education is another major reason for the digital divide phenomenon. First of all, teachers lack awareness of the need to learn deeply and enhance their digital literacy. The effectiveness of teaching and efficiency of student learning depends on the proficiency and competence of teachers in utilizing digital teaching methods. However, in disadvantaged areas, schools generally face a shortage of high-quality educators who emphasize digital teaching. In contrast to urban educators who are motivated to improve their digital skills, these teachers tend to rely on more basic teaching methods and have less positive attitudes and innovative spirit to embrace new things. Thus the abundant online educational resources remain underutilised, and students do not have access to the same instructional materials and innovative pedagogical methods as those available in developed cities.

As a second factor, intergenerational persistence also influences students' acceptance and proper mastery of online learning. Intergenerational persistence refers to the fact that parents' education level has a direct impact on the quality of their children's education. In addition to material provision, well-educated parents have a higher level of attentiveness to online education and can offer their children greater support in information technology and encouragement. During the COVID-19 pandemic, studies showed that students from advantaged families adapted more quickly to online teaching methods and maintained higher learning efficiency due to their parents' provision of guidance on the operation of the device and self-study [6].

And lastly, students' intrinsic motivation is a reflection of their attitudes toward participation in online learning. Especially for some left-behind children, the absence of parents and limited home environment make their psychological needs of relatedness unsatisfied. relatedness means that parental attention and motivation to their children meet their basic psychological needs, thereby enhancing intrinsic motivation to learn [10]. The reality is that many left-behind children in remote areas have parents who work in other cities throughout the year, which makes it impossible to provide accurate guidance and incentives for online education. consequently, left-behind children who lack intrinsic motivation may not be willing to explore new learning approaches, perceiving electronic devices primarily as a tool for entertainment, such as watching short videos or playing games rather than for educational pursuits.

In sum, the benefit of digital education can be realized and the significant gap between different groups and regions in terms of the digital divide can be mitigated through the synergistic interaction among teacher professionalism, intergenerational persistence, and students' intrinsic motivation.

4 Recommendations

4.1 Promoting Digital Inclusion

To address the multiple causes of the digital divide, the Government, society, and educational institutions should collectively offer assistance and propose correspond-

ing recommendations on the material and spiritual dimensions of the divide. The State should actively advance the popularisation of digitalization, including full network coverage, and offering material assistance such as subsidies to disadvantaged households, thereby promoting the balanced development of distance education. From the government's perspective, it is advisable to provide appropriate online education subsidies for low-income families and families with children in rural hukou. For instance, the government can take measures such as free broadband installation or subsidies for the cost of electronic products. From a societal perspective, communities can establish online education fund websites or use self-publishing media to post videos about schools in underprivileged areas to illustrate their plight. Individuals or businesses are encouraged to donate second-hand equipment, such as computers and tablets, to economically disadvantaged families that cannot afford online education. From the school's point of view, the school can set up a mutual aid program. Encourage the sharing of resources between students in the class and those who do not have electronic devices, the borrowing of equipment between peers, and the sharing of electronic teaching materials. At the same time, donated equipment can be used by schools to create year-round accessible multimedia classrooms for students and faculty.

4.2 Raising Awareness of Educational Transformation

In addition, the successful transition from traditional to digital education necessitates the active collaboration of educators, parents, and students to reduce inequalities in online education. In the first place, educational institutions should foster an environment that encourages teachers to experiment with novel teaching methods and provide ample opportunities for professional development. This is because teachers' positive attitudes towards digital tools can better help them integrate them into their instructional practices [2]. Ideologically, schools can encourage teachers to engage in sharing and collaboration. For example, schools can establish an online digital education platform where teachers from different cities nationwide share teaching experiences and teaching resources. By exposing teachers to more successful cases and teaching achievements, this approach potentially helps teachers to raise digital awareness. Additionally, schools can give incentives to teachers who actively learn and participate in digital education, such as setting up awards or prizes. Apart from ideological shifts, schools can recruit volunteers or online education to train teachers in technology. Slightly better-equipped schools can provide teachers with online training programs, such as how to make full use of quality lesson plans available online, how to effectively conduct virtual teaching sessions, and use the online rating system to improve their professionalism and proficiency. Underfunded schools can seek social support, for example, on the Internet where volunteers are openly recruited to provide free training and instruction for teachers. The integration of these technologies and resources would largely reduce teachers' resistance to adopting new technologies.

Besides, for families with left-behind children, schools should enhance home-school communication. Because the attitude of parents has a direct influence on their children. Schools should effectively convey the significance of online education to

parents and develop a proper understanding of digital learning. Additionally, parents who work outside the home should pay more attention to their children, ensuring their basic psychological needs are satisfied, and encouraging them to utilize the Internet for learning rather than entertainment.

In the end, teachers should empower students with more autonomy and communicate with them to help them gradually accept and correctly utilize digital resources. For instance, teachers can assign digital homework, the content can be divided into live classes, lectures, or e-book reading, so that students have a strong interest in digital learning and reshape their views on the usage of electronic devices. To cater to introverted students, online communication platforms can be established to allow students to voice their difficulties and ideas. This approach ensures equitable access to online educational opportunities for all students.

5 Conclusion

This study finds that both physical and spiritual dimensions are key factors in widening the digital divide. Influenced by regional differences, income levels, infrastructure development and the attitudes and perceptions of educators, parents, and students towards online education are responsible for the inequity in digital education. Therefore, it is suggested that addressing such a digital education necessitates collaborative needs effort and support from society, government, and educational institutions. Seeking social assistance, government subsidies, and school cooperation in the material aspect, and providing more support to teachers in the spiritual aspect, allowing parents to effectively address their children's psychological needs and foster a heightened students' interest in online learning. Future studies should give the sustainable growth of online education more consideration. Under the prevailing backdrop of social and economic inequality, there is no absolute fairness in education. consequently, based on such conditions, how to alleviate the digital divide phenomenon caused by environmental differences and achieve the sustainable development of online education are the directions of future research.

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