INTERNATIONAL JOURNAL OF SOCIAL SCIENCE AND BUSINESS MANAGEMENT (IJSSBM)
(e-ISSN: 3009-0091) (Vol.02, ISSUE 01, 01-14)

RESEARCH ON THE GAP BETWEEN URBAN AND RURAL SECONDARY EDUCATION IN SHANDONG PROVINCE IN THE INTERNET ERA

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ABSTRACT- In the age of digital connectivity, the integration of information technology into secondary Education is often lauded for transforming the teacher-student relationship through enhanced interactive communication. However, this study argues that this so-called "progress" has inadvertently exacerbated inequalities between urban and rural educational settings. Using a mixed-methods approach, including a literature review, surveys, and interviews, the study critically assesses four critical areas of this growing divide: access to educational resources, economic constraints, cultural gaps, and family-based differences. By deconstructing these complex, interconnected factors, this study challenges overly optimistic narratives surrounding the role of the Internet in Education and suggests pragmatic solutions to narrow these disparities.

ARTICLE HISTORY
Received: 01/10/2023
Revised:20/11/2023
Accepted: 1/12/2023

KEYWORDS
Education, Internet, Urban and Rural, Gap, Secondary Education

INTRODUCTION

Whilst the transformative impact of rapidly evolving information technology on everyday life in modern China is often lauded (Yi, 2017), this study argues that its integration into the education sector has produced mixed and stratified results. As a result of the integration of Internet technology into teaching practices, educational standards and the quality of teaching have improved (Wu, 2020). However, it has also been shown to widen the gap between urban and rural educational environments. Urban students rely more on mobile technology for academic activities than rural students. Similarly, rural children have lower rates of online information assimilation (He, Shi, Chen, Zhao, Wu, Yan, & Cao, 2020). These uneven trends contribute to a skewed education system that disproportionately benefits urban areas. Therefore, this study critically examines the role of the Internet in deepening educational inequalities in the specific context of Shandong, China.

The education gap between urban and rural areas has been identified as a significant issue in China's ongoing social transformation, with rural secondary schools experiencing substandard educational standards that must align with more comprehensive developmental needs (Yang, Huang & Liu, 2014). This gap between urban and rural secondary education levels is further exacerbated in the context of the Internet age. Various factors have been cited as contributing to this disparity. This study critically examines the underlying causes that drive the disparity between urban and rural secondary Education in the Internet age. This study offers potential solutions to raise educational standards in both areas and advocate for enhanced policy development.

PROBLEM STATEMENT

This study aims to address three critical aspects of this escalating problem. These include the issue of inequitable distribution of Internet resources, the migration of rural students to urban schools, gaps in the existing literature, and the long-term consequences for rural students.

In response to the problem of inequitable distribution of Internet resources, the advent of the Internet age has brought about significant advances in educational opportunities. However, it has also widened the long-standing gap between urban and rural secondary Education in Shandong, China. Despite annual growth in Internet penetration, the gains have been markedly uneven. Recent findings suggest a persistent digital divide between urban and rural educational environments in Shandong Province (Tian, 2021). This unequal distribution of digital assets sets the stage for a complex problem that will profoundly affect students' academic outcomes and overdevelopment.

Regarding the second issue of disparity in the existing literature, current academic discourse, while comprehensively exploring the overall impact of the Internet on Education and the overall urban-rural education gap, offers limited specific insights on Secondary Education in Shandong (Wang, Chen and Li, 2019). The evolving and complex role of the Internet in Education - especially its rapidly growing diversity - has yet to be thoroughly researched, leaving a significant knowledge gap that this study aims to fill.

Finally, consider the third problem statement regarding the long-term consequences for rural students, an issue whose importance is heightened by its lasting impact on students' prospects. Research confirms that the scarcity of educational resources in rural areas, coupled with the digital divide, has a detrimental effect on rural students' learning outcomes and future career trajectories (Herman. George Emma. (K. & Sara G., 2022; Deng & Lin, 2020). This widening gap affects immediate academic achievement and perpetuates systemic imbalances with far-reaching intergenerational consequences.

RESEARCH OBJECTIVES

The research objectives are outlined as follows:

Quantitative Research Objectives

1. What is the relationship between internet penetration rates and the urban-rural secondary education gap in Shandong, China?

Qualitative Research Objectives

2. What are the unaddressed factors and aspects of the Internet's impact on the urban-rural secondary education gap in Shandong, China?
3. What are the long-term consequences of the urban-rural education gap on the prospects of rural secondary students in Shandong, China?

LITERATURE REVIEW

Scholars at home and abroad have researched the urban-rural education gap. These studies have explored the causes, manifestations and problems of educational equity associated with this gap. Notable examples include studies such as "Inequity in Resource Allocation between Urban and Rural Schools" (Deng & Jiang, 2023), "Realistic Demand for Urban and Rural Educational Resource Allocation" (Hu, 2022), "Rural Basic Education and the Relationship between Children's Migration and School Choice" (Chen, 2022) and "Rural Basic Education and Children's Migration and School Choice" (Chen, 2022). Although providing valuable insights, none of these studies specifically analysed the gap between rural and urban secondary Education in Shandong, China, in the context of Internet penetration.

Another aspect of this study examined the impact of student mobility on resource allocation in urban and rural secondary schools in Shandong Province, China. Prior studies, such as that by Jackson and Makarin (2018), which investigated Internet use in mathematics

across regions of the United States, explored changes and trends in the urban-rural education gap in the Internet age. These studies have also sparked discussions about instructional models, material selection, and educational equity. For example, Cheng (2018) explored shifts in teaching and learning styles due to Internet education, while Mokhtar (2005) examined the evolution of teachers' roles in the Internet era. Lin (2023) proposed an information technology framework for equity in primary Education, and Deng and Lin (2020) examined the impact of the Internet on rural left-behind children. However, none of these studies paid particular attention to the consequences of rural-urban student migration and its implications for resource allocation in Shandong's secondary schools.

Despite extensive research on the urban-rural education gap, several factors, and dimensions of the Internet's impact on this issue have not been thoroughly explored in Shandong, China. Zhao et al. (2021) used GIS technology to visualize resource disparities in small-scale rural schools, and their recommendations centered around inter-school cooperation and cost compensation for students in remote areas. Similarly, Tang et al. (2021) surveyed Hunan Province and proposed measures to integrate urban and rural Education. However, none of these studies delved into the Internet's impact on the urban-rural secondary education gap. They did not answer the question of the Internet's role in shaping this gap.

Lastly, it is crucial to consider the long-term consequences of the urban-rural education gap on the prospects of rural secondary students in Shandong, China. Previous research efforts have predominantly focused on identifying the causes and manifestations of this gap, offering various solutions. However, there remains a notable gap in the literature concerning a comprehensive analysis of the enduring implications of this education gap on the future opportunities and outcomes of rural secondary students in Shandong. This aspect warrants thorough examination to shed light on the potential long-term effects of the urban-rural education divide within the region.

METHODOLOGY

Research Design

At the core of this study lay a meticulously designed research framework calibrated to unearth the nuanced complexities behind the urban-rural secondary education gap in the Internet age in Shandong, China. First and foremost, a structured questionnaire was judiciously employed to collect responses from urban and rural secondary school students and teachers. Let it not be understated—the choice of a questionnaire was not merely logistical but strategic. This instrument provided a broad snapshot, illuminating the specific manifestations and influential factors behind the educational disparities. This was critical in offering a macro and micro view of the issue, establishing a robust foundation for subsequent analyses.

However, numbers alone could not capture the breadth and depth of human experience and sentiment; thus, in-depth interviews were conducted with a carefully chosen group of secondary school teachers, students, and parents. Cited studies, such as Xu & Yao (2018), have emphasised the Value of such qualitative insights for painting a comprehensive picture. These interviews provided invaluable, on-the-ground perspectives, making it possible to glean observations that statistics could easily overlook.

To say that this study "used" a mix of quantitative and qualitative methods would undermine the strategic integration of these approaches. It comprehensively and rigorously explored the multifaceted factors contributing to the urban-rural educational divide in the context of the digital age. The insights thus gathered provided a critical nexus of theoretical and practical frameworks, which, in turn, informed strategies for a more balanced educational landscape.

The fruits of these laborious efforts were not merely academic; they bore tangible solutions to rectify the ingrained inequalities. Among these were initiatives to increase educational empowerment, promote Internet education platforms, and enhance rural Internet infrastructure—all underscored by a focus on improving information-sharing rates. Far from mere recommendations, these were actionable steps precisely calibrated to foster a mutually beneficial and win-win situation, equitably benefiting both land and rural secondary education settings.

Population and Sampling

Utilising the random sampling method, 400 questionnaires were distributed among urban and rural teachers and secondary school students in Shandong Province, China. Out of these, 100 were given to teachers and students in urban areas and another 100 to teachers and students in rural areas. Scale data from these questionnaires were subsequently collected and analysed. Additionally, 12 individuals were chosen for in-depth interviews for a more detailed perspective. This comprised four teachers, four secondary school students, and four parents from both urban and rural areas.

Data Collection

To ensure the data's validity and timeliness and to improve the recall rate, the questionnaire for this study was conducted primarily online. The professional platform "Questionnaire Star" was utilised to distribute the questionnaires and to quantify the statistical results.

Random sampling was employed, selecting two urban teachers, two rural teachers, two urban students, two rural students, and two parents from urban and rural areas from those who completed the questionnaire. These 12 individuals were then interviewed in-depth. The interviews were transcribed into textual form using voice transcription. A qualitative analysis was conducted on their interview contents, with root coding employed to discern the meaning of each sentence. This process aimed to explore the factors influencing the disparities between urban and rural secondary school students in the Internet era, enabling the proposal of targeted measures based on these insights.

Measurement/Trustworthiness

To ensure a rigorous study, a meticulous two-step process was used to determine the reliability and validity of the instruments used. Initially, the reliability of the items in the scale was thoroughly reviewed. Reliability analyses were conducted using the well-known SPSS 27.0 software, focusing on individual items and their associated influences. This robust approach was essential to confirm that the instruments consistently measured the expected variables and to increase confidence in the data generated.

Subsequently, it was equally important to validate the items. The SPSS 27.0 software again played a role in conducting the validity analyses. This process tested the construct validity of the scales, ensuring that the measurements were consistent and accurately represented the concepts they were designed to measure. The concluding results, as discussed later, confirmed the rigorous methodology employed and enhanced the credibility of the findings.

RESULTS

In this rigorously conducted study, it should be emphasized that the data collected was both extensive and responsive. Out of the 400 questionnaires, 100 teachers and 100 students from urban areas and an equal number of students from rural areas participated in the careful stratified sampling. After the questionnaires were returned, 13 questionnaires were found to have an abnormal response time, which was significantly less than the expected response time

required for the questionnaires to be considered invalid questionnaires, thus resulting in a response rate of 91.75 %.

There is no doubt a massive divide between urban and rural areas in Secondary Education, and even more so in the Internet age. The most noticeable aspects of these differences are isolated, such as educational resources, economic conditions, cultural exchanges, and family environment.

It is essential to note the stark differences in educational resources. The promise of the digital age has largely been realized in urban environments, while in rural environments, the digital potential remains largely untapped. Some might argue that this is not simply a divide but a gross inequality that has been exacerbated, rather than facilitated, by technological advances.

Moreover, economic constraints in the rural environment have largely exacerbated the divide, increasing the resource and opportunity gap. This is not merely an extension of pre-existing inequality; instead, it is an actively widening divide that the advent of the Internet should have bridged.

In terms of culture, it has been observed that cultural exchanges and information continue to be disproportionately available in urban educational environments compared to rural ones. While this can be interpreted as an extension of resource-based inequality, it also creates a distinct category of deprivation that affects the overall development of rural students.

Finally, in terms of families, the data clearly show that families in urban environments are better equipped to promote educational environments that can benefit from the Internet age.

Reliability and validity test results

The reliability analysis aimed to assess the internal consistency of the items in the scale. This served as an essential metric for the questionnaire's reliability. Similarly, the validity analysis was executed to evaluate the structural validity of the items in the scale.

The SPSS 27.0 software was employed for the analyses. A reliability analysis was initially conducted, followed by a factor analysis to examine structural validity.

Statistical Findings

·**Table 1:** Reliability Statistics

Indicator	Value	Number of Items
Cronbach's Alpha	0.776	10

Interpretation: A Cronbach's α Value greater than 0.7 is widely considered an indicator of internal sidereal consistency and high reliability. This research achieved a Cronbach's α of 0.776, confirming the scale's robust reliability.

·**Table 2:** KMO and Bartlett's Test

Indicator	Value	df	Significance Level
Kaiser-Meyer-Olkin (KMO)	0.835		
Bartlett's Test of Sphericity	1408.640	36	0.000

Interpretation: A scale is commonly deemed suitable for factor analysis if the KMO measure exceeds 0.7 and Bartlett's Spherical Test is significant at P=0.000. This study recorded a KMO measure of 0.835 and a critical Bartlett's Test (sig).=0orded, validating the scale's appropriateness for additional factor analysis.

Summary

The reliability and validity of the scale used to investigate the impact of the Internet age on the urban-rural secondary education gap in Shandong, China, were effectively substantiated through rigorous statistical evaluations.

Factors Influencing Differences Between Urban and Rural Secondary Schools in the Internet Age

Correlation analysis is typically employed to determine the direction and magnitude of associations between variables. In this study, Pearson's method was utilised to analyse the relationship between the influence of the Internet on the gap between urban and rural secondary Education and the associated factors.

▪ **Statistical Guidelines**

It is generally accepted that the closer the absolute value of the correlation coefficient r ($-1 \leq |r| \leq 1$) is to 1, the higher the correlation between the variables, with $0.5 \leq |r| \leq 0.8$ being considered moderately relevant.

Statistical Findings

▪ **Table 3: Correlation Analysis of the Education Gap between Urban and Rural Secondary School Students in the Internet Era**

Factors	Correlation Coefficient (r)
Educational Resources	[Value between 0.400-0.800]
Cultural Information and Cultural Exchange	[Value between 0.400-0.800]
Economic Factor	[Value between 0.400-0.800]
Family Factor	[Value between 0.400-0.800]

Interpretation: As can be discerned from Table 3, the correlation coefficients about the educational gap between urban and rural secondary schools during the Internet age and factors such as educational resources, cultural information and exchanges, economic influences, and family circumstances all lay in the range of 0.400 to 0.800. Consequently, it was deduced that the educational disparity between urban and rural secondary schools during the Internet age correlated with these four categories of factors.

▪ **Summary**

Through meticulous statistical analyses, correlations were identified between the educational gap observed in urban and rural secondary schools in the Internet era and four predominant factors: educational resources, cultural exchanges, economic conditions, and family influences in Shandong, China.

Correlation analysis was used to determine the relationship between various influencing factors and the education gap between urban and rural secondary schools in the Internet era. The correlation coefficients were calculated using Pearson's method.

Table 4: Correlation Analysis of the Education Gap

	Result: Differences in Education	**Educational Resource Factor**	**Cultural Information & Exchange**	**Economic Factor**	**Family Factor**
Result: Differences in Education	1	.445**	.520**	.540**	.489**
Sig. (2-tailed)	.000	.000	.000	.000	.000
N	367	367	367	367	367
Educational Resource Factor	.445**	1	.395**	.278**	.278**
Sig. (2-tailed)	.000	.000	.000	.000	.000
N	367	367	367	367	367
Cultural Information & Exchange	.520**	.395**	1	.588**	.460**
Sig. (2-tailed)	.000	.000	.000	.000	.000
N	367	367	367	367	367
Economic Factor	.540**	.278**	.588**	1	.549**
Sig. (2-tailed)	.000	.000	.000	.000	.000
N	367	367	367	367	367
Family Factor	.489**	.278**	.460**	.549**	1
Sig. (2-tailed)	.000	.000	.000	.000	.000
N	367	367	367	367	367

Note: **. Denotes that the correlation is significant at the 0.01 level (2-tailed).
Based on the data in Table 4, significant correlations were observed between the education gap among urban and rural secondary schools in the Internet era and the identified factors: educational resources, cultural information and exchange, economic conditions, and family environments. The coefficients ranged between .278 and .588, suggesting moderate to strong correlations.

Correlation analysis was traditionally employed for evaluating the direction and magnitude of relationships between variables. This study utilised Pearson's method to ascertain the correlation between various factors and the education gap between urban and rural secondary schools in the Internet era.

▪ Statistical Guidelines

A widely accepted criterion posits that a correlation coefficient r in the range $-1 \leq r \leq 1$ $-1 \leq r \leq 1$ with an absolute value closer to 1 indicates a stronger relationship. Coefficients within $0.5 \leq |r| \leq 0.8$ $0.5 \leq |r| \leq 0.8$ are moderately significant.

Statistical Findings

▪ Table 5: Pearson Correlation Coefficients Between Factors and Educational Gap

Factors	Result: Differences in Education	Pearson Correlation	Sig. (2-tailed)	N
Overall	Differences in Education	1	.000	367
Educational Resource Factor		.445**	.000	367
Cultural Information and Exchange		.520**	.000	367
Economic Factor		.540**	.000	367
Family Factor		.489**	.000	367

Interpretation: As revealed by Table 5, correlation coefficients between the gap in Education among urban and rural secondary schools and the factors—educational resources, cultural information and exchange, economic considerations, and family circumstances—were observed to lie in the moderate range of 0.445 to 0.540. Consequently, it was inferred that the educational disparity between urban and rural secondary schools in the Internet era was significantly correlated with these four factors.

▪ Summary

Upon comprehensive analysis, statistically significant correlations were found between the educational disparities among urban and rural secondary schools in Shandong, China, during the Internet age and four predominant factors: educational resources, cultural exchanges, economic conditions, and family environments.

Note: The asterisks (**) in the correlation coefficients usually denote significance levels. Here, all the correlations were statistically significant at a 0.01 level (2-tailed), as indicated by the significance (Sig.) values of .000.

DISCUSSION

The rapid advent of the Internet age has profoundly reshaped the pedagogical landscape, emphasizing multi-stakeholder collaboration and moving away from the traditional teacher-student dichotomy (Tiene & Ingram, 2001). Furthermore, online educational models have enhanced students' communication skills and developmental capabilities (Berenfeld, 1997). Despite these advancements, a distinct divide persists between urban and rural secondary Education in the Internet era, a gap that has significant repercussions for the future development opportunities of rural students (Wu, 2020).

Governmental Role and Policy Recommendations

As underscored by recent findings (Chen, 2023), there is an urgent need to augment digital Education and internet platforms in rural areas. Several measures can be proposed considering this analysis:

1. Strengthening of Government Investment and Internet Facilities: Increased governmental funding could augment the rate of information sharing and ensure the provision of quality educational resources.
2. Quality Control and Assessment: Alongside resource distribution, a robust and scientific assessment mechanism should be in place to monitor the effectiveness of learning outcomes (He et al., 2020).
3. User Experience: Special attention should be devoted to crafting a user-friendly experience, especially for children left behind in rural areas, including interface design, security, and privacy protection (He et al., 2020).

These strategies are aligned with prior research indicating that digital Education can ameliorate the shortage of teachers and improve instructional conditions in rural schools (Jiang, 2021).

Public Awareness and Stakeholder Collaboration

Promoting Internet education platforms is not solely the government's prerogative. Educational institutions and industry associations should collaborate in publicising the efficacy of these platforms (He & Xu, 2019). Such cooperative efforts can be manifested through extensive publicity in local media and social networks to increase stakeholder awareness and engagement.

CONCLUSION AND IMPLICATIONS

Impact of the Internet Age on Education in Urban and Rural Areas

Based on the systematic data collection, analysis, and interviews with stakeholders in both urban and rural environments, it was conclusively established that judicious utilization of the Internet can be instrumental in advancing educational outcomes. Four core variables were identified as fundamental influencers in exacerbating the academic gap between rural and urban secondary schools in the Internet age. These variables were systematically analyzed and coded at three levels to comprise the educational resources factor, family factor, economic Factor, and cultural exchange and information factor.

Summary of Key Findings

Box 1: Educational Resources Factor

Differential access to Internet resources, varying pedagogical attitudes towards Internet teaching, and disparities in teacher age and educational qualifications were identified as the primary contributors to the educational resources gap between urban and rural areas.

Box 2: Family Factors

Significant variations in parental educational levels, family Internet awareness, and overall familial support contributed to divergent educational experiences between urban and rural students.

Box 3: Economic Factors

Distinct differences were noted in the economic income of families, the extent of financial support extended for child development, and the quality of Internet connectivity, which was more favourably skewed towards urban settings.

Box 4: Cultural Exchange and Information Factors

Differences in cultural Education and the awareness and implementation of hobbies and interests were ascertained to widen the urban-rural educational gap further.

Box 5: Implications for Future Development

The accessibility to quality Internet-based educational resources for urban secondary studens contrasted starkly with the absence of such resources for their rural counterparts. This differential access was found to have severe implications for the latter's future educational and developmental prospects.

Recommendations and Future Directions:

Given the pronounced disparities, targeted and science-based interventions are urgently warranted. Governmental bodies must amplify investments in Internet infrastructure and educational technologies, particularly in rural settings (He et al., 2020). Simultaneously, concerted efforts should be directed towards modernizing and standardising teacher training programs (Tang et al., 2021). Moreover, there is a compelling need to augment the curriculum to prepare students to become future-ready and comprehensive talents.

Promoting Internet literacy among rural secondary school students and their parents is crucial for narrowing the observed educational gap. This necessitates collaborative initiatives that engage governmental agencies, educational institutions, industry, community organizations, and families (Deng & Lin, 2020).

In sum, the observed disparities in the educational experiences between urban and rural secondary school students in the Internet era represent a critical social issue. Addressing this gap is integral to advancing a modern educational system, fostering educational equity, dismantling cultural hindrances, and establishing an inclusive educational environment. It is hoped that the findings and recommendations proffered in this study will offer a robust scaffold for shaping the future educational landscape in China.

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