

Reimagining Education in the Post-COVID-19 Era: Embracing Technology, Promoting Resilience, and Fostering Equity**Menata Ulang Pendidikan di Era Pasca-COVID-19: Merangkul Teknologi, Mempromosikan Ketahanan, dan Membina Keadilan****Ani Nafisah¹, Citra Juniarni², Almujaheed³, Hesta Rafmana⁴, Mona Novita⁵**Institut Agama Islam Al-Qur'an Al-Ittifaqiah Indralaya^{1,2,3,4}, Sekolah Tinggi Agama Islam Yasni Muara Bungo⁵*ani@iaiqi.ac.id¹, citra@iaiqi.ac.id², almujaheed163@gmail.com³, tararafmana@gmail.com⁴, monanovita.staiyasni@gmail.com⁵**Corresponding Author***ABSTRACT**

This research aims to explore the effectiveness of distance learning (PJJ) strategies in overcoming the digital divide and promoting educational equality in rural areas post-COVID-19 pandemic. Using a systematic literature review approach, this study analyzes various relevant literature, including peer-reviewed articles, research reports, and case studies. The findings show that although PJJ can improve access to education, significant challenges related to digital infrastructure, technology skills, and inclusive education policies still need to be addressed. This research emphasizes the importance of investing in digital infrastructure, training for educators and students, and developing fair policies to support the success of PJJ in rural areas. The results of this research make a significant contribution to the existing literature and offer valuable insights for policy makers, educators, and school administrators in creating equitable learning environments.

Keywords: Distance Learning, Digital Divide, Educational Equity, Infrastructure Investment, Inclusive Education Policy, Technology Training

ABSTRAK

Penelitian ini bertujuan untuk mengeksplorasi efektivitas strategi pembelajaran jarak jauh (PJJ) dalam mengatasi kesenjangan digital dan mempromosikan kesetaraan pendidikan di wilayah pedesaan pasca-pandemi COVID-19. Dengan menggunakan pendekatan *systematic literature review*, studi ini menganalisis berbagai literatur yang relevan, termasuk artikel *peer-reviewed*, laporan penelitian, dan studi kasus. Temuan menunjukkan bahwa meskipun PJJ dapat meningkatkan akses pendidikan, tantangan signifikan terkait infrastruktur digital, keterampilan teknologi, dan kebijakan pendidikan yang inklusif masih perlu diatasi. Penelitian ini menekankan pentingnya investasi dalam infrastruktur digital, pelatihan bagi pendidik dan siswa, serta pengembangan kebijakan yang adil untuk mendukung keberhasilan PJJ di wilayah pedesaan. Hasil penelitian ini memberikan kontribusi yang signifikan terhadap literatur yang ada dan menawarkan wawasan berharga bagi pembuat kebijakan, pendidik, dan pengelola sekolah dalam menciptakan lingkungan belajar yang setara.

Kata Kunci: Pembelajaran Jarak Jauh, Kesenjangan Digital, Kesetaraan Pendidikan, Investasi Infrastruktur, Kebijakan Pendidikan Inklusif, Pelatihan Teknologi

1. Introduction

The COVID-19 pandemic has fundamentally changed educational practices around the world, particularly through the rapid implementation of distance learning (PJJ) in response to school closures. This transition reveals pre-existing structural inequalities, especially the digital divide, which refers to differences in access to technology and the internet. Students in urban areas, who typically have better access to digital resources, have adapted more quickly to online learning environments compared to their peers in rural areas, who often face significant barriers such as unstable internet connectivity and limited access. limited to digital devices

(Halpern, 2020; Cheshmehzangi et al., 2022). The challenges of distance learning are particularly pronounced in rural and less developed areas, where educational institutions were already struggling with limited resources before the pandemic. For example, schools in these areas often lack the infrastructure and teaching materials necessary to support effective online learning (Siambi, 2022; Sarah, 2022). This sudden need for technology-based education has exacerbated existing inequalities, leading to an increased risk of academic failure among students from disadvantaged backgrounds (Chasanah & Purwanti, 2022). This situation is further complicated by the fact that many students in rural areas may experience low motivation and social isolation due to their limited engagement with peers and educational resources (Raza et al., 2020).

Furthermore, the implications of this digital divide go beyond individual academic performance; they have broader social and economic impacts. Differences in educational access can perpetuate and even widen economic disparities between urban and rural communities, as students from less developed areas may miss out on crucial learning opportunities that are increasingly available online (Salvatore et al., 2020; Siambi, 2022). The urgent need to address these inequities has sparked discussions regarding the effectiveness of distance learning strategies and the need for innovative policies that can improve educational equity in a post-pandemic landscape (Soares et al., 2020). Given these challenges, it is important to explore how distance learning initiatives can be adapted to meet the needs of all students, particularly those in rural areas. Policymakers and educators must consider how technological innovation can be leveraged to bridge the digital divide and ensure equal access to quality education (Cibrian et al., 2021; Omodan, 2022). This includes investing in infrastructure improvements, providing resources for digital literacy, and developing inclusive educational practices that address diverse learning environments (Saha et al., 2022).

In conclusion, the COVID-19 pandemic has not only accelerated the adoption of distance learning, but has also highlighted the urgent need to address the digital divide in education. By focusing on equitable access to technology and resources, education systems can work to reduce disparities exacerbated by the pandemic, ultimately creating more inclusive and effective learning environments for all students. This research has significant urgency in the post-pandemic global context. The COVID-19 pandemic has exposed the weaknesses of the global education system, especially regarding unequal access to education in various regions. In situations where distance learning is the main alternative, major challenges arise related to the ability of rural and less developed areas to access adequate technology. As the world slowly moves into the post-pandemic phase, efforts toThe UK's rebuilding education system must focus not only on technological sustainability, but also on achieving more inclusive educational equality.

The importance of this research lies in the urgent need to understand the effectiveness of distance learning strategies in addressing the challenges of the existing digital divide. If not addressed properly, the digital divide can worsen socio-economic disparities between students from different regions, especially in developing countries or areas that have limited access to digital infrastructure. This research is relevant to ensuring that new approaches to learning can create equality, especially in areas that have previously experienced limited access to education. Furthermore, this research also promotes the importance of developing digital infrastructure in rural areas as a key component to ensure fair and equitable educational participation in the future. With greater attention to technological development and improving digital access, this research can provide relevant policy recommendations in order to strengthen the resilience of the education system to potential future crises. This research aims to identify and analyze existing literature related to the implementation of stradistance learning strategies in the context of rural and less developed areas. The main focus of this research is to understand how these strategies play a role in overcoming the digital divide and advancing educational equality in regions that have limited access to digital infrastructure.

Through a systematic literature review approach, this research seeks to explore various perspectives and findings that can provide guidance for more effective policy making and implementation of educational technology in the future. Thus, this research not only serves as a review of existing strategies, but also as a foundation for formulating new policies and approaches that can narrow the gap in access to education in rural areas. It is hoped that this research will be able to make a significant contribution in designing more inclusive and fair education policies, especially in utilizing distance learning as a means of promoting equality. In order to achieve this goal, the main question asked in this research is: "How effective are distance learning strategies in overcoming the digital divide and promoting equality in rural and less developed areas?"

This question aims to explore various aspects of implementing distance learning, including the obstacles and opportunities faced in the context of limited infrastructure. Analysis of this question will help provide a clearer picture of the extent to which distance learning strategies have been able to provide solutions to the problem of digital and educational inequality in the areas that most need intervention.

2. Methods

2.1 Research Approach

This research uses a Systematic Literature Review (SLR) approach to identify, evaluate, and synthesize relevant research regarding the effectiveness of distance learning in overcoming the digital divide and promoting educational equality in rural areas in the post-pandemic period. SLR was chosen as the appropriate method because it provides a systematic framework for exploring and summarizing existing literature, thereby revealing trends, findings and research gaps that require further exploration. Data collection was carried out through identifying journal articles, books and research reports that were appropriate to the topic. This process includes a search of available literature in leading scientific databases, such as Scopus, Web of Science, and Google Scholar, with a focus on peer-reviewed articles published between 2020 and the present. Analysis of the selected articles was carried out in depth to assess the effectiveness of distance learning strategies in various rural areas that face limited digital infrastructure. Each article or literature that meets the inclusion and exclusion criteria is then analyzed qualitatively and quantitatively to reveal relevant themes in the context of post-pandemic educational equality.

2.2 Inclusion and Exclusion Criteria

The literature selection process in this study followed strict inclusion and exclusion criteria to ensure the quality and relevance of the studies to be reviewed.

- Inclusion Criteria:
 - Studies relating to distance or online learning, especially those implemented in rural or less developed areas.
 - Research highlighting the digital divide and educational equity across geographic contexts.
 - Articles published after the initial period of the pandemic (2020 onwards), considering that the focus of this research is on the post-pandemic period.
 - Only peer-reviewed articles from reputable international academic journals (Scopus, Web of Science) are considered to provide a solid scientific basis.
- Exclusion Criteria:
 - Non-peer-reviewed articles, such as opinion pieces, corporate reports, or popular writings that do not have a sufficient academic basis.
 - Research that is not related to the post-pandemic educational context or does not touch on rural areas and the digital divide.

- Studies published before 2020 or research that does not specifically address the implementation of distance learning during or after the pandemic.

2.3 Literature Search Process

The literature search was carried out using several recognized scientific databases, including Scopus, Web of Science, and Google Scholar. The literature search process begins by determining relevant keywords and search strings, such as *“remote learning strategies,” “digital divide,” “rural education,”* and *“post-pandemic education equity”*. The search string is tailored to each database to obtain the most relevant results. The initial search yielded a large amount of literature, totaling over 136 meaningful results found from different databases. The selection process was further carried out by reviewing the title and abstract to ensure relevance to this research topic. After an initial screening stage, approximately 80 articles were selected for more in-depth analysis, where each article was reviewed based on predefined inclusion and exclusion criteria.

2.4 Data Analysis Procedures

After selecting appropriate literature, the data is analyzed using narrative synthesis and quantitative synthesis techniques, depending on the type and research methods used in the literature. This analysis includes grouping studies based on key emerging themes, such as the effectiveness of distance learning, the impact of the digital divide, and approaches to promoting educational equity in rural areas. Study quality assessment was carried out using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) method. This method ensures that only studies that have sufficient methodological quality and clear relevance to the research topic are included in the final review. This stage includes the study selection process which includes identification, screening, eligibility, and inclusion (following the PRISMA flow diagram). Data from each selected study is then organized in the form of tables and narratives to present the synthesis results systematically.

3. Results

3.1 Characteristics of the Studies Reviewed

The results of this review include the total 61 studies who meet the inclusion criteria after going through the selection process. The studies reviewed cover a diverse range of geographic regions, with a primary focus on countries with significant rural populations, including Southeast Asia, Sub-Saharan Africa, Latin America, and parts of Eastern Europe. Additionally, research from developed countries such as Australia and the United States is also included, highlighting similar challenges in accessing education in remote areas. The common thread connecting these studies is the exploration of technology-based distance learning methods, especially the use of online platforms, learning management systems (LMS), video conferencing tools, and digital content adapted to local contexts. For example, the integration of innovative educational technologies, such as problem-based learning and project-based learning, is emphasized as vital for improving educational outcomes in these areas (Anderson & Hira, 2020; Astremska et al., 2021).

Furthermore, the use of mobile technology has emerged as a significant alternative for educational communications in areas with limited digital infrastructure. Tools such as WhatsApp and SMS are identified as effective means to facilitate educational interactions, particularly in rural settings where internet access may be sporadic (Blyznyuk et al., 2021; Glebov et al., 2021). These studies show that this technology not only bridges educational access gaps, but also builds a sense of community among students and educators, thereby enhancing the overall learning experience (Levina et al., 2021).

In terms of research methodology, quantitative approaches dominate, accounting for approximately 60% of the studies reviewed. These quantitative studies typically focus on

assessing the impact of the digital divide and the effectiveness of distance learning strategies in improving student learning outcomes. In contrast, qualitative studies, which account for about 30% of the research, explore the lived experiences of students, teachers, and communities as they adapt to new learning models during the COVID-19 pandemic. This dual approach allows for a comprehensive understanding of the statistical impact of distance learning as well as personal narratives describing the challenges and successes experienced (Stolyarchuk et al., 2021; Suvorova et al., 2021). All studies reviewed are situated in the post-COVID-19 pandemic context, spanning from 2020 to the present. Some studies include retrospective analyzes of the early period of the pandemic to evaluate the effectiveness of strategies implemented before and after the start of widespread distance learning. This temporal focus emphasizes the pandemic's transformational impact on educational practices globally, driving a rapid shift towards digital learning environments (Wang, 2023). The findings from these studies collectively highlight the need for continued adaptation and innovation in educational methodology to ensure equitable access to quality education for all students, especially in underserved areas.

3.2 Key Findings Regarding the Digital Divide

The digital divide in rural areas, especially in the context of post-pandemic distance learning, is a multifaceted problem and is influenced by access to technological infrastructure, digital competence, and government policy support. Each of these aspects plays a crucial role in exacerbating or alleviating the challenges faced by rural communities in accessing digital educational resources.

3.2.1. Access to Technology Infrastructure

Limited access to reliable internet and technology devices is a major factor contributing to the digital divide in rural areas. Many rural areas suffer from inadequate infrastructure, characterized by slow internet speeds, high costs, and sporadic electricity supply, which significantly hinders effective online learning experiences (Fu et al., 2023; Kelly & McGrath, 2022). Although some students may have devices such as smartphones or laptops, poor quality internet connectivity often makes these devices ineffective for educational purposes (Fu et al., 2023; Price et al., 2021). Additionally, although governments and non-governmental organizations have attempted to bridge this gap by providing devices, challenges remain regarding the maintenance of these devices and the training required for their effective use. This situation is exacerbated by the lack of technical knowledge of parents and teachers, which is critical in supporting students in utilizing technology (Wang et al., 2021; Sandun, 2023).

3.2.2. Digital Competence

A lack of digital competency among students, educators, and parents is another significant barrier to effective distance learning in rural areas. Many teachers are unfamiliar with digital learning platforms and lack the training necessary to use technology effectively (Koch, 2022). These deficiencies are reflected in low levels of digital literacy among students and their families, which further hinders their ability to utilize available technological resources (Hu et al., 2021; Zheng & Walsham, 2021). Intervention programs aimed at improving digital skills through targeted training for teachers and students show promise in improving digital competence. These programs often include the development of learning materials that are simplified and adapted to local contexts and technological limitations, thus encouraging the creation of more inclusive learning environments (Saputra, 2023; Tahmasebi, 2023).

3.2.3. Policy Support and Government Intervention

Effective government policies and interventions are critical in addressing the digital divide in rural areas. Research shows that countries with proactive policies aimed at improving

digital infrastructure, providing internet subsidies, and distributing affordable technology to low-income families have seen significant improvements in bridging the digital divide (Koch, 2022; Chen et al., 2022). For example, initiatives in countries such as Kenya and India, which offer free internet access in public spaces such as schools and community centers, have been effective in increasing internet accessibility for students in remote areas (Aissaoui, 2021; "Bridging the rural digital divide", 2018). Additionally, collaborative efforts between the public and private sectors to expand internet access have proven beneficial in reducing disparities in digital connectivity (Cao et al., 2022; Park et al., 2015). However, despite this progress, the literature consistently highlights that economic, social, and geographic factors continue to hinder the full adaptation of rural areas to the demands of digital learning in the post-pandemic landscape (Fu et al., 2023; Zheng & Walsham, 2021).

In conclusion, the digital divide in rural areas is a complex issue influenced by infrastructure access, digital competence and policy support. Addressing these interrelated factors is critical to promoting equitable access to digital educational resources, especially in the wake of the challenges posed by the COVID-19 pandemic.

3.3 Effectiveness of Distance Learning Strategies

The effectiveness of distance learning (DLE) strategies in reducing the digital divide in rural areas has been the subject of extensive research, revealing a complex landscape full of successes and challenges. This synthesis discusses key findings regarding effective strategies, challenges, and community-based interventions supported by relevant literature.

3.3.1. Effective Strategies in Reducing the Digital Divide

Mobile-based learning is emerging as a highly effective strategy in rural contexts. Research shows that mobile technology, including applications that can be accessed via smartphones, has significantly increased access to education in areas with limited internet infrastructure. For example, studies conducted in India show that mobile applications, such as WhatsApp, facilitate learning by allowing students to access material offline, thereby overcoming connectivity issues (Nedungadi et al., 2017). The accessibility of mobile devices compared to traditional computers makes this approach feasible for many rural families, who often already own smartphones (Nedungadi et al., 2017).

Asynchronous learning materials also play an important role in bridging the digital divide. Studies from Peru and India highlight that asynchronous formats—such as instructional videos and PDF modules—allow students to engage with content at their own pace, accommodating the irregular availability of internet and electricity in rural areas (Sadova et al., 2022). This flexibility not only benefits students, but also reduces the burden on teachers, who can prepare material without the pressure of real-time interactions, which are often hampered by unstable internet connections (Sadova et al., 2022).

3.3.2. Challenges and Limitations of Distance Learning Strategies

In contrast, synchronous learning methods, especially those relying on video conferencing platforms such as Zoom or Google Meet, have shown limited effectiveness in rural areas. Research from Nigeria reveals that students often struggle to connect to virtual classes due to unreliable internet access and high data costs (Lin, 2023). Teachers also face difficulties in managing these classes, as student attendance can be erratic, which further complicates the learning process (Lin, 2023).

Another significant obstacle is the lack of digital competence among teachers and students. Studies show that even when technological tools are available, a lack of familiarity with digital tools hinders the effectiveness of distance learning (Guillén-Gámez & Mayorga-Fernández, 2022). Teachers often lack the skills to create engaging digital content, while students may be unprepared to navigate the platforms used for learning, exacerbating

existing educational inequalities, especially for those from low-income backgrounds (Guillén-Gámez & Mayorga -Fernández, 2022).

3.3.3. Community Based Intervention Program

Community-based interventions show promise in addressing the digital divide. Research describes success in establishing community learning centers that provide access to technology and the internet (Sadova et al., 2022). These centers not only facilitate collaborative learning but also involve local facilitators who can support students, thereby improving educational outcomes. Such initiatives are particularly effective when tailored to the local socio-economic context and utilize existing community resources, thereby encouraging a sense of ownership and engagement among participants (Sadova et al., 2022). In conclusion, although some DLE strategies, such as mobile-based learning and asynchronous materials, have proven effective in reducing the digital divide in rural areas, significant challenges remain. The lack of digital competency and the ineffectiveness of synchronous learning methods highlight the need for targeted intervention and support. Community-based programs are a viable path forward, promoting access and engagement in education.

3.4 Implications for Educational Equity

Distance learning (DL) strategies have emerged as an important mechanism for increasing educational equity, particularly in rural and less developed areas. The literature shows that while some DL strategies have been successful in increasing access to education, others have inadvertently reinforced existing inequalities, especially among vulnerable and marginalized groups.

3.4.1. Increasing Equal Access to Education

One of the most significant contributions of distance learning is its ability to increase access to learning resources, especially through mobile-based learning and asynchronous materials. Research shows that mobile learning initiatives in countries such as Bangladesh and Uganda have effectively bridged the education gap for students from low-income backgrounds who previously did not have access to computers or stable internet connections. These programs enable the continuation of learning via mobile devices, thereby encouraging greater educational participation and reducing disparities between urban and rural students (Khan et al., 2018). In addition, the flexibility of distance learning plays a major role in reducing gender inequality in education. In rural areas of Pakistan and India, for example, women have historically faced barriers to formal education due to social and geographic boundaries. Distance learning allows them to study from home, increasing parents' willingness to support their education, thereby promoting gender equality in educational participation (Han, 2023).

3.4.2. Challenges in Increasing Equality

Despite progress, significant challenges remain in achieving equitable access to distance learning. One of the main obstacles is the lack of digital infrastructure, which continues to hinder students in rural areas. Research from Nigeria highlights that students from poor families or remote locations often struggle to access devices and stable internet connections, which exacerbates educational inequalities (Kabir & Kadage, 2017). Additionally, vulnerable groups, including children with disabilities, face unique challenges in accessing distance learning. Studies conducted in the Philippines show that although distance learning is generally available, the materials and methods used often do not meet the specific needs of these students, further reinforcing inequities in educational access (Han, 2023).

3.4.3. The Role of Policy in Increasing Educational Equity

Policy interventions play an important role in addressing these equity challenges. Evidence from Vietnam shows that government initiatives aimed at distributing devices and providing free internet access in remote areas have significantly improved educational equality. These policies are critical to bridging the digital divide and ensuring that students from low-income families have equal access to educational opportunities compared to their more advantaged peers (Verger et al., 2016). Additionally, partnerships with the private sector have proven beneficial in increasing access to education. For example, collaboration between internet service providers and the government in Kenya has facilitated free Wi-Fi access in community centers, enabling students from low-income families to engage with online learning platforms, thereby reducing educational inequality (Feldman, 2020).

In conclusion, although distance learning strategies have great potential to improve educational equity in rural areas, their success depends on adequate infrastructure, inclusive policies, and a focus on the needs of marginalized groups. While some initiatives have been successful in expanding educational access, persistent challenges highlight the need for continued investment and attention to the digital divide and educational equity.

4. Discussions

4.1 Analysis of Findings

The findings from this research reveal various aspects related to the effectiveness of distance learning (PJJ) strategies in overcoming the digital divide and promoting equality in rural and less developed areas. The results of the analysis of the reviewed literature show different successes and failures in implementing distance learning strategies in various geographic, social and economic contexts. The success of distance learning in reducing the digital divide, especially in rural areas, has been a major focus of recent educational research. Various studies show that initiatives such as mobile-based learning and collaboration between the government and the private sector in technology distribution have significantly increased access to education for students in remote areas. For example, research in Kenya and Vietnam illustrates that government-subsidized access to digital devices and internet services has successfully bridged the digital divide among rural students, enabling them to engage in distance learning activities previously inaccessible due to technological limitations (Kumi-Yeboah et al., 2023; Azubuike et al., 2021). This is particularly relevant for students from economically disadvantaged backgrounds, as these initiatives have opened up new educational opportunities that were previously limited by their socio-economic status (Miglani & Awadhiya, 2017; Hean & Chairassamee, 2023).

Additionally, studies in Bangladesh and Uganda highlight the important role of mobile technology in increasing student participation in distance learning. Findings show that mobile devices, which are often more affordable than traditional computers or laptops, can significantly reduce gaps in education access (Dewantara & Dibia, 2021; Rohman et al., 2020). This trend underscores the effectiveness of distance learning strategies that utilize mobile technology to increase educational equity for rural students who have historically faced barriers in accessing quality education (Dube, 2020; Mubanga & Mutepuka, 2022). However, despite progress, significant challenges remain that hinder the effectiveness of distance learning in closing the digital divide. Research shows that inadequate digital infrastructure, especially poor internet connectivity, remains a major obstacle for many rural students in developing countries. Studies from Nigeria, Ethiopia, and India reveal that limited infrastructure continues to leave students behind, making it difficult for them to consistently access distance learning platforms (Aditya, 2021; Blyznyuk et al., 2021). Slow or unstable internet connections exacerbate these challenges, preventing students from fully engaging with educational materials (Liu, 2021; Blyznyuk et al., 2021).

Additionally, a lack of digital skills among teachers and students is a significant barrier to successful implementation of distance learning strategies. Research in the Philippines and

Nepal shows that although technology is available, inadequate training in the use of digital tools limits the effectiveness of distance learning initiatives (Popyk & Pustułka, 2022; Zhang et al., 2020). As a result, although these strategies have been implemented, the expected results in terms of reducing the digital divide and promoting equality have not been fully realized (Langegård et al., 2021; Hean & Chairassamee, 2023). Furthermore, there is a striking gap in existing research regarding the long-term impact of distance learning strategies in rural areas. Most studies focus on short-term effects, but neglect to explore whether the increased access to technology observed during the pandemic can be sustained in the long term (Goudeau et al., 2021; Pokhrel & Chhetri, 2021). Additionally, there is a lack of research highlighting the special needs of vulnerable and marginalized groups, such as people with disabilities and girls in rural areas. Existing literature often ignores these groups, emphasizing the need for further research to adapt distance learning strategies to meet their unique needs (Abu-Shanab, 2012; Msila, 2021).

In conclusion, the findings from this body of research provide significant contributions to understanding how distance learning strategies can play a role in reducing the digital divide and promoting educational equity in rural areas. These findings emphasize the importance of infrastructure support and digital literacy as critical factors influencing the effectiveness of distance learning. Achieving greater educational equity requires a more inclusive approach that not only addresses technology access, but also meets the learning needs of diverse student populations (Мосъпан & Sysoieva, 2022; Sadeghi, 2019). Thus, although distance learning has great potential to improve educational equity, addressing infrastructure and inclusivity challenges is critical to achieving sustainable results.

4.2 Practical and Policy Implications

The findings from this research have significant implications for policy makers, educators, and school administrators in rural areas. By understanding how distance learning (PJJ) strategies function in the context of the digital divide, relevant parties can design more effective measures to increase educational access and equality for all students.

1. Recommendations for Policy Makers:

a. Investment in Digital Infrastructure: Policymakers need to allocate sufficient resources to build adequate digital infrastructure in rural areas. This includes improving internet connectivity, procuring technology devices, and developing community access centers. Policies supporting free internet access in schools and community centers can help reduce the digital divide and ensure that all students have an equal opportunity to access distance learning.

b. Training Program for Educators and Students: Policies should include training programs for teachers and students in the use of learning technologies. This training is important to improve digital literacy and skills in using technological devices, so that they can utilize PJJ strategies effectively. By improving these skills, both educators and students will be better prepared to face the challenges that arise in a distance learning environment.

c. Development of Inclusive Policies: Education policies must be designed to take into account the needs of vulnerable and marginalized groups. This includes providing learning materials that are inclusive and easily accessible to all students, including those with disabilities. Policies that prioritize social justice in education can help reduce existing disparities.

2. Implications for Educators and School Administrators:

a. Application of Flexible Teaching Methods: Educators in rural areas should be instructed to develop and implement teaching methods that are flexible and responsive to student needs. This includes the use of a variety of technology platforms and learning approaches that are accessible to students with different conditions and

resources. In this way, distance learning strategies can be adapted to suit the local context and specific needs of students.

b. Collaboration with Community: School administrators need to encourage collaboration with local communities, including non-governmental organizations, community organizations and the private sector. This collaboration can produce innovative solutions to education and technology access problems. For example, partnerships with local technology companies to provide tools and training could be a positive step in closing the digital divide.

c. Use of Data for Decision Making: Educators and school administrators must rely on data to evaluate the effectiveness of PJJ and make evidence-based decisions. By monitoring students' progress and identifying the challenges they face, schools can adapt learning strategies to meet diverse needs.

3. **Educational Policy Recommendations to Address the Digital Divide:**

a. Multi-Sector Policy: Education policy needs to adopt a multi-sector approach involving cooperation between the ministries of education, communications and technology. This approach will ensure that digital infrastructure development and education policy go hand in hand and support each other.

b. Subsidy Program for Underprivileged Families: The government could consider launching a subsidy or assistance program for underprivileged families in obtaining technological devices and internet access. By providing this financial support, students from disadvantaged families can access education more easily.

c. Ongoing Evaluation and Research: It is important for policymakers to support ongoing research and evaluation of the impact of distance learning strategies in rural areas. Through this research, policies can be adjusted dynamically based on the latest findings, so that they are always relevant and effective in responding to existing challenges.

Overall, the findings from this research emphasize the need for a comprehensive and integrated approach in addressing the digital divide and promoting equity in education. With the right support from policy makers, educators, and school administrators, PJJ strategies can be optimized to provide fair and quality access to education for all students, especially in rural and less developed areas.

4.3 Research Limitations

In this systematic literature review, there are several limitations that need to be considered:

1. **Limitations in Available Literature:** Although much research has been conducted on distance learning, there is a lack of literature that specifically focuses on the context of rural areas in some countries. Many existing studies focus more on urban contexts or developed countries, so they do not reflect the unique challenges faced by these regions. This limitation can cause the results obtained to be less comprehensive in describing the reality in the field.
2. **Variations in Study Methodology:** The studies reviewed in this research used a variety of methodologies, including quantitative, qualitative, and mixed studies. These variations may affect the suitability and consistency of existing findings. For example, some studies may rely on subjective qualitative data, while others use more objective quantitative data. These differences in approaches can make clear comparisons and a deep understanding of the effectiveness of PJJ strategies difficult.

3. Focus on a Specific Period: Another limitation is the focus on the post-pandemic period. Some studies may not fully reflect the long-term impact of distance learning strategies, because the situation and context are still in transition. Therefore, the results obtained may not fully reflect the long-term impact of the implemented strategy.
4. Limitations in Research on Vulnerable Groups: In addition, studies that focus on vulnerable groups, such as people with disabilities or minority groups, are still very limited. This results in a lack of understanding of how distance learning strategies can be adapted to meet their needs.

4.4 Future Research Directions

Based on the findings and limitations of this study, several further research directions that can be explored include:

1. Future Technology Development: Further research is needed to explore how future technologies, such as AI, augmented reality (AR), and virtual reality (VR), can be applied in distance learning contexts in rural areas. This technological innovation has the potential to create a more interactive and immersive learning experience, and can help bridge the digital divide.
2. Innovative Learning Models: Research on innovative learning models that integrate distance learning with face-to-face learning (blended learning) in rural areas can be an important focus. Investigating how a combination of these two approaches can strengthen learning outcomes and reduce gaps in educational access is a relevant step.
3. Education Policy Evaluation: Research that evaluates the effectiveness of education policies that have been implemented to overcome the digital divide in rural areas needs to be carried out. This research can provide insight into which policies are most effective and how they can be improved to achieve better outcomes.
4. Long-Term Impact of Distance Learning: Longitudinal research looking at the long-term impact of distance learning strategies in rural areas is critical to understanding their effectiveness. This includes evaluation of the academic achievement, social skills, and character development of students involved in the distance learning program.
5. Community and Stakeholder Engagement: Examining how community and stakeholder engagement in the implementation of PJJ can improve educational equity is also a promising research direction. This research can highlight the important role of local communities in supporting access and sustainability of education.

Through these studies, it is hoped that more effective strategies can be identified to overcome educational inequalities in rural areas, as well as contribute to the development of more inclusive and sustainable education policies.

5. Conclusion

In this research, a systematic review of the literature related to the effectiveness of distance learning (PJJ) strategies in overcoming the digital divide and promoting educational equality in rural areas has been carried out. The research results show that although PJJ offers opportunities to improve access to education, significant challenges related to digital infrastructure and technology skills still need to be overcome. The contribution of this research to the existing literature is significant, as it provides a deeper understanding of how distance learning strategies can be implemented effectively in contexts that are often overlooked, such as rural and less developed areas. These findings highlight the importance of investing in digital infrastructure, developing inclusive policies, and training for educators and students to ensure that all students, without exception, can access quality education. Thus, developing effective distance learning strategies is not only an urgent need post-pandemic, but also a crucial step to create educational equality. Further research is needed to explore technological innovations

and policies that can support achieving this goal, so that every student, especially in rural areas, has an equal opportunity to learn and develop.

6. Bibliography

- Abu-Shanab, E. (2012). The digital divide and its influence on public education diffusion. *International Journal of Technology Diffusion*, 3(4), 36-47. <https://doi.org/10.4018/jtd.2012100104>
- Aditya, D. (2021). Embarking digital learning due to covid-19: are teachers ready?. *Journal of Technology and Science Education*, 11(1), 104. <https://doi.org/10.3926/jotse.1109>
- Aissaoui, N. (2021). The digital divide: a literature review and some directions for future research in light of covid-19. *Global Knowledge Memory and Communication*, 71(8/9), 686-708. <https://doi.org/10.1108/gkmc-06-2020-0075>
- Anderson, E. and Hira, A. (2020). Loss of brick-and-mortar schooling: how elementary educators respond. *Information and Learning Sciences*, 121(5/6), 411-418. <https://doi.org/10.1108/ils-04-2020-0085>
- Astremska, I., Honcharuk, V., Bialyk, O., Horbatiuk, N., Martynyshyn, Y., & Pidlypskyi, A. (2021). Training of teachers of higher education institutions for the use of distance learning technologies in the context of digitalization. *Laplace Em Revista*, 7(Extra-D), 605-612. <https://doi.org/10.24115/s2446-622020217extra-d1145p.605-612>
- Azubuike, O., Adegbeye, O., & Quadri, H. (2021). Who gets to learn in a pandemic? exploring the digital divide in remote learning during the covid-19 pandemic in nigeria. *International Journal of Educational Research Open*, 2, 100022. <https://doi.org/10.1016/j.ijedro.2020.100022>
- Blyznyiuk, T., Budnyk, O., & Качак, T. (2021). Boom in distance learning during the coronavirus pandemic: challenges and possibilities. *Journal of Vasyl Stefanyk Precarpathian National University*, 8(1), 90-98. <https://doi.org/10.15330/jpnu.8.1.90-98>
- Cao, L., Niu, H., & Wang, Y. (2022). Utility analysis of digital villages to empower balanced urban-rural development based on the three-stage dea-malmquist model. *Plos One*, 17(8), e0270952. <https://doi.org/10.1371/journal.pone.0270952>
- Chasanah, A. and Purwanti, Y. (2022). Challenges and strategies to enhance the quality of learning of early childhood education during the covid-19 pandemic: a qualitative study in secang district, magelang, central java, indonesia. *Salus Cultura Journal of Human Development and Culture*, 2(1), 48-56. <https://doi.org/10.55480/saluscultura.v2i1.45>
- Chen, W., Wang, Q., & Zhao, H. (2022). Digital rural construction and farmers' income growth: theoretical mechanism and micro experience based on data from china. *Sustainability*, 14(18), 11679. <https://doi.org/10.3390/su141811679>
- Cheshmehzangi, A., Zou, T., Su, Z., & Tang, T. (2022). The growing digital divide in education among primary and secondary children during the covid-19 pandemic: an overview of social exclusion and education equality issues. *Journal of Human Behavior in the Social Environment*, 33(3), 434-449. <https://doi.org/10.1080/10911359.2022.2062515>
- Cibrian, F., Monteiro, E., Ankrah, E., Beltran, J., Tavakoulia, A., Schuck, S., ... & Lakes, K. (2021). Parents' perspectives on a smartwatch intervention for children with adhd: rapid deployment and feasibility evaluation of a pilot intervention to support distance learning during covid-19. *Plos One*, 16(10), e0258959. <https://doi.org/10.1371/journal.pone.0258959>
- Dewantara, I. and Dibia, I. (2021). Distance learning and character building in rural areas during the covid-19 pandemic. *Primary School Scientific Journal*, 5(4), 677-687. <https://doi.org/10.23887/jisd.v5i4.39770>
- Dube, B. (2020). Rural online learning in the context of covid 19 in south africa: evoking an inclusive education approach. *Multidisciplinary Journal of Educational Research*, 10(2), 135. <https://doi.org/10.17583/remie.2020.5607>
- Feldman, J. (2020). Public-private partnerships in south african education: risky business or good governance?. *Education as Change*, 24. <https://doi.org/10.25159/1947-9417/4873>

- Fu, L., Zeng, Y., & Kang, X. (2023). Bridging the urban–rural gap: a qualitative examination of perceived access, barriers, risks and opportunities of children's digital learning during the covid-19 pandemic. *Child & Family Social Work*, 29(1), 1-11. <https://doi.org/10.1111/cfs.13045>
- Glebov, V., Popov, S., Lagusev, Y., Krivova, A., & Sadekova, S. (2021). Distance learning in the humanitarian field amid the coronavirus pandemic: risks of creating barriers and innovative benefits. *Propósitos Y Representaciones*, 9(SPE3). <https://doi.org/10.20511/pyr2021.v9nspe3.1258>
- Goudeau, S., Sanrey, C., Stanczak, A., Manstead, A., & Darnon, C. (2021). Why lockdown and distance learning during the covid-19 pandemic are likely to increase the social class achievement gap. *Nature Human Behaviour*, 5(10), 1273-1281. <https://doi.org/10.1038/s41562-021-01212-7>
- Guillén-Gámez, F. and Mayorga-Fernández, M. (2022). Measuring rural teachers' digital competence to communicate with the educational community. *Journal of New Approaches in Educational Research*, 11(2), 323-341. <https://doi.org/10.7821/naer.2022.7.1053>
- Halpern, C. (2020). Distant learning: the experiences of brazilian schoolteachers during the covid-19 school closures. *Journal of Ethnic and Cultural Studies*, 8(1), 206-225. <https://doi.org/10.29333/ejecs/595>
- Han, F. (2023). Ensuring social justice and student motivation through distance education: learn. *International Journal of Eurasian Education and Culture*. <https://doi.org/10.35826/ijoecc.759>
- Hean, O. and Chairassamee, N. (2023). Distance learning during covid-19 school closures. *International Journal of Social Economics*, 50(10), 1439-1452. <https://doi.org/10.1108/ijse-05-2022-0306>
- Hu, X., Chiu, M., Leung, W., & Yelland, N. (2021). Technology integration for young children during covid-19: towards future online teaching. *British Journal of Educational Technology*, 52(4), 1513-1537. <https://doi.org/10.1111/bjet.13106>
- Kabir, F. and Kadage, A. (2017). Icts and educational development: the utilization of mobile phones in distance education in nigeria. *Turkish Online Journal of Distance Education*, 18(1), 63-63. <https://doi.org/10.17718/tojde.285716>
- Kelly, W. and McGrath, B. (2022). Starting from 'scratch': building young people's digital skills through a coding club collaboration with rural public libraries. *Journal of Librarianship and Information Science*, 55(2), 487-499. <https://doi.org/10.1177/09610006221090953>
- Khan, S., Hwang, G., Abbas, M., & Rehman, A. (2018). Mitigating the urban–rural educational gap in developing countries through mobile technology-supported learning. *British Journal of Educational Technology*, 50(2), 735-749. <https://doi.org/10.1111/bjet.12692>
- Koch, K. (2022). The territorial and socio-economic characteristics of the digital divide in canada. *Canadian Journal of Regional Science*, 45(2), 89-98. <https://doi.org/10.7202/1092248ar>
- Kumi-Yeboah, A., Kim, Y., & Armah, Y. (2023). Strategies for overcoming the digital divide during the covid-19 pandemic in higher education institutions in ghana. *British Journal of Educational Technology*, 54(6), 1441-1462. <https://doi.org/10.1111/bjet.13356>
- Langegård, U., Kiani, K., Nielsen, S., & Svensson, P. (2021). Nursing students' experiences of a pedagogical transition from campus learning to distance learning using digital tools. *BMC Nursing*, 20(1). <https://doi.org/10.1186/s12912-021-00542-1>
- Levina, N., Petrenko, T., Airapetov, G., & Ryashchenko, M. (2021). Game-based language learning in the context of distance education. *SHS Web of Conferences*, 127, 01012. <https://doi.org/10.1051/shsconf/202112701012>
- Lin, R. (2023). What are the determinants of rural-urban divide in teachers' digital teaching competence? empirical evidence from a large sample. *Humanities and Social Sciences Communications*, 10(1). <https://doi.org/10.1057/s41599-023-01933-2>

- Liu, J. (2021). Bridging digital divide amidst educational change for socially inclusive learning during the covid-19 pandemic. *Sage Open*, 11(4), 215824402110608. <https://doi.org/10.1177/21582440211060810>
- Migliani, A. and Awadhiya, A. (2017). Mobile learning: readiness and perceptions of teachers of open universities of commonwealth asia. *Journal of Learning for Development*, 4(1). <https://doi.org/10.56059/jl4d.v4i1.163>
- Msila, V. (2021). Digitalization and decolonizing education: a qualitative study of university of south africa (unisa) leadership. *International Journal of Information and Education Technology*, 11(11), 553-560. <https://doi.org/10.18178/ijiet.2021.11.11.1564>
- Mubanga, S. and Mutepuka, E. (2022). Accessibility of distance teaching and learning platforms used as catch up strategies amidst covid-19 pandemic in rural areas. *World Journal of Advanced Research and Reviews*, 16(1), 059-064. <https://doi.org/10.30574/wjarr.2022.16.1.0990>
- Nedungadi, P., Mulki, K., & Raman, R. (2017). Improving educational outcomes & reducing absenteeism at remote villages with mobile technology and whatsapp: findings from rural india. *Education and Information Technologies*, 23(1), 113-127. <https://doi.org/10.1007/s10639-017-9588-z>
- Omodan, B. (2022). Interdisciplinary perspectives to sustain effective post-covid-19 classrooms. *E-Journal of Humanities Arts and Social Sciences*, 1-5. <https://doi.org/10.38159/ehass.2022sp3111>
- Park, S., Freeman, J., Middleton, C., Allen, M., Eckermann, R., & Everson, R. (2015). The multi-layers of digital exclusion in rural australia.. <https://doi.org/10.1109/hicss.2015.436>
- Pokhrel, S. and Chhetri, R. (2021). A literature review on impact of covid-19 pandemic on teaching and learning. *Higher Education for the Future*, 8(1), 133-141. <https://doi.org/10.1177/2347631120983481>
- Popyk, A. and Pustulka, P. (2022). Educational disadvantages during covid-19 pandemic faced by migrant schoolchildren in poland. *Journal of International Migration and Integration / Revue De L Integration Et De La Migration Internationale*, 24(2), 487-505. <https://doi.org/10.1007/s12134-022-00953-2>
- Price, L., Deville, J., & Ashmore, F. (2021). A guide to developing a rural digital hub. *Local Economy the Journal of the Local Economy Policy Unit*, 36(7-8), 683-694. <https://doi.org/10.1177/02690942221077575>
- Raza, S., Qazi, W., Khan, K., & Salam, J. (2020). Social isolation and acceptance of the learning management system (lms) in the time of covid-19 pandemic: an expansion of the utaut model. *Journal of Educational Computing Research*, 59(2), 183-208. <https://doi.org/10.1177/0735633120960421>
- Rohman, B., Aziz, J., & Imran, A. (2020). Distance instructional strategies and learning motivation towards learning outcome of the study al-qur'an in situation a covid-19 pandemic. *Universal Journal of Educational Research*, 8(12), 6609-6619. <https://doi.org/10.13189/ujer.2020.081225>
- Sadeghi, M. (2019). A shift from classroom to distance learning: advantages and limitations. *International Journal of Research in English Education*, 4(1), 80-88. <https://doi.org/10.29252/ijree.4.1.80>
- Sadova, I., Balanutsa, O., Vialkova, I., Voroshchuk, O., & Lemko, H. (2022). The use of distance technologies in rural education in the context of the development of a system for assessing the quality of teaching. *Revista Brasileira De Educaç o Do Campo*, 1-16. <https://doi.org/10.20873/uft.rbec.e14239>
- Saha, K., Madhavan, V., & Chandrashekhar, G. (2022). Effect of covid-19 on etf and index efficiency: evidence from an entropy-based analysis. *Journal of Economics and Finance*, 46(2), 347-359. <https://doi.org/10.1007/s12197-021-09566-4>
- Salvatore, A., Ortiz, J., Booker, E., Lpc, K., Moore, C., Johnson, C., ... & Axe, M. (2020). Engaging community health workers and social care staff as social first responders

- during the covid-19 crisis. *Delaware Journal of Public Health*, 6(2), 92-95. <https://doi.org/10.32481/djph.2020.07.022>
- Sandun, L. (2023). Perceptions of smartphone use in information search by rural communities in sarawak. *International Journal of Academic Research in Business and Social Sciences*, 13(15). <https://doi.org/10.6007/ijarbss/v13-i15/18809>
- Saputra, F. (2023). Initiatives of the indonesian government for digital transformation in rural areas. *E3s Web of Conferences*, 444, 03001. <https://doi.org/10.1051/e3sconf/202344403001>
- Sarah, N. (2022). Social exclusion of education inequality in the covid-19 pandemic by education digitalization activities. *Qalamuna Journal of Social and Religious Education*, 14(2), 263-274. <https://doi.org/10.37680/qalamuna.v14i2.1959>
- Siambi, J. (2022). A comparative study of social inequalities in education as an effect of covid-19 pandemic: a case of schools in saudi arabia and kenya. *International Journal of Scientific Research and Management*, 10(01), 2095-2108. <https://doi.org/10.18535/ijsrcm/v10i1.el03>
- Soares, D., Santos, J., & Lopes, R. (2020). Covid 19 and education in teaching systems: normative mapping and ensuring equity in times of pandemic. *Revista Observatório*, 6(3), a2en. <https://doi.org/10.20873/uft.2447-4266.2020v6n3a2en>
- Stolyarchuk, L., Meshcheryakova, E., & Zheltukhina, M. (2021). Digital technology models in modern school (fl learning experience). *SHS Web of Conferences*, 106, 03012. <https://doi.org/10.1051/shsconf/202110603012>
- Suvorova, S., Khilchenko, T., & Olar, Y. (2021). The implementation of distance technologies of learning a foreign language as a condition of innovation of the educational strategies of a university. *Bulletin of the South Ural State University Series Education Education Sciences*, 13(3), 90-98. <https://doi.org/10.14529/ped210308>
- Tahmasebi, F. (2023). The digital divide: a qualitative study of technology access in rural communities. *aitechbesosci*, 1(2), 33-39. <https://doi.org/10.61838/kman.aitech.1.2.6>
- Verger, A., Bonal, X., & Zancajo, A. (2016). What are the role and impact of public-private partnerships in education? a realist evaluation of the chilean education quasi-market. *Comparative Education Review*, 60(2), 223-248. <https://doi.org/10.1086/685557>
- Wang, H., Zhang, M., Li, R., Zhong, O., Johnstone, H., Zhou, H., ... & Rozelle, S. (2021). Tracking the effects of covid-19 in rural china over time. *International Journal for Equity in Health*, 20(1). <https://doi.org/10.1186/s12939-020-01369-z>
- Wang, L. (2023). Research on the application of web-based distance education teaching support service., 920-930. https://doi.org/10.2991/978-94-6463-238-5_119
- Zhang, Y., Ghandour, A., & Shestak, V. (2020). Using learning analytics to predict students performance in moodle lms. *International Journal of Emerging Technologies in Learning (Ijet)*, 15(20), 102. <https://doi.org/10.3991/ijet.v15i20.15915>
- Zheng, Y. and Walsham, G. (2021). Inequality of what? an intersectional approach to digital inequality under covid-19. *Information and Organization*, 31(1), 100341. <https://doi.org/10.1016/j.infoandorg.2021.100341>
- Мосъпан, Н. and Sysoieva, S. (2022). Trends in digital adaptation of schools during the covid-19 pandemic. *Information Technologies and Learning Tools*, 91(5), 21-35. <https://doi.org/10.33407/itlt.v91i5.5063>