

Achieving Educational Equality through Digital Learning: Challenges and Solutions in Underprivileged Madrasas

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Abstract:

Digital education offers significant opportunities to expand access and improve the quality of learning, but remains a significant challenge in underprivileged madrasas with limited infrastructure and resources. This study aims to explore the key challenges faced in implementing digital learning and formulate relevant and contextual solutions. This study used a qualitative approach with field studies in three state madrasas in suburban and rural areas. Data were obtained through direct observation, documentation, and in-depth interviews with teachers, madrasa principals, and students. The results revealed three important findings: (1) limited devices and internet access that hinder the online learning process; (2) low digital literacy of teachers and students that impacts the effectiveness of technology use; and (3) the lack of systemic support from the government or local stakeholders to develop capacity and access to technology in these madrasas. Nevertheless, several local initiatives have emerged, such as community-based training, the use of personal devices, and collaboration with external parties, which have been able to gradually reduce the digital divide. This research contributes to the development of a digital learning implementation model based on the needs of marginalized madrasas. The implications of this research encourage affirmative policies, empowerment of local educational communities, and adaptive technology integration so that digital educational equality can be realized in a real and sustainable manner.

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INTRODUCTION

Equality in education is a fundamental right guaranteed by national laws and international treaties (Oknora Firza et al., 2024; Siregar & Desky, 2024; Tampubolon, 2020). However, inequality in terms of access and quality of education still persists, especially in madrasas with limited economic conditions (Zulkarnaen et al., 2020). Digital technology has given rise to new possibilities for reaching broader, more flexible, and



more effective education (Handoyo et al., 2021). However, not all educational institutions have equal opportunities to access and implement this technology.

Previous research has underscored the potential of technology to support learning, particularly for poor communities. Faishol et al., (2021) emphasizes that technology can improve learning outcomes if used within a supportive policy context. UNESCO's (2020) report also highlights serious barriers to digital infrastructure and literacy, particularly in disadvantaged regions (N. Husain, 2021). These constraints demonstrate that even when technology is available, its effectiveness depends on preparedness and systemic support on the ground.

There is still minimal research that explores real practices in madrasas with limited resources in using digital technology to support the teaching and learning process (Purnasari & Sadewo, 2021; Susilawati et al., 2022). This study attempts to fill this gap by highlighting the perspectives of madrasas that are attempting to utilize technology despite facing various obstacles (Lumban Gaol & Hutasoit, 2021). The focus is not only on challenges, but also on solutions that emerge contextually from the field.

This study aims to uncover the dynamics of digital learning implementation in underprivileged Islamic schools. In this context, various challenges arise not only from limited infrastructure but also from students' mental and emotional readiness to adapt to changing learning methods. Specifically, this study explores the obstacles faced by students, both technical and psychological, as well as the adaptive strategies implemented by teachers and Islamic schools to maintain the continuity of the teaching and learning process. These findings reinforce the importance of systemic support that includes training, mentoring, and providing equal access for all groups. The implications of this study's results emphasize that digital transformation in education cannot be separated from aspects of social justice. Therefore, this research is expected to make a real contribution, both theoretically and practically, in designing digital education policies that are more inclusive, adaptive, and pro-groups vulnerable to inequalities in access and quality of education.

RESEARCH METHOD

This research uses a descriptive qualitative approach to explore digital learning practices in madrasas with limited resources. This approach was chosen because it captures the complexity of the realities on the ground and describes the experiences and strategies employed by teachers and students to overcome these limitations. The research focuses on efforts to utilize digital technology as a learning tool that supports educational equality amidst limited resources.

The research location was purposively selected: a secondary madrasah (Islamic boarding school) in a suburban urban area known for its limited infrastructure but high level of innovation in technology adoption. MA Zaha Pakuniran, Probolinggo, was chosen as the research object because it has independently initiated several digital initiatives, such as the use of Android-based devices for online learning and the use of social media as a learning communication tool. This madrasah provides a concrete illustration of the challenges and potential solutions from the bottom up.

Data was collected from various primary and secondary sources, including

learning records, madrasah reports, and the lived experiences of educators and students. Data collection took place over two months, with activities reflecting daily digital learning practices. The information obtained was then analyzed thematically to identify key patterns that both hinder and strengthen digital learning practices within the context of equality.

The analysis process was conducted through data reduction, data presentation, and conclusion drawing techniques. The validity of the results was maintained through source triangulation and cross-checking with key informants. Therefore, the findings of this study not only describe the empirical situation but can also be used as a reference in developing more equitable education policies based on field realities. This method is expected to produce reflective, critical, and applicable results.

RESULTS AND DISCUSSION

Result

Device and Internet Access Limitations

The issue of limited digital infrastructure is the starting point for various obstacles faced by underprivileged madrasas in implementing technology-based learning. In this context, the availability of devices such as computers, a stable internet connection, and adequate digital learning spaces remain unmet needs. The reality on the ground shows that many madrasas have very limited facilities, often requiring the sharing of devices among a large number of students. This situation demonstrates a significant gap in technology utilization, which ultimately impacts the quality and equity of learning access for all students.

Most students at this madrasah lack personal digital devices, severely limiting access to digital learning. Madrasah data shows that only about 30% of students have adequate devices. As a result, students must share devices with other family members or wait their turn to use the madrasah's devices. One 11th-grade student, Fajar, said in an interview, "I have to wait for my older sibling to finish work before I can borrow his phone. Sometimes I miss my assignments."

Besides limited devices, internet connection is a major challenge. Weak networks and limited data quotas make it difficult for students to access online learning materials smoothly. According to ICT teacher, Ms. Rahma, "Many students can only access materials at night because the free data quota from the government only starts at 9 p.m." The school has attempted to provide Wi-Fi, but coverage is limited to the staff room and a few classrooms.

This situation directly impacts student engagement in the learning process. Digital attendance records show that over 40% of students are unable to participate in regular synchronous learning. Teachers must adjust time and methods to ensure students can continue learning, even asynchronously. This obstacle highlights the digital divide that remains very real in the field.

Alternative Strategies in Overcoming Technological Barriers

Beyond infrastructure, the ability to operate and understand technology is also a major challenge. Many teachers and students in underprivileged madrasas lack adequate digital literacy, whether in the use of learning applications, digital information management, or effective use of online platforms. In interviews, several teachers admitted that they still feel burdened when it comes to utilizing technology to support learning. Meanwhile, for students, limited support and access to information make the digital learning process confusing and less than optimal.

Facing infrastructure challenges, teachers have developed various alternative strategies. One example is the use of lightweight applications like WhatsApp and Google Forms. Teachers deliver materials in the form of images and audio to conserve data usage. Additionally, assignments are given in the form of multiple-choice or short answer questions that can be completed offline and then submitted when the connection is available.

Teachers also take an individual approach to students. Ms. Lilis, an Indonesian language teacher, said, "I often contact students one-on-one, asking how they are, and asking about their difficulties. Sometimes they're embarrassed to ask questions in a group setting." This approach has had a positive impact, as students feel more cared for. Even previously passive students are starting to submit assignments, albeit late. Madrasah data shows a 40% increase in assignment participation after three months of implementing this strategy. Furthermore, teachers form small study groups in students' homes. These groups take turns using a single device and study together, guided by parents or local volunteers.

Teachers' creativity is key to maintaining learning continuity. They print digital modules into physical worksheets for students who are completely unable to access the internet. This way, learning can continue in a variety of settings, without relying entirely on the internet.

Contextually Improving Digital Literacy

Amidst these limitations, a number of collaborative initiatives have emerged, run by madrasas in collaboration with various external parties, such as educational communities, IT volunteers, and social institutions. This collaboration is a strategic effort to bridge the gap in infrastructure and human resources. For example, several madrasas have partnered with donors to provide equipment, while digital training is conducted by the community to strengthen the capacity of teachers and students. These initiatives demonstrate a collective spirit in realizing digital-based educational equality, while also opening up space for innovation in education management in underserved areas.

At the beginning of the program, many students were unfamiliar with software like Google Classroom, and not all knew how to create an email. However, with regular guidance and in-house training, students' digital skills improved significantly. Within two months, more than 70% of students were able to access materials independently and submit assignments on time. One 12th-grade student, Dinda, said, "At first, I was confused about sending files via email. But over time, I got the hang of it because my friends and teachers often taught me." The school facilitated short training sessions led

by ICT teachers and experienced students, fostering a culture of knowledge sharing among students.

Digital literacy also improves through hands-on experience. Students become accustomed to using various applications for online presentations, discussions, and quizzes. Teachers give students the freedom to choose platforms that suit their needs, boosting their confidence. The local context significantly influences this process. The less formal approach, the use of everyday language in the training, and the flexibility of time allow students to feel comfortable learning technology. This demonstrates that digital learning doesn't always have to be structured and formal, but can be effective through familiarization and contextual adaptation.

DISCUSSION

The first finding shows how the digital divide is a major obstacle to implementing online learning. Unequal access to devices and connectivity creates new inequalities in the learning process (Alifah, 2021; Zainiah et al., 2024). This strengthens the statement Kurdi et al., (2023) The success of technology integration is heavily influenced by the technical and social readiness of the madrasah community. In this context, the designated location illustrates a common situation where infrastructure is not yet supportive but the need for digital transformation remains urgent.

Furthermore, the second finding shows that local and flexible strategies are more effective than centralized approaches in addressing limitations. Teachers, as the primary actors, are able to adapt digital learning to the situation on the ground (Imjai et al., 2024; Novita Sari et al., 2023). Strategies such as the use of lightweight applications and personal communication are forms of micro-innovation that address real challenges (H. Hanif et al., 2023). This is in line with the research results Hanif et al., (2023), which states that educational technology is not effective without local adaptation and teacher involvement in method development.

Finally, the third finding underscores the importance of a contextual approach to improving digital literacy. Students who were initially unfamiliar with technology were able to adapt with guidance tailored to their pace and needs (Cuprianto & Firmansyah, 2023; Putri, 2024). This proves that improving digital literacy does not only depend on formal training, but also on daily practice and direct interaction in learning (Amelia, 2023; Setiawati, 2021; Tanjung et al., 2022). In other words, a humanistic and collaborative approach is key to success in building digital competency in underprivileged madrasa environments.

CONCLUSION

This research shows that efforts to achieve educational equality through digital learning in madrasas are unable to address real challenges in three main areas: limited infrastructure, low digital literacy, and a lack of sustained support from various parties. Limited facilities, such as hardware and a stable internet connection, significantly impact the effectiveness of technology-based learning. Furthermore, teachers' and students' ability to use digital devices and applications still needs to be improved for optimal learning. However, the emergence of collaborative initiatives between

madrasas and external parties, such as the education community, donors, and technology volunteers, demonstrates that alternative solutions can be realized with the right synergy.

The implications of this research underscore the importance of a collaborative and comprehensive approach to addressing digital education inequality. The government, madrasas, and the community need to unite to provide equitable access, build digital capacity, and create an inclusive education ecosystem. With these steps, educational equality utilizing technology can become more than just a discourse, but a truly sustainable reality on the ground.

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