



The digital divide in the field of physical education and sports: A comparison of large cities and remote sparsely populated areas in Nigeria

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Abstract

This study examines the factors influencing the digital divide in physical education and sports in Nigeria, highlighting infrastructural, socioeconomic, and policy-related barriers. A qualitative approach was adopted, using focus group interviews with 48 participants, including physical education teachers, sports coaches, and students from Lagos, Kano, Bauchi, and Ekiti. Findings revealed that poor internet access, unreliable electricity, and a lack of digital tools were the most significant barriers, particularly in rural areas. Socioeconomic disparities further widened the gap, as many rural participants could not afford digital devices or internet services. Additionally, policy gaps contributed to digital exclusion, with inadequate government investment in ICT infrastructure for sports education. While urban schools had better access to digital tools, inequalities persisted, especially in public and low-income institutions. The digital divide negatively impacted teaching quality, training effectiveness, and career opportunities, disadvantaging rural students. To bridge this gap, respondents recommended expanding internet and electricity access, subsidizing digital devices, enforcing ICT policies, and fostering public-private partnerships. The study concludes that a comprehensive digital inclusion strategy is crucial for ensuring equal access to digital resources in physical education and sports across Nigeria.

Keywords: Digital Divide; Physical Education; Sports Education; Infrastructure; Socioeconomic Barriers; ICT Access; Policy Gaps; Urban-Rural Disparity; Nigeria; Digital Inclusion

1. Introduction

The digital divide refers to the disparity in access to, use of, and benefits from information and communication technologies (ICTs) among different populations (Van Dijk, 2020). This gap, driven by infrastructural, socioeconomic, and cultural factors, has far-reaching implications for many sectors, including education, health, and sports. In physical education and sports, the digital divide limits the adoption of technology for training, coaching, talent development, and data-driven performance analysis (Bai et al., 2020). The situation is particularly acute in developing countries like Nigeria, where access to digital resources is unevenly distributed between urban and rural areas, exacerbating existing inequalities.

Infrastructure remains one of the most critical factors shaping the digital divide in physical education and sports in Nigeria. Urban centers like Lagos and Abuja benefit from relatively advanced ICT infrastructure, including broadband internet, stable electricity, and access to digital tools, enabling the integration of technology into sports training and education (Olanrewaju et al., 2023). Conversely, rural areas often lack the basic infrastructural backbone required to support digital platforms, resulting in limited access to resources such as online coaching modules, fitness tracking applications, and virtual sports programs (Akinwale, 2021). These infrastructural deficiencies hinder rural athletes and

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students from participating fully in modern sports and physical education programs, leaving them at a significant disadvantage compared to their urban counterparts.

The integration of digital technologies in physical education and sports has transformed these fields globally. From wearable fitness trackers and virtual coaching platforms to video analysis tools, technology enhances physical education by promoting personalized learning, improving performance tracking, and providing access to global best practices (Chukwu & Nnamani, 2021). In urban Nigerian schools and sports academies, such technologies are becoming increasingly common. However, in rural areas, the absence of reliable power supply, internet connectivity, and digital devices perpetuates a cycle of exclusion, preventing rural students and athletes from accessing these tools (Okeke et al., 2021). This digital inequity limits their opportunities to improve their skills, compete at higher levels, and fully benefit from advances in sports science.

Beyond infrastructure, socioeconomic disparities also play a significant role in the digital divide in physical education and sports. Urban residents are more likely to afford internet subscriptions, smartphones, and other digital devices, giving them access to online resources for physical education and training. In contrast, many families in rural areas prioritize meeting basic needs over investing in technology, further widening the gap (Ajayi & Fakunle, 2022). As a result, schools and sports programs in rural areas often lack the resources to integrate digital tools into their curricula, leaving students and athletes with fewer opportunities to benefit from advancements in physical education and sports training.

The implications of the digital divide extend beyond access to resources. Cultural attitudes towards technology also influence its adoption in physical education and sports. In some rural communities, limited awareness of the benefits of digital technologies or resistance to change hinders the integration of these tools into sports programs (Idowu et al., 2020). Conversely, urban centers, with greater exposure to global trends and innovations, are more likely to embrace technology as an integral part of physical education and sports development. This cultural disparity reinforces existing inequalities, as rural students and athletes are less likely to develop the digital skills needed to succeed in modern sports.

The rationale for comparing large cities and remote areas in Nigeria stems from the significant differences in their access to and utilization of digital technologies in physical education and sports. Urban areas often enjoy better infrastructure, higher income levels, and greater technological awareness, enabling them to leverage digital tools effectively. In contrast, remote areas face systemic challenges that limit their ability to adopt these technologies, further marginalizing their residents (Adebayo et al., 2023). By exploring these contrasts, this study seeks to uncover the root causes of the digital divide and its implications for physical education and sports, providing a basis for targeted interventions.

This study is motivated by the growing recognition of the critical role of digital technologies in enhancing physical education and sports. The purpose of this research is to investigate the factors influencing the digital divide in these fields, with a particular focus on infrastructure, socioeconomic disparities, and cultural attitudes. By comparing large cities and remote areas in Nigeria, the study aims to identify the unique challenges and opportunities associated with digital inclusion in physical education and sports. The findings will provide valuable insights into how digital technologies can be leveraged to promote equitable access to resources and opportunities in these sectors.

1.1. Research Questions

- What are the key factors contributing to the digital divide in physical education and sports in Nigeria?
- How do these factors vary between large cities and remote, sparsely populated areas?
- How do stakeholders perceive the impact of the digital divide on physical education and sports outcomes?
- What strategies can help bridge the digital divide?

1.2. Theoretical Framework: Digital Divide Theory

The Digital Divide Theory serves as a critical framework for understanding disparities in access to and use of digital resources across different socioeconomic, geographical, and demographic groups. This theory has been widely used to explain inequalities in digital technology adoption in various fields, including education, healthcare, and sports (Van Dijk, 2020). In the context of physical education and sports, the digital divide manifests in unequal access to online training resources, performance analytics tools, virtual coaching platforms, and sports science innovations. These disparities are particularly evident in Nigeria, where urban centers benefit from technological advancements while rural and sparsely populated areas face significant infrastructural and economic limitations.

One of the core principles of the Digital Divide Theory is the access divide, which highlights the unequal distribution of digital technologies, including computers, internet connectivity, and smart training devices. In physical education and sports, this means that while elite sports academies and urban schools may have access to video analysis software, wearable fitness trackers, and online coaching programs, many rural schools and grassroots sports initiatives lack even basic technological tools (DiMaggio & Hargittai, 2001). This limited access restricts the ability of athletes and students in remote areas to engage with digital training resources, ultimately affecting their skill development and competitiveness.

Beyond access, the usage divide represents the differences in digital literacy and the ability to effectively use available technologies. Even when digital tools are present in some rural schools, the lack of adequate training for teachers and coaches hinders their proper utilization. Many physical education instructors in remote areas are unfamiliar with how to integrate digital technologies into their teaching methodologies, making it difficult for students and athletes to benefit from such tools (Okeke et al., 2021). Conversely, in large cities, students and athletes are more likely to have exposure to digital learning platforms, making them more adept at leveraging technology for skill enhancement.

A third component of the Digital Divide Theory is the impact divide, which refers to the varying benefits that different individuals or groups derive from digital technologies. While athletes and students in urban centers can use advanced sports analytics and online coaching platforms to improve performance, those in rural regions remain disconnected from such opportunities. This disparity reinforces existing inequalities in talent development and access to global sports opportunities. Scholars have argued that bridging this impact divide requires not only infrastructure development but also initiatives that promote digital education and awareness (Van Dijk, 2020).

The relevance of the Digital Divide Theory to physical education and sports is evident in how technological gaps affect participation, training quality, and opportunities for professional advancement. Infrastructure gaps are among the most critical factors contributing to the digital divide in sports and physical education in Nigeria. Rural areas often lack stable electricity, broadband internet, and modern training facilities, making it nearly impossible to integrate digital tools into sports programs (Olanrewaju et al., 2023). Without proper infrastructure, even the most innovative digital solutions remain inaccessible to athletes and students in these regions.

Additionally, economic disparities further widen the digital divide in physical education. While high-end sports academies in cities can afford expensive digital training systems, virtual reality-based simulations, and biomechanical analysis tools, rural schools struggle with insufficient funding to acquire even basic sports equipment (Ajayi & Fakunle, 2022). The high cost of digital sports technology creates an uneven playing field where urban athletes receive significantly more advanced training than their rural counterparts.

Another significant factor is educational and training inequality. Digital literacy plays a crucial role in integrating technology into physical education and sports. Many physical education teachers and coaches in rural Nigeria lack exposure to digital resources and have not been trained on how to incorporate technology into their teaching methods (Idowu et al., 2020). As a result, even when digital tools are available, their benefits remain underutilized. In contrast, urban schools with well-trained teachers and access to digital resources can implement blended learning approaches that combine traditional and digital training methods to improve performance outcomes.

Cultural and institutional barriers also contribute to the digital divide in sports education. In some communities, there is a reluctance to adopt new technological methods due to deep-rooted traditional training approaches. Some coaches and school administrators in rural areas may not recognize the potential of digital tools in enhancing physical education, leading to resistance or minimal investment in technology (Chukwu & Nnamani, 2021). Overcoming these barriers requires a shift in mindset, coupled with policies that emphasize the role of digital tools in modern sports development.

The Digital Divide Theory provides a strong foundation for understanding the stark differences between urban and rural physical education and sports environments in Nigeria. In urban centers such as Lagos, Abuja, and Port Harcourt, digital technology has become an integral part of physical education. Schools and training centers in these cities have access to online training modules, video-based skill assessments, and digital coaching platforms that allow athletes to refine their techniques and receive expert guidance remotely (Adebayo et al., 2023). These digital advancements contribute to improved athletic performance and greater access to international sports competitions and scholarships.

In contrast, rural and sparsely populated areas experience severe limitations in digital access. Schools in these regions often lack the necessary infrastructure to support digital learning, and students have little to no exposure to modern training technologies. The absence of digital resources means that physical education in rural areas continues to rely on

outdated teaching methods, placing students and athletes at a disadvantage in national and international sports competitions (Akinwale, 2021).

One of the most concerning consequences of the digital divide in physical education and sports is the unequal opportunity for talent development. Urban athletes have better access to virtual coaching, online competitions, and digital talent scouting networks, allowing them to showcase their skills to a global audience. Meanwhile, rural athletes remain largely invisible due to limited digital exposure. This reinforces an uneven distribution of sports opportunities, where talent from remote areas often goes unrecognized despite potential skill and capability (Okeke et al., 2021).

Addressing the digital divide in physical education and sports requires targeted interventions that improve digital infrastructure, increase digital literacy among educators and athletes, and promote policies that ensure equitable access to sports technology across all regions. Government initiatives, public-private partnerships, and educational reforms can play a crucial role in bridging these gaps. Countries that have successfully reduced digital disparities in sports, such as South Korea and Germany, have done so by prioritizing investments in digital education, expanding internet access to rural areas, and providing training programs for coaches and teachers (Norris, 2001).

2. Methodology

This study employed a qualitative research design to examine the factors influencing the digital divide in physical education and sports in Nigeria, particularly in comparing large cities and remote, sparsely populated areas. A qualitative approach was deemed appropriate as it provided an opportunity to explore participants' lived experiences, perceptions, and challenges related to digital access in sports education. This methodology allowed for a deeper understanding of how infrastructural limitations, socioeconomic disparities, and policy gaps shaped the digital landscape in physical education.

2.1. Research Design

The study adopted a phenomenological research design, which focused on understanding the shared experiences of individuals concerning digital disparities in sports education. This approach was particularly useful for capturing the perspectives of teachers, coaches, and students who had firsthand experience with the advantages and limitations of digital tools in physical education. The phenomenological method ensured that the study provided rich, context-specific insights into how digital accessibility—or the lack thereof—impacted sports learning and performance.

2.2. Study Population

The study population comprised physical education teachers, sports coaches, and students drawn from both urban and rural areas in Nigeria. Participants were selected from two major urban centers, Lagos and Kano, and two rural locations, Bauchi and Ekiti. These locations were chosen to reflect regional variations in digital infrastructure, economic conditions, and policy implementation in sports education. By including participants from both highly developed and underdeveloped regions, the study provided a comparative perspective on the digital divide in physical education.

- A total of 48 participants were recruited for the study, distributed as follows:
- 16 physical education teachers (8 from urban areas, 8 from rural areas)
- 16 sports coaches (8 from urban areas, 8 from rural areas)
- 16 students (8 from urban areas, 8 from rural areas)

The selection of teachers, coaches, and students ensured a balanced representation of individuals involved in both the teaching and learning aspects of physical education, as well as the practical application of sports training and performance analysis.

2.3. Sampling Technique

A purposive sampling technique was used to select participants. This method was appropriate because it ensured that only individuals with relevant experience and knowledge of digital access in physical education were included in the study. The criteria for participant selection included:

- Teachers who had been involved in digital or technology-enhanced physical education.
- Coaches who used or attempted to use digital tools in training programs.
- Students who had experience with or were affected by digital inequalities in sports learning.

This sampling strategy allowed the study to focus on individuals directly impacted by the digital divide, ensuring that the findings were rich and insightful.

2.4. Data Collection Methods

Data were collected through semi-structured focus group interviews, which allowed for an in-depth exploration of participants' experiences. Each focus group consisted of six to eight participants, with separate sessions for teachers, coaches, and students to ensure that discussions remained focused and relevant to each group's unique experiences. The interviews were guided by open-ended questions designed to explore:

- The infrastructural challenges affecting digital access in physical education and sports.
- The impact of socioeconomic conditions on the use of digital tools.
- Institutional and policy-related factors contributing to digital disparities.
- The perceived impact of the digital divide on sports training and education.
- Possible strategies to bridge the digital divide in physical education.

All interviews were audio-recorded with the consent of participants and later transcribed verbatim to ensure accuracy in data representation. Additional field notes were taken during the discussions to capture non-verbal cues and contextual information that complemented the verbal responses.

2.5. Data Analysis

The study employed thematic analysis to analyze the collected data. This method allowed for the identification of recurring patterns and themes within participants' responses. Thematic analysis was conducted in six key stages:

- Familiarization with the data – The research team read and re-read interview transcripts to gain an overall understanding of the responses.
- Generating initial codes – Key phrases and significant statements were highlighted and labeled to capture emerging patterns.
- Searching for themes – The codes were categorized into broader themes based on their similarities and relevance to the research questions.
- Reviewing themes – The themes were refined to ensure that they accurately represented participants' perspectives.
- Defining and naming themes – The final themes were clearly defined to ensure they aligned with the study's objectives.
- Producing the report – Findings were synthesized into a coherent narrative, integrating direct participant quotes where necessary.

To ensure the credibility and trustworthiness of the analysis, the study employed peer debriefing, where fellow researchers reviewed the coding process and emerging themes. Additionally, member checking was conducted by sharing preliminary findings with selected participants to confirm that their responses were accurately interpreted.

2.6. Ethical Considerations

Ethical approval was obtained from a relevant institutional review board before data collection commenced. Participants were informed about the study's objectives, their voluntary participation, and their right to withdraw at any time without consequence. Written informed consent was obtained from all participants before their involvement in the study.

To maintain confidentiality, all personal identifiers were removed from transcripts, and responses were anonymized in reporting. Data were securely stored and accessible only to the research team. Additionally, participants were assured that their responses would be used solely for research purposes.

3. Results and Discussion

In this section, we presented the findings of the study, structured around the research questions. The analysis highlights the factors influencing the digital divide in physical education and sports in Nigeria and compares experiences between urban and rural areas. The findings are derived from focus group interviews and are supported by direct quotes from respondents to provide deeper insights into the digital disparities experienced by teachers, coaches, and students.

3.1. Description of Respondents' Demographic Data

The study involved 48 participants, comprising 16 physical education teachers, 16 sports coaches, and 16 students, selected from four locations in Nigeria. Urban respondents were drawn from Lagos and Kano, while rural participants were selected from Bauchi and Ekiti. These locations were chosen to provide a balanced representation of well-developed and underdeveloped regions in terms of digital infrastructure.

Of the 48 participants, 60% were male and 40% were female, reflecting the general gender distribution in sports education in Nigeria. The teachers and coaches were mostly aged between 35 and 50 years, while students fell within the 18–25-year age group. The years of experience in sports education and coaching varied, with coaches averaging 10 years of experience, while teachers had between 5 and 15 years in physical education. The diversity in experience provided a comprehensive perspective on how digital disparities affected different stakeholders within physical education and sports.

3.2. Analyzing the Research Question

3.2.1. *What Are the Key Factors Contributing to the Digital Divide in Physical Education and Sports in Nigeria?*

Findings from the study revealed three major factors contributing to the digital divide: infrastructural limitations, socio-economic barriers, and policy gaps.

Infrastructural Limitations: Across all focus groups, poor internet access, unreliable electricity, and a lack of digital devices were frequently cited as major challenges. Respondents from rural areas emphasized that their schools and training centers lacked broadband access, forcing them to rely on unstable mobile data services. Even in urban areas, participants noted inconsistent internet speeds in public schools, making it difficult to stream instructional videos or use online learning platforms. A teacher from Bauchi stated: "There is no proper internet connection in our school. Sometimes, I want to show my students training videos, but the network is too slow, so I give up."

The electricity crisis in Nigeria further deepened the digital divide. Rural coaches and students reported frequent power outages, which limited their ability to use digital tools for extended periods. A coach from Ekiti explained: "Even if we have access to digital resources, we can't use them when there is no electricity. We go days without power, and the school can't afford generators all the time."

Urban respondents confirmed that while access to digital tools was better in cities, electricity supply was still a challenge, particularly in public institutions that could not afford alternative power sources.

- **Socio-Economic Barriers:** The affordability of digital resources emerged as another major factor driving the digital divide. Students and coaches in rural areas struggled to afford smartphones, laptops, or internet subscriptions, making it difficult for them to engage in online learning or virtual training programs. A student from Ekiti expressed frustration, saying: "Some of my classmates have never owned a smartphone or laptop. When we get assignments that require online research, we have to find a cybercafé or borrow someone's device."

Even in urban centers, students and teachers in low-income schools had limited access to personal digital devices, further reinforcing disparities in education and training.

- **Policy Gaps:** Participants pointed out that government policies aimed at integrating digital tools into education were not effectively implemented in sports education. Many rural respondents felt neglected by national and state policies, as their schools received little to no funding for ICT infrastructure. A teacher from Bauchi stated: "We hear that the government is pushing digital education, but we see nothing in rural schools. They focus on city schools, leaving us behind."

Urban respondents acknowledged some level of government intervention, but they also noted that funding was inconsistent, and most public schools still relied on outdated equipment.

3.3. How Do These Factors Vary Between Large Cities and Remote Areas?

A significant disparity was found between urban and rural respondents regarding access to digital resources in sports education.

Urban Respondents: Participants from Lagos and Kano reported better access to digital tools, particularly in private schools, sports academies, and government-backed institutions. Some urban schools had access to interactive learning platforms, virtual coaching, and sports analytics tools. However, not all urban institutions benefited equally. A coach from Kano stated: "Only the private schools and well-funded institutions have good digital access. Many public schools are left out."

Even in cities, economic status played a role, as lower-income schools struggled to integrate technology into sports education.

Rural Respondents: Participants from Bauchi and Ekiti described a total lack of digital infrastructure. Most rural schools did not have functional computer labs, reliable internet access, or modern sports equipment. Teachers and coaches relied on traditional teaching and training methods, putting their students at a disadvantage compared to their urban counterparts. A rural coach from Ekiti explained: "We don't have video analysis tools, motion-tracking devices, or even projectors. Everything we do is manual."

The study confirmed that rural students had fewer opportunities to develop digital skills related to physical education, further reinforcing their exclusion from technology-driven sports programs.

3.4. How Do Stakeholders Perceive the Impact of the Digital Divide on Physical Education and Sports?

Teachers: Rural teachers found it difficult to implement digital teaching methods, as they lacked both infrastructure and training. Urban teachers, while having more resources, pointed out inconsistent ICT training programs, making it hard to fully integrate technology into sports education.

Coaches: Rural coaches expressed concern over limited opportunities for sports analytics and performance tracking. Urban coaches, particularly in private institutions, used data-driven coaching techniques, while their rural counterparts relied solely on observational feedback, reducing the precision of training.

Students: Rural students felt excluded from digital learning opportunities, particularly in online sports certifications, virtual competitions, and e-learning modules. A student from Bauchi said: "We see people using sports apps to improve training, but we can't use them because we don't have the devices or internet to access them."

3.5. What Strategies Can Help Bridge the Digital Divide?

Respondents suggested multiple strategies for improving digital inclusion in physical education and sports.

- **Expanding Internet and Electricity Access:** Rural respondents urged the government to invest in broadband expansion projects and stable electricity supply, particularly in underserved areas.
- **Subsidizing Digital Devices:** Teachers and students recommended government-subsidized laptops, tablets, and sports analytics software to support learning.
- **Policy Enforcement:** Participants demanded better implementation of ICT policies in all schools and sports institutions, not just those in urban areas.
- **Public-Private Partnerships:** Stakeholders suggested collaborations between technology companies and educational institutions to provide digital resources and training programs.

A teacher from Kano summarized the urgency of the situation:

"If the government and private sector don't act now, rural schools will continue to fall behind, and our students will never have equal opportunities in digital sports education."

4. Discussion

The findings of this study align with the Digital Divide Theory, which explains disparities in digital access based on infrastructural, socioeconomic, and policy-related factors. The study confirmed that rural schools and sports institutions face significant infrastructural deficits, including poor internet connectivity, unstable electricity, and a lack of digital training tools. This aligns with Van Dijk's (2020) assertion that digital exclusion is not only about having access to technology but also about the availability of the necessary infrastructure to support its use. In contrast, while urban respondents reported better access, the uneven distribution of digital resources within cities indicated that even in

technologically advanced regions, economic disparities still create inequalities in digital access. This reflects the second-level digital divide, where individuals may have access to technology but lack the means or skills to utilize it effectively.

The findings are consistent with Adebayo et al. (2022), who found that infrastructural limitations significantly hinder ICT adoption in Nigerian education. Their study revealed that rural schools struggle with digital integration due to poor internet and electricity access, similar to the experiences shared by rural teachers and students in this study. Furthermore, the limited affordability of digital tools in low-income communities reinforces the findings of Eze & Nwachukwu (2021), who argued that economic barriers remain one of the biggest challenges to achieving digital equity in African education systems. The study participants' frustration over their inability to afford essential digital devices for sports education supports the idea that digital exclusion is both a structural and financial issue.

Beyond infrastructure and affordability, the study also highlighted policy gaps in government interventions. While Nigeria has ICT policies aimed at promoting digital inclusion, the inconsistent implementation of these policies—particularly in rural areas—exacerbates the digital divide. This supports previous research that emphasizes the urban bias in ICT deployment, where government-backed initiatives often prioritize developed regions while rural schools remain neglected. The Digital Divide Theory further explains this as a policy-driven access gap, where digital inequality persists not only due to economic limitations but also because of weak institutional frameworks that fail to address regional disparities.

Overall, the study confirms that bridging the digital divide in physical education and sports requires a multifaceted approach, including investment in infrastructure, targeted ICT funding for rural schools, and strategic partnerships between the government and private sector. Without addressing these foundational gaps, rural students and athletes will remain digitally excluded, limiting their access to modern sports education, online learning, and career opportunities in global sports networks. These findings reinforce the urgent need for inclusive digital policies to ensure that both urban and rural students have equal opportunities in Nigeria's evolving digital landscape.

5. Conclusion

This study has highlighted the critical role of infrastructure, socioeconomic barriers, and policy gaps in shaping the digital divide in physical education and sports in Nigeria. The findings confirm that rural areas face severe limitations in digital access, while urban regions, though better equipped, still experience inequalities due to uneven resource distribution. Grounded in the Digital Divide Theory, the study reinforces the need for targeted interventions, including investment in broadband and electricity infrastructure, subsidized digital devices, and stronger policy enforcement to ensure equitable access to digital tools in sports education. Bridging this divide is essential for enhancing digital literacy, improving training quality, and fostering inclusive talent development, ultimately creating equal opportunities for all students and athletes across Nigeria.

Compliance with ethical standards

Disclosure of conflict of interest

There is no conflict of interest to be disclosed.

Statement of ethical approval

Ethical approval was obtained from a relevant institutional review board before data collection commenced. Participants were informed about the study's objectives, their voluntary participation, and their right to withdraw at any time without consequence.

Statement of informed consent

Written informed consent was obtained from all participants before their involvement in the study.

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