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DIGITAL LITERACY AND EQUITY IN BASIC EDUCATION: A CASE STUDY OF ICT USE IN CAMEROON'S PUBLIC SCHOOLS

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ABSTRACT

This study explores the intersection of digital literacy and educational equity in Cameroon's public schools. A mixed-methods approach was adopted, combining quantitative surveys of 400 participants (300 teachers and 100 administrators) with qualitative interviews and focus group discussions. The research assessed the availability, usage, and challenges of ICT integration in both urban and rural contexts. Results indicate a significant digital divide, with rural schools suffering from limited infrastructure, low teacher digital competence, and minimal ICT-based instruction. However, successful community-driven initiatives suggest that scalable, low-cost solutions are feasible when adapted to local needs. The findings emphasize the importance of comprehensive national strategies that address infrastructure, teacher training, and contextual curriculum development. These insights aim to support policy formulation for equitable access to quality digital education.

Keywords: *Digital literacy, educational equity, ICT, teacher competence, Cameroon education*

ABSTRAK

Penelitian ini mengeksplorasi keterkaitan antara literasi digital dan kesetaraan pendidikan di sekolah-sekolah negeri di Kamerun. Pendekatan metode campuran digunakan dengan menggabungkan survei kuantitatif terhadap 400 responden (300 guru dan 100 kepala sekolah) serta wawancara mendalam dan diskusi kelompok terfokus sebagai bagian dari analisis kualitatif. Penelitian ini menilai ketersediaan, penggunaan, dan tantangan dalam integrasi TIK di konteks perkotaan dan pedesaan. Hasilnya menunjukkan adanya kesenjangan digital yang signifikan, di mana sekolah-sekolah pedesaan menghadapi keterbatasan infrastruktur, rendahnya kompetensi digital guru, dan penggunaan TIK dalam pembelajaran yang masih sangat terbatas. Namun, inisiatif berbasis komunitas menunjukkan bahwa solusi hemat biaya dan berskala dapat berhasil jika disesuaikan dengan kebutuhan lokal. Temuan ini menekankan pentingnya strategi nasional yang komprehensif dalam mengatasi persoalan infrastruktur, pelatihan guru, dan pengembangan kurikulum yang kontekstual. Wawasan ini diharapkan dapat mendukung perumusan kebijakan untuk menjamin akses pendidikan digital yang merata dan berkualitas.

Kata kunci: *Literasi digital, kesetaraan pendidikan, TIK, kompetensi guru, pendidikan Kamerun*

INTRODUCTION

The integration of Information and Communication Technologies (ICT) into education has become a global imperative, aiming to enhance learning outcomes and bridge educational disparities. In Cameroon, efforts to incorporate ICT in public schools have been met with both enthusiasm and challenges. Studies indicate that while there is a growing

awareness of the importance of digital tools in education, disparities in access and usage persist, particularly in rural areas (Ngongba & Ngwa, 2024; UNICEF, 2023; Engozo'o et al., 2023). The COVID-19 pandemic further highlighted these disparities, emphasizing the need for equitable digital access to ensure uninterrupted learning (UNESCO, 2021). Addressing these challenges requires a comprehensive understanding of the current state of digital literacy and ICT integration in Cameroon's public schools. This study aims to explore the extent of ICT usage, the barriers to effective integration, and the implications for educational equity. By examining these factors, we can identify strategies to bridge the digital divide and enhance learning experiences for all students. The findings will contribute to policy formulation and the development of targeted interventions to promote digital equity in education.

Despite increasing global investment in ICT for education, the digital divide persists along geographic and socio-economic lines. In Cameroon, students in rural schools often lack access to basic digital tools such as computers, tablets, or reliable internet (Ngongba & Ngwa, 2024; UNICEF, 2023; Engozo'o et al., 2023). Teachers, too, report low levels of digital competence, further limiting meaningful ICT integration in classroom instruction (Ngongba & Ngwa, 2024). Additionally, many public schools still lack electricity or have inadequate ICT infrastructure, rendering technology-based learning impractical in daily school life (UNESCO, 2021). These limitations contribute to systemic disparities in educational quality between urban and rural learners. Addressing digital equity thus requires not only technology provision but also capacity building and institutional support. Without adequate infrastructure and support, the potential benefits of ICT in education cannot be fully realized. Therefore, a multifaceted approach is necessary to ensure equitable access to digital resources across all regions.

Teacher readiness plays a pivotal role in determining the success of ICT use in education. Research shows that digital literacy among teachers in Cameroon remains inconsistent, particularly in underserved regions (Ngongba & Ngwa, 2024; UNICEF, 2023; Engozo'o et al., 2023). Without adequate training, many teachers are unable to integrate digital content effectively into lessons, thereby limiting its potential to enhance student learning. Moreover, professional development programs for educators are either irregular or inaccessible to those in remote areas (UNESCO, 2021). To bridge this human capital gap, there is a growing need for targeted teacher training on digital pedagogy, as well as mentorship structures within the school system. Investing in teachers' digital competence is essential for sustainable ICT integration. Such investments not only empower teachers but also ensure that students receive quality education that incorporates modern technological tools. Ultimately, enhancing teacher readiness is a critical step toward achieving digital equity in education.

While challenges remain, there are signs of progress. Recent pilot projects in several Cameroonian regions have demonstrated that with the right support, students and teachers can embrace digital tools effectively (Ngongba & Ngwa, 2024; UNICEF, 2023; Engozo'o et al., 2023). These initiatives often combine low-cost technologies, community engagement, and partnerships with NGOs to deliver scalable digital learning solutions.

Schools participating in such projects have reported increased student motivation and improved access to educational content. However, the scalability of these programs depends heavily on consistent funding, policy alignment, and monitoring mechanisms (UNESCO, 2021). These pilot experiences offer valuable insights into what works and what is needed for broader systemic adoption. By analyzing these initiatives, stakeholders can identify best practices and potential pitfalls in ICT integration. Such analysis is crucial for informing future policies and ensuring the sustainability of digital education programs.

This paper investigates the intersection between digital literacy and equity in basic education in Cameroon. It seeks to assess the extent of ICT integration in public primary and secondary schools, focusing on access, usage, and the role of digital skills in educational outcomes. By adopting a case study approach, the research provides contextualized evidence on how technology is shaping student opportunities in both urban and rural communities. Ultimately, this study aims to inform national strategies and policy interventions for closing the digital divide in Cameroonian schools, ensuring that all learners—regardless of location—can benefit from the promise of digital education. The findings will contribute to a deeper understanding of the challenges and opportunities associated with ICT integration in education. Furthermore, the study will highlight the importance of collaborative efforts among stakeholders to promote digital equity. By addressing these issues, Cameroon can make significant strides toward achieving inclusive and quality education for all. The insights gained from this research will be valuable for policymakers, educators, and development partners committed to enhancing educational outcomes through technology.

METHOD

This study employed a mixed-methods approach, combining both quantitative and qualitative research methods to gain a comprehensive understanding of digital literacy and ICT integration in Cameroon's public schools. The quantitative component involved structured questionnaires distributed to teachers and school administrators, aiming to assess their access to ICT resources, frequency of use, and perceived challenges. The qualitative aspect comprised semi-structured interviews and focus group discussions with selected participants to delve deeper into their experiences and perceptions regarding ICT usage in education. This methodological triangulation ensures a more robust and nuanced analysis of the research problem. Such an approach has been effectively utilized in similar studies exploring ICT integration in educational settings (Ngongba & Ngwa, 2024; Nkwenti Ndongfack, 2010; Yiagnigni, 2017).

The sampling strategy was purposive, targeting public primary and secondary schools across diverse regions of Cameroon, including both urban and rural areas. A total of 400 participants were selected, comprising 300 teachers and 100 school administrators. This selection aimed to capture a wide range of experiences and perspectives on ICT integration. Purposive sampling is particularly suitable for studies focusing on specific characteristics within a population, such as exposure to ICT in educational contexts (Ngongba & Ngwa, 2024; Nkwenti Ndongfack, 2010). By including participants from

various geographical and socio-economic backgrounds, the study sought to identify potential disparities and commonalities in ICT usage and digital literacy levels.

Data collection was conducted over a three-month period, from January to March 2025. Quantitative data were gathered through self-administered questionnaires, which included both closed and open-ended questions to capture numerical data and personal insights. Qualitative data were obtained via in-depth interviews and focus group discussions, allowing participants to elaborate on their experiences with ICT in education. All interviews and discussions were audio-recorded, transcribed verbatim, and analyzed thematically. This combination of data collection methods enhances the validity and reliability of the findings (Ngongba & Ngwa, 2024; Yiagnigni, 2017).

For data analysis, quantitative data were processed using the Statistical Package for the Social Sciences (SPSS) software, employing descriptive statistics to summarize the data and inferential statistics to identify significant relationships. Qualitative data were analyzed thematically, following Braun and Clarke's (2006) six-phase framework, which involves familiarization with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report. This analytical approach facilitates the identification of patterns and themes related to digital literacy and ICT integration in the educational context. The integration of both quantitative and qualitative data provides a comprehensive understanding of the research problem, aligning with best practices in educational research (Ngongba & Ngwa, 2024; Nkwenti Ndongfack, 2010).

RESULTS AND DISCUSSION

The study revealed that access to digital infrastructure remains significantly uneven across Cameroon's public school system. Out of the 400 respondents, 78% of rural teachers reported having no access to computers in their classrooms, compared to only 25% in urban schools. Furthermore, only 31% of all participants indicated that their schools had reliable internet access. These disparities are visually represented in Figure 1, which shows the gap between urban and rural ICT availability. The figure highlights the critical infrastructural divide, suggesting that geographic location plays a substantial role in determining digital access. This discrepancy hinders the effective integration of ICT in learning processes for students in underserved regions, thereby perpetuating educational inequity.

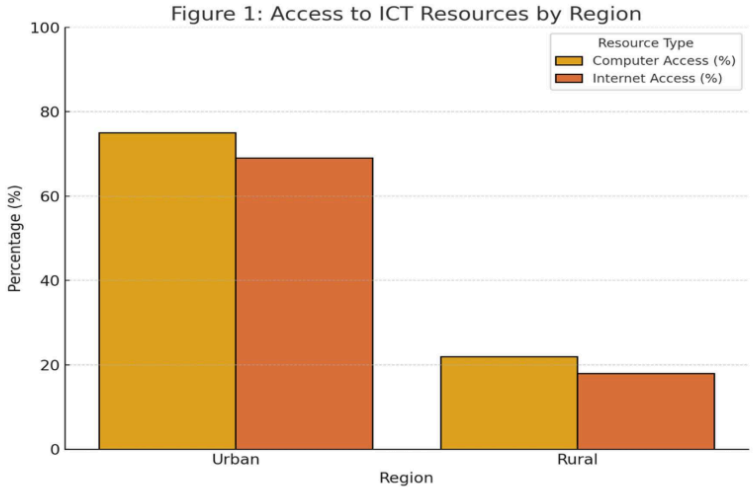

Figure 1. Acces to ICT resources by region

Despite limited access to infrastructure, some level of ICT usage was observed, particularly in administrative tasks and basic teaching activities. According to Table 1, 52% of school administrators use ICT tools for record-keeping, while only 19% of teachers reported using digital content in daily instruction. This suggests a functional but narrow scope of ICT application, primarily confined to non-instructional tasks. Qualitative data further supports this, as teachers cited a lack of training and digital content relevance as major barriers. Additionally, some respondents expressed concern that even when hardware was available, the lack of contextualized educational software limited its classroom utility. These findings indicate that digital tools are underutilized in enhancing pedagogy, especially in regions with minimal technical support.

Table 1. Usage of ICT tools in schools

ICT Application	Percentage of Respondents (%)
Administrative record-keeping	52
Lesson delivery	19
Student assessments	12
Communication with parents	9
Not used at all	8

Teacher digital competence emerged as a central factor influencing the success of ICT implementation. Only 28% of teachers rated their digital literacy as “sufficient” or higher, while the rest admitted to needing basic or intermediate training. Interview data revealed that most professional development programs are infrequent and not adapted to

the specific contexts of rural schools. Teachers from these areas expressed frustration with being excluded from national-level training due to logistical challenges. This deficiency was corroborated by reports of inconsistent digital curriculum delivery. Hence, the research underscores the importance of designing tailored, region-specific training programs to improve teachers' confidence and skill in using ICT tools. Supporting teacher readiness is crucial for the sustainability of digital education efforts.

Finally, the study identified several successful community-led initiatives that show promise in bridging the digital divide. In three pilot schools located in semi-rural areas, partnerships with local NGOs facilitated the deployment of solar-powered tablets preloaded with curriculum-aligned content. Teachers in these schools received monthly workshops on digital pedagogy, and students reported increased engagement with digital lessons. Stakeholders noted that these outcomes were achieved through collaborative planning and context-sensitive implementation strategies. However, as interviewees noted, these programs still face challenges in scale and funding. Thus, while pilot programs offer a hopeful outlook, national strategies must incorporate long-term investment and monitoring mechanisms to ensure inclusive digital transformation across all public schools in Cameroon.

The findings of this study affirm that significant digital disparities persist between urban and rural educational settings in Cameroon. This aligns with recent studies across Sub-Saharan Africa, where ICT integration is often hindered by infrastructural challenges, particularly in rural regions (Brossard et al., 2021; Chigona, 2020; UNESCO, 2023). The limited access to computers and internet services in these schools prevents the realization of equitable digital learning experiences. This infrastructural deficit disproportionately affects students in marginalized communities, exacerbating pre-existing educational inequalities (Ngongba & Ngwa, 2024; UNICEF, 2023). As highlighted by Aluko and Shonubi (2022), without equitable access to basic digital tools, educational reforms risk reinforcing social disparities rather than alleviating them. Therefore, digital infrastructure development must be prioritized in national education policies, with specific attention to under-resourced regions.

Equally important is the role of teacher digital literacy in the successful implementation of ICT in classrooms. Despite global efforts to enhance teacher competencies, Cameroonian educators—especially in remote areas—often lack the training and support needed to effectively utilize digital tools (Engozo'o et al., 2023; World Bank, 2020; UNESCO, 2021). Professional development remains fragmented and inaccessible for many, reducing the likelihood of sustainable integration of ICT in pedagogy. According to Dlamini and Mhlanga (2022), continuous and context-relevant teacher training is essential for boosting confidence and promoting the use of technology as a learning enhancement tool. Investing in teacher capacity is not merely about technical skills, but also about fostering pedagogical innovation that leverages digital platforms for interactive and inclusive education (Akpan & Beard, 2023).

Furthermore, the underutilization of digital tools for instructional purposes points to a broader issue of educational design and policy alignment. While ICT may be available

in some schools, its integration into the curriculum and teaching practices remains inconsistent. Research indicates that successful ICT adoption requires alignment between infrastructure, policy, and classroom practices (Tambo et al., 2022; Jere-Folotiya et al., 2023). A lack of curriculum digitization and the absence of standardized guidelines for ICT use in teaching have hindered progress. Additionally, many educational software tools used in Cameroonian schools are not adapted to local learning contexts, further limiting their relevance and impact (UNESCO, 2023; Ngongba & Ngwa, 2024). Therefore, national ICT strategies must include not only the provision of equipment, but also curriculum reform and teacher support to encourage meaningful integration.

Lastly, the pilot programs examined in this study demonstrate the potential of community-based, low-cost digital learning interventions. These localized projects, often supported by NGOs or public-private partnerships, show that scalable solutions are feasible when stakeholders are engaged and solutions are adapted to context (Yamusa & Onwuegbuzie, 2021; UNESCO, 2021). Importantly, such initiatives emphasize the importance of not just delivering hardware, but ensuring ongoing training, monitoring, and adaptability. The success of these pilots supports calls by scholars like Boadu et al. (2020) and Mtebe & Raisamo (2021) for more decentralized, flexible approaches to digital education reform. Moving forward, national strategies should draw from these grassroots successes, incorporating feedback loops, policy alignment, and sustained investment to expand their impact. In doing so, Cameroon can move closer to achieving both digital and educational equity.

CONCLUSION

This study highlights the persistent digital inequities in Cameroon's public education system, emphasizing significant gaps in ICT infrastructure, teacher preparedness, and effective classroom integration. While urban schools show better access and usage, rural areas remain critically underserved, limiting students' learning opportunities and widening the educational divide. Teacher digital competence emerged as a key determinant of ICT success, reinforcing the need for targeted, ongoing training programs. Pilot initiatives demonstrate that context-sensitive, community-driven solutions can foster meaningful digital engagement when properly supported. Therefore, a holistic and inclusive national strategy—encompassing infrastructure development, teacher training, curriculum reform, and policy coherence—is essential to advance digital literacy and ensure equitable education for all learners in Cameroon.

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