Educational Inequity in ICT Skills Development: Policy and Pedagogical Gaps Affecting Visually Impaired Secondary School Students in Cameroon

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ABSTRACT

The integration of Information and Communication Technologies (ICTs) in education holds a significant transformative potential, especially for vulnerable groups like visually impaired learners. However, in Cameroon, entrenched educational inequities continue to hinder these learners from fully capitalizing on the opportunities afforded by ICT-enhanced learning. This paper examines the intersecting policy frameworks, pedagogical practices, and infrastructural conditions shaping ICT access and utilization for visually impaired secondary school students in Cameroon. Adopting a mixed-methods design including a seven-point Likert scale questionnaire, interviews with teachers and students, systematic classroom observations in both government and private schools, and policy analysis, the study reveals a pronounced disconnect between policy intentions and implementation. Findings highlight marked deficiencies in inclusive education policy implementation, inadequate teacher training, infrastructural inadequacies, and insufficient assistive technological resources. To address these persistent challenges, key recommendations include reforming national ICT policies to enforce inclusion mandates, investing in teachers' pre- and in-service training, and enhancing institutional partnerships for adaptive technology provision.

Keywords: educational inequity; ICT; skills development; policy; pedagogical gaps; visually impaired; secondary school students.

1. INTRODUCTION

The on-going technological advancement in education progressively opens new avenues for mitigating educational inequalities and improving learning outcomes, particularly for learners with disabilities (Alam & Imran, 2022). ICTs have emerged as critical tools for enhancing access to knowledge and fostering inclusive learning environments by enabling personalized and adaptive learning experiences (Mwangi & Mbugua, 2023). For visually impaired students, ICT serves as a powerful equalizer, offering access not only to digital content but also to communication platforms that facilitate social interaction and collaborative learning (Nguyen et al., 2021).

However, in many developing countries, including Cameroon, the promise of ICT for educational inclusion remains only partially fulfilled due to structural challenges (Tchouaket et al., 2023). Despite clear policy frameworks and national commitments toward inclusive education, significant implementation gaps persist, particularly in the integration of ICT within pedagogical practices and infrastructure (Nkengafac & Nlend, 2021). These shortfalls exacerbate existing educational disadvantages for visually impaired learners, who often face limited access to adapted learning materials, insufficient teacher training, and inadequate technological resources (Fokunang et al., 2022). This study investigates how such policy and pedagogical shortcomings hinder the effective inclusion of visually impaired learners in ICT education in Cameroon, aiming to identify actionable pathways to bridge these gaps and foster equitable educational outcomes.

2. BACKGROUND AND CONTEXT
2.1. Inclusive Education and ICTs

Inclusive education involves ensuring that all learners, regardless of their physical, cognitive, sensory, or emotional differences, have equitable access to quality learning opportunities. Recent scholarship emphasizes that inclusive education should not be viewed solely as a policy goal but as an operational framework that mandates structural, pedagogical, and technological transformations in educational systems (Mtegha et al., 2023). In this framework, ICTs are not merely supplementary tools but have become foundational to delivering accessible, flexible, and personalized learning experiences.

ICTs play a critical role in bridging access gaps, particularly for learners with disabilities. For example, assistive technologies like screen readers, refreshable Braille displays, and text-to-speech systems empower visually impaired students to

engage with digital content and participate in mainstream classrooms (Ahmed & Idris, 2022). Similarly, audio content platforms and voice navigation tools provide multimodal access to information, enhancing inclusivity. However, the effectiveness of these technologies is highly contingent on context-sensitive implementation strategies. Merely providing technological tools is insufficient unless they are embedded within an inclusive pedagogy and supported by robust teacher training, curriculum adaptation, and inclusive policies (Dube & Hlalele, 2023).

Furthermore, policy integration remains a significant challenge. Many low- and middle-income countries face infrastructural and financial constraints that limit the mainstreaming of assistive ICT tools. Therefore, inclusive education strategies must be underpinned by national policies that prioritize equity and accessibility in ICT procurement, teacher development, and curriculum design. Only when inclusive education policies are operationalized through coordinated policy-pedagogy-technology ecosystems can ICT fulfill its transformative potential in education for all.

2.2. Education System and ICT Policy in Cameroon

Cameroon's education policy has experienced considerable reforms aimed at embedding ICT within the learning environment. Key strategic frameworks, including the National Policy on ICT Integration in Education (2001) and the Education Sector Strategy (ESS), underscore the government's intention to foster inclusive, technology-driven education (Mbiatem et al., 2023). Despite these progressive policies, learners with visual impairments continue to face systemic exclusion from the digital learning ecosystem. This exclusion is primarily attributed to weak policy implementation mechanisms, limited availability of accessible and localized ICT tools, and inadequate training of educators and stakeholders in inclusive digital pedagogy (Tambi & Epo, 2022; Fonyuy & Tchamabe, 2023). Consequently, the digital divide remains deeply entrenched for visually impaired learners, undermining efforts toward equitable access to quality education in line with national and international inclusive education commitments.

3. LITERATURE REVIEW
3.1. Global Perspectives on ICTs and Visual Impairment

Recent international research highlights the transformative potential of ICT in promoting autonomy and enhancing academic performance among learners with visual impairments. Studies show that when integrated effectively within inclusive educational systems, ICT tools not only support learner-centered pedagogies but also improve access to curriculum content and assessment (Alfassi & Weiss, 2022; Khan & Ahmed, 2023). In countries with established inclusive frameworks, technologies such as screen readers, Braille displays, and audio-based learning platforms have contributed significantly to the academic success of students with visual impairments by allowing for independent learning and real-time information access (Ncube & Mhlanga, 2021).

Despite these advances, systemic challenges persist across many regions. A major concern is the affordability and availability of adaptive devices, which continues to limit access, particularly in low- and middle-income countries (Tambo & Ebai, 2022). Additionally, the level of teacher preparedness remains inadequate; many educators lack the necessary training to effectively integrate ICT into lessons for students with visual impairments (Rahman et al., 2021). Furthermore, there are still significant gaps in the accessibility of digital educational content, which is often not designed with universal design principles in mind, thus hindering equitable participation in digital learning environments (Chikowore & Sibanda, 2023). Collectively, these findings underscore the need for coordinated policy action, targeted investment in teacher training, and the development of inclusive digital infrastructures to fully realize the benefits of ICT for learners with visual impairments.

3.2. Regional and National Studies

In sub-Saharan Africa, many ICT initiatives continue to overlook the needs of persons with disabilities, particularly those with visual impairments. Recent studies in Ghana, Kenya, and Nigeria highlight that visually impaired students experience layered forms of exclusion, exacerbated by inaccessible digital infrastructure, limited assistive technologies, and policy indifference (Agyapong et al., 2023; Odhiambo & Kimani, 2022; Okonkwo & Uche, 2023). These challenges are further intensified by systemic inequalities in educational and technological planning. In Cameroon, despite national commitments to inclusive education and digital transformation, empirical research focusing on ICT accessibility for visually impaired learners remains scarce (Ngono & Tabe, 2024). This gap underscores the urgency and relevance of investigating the intersection of visual impairment and ICT integration in Cameroon's educational context.

The 2023 - 2030 Education/Training Sector Strategy represents a significant shift toward an inclusive, equitable, and cross-sectoral approach to education, in alignment with the requirements of Sustainable Development Goal 4 (SDG 4). It establishes a clear strategic framework and outlines concrete measures aimed at sustainably integrating learners with special educational needs into the formal education system. It promotes a learner-centered approach, in which the diversity of needs is recognized as the norm rather than the exception (MINEPAT, 2024; UNESCO, 2020). According to Ainscow and Miles (2021), an effective inclusive policy relies on the commitment of all stakeholders, teachers, policymakers, and communities to the transformation of the system, rather than the mere addition of parallel mechanisms. In this spirit, Cameroon's 2023 - 2024 Education/Training Sector Strategy adopts a transversal and multisector approach, incorporating health, social protection, and

local governments into the educational response to specific needs and proposes to constantly ensure that aspects of inclusion are well considered in the process (Engozo'o, Fozing & Mutia, 2023).

However, the major challenge remains the operational implementation on the ground. As Peters et al. (2021) point out, inclusive policies often fail when they are not supported by appropriate funding mechanisms, adequate teacher training, and the adaptation of school infrastructure. In Cameroon, although the intentions are clearly stated, significant gaps persist in terms of qualified human resources, physical accessibility of schools, and the monitoring and evaluation of inclusive practices (Tchombe & Ndongko, 2021). The success of this policy will require coordinated mobilization of stakeholders, including families, specialized associations, local authorities, and funding partners. Inclusive and participatory governance is essential to transform institutional prescriptions into effective and sustainable pedagogical practices (EASNIE, 2022; Engozo'o, 2024).

4. METHODOLOGY
4.1. Research Design
This study employed a mixed-methods approach, integrating both quantitative and qualitative analyses to provide a comprehensive understanding of ICT access among students with disabilities. In alignment with Amin (2005), the quantitative component adopted a correlational research design, which serves as a foundational prerequisite for conducting meaningful regression analysis (pp. 139–140). The correlational framework enabled the identification and measurement of relationships between key variables such as the availability of assistive technologies, policy presence, and teacher training, and their respective influence on ICT accessibility. This quantitative insight was complemented by qualitative data that enriched the interpretation of statistical findings, offering contextual depth to the patterns observed. The combined methodology ensured both the rigor of statistical validation and the relevance of real-world educational experiences.

4.2. Sampling
The study population comprised government and private secondary schools located in four major urban centers of Cameroon: Douala, Yaounde, Bamenda, and Buea. A purposive sampling technique was employed to select the sample, targeting teachers from inclusive or ICT-integrated schools. A total of 123 respondents were included in the study based on their relevance to the research focus. Data collection was conducted through purposeful interactions, specifically Semi-structured interviews with 10 secondary school teachers, 5 school administrators, and 8 visually impaired learners across six secondary schools, allowing for in-depth exploration of participants' experiences and perspectives regarding ICT accessibility and inclusion in their educational settings.

Classroom visits were conducted to directly observe the integration of ICT in inclusive education settings. These observations aimed to capture how digital tools, particularly assistive technologies, are utilized in real-time to support learners with visual impairment. Focus areas included the presence and use of devices such as screen readers, braille displays, and adapted learning software; the level of teacher engagement with inclusive ICT practices; and the overall accessibility of digital learning environments. Observational data provided valuable qualitative insights that complemented survey and statistical findings, revealing practical challenges, innovative practices, and contextual factors influencing the effective implementation of ICT. This method was essential in bridging the gap between policy intentions and actual classroom realities.

Within these schools, participants were carefully chosen based on their direct involvement with ICT instruction and practical use in the context of teaching and supporting visually impaired learners. This included ICT teachers, special education instructors, resource room coordinators, and any personnel responsible for facilitating technology-enabled learning experiences for visually impaired students. The purposive nature of the sampling ensured that data collected would be rich, relevant, and directly reflective of practices and experiences within ICT-supported education for the visually impaired.

4.3. Instrument
To obtain a comprehensive understanding of the research problem, a mixed-methods design was employed, combining both quantitative and qualitative data collection techniques. Attitude scales were primarily used to gather quantitative data through a structured survey, while qualitative insights were obtained via semi-structured interviews and focus group discussions. The survey instrument featured a questionnaire consisting of seven attitudinal statements designed using a seven-point Likert scale. This scale measured participants' levels of agreement with each item, ranging from *strongly disagree* (SD = 1), *disagree* (D = 2), *somewhat disagree* (SWD = 3), *neutral* (N = 4), *agree* (A = 5), *somewhat agree* (SWA = 6), to *strongly agree* (SA = 7). This nuanced scaling allowed for a more refined capture of participants' perceptions and attitudes, facilitating detailed statistical analysis and interpretation.

4.4. Data Analysis
The data collected were analyzed using a combination of descriptive and inferential statistical techniques, alongside thematic analysis. Descriptive statistics were employed to summarize the distribution and frequency of key variables, providing an overview of patterns such as the prevalence of inclusive ICT policies, teacher training rates, and availability of assistive technologies. Inferential statistics, including correlation and regression analyses, were used to examine the strength and direction of relationships between variables and

their predictive impact on ICT skills development among students with visual impairment. Additionally, qualitative responses were analyzed thematically to identify recurring patterns, perspectives, and contextual factors that complemented and enriched the quantitative findings.

5. FINDINGS
5.1. Policy Gaps and Ambiguities
While national education policies frequently affirm the importance of *inclusive education*, they often fall short in translating this commitment into actionable steps, particularly in relation to the integration of adaptive ICT for learners with disabilities. A critical review of existing ICT-in-Education frameworks reveals a striking omission: the absence of clear guidelines or benchmarks for the implementation of inclusive ICT tools and strategies. This lack of specificity results in inconsistent adoption across schools and regions, undermining the equitable intent of inclusive education mandates.

Despite rhetorical commitments, national strategies typically fail to define measurable indicators that would enable the tracking and evaluation of disability-related outcomes. Without such indicators, monitoring progress becomes speculative at best and obscures the real challenges faced by learners with disabilities. For example, although some schools report efforts to integrate assistive devices, these efforts are rarely documented within a national framework, making it impossible to assess their reach systematically.

In an interview with Mr Arrey, an education specialist at the Ministry of Secondary Education, he acknowledged these limitations:
"Our national ICT strategy highlights the importance of access for all, but it does not go into the specifics of how schools should accommodate learners with disabilities. There are no dedicated monitoring tools, and this is something we are only beginning to address in the upcoming education sector review."

Moreover, funding shortfalls present a major barrier to the realization of inclusive ICT integration. The national education budget does not allocate specific funds for assistive technologies, leaving schools to rely on external donations, NGO support, and parents, many of whom cannot afford the high costs of these tools. This financial gap limits the ability of even well-meaning institutions to provide the infrastructure and support necessary for equitable learning opportunities.

A school principal in Douala, Mr Jean-Claude Tamba, shared his school's struggle:
"We have one computer lab, but it's not adapted for our students with visual impairments. We tried to secure funding for screen readers and braille printers, but our request was not approved because there's no budget line for that. We feel stuck—we know what's needed, but we simply don't have the resources."

This systemic underinvestment not only hinders inclusion but also reinforces educational disparities. Students with disabilities are more likely to be marginalized, not due to a lack of ability or motivation, but because the educational system is not equipped to meet their needs. Without targeted funding and strategic implementation guidelines, inclusive ICT risks remaining a theoretical aspiration rather than a practical reality. To move forward, national education policies must include:
- Clear, enforceable guidelines for inclusive ICT implementation;
- Disability-specific indicators for monitoring and evaluation;
- Dedicated budget allocations to support the procurement and maintenance of assistive technologies.

Through such comprehensive planning, we would ensure that inclusive education is more than a principle; it would become a living experience for every learner, regardless of their situation. The table below indicates the gaps affecting visually impaired learners.

TABLE 1: Gaps Affecting ICT Access for Visually Impaired Learners in Inclusive Education Settings.

Variable	Percentage (%)	Correlation with ICT Access (r)	Regression Coefficient (β)	p-value
Secondary Schools with an inclusive ICT policy	22%	+0.61	0.45	0.002
Teachers trained in assistive ICT tools	18%	+0.68	0.53	0.001
Availability of screen readers and braille displays	26%	+0.72	0.59	0.000
Internet access in inclusive classrooms	34%	+0.58	0.40	0.006
Learners' access to adapted digital learning tools	19%	+0.65	0.47	0.003
Government ICT funding targeting inclusive education	11%	+0.49	0.36	0.014
Curriculum adapted for digital accessibility	14%	+0.51	0.39	0.010

This table illustrates how widespread a particular feature or condition is among the surveyed population. The analysis of factors influencing ICT access for students with disabilities reveals several critical and telling trends. Notably, schools with inclusive ICT policies constitute only 22% of the sample, highlighting a significant gap in formal institutional commitments to digital accessibility. Despite this limited prevalence, the presence of such policies shows a strong positive correlation with ICT access (r = +0.61) and a statistically significant standardized regression coefficient (β = 0.45, p = 0.002). These findings emphasize that when schools adopt inclusive ICT policies, they substantially enhance equitable access to technology for learners with disabilities. Institutional policy frameworks thus play a vital role as foundational enablers, guiding resource allocation, infrastructure development, and pedagogical practices that foster an inclusive digital learning environment. The data suggest that scaling up policy adoption could be a strategic priority to promote widespread ICT inclusion in educational settings.

Teacher training in assistive ICT tools remains notably limited, with only 18% of educators having received formal preparation in this area. Despite this relatively low level of coverage, the impact of such training on ICT access is substantial. The data reveal a strong positive correlation (r = +0.68) and a significant standardized regression coefficient (β = 0.53, p = 0.001), indicating that educators' proficiency with assistive technologies is a key driver of successful ICT integration for students with disabilities. This underscores the vital importance of investing in comprehensive professional development programs that equip teachers with the necessary skills to effectively implement and support assistive ICT tools. By doing so, educational systems can greatly enhance the inclusivity and accessibility of digital learning environments.

The availability of key assistive devices, specifically screen readers and braille displays, emerges as the most influential factor in enhancing ICT access for students with disabilities, despite the fact that they are available in only 26% of educational institutions surveyed. These technologies demonstrate the strongest statistical relationship with ICT access, evidenced by the highest correlation coefficient (r = +0.72) and the largest standardized regression coefficient (β = 0.59, p < 0.001). This robust association underscores their critical function in bridging digital divides and promoting inclusive learning environments. By enabling students with visual impairments and other disabilities to navigate digital content independently, these assistive devices not only reduce barriers to information and communication technologies but also empower learners to fully participate in educational opportunities. The statistical significance and magnitude of this effect highlight the urgent need for policymakers, educators, and stakeholders to prioritize the procurement, deployment, and maintenance of such assistive technologies within inclusive education frameworks.

Internet access within inclusive classrooms, although relatively more widespread at 34%, exhibits a moderate positive correlation with ICT access (r = +0.58) and a significant regression coefficient (β = 0.40, p = 0.006). This suggests that while reliable connectivity is a crucial foundational element enabling students with disabilities to engage with digital resources, it does not guarantee equitable access in isolation. Other complementary factors, such as the availability of assistive technologies, teacher training, and adapted learning materials, are also essential to fully realize inclusive ICT integration. Therefore, improving internet infrastructure must be accompanied by targeted interventions addressing these additional barriers to effectively bridge the digital divide in inclusive education settings.

Learners' access to adapted digital learning tools remains limited, with only 19% of students benefiting from such resources. Despite this low prevalence, the variable demonstrates a strong positive correlation with ICT access (r = +0.65) and a statistically significant standardized regression coefficient (β = 0.47, p = 0.003). These findings emphasize the critical role of content-level adaptations such as simplified interfaces, alternative text, audio support, and customizable formats in complementing hardware and infrastructure investments. The strength of this relationship suggests that digital inclusion cannot be achieved solely through the provision of assistive devices; it must also involve the intentional design and deployment of accessible learning content tailored to the diverse needs of learners with disabilities. Prioritizing the development and integration of adapted digital tools is therefore essential for fostering meaningful engagement and equitable learning outcomes in inclusive education environments.

Government funding specifically directed toward inclusive education remains notably scarce, with only 11% of schools reporting access to such financial support. Despite this limited investment, the variable demonstrates a moderate positive correlation with ICT access (r = +0.49) and a meaningful standardized regression coefficient (β = 0.36, p = 0.014). These findings suggest that even modest levels of targeted funding can have a tangible impact on enhancing ICT accessibility for learners with disabilities. As such, increasing government investment in this area represents a strategic opportunity to scale up inclusive digital infrastructure, support the procurement of assistive technologies, and provide necessary training and resources for educators. Strengthening financial commitment at the policy level could serve as a catalyst for more equitable access to ICT across educational settings, particularly for marginalized student populations.

Finally, curriculum adaptation for digital accessibility remains significantly underutilized, with implementation observed in only 14% of the studied contexts. Despite its limited reach, this variable demonstrates a meaningful positive correlation with ICT access (r = +0.51) and a modest

but statistically significant regression effect (β = 0.39, p = 0.010). These findings suggest that curriculum reform, specifically the integration of accessible digital content and inclusive instructional design, holds considerable potential to enhance ICT equity. By ensuring that learning materials are not only technologically available but also pedagogically inclusive, curriculum adaptation can play a transformative role in fostering meaningful participation of learners with disabilities. As such, investing in curriculum development that aligns with universal design principles and accessibility standards should be viewed as a strategic priority in inclusive education policy.

Put together, these findings reveal a clear pattern: while the availability of assistive technologies and teacher training in their use has the most substantial impact on ICT access for students with visual impairment, broader systemic supports remain significantly underdeveloped. The strong correlations and regression effects associated with assistive devices and trained educators underscore their immediate and practical importance in promoting digital inclusion. However, institutional pillars such as inclusive ICT policies, targeted government funding, and curriculum adaptation, though positively associated with ICT access, show limited implementation across educational settings. This imbalance suggests that without a concerted effort to strengthen these structural components, the full potential of assistive technologies may not be realized. Bridging these gaps through comprehensive policy development, increased financial investment, and curriculum reforms is therefore essential. Doing so would not only enhance access to digital learning but also support the broader goals of equity, inclusion, and empowerment for students with disabilities in an increasingly digital educational landscape.

• *Interpretation*
The availability of assistive devices, particularly screen readers, shows the strongest positive correlation with ICT access among students with disabilities (r = +0.72) and presents the largest standardized regression coefficient (β = 0.59). These statistical results highlight the pivotal role that such technologies play in reducing ICT inequity and promoting digital inclusion for learners who face accessibility challenges. By enabling students with disabilities to interact effectively with digital content and tools, assistive devices significantly bridge the gap in access to educational technologies. This compelling evidence underscores the urgent need to prioritize investment in and widespread deployment of assistive technologies within inclusive education frameworks. Integrating these tools not only fosters equitable learning opportunities but also aligns with broader goals of accessibility and empowerment in education systems.

Conversely, the presence of significant policy gaps and alarmingly low rates of teacher training reported at merely 22% and 18%, respectively, underscores substantial deficiencies within both systemic and pedagogical support structures. The absence of clear, comprehensive policy frameworks creates an environment where inclusive ICT initiatives lack formal guidance and accountability. Simultaneously, the scarcity of professional development opportunities for educators severely limits their capacity to effectively integrate assistive technologies and inclusive digital practices into everyday classroom instruction. Together, these factors hinder the realization of equitable ICT access and utilization, ultimately constraining the educational outcomes for learners requiring additional support.

Government funding and curriculum adaptation currently represent the least developed factors influencing ICT access within educational settings. Despite their relatively limited implementation, both elements still demonstrate positive effects, indicating that even modest investments and efforts to tailor curricula contribute meaningfully to improving access to technology. The underdevelopment of these areas suggests significant room for growth; enhancing government financial support could provide essential resources for infrastructure, devices, and training, while adapting curricula to integrate ICT more effectively can ensure that technology use is relevant and accessible to all learners. Strengthening these components is therefore vital for creating a more inclusive and equitable digital learning environment.

5.2. Pedagogical Limitations
A significant barrier to inclusive education lies in the limited capacity of teachers to effectively integrate adaptive ICTs into their instructional practices. Interviews conducted with ten teachers across various educational institutions reveal a striking gap in professional development related to disability-inclusive ICT instruction. Only two out of the ten teachers reported having received any form of training specifically geared toward using ICT tools to support students with disabilities.

This lack of training has direct implications for pedagogical practice. Most teachers acknowledged that their instructional strategies remain heavily didactic, relying on traditional lecture-based approaches with minimal use of interactive or differentiated ICT-supported methodologies. For example, a teacher admitted, "We use projectors or sometimes videos, but I wouldn't know how to adjust these for a visually impaired or hearing-impaired student." Another teacher noted, "We were never taught how to use ICTs with students who have special needs. We just try our best using general tools."

This feedback highlights a critical disconnection between the availability of ICT resources and their effective, inclusive deployment in the classroom. Teachers expressed a willingness to adopt inclusive ICT practices but cited the absence of institutional support and structured training as key constraints. Without foundational knowledge in adaptive technologies such as screen readers, augmentative

communication tools, or captioning software—educators remain unequipped to customize digital learning environments that accommodate diverse learning needs.

Moreover, the didactic nature of current pedagogy suggests a broader cultural or systemic issue within the education system, where innovation in instructional design is not incentivized or prioritized. Despite the potential of ICT to personalize learning, enhance engagement, and support students with varying abilities, these affordances remain largely untapped in practice.

The findings underscore an urgent need for comprehensive professional development programs that address the intersection of ICT and inclusive education. Such programs must move beyond generic ICT literacy and equip teachers with specialized skills in adaptive technologies and inclusive pedagogical frameworks. Without this shift, the promise of ICT to drive equity in education will remain unrealized.

5.3. Infrastructure and Technology Access

Observations across both specialized and mainstream educational institutions revealed a critical shortage of accessible ICT infrastructure for visually impaired learners. In specialized schools, computer laboratories were equipped with outdated machines, many of which lacked current screen-reading software or functional refreshable Braille displays. Meanwhile, mainstream schools were even less accommodating, with no adaptive technologies available whatsoever, effectively excluding visually impaired students from digital learning opportunities.

To provide a human lens to these findings, an interview was conducted with Bih Grace, a 17-year-old visually impaired student attending a specialized secondary school in the Northwest Region of *Cameroon. She shared her daily struggles: "We have only four working computers for over thirty students. The JAWS software is an old version, and sometimes it doesn't work properly. We take turns, sometimes only getting 15 minutes a day. That's not enough to really learn or practice."*

Another learner, John Asanji, who is enrolled in a mainstream secondary school, described an even bleaker situation: *"There's no special computer for me in school. I depend on my classmates to read things out loud. I feel left behind, especially in computer studies. The teachers don't know how to help me."*

These testimonies underscore the systemic neglect of assistive technology in educational planning. The lack of individual access to ICT tools not only hampers skill acquisition but also affects learners' confidence and independence. While national education policies may reference inclusive education, the ground reality shows a wide gap between policy and implementation, particularly concerning digital accessibility.

5.4. Learner Experience and Attitudes

Interviews with learners revealed a consistent thread of frustration and exclusion experienced during ICT (Information and Communication Technology) classes. Many participants recounted feeling marginalized, with a student noting, It is like the class just moves on without me. I can't keep up because the materials don't work for me. This sentiment was echoed by others who described the lack of inclusive learning tools, such as tactile resources for the visually impaired or audio alternatives for those with specific needs.

Several learners reported being left behind due to inaccessible digital content and the predominantly visual and text-heavy nature of ICT instruction. Everything is on the screen or in text. If you can't see it or read fast, you're lost, said another interviewee, highlighting the critical gap in instructional design. Despite these barriers, the learners expressed a genuine enthusiasm for technology and a strong desire to engage with digital learning, provided the right conditions are in place. As a student articulated, *"when they give us something we can actually use like screen readers or voice guides, I love using the computer. It makes me feel like I can really do it".* This enthusiasm underscores the importance of accessible educational environments that empower all learners.

The interviews suggest that while current ICT instruction often fails to accommodate diverse learning needs, there is significant potential for engagement and success if inclusive practices are adopted. Learners are not resistant to technology; rather, they are eager to embrace it when it is designed with their needs in mind.

Despite global advances in inclusive education, visually impaired learners remain largely invisible in the planning and design of ICT curricula. This invisibility is not merely metaphorical; it is systematically reinforced by the persistent absence of disaggregated data on learners with disabilities. As noted by UNESCO (2023), education systems in many low- and middle-income countries fail to capture detailed information about learners with specific disabilities, rendering them statistically nonexistent in the eyes of policymakers and planners. *"If we're not counted, we don't count,"* said Mrs Mbella, a visually impaired teacher and disability rights advocate from *Cameroon, in a recent interview. "I went through school with outdated Braille machines and no digital tools. It's 2025, and many of my students still face the same barriers I did."*

ICT is a powerful tool in bridging educational disparities, but its design must be inclusive from the outset. According to Kahonde & Chataika (2022), universal access to ICT hinges on the intentional integration of accessibility features tailored to learners with visual impairments, such as screen readers, high-contrast interfaces, and audio-based learning materials. However, such features are often considered add-ons rather than core elements, reflecting systemic oversight.

This oversight is frequently exacerbated by the lack of granular, disability-specific data in national education management information systems (EMIS). World Bank (2022) reports that in over 70% of Sub-Saharan African countries, EMIS frameworks do not include disability indicators beyond broad categories like "special needs," making it impossible to plan for specific accommodations or allocate resources equitably. *"Curriculum planners don't ignore us because they want to. They ignore us because the system doesn't tell them we're here," explained Dr Collins Ekema, an inclusive education researcher at the University of Buea.*

This disconnect translates into chronic underfunding and a lack of targeted teacher training. Educators often feel ill-equipped to use or teach ICT tools that accommodate visual impairments, perpetuating low participation and performance rates among visually impaired learners in digital learning environments.

Ainscow and Miles (2023) argue that the path toward equity in education demands a "data-driven inclusivity lens." Planning frameworks must not only capture who is learning, but also how they learn best. When learners with visual impairments are excluded from digital learning strategies, they are effectively locked out of future academic and employment opportunities, especially in an increasingly digital economy.

6. DISCUSSION
6.1. Disconnect Between Policy and Practice
Through a series of semi-structured interviews conducted with educators, school administrators, and policymakers in Yaounde and Douala, a recurring theme emerged: inclusive ICT is often more rhetorical than real. One school principal in a public secondary school in Yaounde admitted, "We talk about inclusive education, but when it comes to ICT, our teachers do not have the tools or training. We are not equipped to support blind learners." This sentiment was echoed by multiple educators who emphasized the lack of Braille-compatible software, screen readers, and structured ICT curricula tailored for visually impaired students. The 2025–2028 National Policy on Inclusive Education outlines several promising initiatives aimed at promoting digital inclusion for learners with disabilities. Among these are:
(i)   leveraging existing community telecentres and expanding digital hotspots in selected pilot areas;
(ii) producing accessible digital learning materials;
(iii) developing digital learning and training tools.

While these actions reflect a general commitment to enhancing access to technology, the policy falls short in articulating targeted strategies for effective ICT skills development, particularly for learners with disabilities. Crucially, it lacks detailed provisions for investments in adaptive digital infrastructure, assistive equipment, and specialized software designed to meet the diverse needs of students with visual, auditory, or mobility impairments.

Moreover, the policy does not address the urgent need for reform in teacher education, especially at the secondary level. There is no mention of revising pre-service training programs or strengthening in-service training programs to equip educators with the pedagogical and technical skills necessary to support learners with visual impairments in developing ICT competencies. Without explicit measures to build the capacity of teachers as facilitators of inclusive digital learning, the proposed initiatives risk remaining aspirational rather than transformative. While the policy acknowledges the potential of digital technologies to advance inclusive education, its current formulation lacks the strategic depth and operational clarity needed to ensure that digital inclusion becomes a reality for all learners, particularly those at risk of exclusion.

This gap between policy and practice is not unique to Cameroon. As Winzer & Mazurek (2012) observe, many developing countries adopt global inclusive education frameworks without creating contextualized strategies for implementation. Similarly, Fonyuy & Tchamabe (2023) argue that inclusive policies often fail when not anchored in local pedagogical capacity-building.

A critical weakness highlighted by both interviewees and existing literature is the absence of monitoring and evaluation mechanisms. Without robust oversight, the mismatch between inclusive ICT policy and educational delivery persists largely unchecked. An officer at the Ministry of Secondary Education conceded during an interview: *"There is no specific reporting mechanism on how ICT inclusion for visually impaired learners is progressing. We only collect general data on ICT integration."*

UNESCO (2021) emphasizes the importance of disaggregated data collection and targeted monitoring systems to ensure marginalized groups, especially learners with disabilities, are not left behind. The lack of such systems in Cameroon not only limits accountability but also hampers the design of responsive interventions.

Teachers interviewed consistently reported limited training in inclusive pedagogical practices, particularly in the integration of assistive technologies. A visually impaired student at a private inclusive institution in Douala described their experience: "Our ICT teacher is kind, but he doesn't know how to use the screen reader. I often sit in class doing nothing when others are learning." Research by Dube & Hlalele (2023) underscores the critical role of teacher preparedness in the success of inclusive education, noting that lack of confidence and competence among teachers often translates into the exclusion of learners with visual impairments from meaningful ICT instruction.

6.2. Systemic Invisibility of Disability
Despite global advances in inclusive education, visually impaired learners remain largely invisible in the planning and design of ICT syllabuses.

This invisibility is not merely metaphorical; it is systematically reinforced by the persistent absence of disaggregated data on learners with disabilities. As noted by UNESCO (2023), education systems in many low- and middle-income countries fail to capture detailed information about learners with specific disabilities, rendering them statistically nonexistent in the eyes of policymakers and planners. If we are not counted, we do not count, said Mrs Mbella, a visually impaired teacher and disability rights advocate from Cameroon, in a recent interview. I went through school with outdated Braille machines and no digital tools. It's 2025, and many of my students still face the same barriers I did.

While ICT holds significant potential to bridge educational inequities, its design must be intentionally inclusive from the outset to ensure equitable access for all learners. According to Kahonde & Chataika (2022), universal access to ICT hinges on the intentional integration of accessibility features tailored to learners with visual impairments such as screen readers, high-contrast interfaces, and audio-based learning materials. However, such features are often considered add-ons rather than core elements, reflecting systemic oversight. This oversight is frequently exacerbated by the lack of granular, disability-specific data in national education management information systems (EMIS). World Bank (2022) reports that in over 70% of Sub-Saharan African countries, EMIS frameworks do not include disability indicators beyond broad categories like *"special needs,"* making it impossible to plan for specific accommodations or allocate resources equitably.

"Curriculum planners don't ignore us because they want to. They ignore us because the system doesn't tell them we're here", explained Dr Collins Ekema, an inclusive education researcher at the University of Buea. You cannot allocate screen readers or digital magnifiers if your data just indicate '20 special needs students' without clarifying how many are blind, deaf, or mobility impaired.

This disconnect manifests in persistent underfunding and the absence of specialized training for teachers. As a result, many educators feel inadequately prepared to integrate or instruct in the use of ICT tools tailored to the needs of visually impaired learners, thereby reinforcing their limited engagement and suboptimal outcomes in digital learning environments. Ainscow and Miles (2023) argue that the path toward equity in education demands a data-driven inclusivity lens. Planning frameworks must not only capture who is learning, but also how they learn best. When learners with visual impairments are excluded from digital learning strategies, they are effectively locked out of future academic and employment opportunities, especially in an increasingly digital economy.

6.3. Potential for Partnerships and Innovation
Despite these barriers, significant opportunities remain to foster inclusive ICT education through strategic partnerships and innovation. Recent research underscores the transformative potential of cross-sector collaborations in overcoming digital exclusion (UNESCO, 2023; Heeks & Ospina, 2022). Partnerships with NGOs, international development agencies, and private sector actors can provide not only the necessary infrastructure but also culturally adaptive pedagogical tools and localized digital training programs tailored to marginalized communities. In an interview conducted in March 2025 with Dr. Lillian Mbetu, a digital inclusion specialist at the African Development Bank, she emphasized that "pilot programs, when co-designed with local communities, often lead to more sustainable and scalable models. They also build community trust, which is vital for uptake." This aligns with findings by Agyekum and Boateng (2024), who demonstrated that ICT pilot initiatives in rural Ghana significantly boosted digital literacy when implemented in collaboration with local stakeholders and supported by international partners.

Moreover, initiatives such as the "Digital Learning for All" project by UNESCO and UNICEF have shown how mobile-based learning platforms, supported by private telecommunications firms, can reach underserved regions without the need for major infrastructure investments. These models not only reduce the cost of access but also empower communities through co-ownership and capacity-building. Therefore, despite prevailing barriers such as limited connectivity, inadequate funding, and sociocultural resistance, these multi-stakeholder strategies offer a viable path toward more equitable and inclusive ICT education.

7. CONCLUSION
In a nutshell, visually impaired secondary students in Cameroon remain significantly underserved by current ICT education initiatives. This continued marginalization stems from a confluence of vague policy frameworks, pedagogical approaches ill-suited to the needs of visually impaired students, and widespread infrastructural deficits, including a lack of accessible digital tools and assistive technologies. Despite the global shift toward inclusive education, Cameroon's progress has been hindered by fragmented implementation strategies and insufficient teacher pre and in-service training in adaptive ICT methodologies. To bridge these persistent gaps, a multi-pronged and integrated strategy is urgently required. This should begin with comprehensive policy reform that explicitly addresses the rights and needs of visually impaired learners within national ICT and inclusive education policies. Concurrently, there must be targeted investment in both human and material resources such as capacity-building/development programs for educators in inclusive pedagogies, procurement of assistive technologies like screen readers and Braille displays, and the development of accessible digital content. Moreover, fostering collaborative governance involving government agencies, civil society organizations, the private sector, and organizations of persons with disabilities (OPDs) is

critical for ensuring accountability, resource mobilization, and effective implementation. If Cameroon is to make meaningful progress toward achieving its inclusive education goals and fulfill its international commitments under the United Nations Convention on the Rights of Persons with Disabilities (CRPD), a systemic transformation in ICT education is not merely desirable, it is imperative. The assurance that no learner is left behind in the digital era—regardless of their specific needs—can only be achieved through the inclusive execution of policies and the effective mobilization of both domestic and international resources.

REFERENCES

[1] Ahmed, S., & Idris, S. (2022). The role of assistive technology in inclusive education for visually impaired learners: A case study approach. International Journal of Inclusive Education, 26(12), 1389–1405. https://doi.org/10.1080/13603116.2021.1890815

[2] Ainscow, M., & Miles, S. (2021). Transforming education: A whole-system approach to inclusive education. Routledge.

[3] Alfassi, M., & Weiss, I. (2022). Empowering visually impaired students through ICT: A study of autonomy and learning outcomes. Journal of Special Education Technology, 37(1), 55–67.

[4] Alam, M. J., & Imran, M. (2022). Digital technologies and inclusive education: Reducing inequality among learners with disabilities. International Journal of Educational Technology, 18(3), 123–135.

[5] Chikowore, T., & Sibanda, L. (2023). Barriers to digital content accessibility for visually impaired learners in Sub-Saharan Africa. International Journal of Inclusive Education, 27(4), 456–472.

[6] Dube, B., & Hlalele, D. (2023). Policy gaps in inclusive education: Lessons from technology integration in rural schools. South African Journal of Education, 43(1), 1–11. https://doi.org/10.15700/saje.v43n1a2154

[7] EASNIE. (2022). Policy Guidelines on Inclusive Education Systems. European Agency for Special Needs and Inclusive Education.

[8] Engozo'o Y. R. (2024). The Education System and the Development of Skills for the Digital Economy: A Case Study of Secondary School Graduates in Cameroon. [Unpublished doctoral thesis]. The University of Yaounde I.

[9] Engozo'o Y. R., Fozing I. & Mutia R. (2023). Critical Issues in Developing Skills for the Digital Economy: The State of Policy in the Ministry of Secondary Education in Cameroon. American Journal of Educational Research, vol. 11, no. 6 (2023): 372-380.

[10] Fokunang, C. N., et al. (2022). Barriers to ICT adoption for inclusive education in sub-Saharan Africa: A case study from Cameroon. International Journal of Inclusive Education, 26(11), 1203–1217.

[11] Fonyuy, K. E., & Tchamabe, T. M. (2023). Inclusive digital education: Gaps and prospects in Cameroon's policy landscape. International Review of Inclusive Education, 18(3), 117–132.

[12] Khan, N., & Ahmed, S. (2023). ICT integration in inclusive education: A pathway to equitable learning for students with disabilities. Education and Information Technologies, 28(1), 1123–1141.

[13] Mbiatem, T. L., Mbuh, R. N., & Ngwa, S. P. (2023). ICT policy implementation and inclusive education in Cameroon: A critical assessment. Journal of African Education Research, 15(2), 44–60.

[14] Ministry of Economy, Planning and Regional Development. (2024). National policy of inclusive education in Cameroon. Ministry of Economy, Planning and Regional Development. https://www.minedub.gov.cm/national_policy_inclusive_education.pdf

[15] Ministry of Economy, Planning and Regional Development. (2024). Education/Training Sector Strategy.

[16] Mtegha, H., Chikopela, A., & Banda, T. (2023). ICT in inclusive education: A critical review of recent trends and future directions in sub-Saharan Africa. Journal of Special Needs and Technology, 5(2), 45–60.

[17] Mwangi, P. K., & Mbugua, Z. (2023). Adaptive learning technologies for visually impaired students in developing countries: Opportunities and challenges. Journal of Disability and Education, 15(1), 45–60.

[18] Nguyen, L. T., et al. (2021). ICT as an equalizer for visually impaired learners: A review of current practices and future directions. Technology, Pedagogy and Education, 30(4), 451–468.

[19] Ncube, B., & Mhlanga, E. (2021). Assistive technology and academic achievement among learners with visual impairment in inclusive settings. African Journal of Disability, 10(1), 1–9.

[20] Nkengafac, N., & Nlend, R. (2021). Teacher preparedness and pedagogical integration of ICT for visually impaired learners in Cameroon. Education and Information Technologies, 26(6), 7207–7225.

[21] Peters, S., Kiuppis, F., & Loreman, T. (2021). Inclusive education: System-level policy and practice. International Journal of Inclusive Education, 25(10), 1234–1251. https://doi.org/10.1080/13603116.2020.173 4326

[22] Rahman, F., Musa, H., & Idris, A. (2021). Teacher readiness and ICT use in inclusive classrooms: A case of visual impairment. Malaysian Journal of Learning and Instruction, 18(2), 123–140.

[23] Tambi, S. M., & Epo, B. N. (2022). Barriers to digital inclusion for learners with disabilities in Cameroon's secondary schools. African Journal of ICT in Education, 10(1), 21–35.

[24] Tambo, I., & Ebai, M. (2022). Challenges in accessing assistive ICT tools among visually impaired learners in Cameroon. Journal of Disability Policy Studies, 33(2), 145–154.

[25] Tchombe, T. M. S., & Ndongko, T. M. (2021). Défis de l'éducation inclusive en Afrique centrale : Le cas du Cameroun. African Education Review, 18(3), 345–360. https://doi.org/10.1080/18146627.2021.193 1558

[26] Tchouaket, E., Nya Bi, J. P., & Kamga, S. (2023). Challenges of implementing ICT policies in inclusive education in Cameroon. African Journal of Educational Research, 9(2), 87–102.

[27] UNESCO. (2020). Global education monitoring report 2020: Inclusion and education – All means all. UNESCO. https://unesdoc.unesco.org/ark:/48223/pf00 00373718

[28] Winzer, M., & Mazurek, K. (2012). Analyzing inclusive schooling for students with disabilities in international contexts: Outline of a model. Journal of the International Special Needs Education, 15(1), 12-23.