

AMERICAN UNIVERSITY OF BEIRUT

AN ANALYSIS OF GHANA'S NATIONAL ICT POLICY IN  
EDUCATION

by  
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# ABSTRACT

## OF THE PROJECT OF

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This study offers a comprehensive analysis of Ghana's National Implementation Guidelines for ICT in Education using Walt and Gilson's Policy Triangle Framework (context, content, actors, process). Motivated by Ghana's repeated policy reforms and the urgent need to translate policy ambition into classroom practice, the research synthesises national strategies, official guidelines, and recent empirical literature (2018–2025) to identify why implementation gaps persist despite pronounced political commitment.

Employing qualitative document analysis, the study interrogates how socio-economic factors, institutional arrangements, and stakeholder dynamics shape the translation of policy into practice. Findings show that the guidelines articulate clear objectives – including curriculum integration, teacher competency development, infrastructure provision, and monitoring mechanisms – and align with the 2018-2030 Education Strategic Plan and SDG targets.

However, the policy's execution is undermined by chronic funding shortfalls, heavy reliance on donor-funded pilots, uneven infrastructure (notably electricity and connectivity), and limited technical and pedagogical capacity among many teachers. Actor analysis reveals a complex multi-agency landscape (MoE, GES, NaCCA, NaSIA, NCA, GIFEC, CENDLOS and development partners such as UNESCO and the World Bank) where coordination remains weak; frontline implementers and communities frequently lack meaningful voice in design and feedback loops. Process analysis highlights a largely top-down adoption approach, ambitious national benchmarks, and phased rollouts that often fail to account for rural–urban disparities, resulting in uneven uptake and frequent underuse of supplied hardware.

The study concludes that achieving transformative and equitable ICT integration requires stronger alignment of policy content with contextual realities: sustained domestic financing and maintenance plans, targeted investments in teacher digital pedagogy and local IT support, robust M&E systems with public indicators, and deliberate equity measures prioritising rural and marginalised schools. Practical recommendations include institutionalising ICT budgets, formalising PPPs with clear sustainability clauses, embedding ICT competencies within teacher accreditation, and creating participatory feedback channels for schools and communities. By applying the Policy Triangle, this paper contributes both a diagnostic account of Ghana's ICT-in-education experience and a set of actionable reforms aimed at converting policy intent into inclusive, sustainable classroom practice.

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## ABBREVIATIONS

- AI** – Artificial Intelligence.
- CENDLOS** – Centre for National Distance Learning and Open Schooling.
- EMIS** – Education Management Information System.
- ESP** – Education Strategic Plan (2018–2030).
- GALOP** – Ghana Accountability for Learning Outcomes Project.
- GES** – Ghana Education Service.
- GES-MIS** – Ghana Education Service – Management Information System.
- GSS** – Ghana Statistical Service (GSS).
- GIFEC** – Ghana Investment Fund for Electronic Communications.
- KFIT** – Korea Funds-in-Trust (UNESCO KFIT support).
- LMS** – Learning Management System.
- M&E** – Monitoring & Evaluation.
- MoE** – Ministry of Education.
- NaCCA** – National Council for Curriculum and Assessment.
- NaSIA** – National Schools Inspectorate Authority.
- NCA** – National Communications Authority.
- NTC** – National Teaching Council.
- PPP(s)** – Public-Private Partnership(s).
- PTA** – Parent-Teacher Association.
- SDG(s)** – Sustainable Development Goal(s).
- UNESCO** – United Nations Educational, Scientific and Cultural Organisation.
- UNICEF** – United Nations Children’s Fund.
- GPE** – Global Partnership for Education.

# CHAPTER 1

## INTRODUCTION

### **Background of the Study**

Despite Ghana's ambitious ICT initiatives, few studies have examined whether these guidelines have translated into practice or identified remaining implementation gaps. By applying Walt and Gilson's (1994) Policy Triangle framework, this research links literature gaps to the policy's content, context, actors, and processes, providing a comprehensive analysis of where policy design may diverge from on-the-ground outcomes.

It is noted that Information and Communication Technologies (ICTs) have become fundamental to education worldwide. Digital innovations can complement and transform education, expanding access and improving quality to meet Sustainable Development Goal (SDG) 4 targets (UNESCO, 2024). For example, technology enables flexible learning, fosters collaboration among teachers and students, and supports distance education during crises (Ahmed & Opoku, 2021; World Bank, 2021). However, the COVID-19 pandemic exposed stark inequities. UNICEF (2020) found that about half of the children in many low-income countries did not receive remote education during school closures. AI-powered tools, such as adaptive learning platforms and intelligent tutors, offer additional opportunities to enhance learning personalisation and teacher support (Osondu et al., 2024).

Bridging these gaps requires intense political and policy action to improve infrastructure, teacher training, and education administration (World Bank, 2022). Establishing national ICT-in-education guidelines is therefore critical. UNESCO (2024) emphasises that countries need effective policies and master plans tailored to local needs,

primarily to support disadvantaged communities. Such policies provide roadmaps for integrating ICT into curricula, teacher development, and school resources. They can turn technology into an active participant in education rather than leaving it as isolated pilot projects (Ahmed & Opoku, 2021).

Ghana has proactively embraced digital education. In recent years, its leadership has prioritised 21st-century skills and ICT literacy (Ministry of Education, Ghana, 2024). A significant milestone was reached in 2023 when UNESCO helped Ghana create a National ICT Competency Framework for Teachers. This framework mandates integrating ICT skills into pre-service and in-service teacher training, acknowledging that all learners must build essential digital skills starting from well-prepared teachers (Abedi & Ametepey, 2025).

Ghana's Education Strategic Plan (ESP) 2018–2030 explicitly incorporates ICT. This plan aims to cultivate early digital skills in children, equip pre-tertiary learners with ICT competencies, infuse ICT into education management, and modernise teacher training through technology-based instruction (Ministry of Education, Ghana, 2019). Oteng et al. (2024) note that these ICTs in Education Reforms reflect Ghana's dedication to preparing students for a knowledge-driven economy and meeting global digital literacy demands.

### **Historical Context and Educational Overview in Ghana**

Ghana's education system has transformed significantly since independence in 1957. Under colonial rule, access to secondary and tertiary education was highly restricted (Wiafe, 2021). After independence, leaders like Kwame Nkrumah saw education as key to development and introduced policies such as free primary education (Amponash & Kyei-Blankson, 2021). Subsequent reforms continued expanding access.

In the 1990s, President Rawlings launched Free Compulsory Universal Basic Education (FCUBE) and policies like capitation grants and school feeding to boost attendance (Takyi et al., 2019; Amponash & Kyei-Blankson, 2021). The 1987 education overhaul introduced the Basic Education Certification Examination (BECE) and reorganised the system into a 6-3-3-4 (primary, junior, senior, tertiary) structure (Takyi et al., 2019).

In the 2000s and 2010s, Ghana achieved almost universal primary enrollment (approximately 95%) by abolishing tuition for primary and junior secondary school (Takyi et al., 2019; Wiafe, 2021). To improve secondary access, the 2017 Free Senior High School (SHS) policy removed fees for public SHS (building on President John Mahama's earlier progressively free" SHS program), meaningfully raising enrollment. However, this led to overcrowding, prompting the introduction of a Double Track system to accommodate the increase (Dwomoh et al., 2022).

Alongside access reforms, Ghana revamped its curriculum for the digital age. In 2019, the National Council for Curriculum and Assessment (NCCA) launched a new competency-based pre-tertiary curriculum emphasising digital skills. For the first time, computing and ICT literacy became mandatory subjects in basic education, and most subjects were redesigned around critical thinking and practical skills (Ministry of Education, Ghana, 2019). These curriculum changes align with strategic plans to equip students with creativity, collaboration, and problem-solving abilities needed in a digital economy.

### **Background of the ICT Policy and Guidelines**

Ghana's formal ICT-in-education policies date from the early 2000s. In 2003, the ICT for Accelerated Development (ICT4AD) initiative aimed to connect all schools to computers and the internet (Gunu et al., 2022; Ministry of Education, Ghana, 2019).

Building on this, a dedicated ICT in Education Policy was introduced in 2008, targeting basic ICT skills for graduates and promoting technology-driven teaching. Key strategies included upgrading teacher training colleges, providing basic ICT training for all teachers, and offering ICT as a subject at every education level (Ministry of Education, Ghana, 2019).

In 2015, Ghana updated its ICT policy with a more transparent structure. The new policy rested on three pillars: using ICT as a learning and operating tool; integrating ICT into teaching all subjects; and encouraging ICT as a career option (Ministry of Education, Ghana, 2019; Dwomoh et al., 2022). It also defined thematic areas such as infrastructure and equitable access, curriculum integration, content development, technical support, sustainability, and monitoring and evaluation (Ministry of Education, Ghana, 2019; UNESCO, 2023).

To implement these policies, the government launched programs like “One Teacher, One Laptop,” distributing laptops (with solar chargers) to teachers in primary, junior, and senior high schools (Abedi et al., 2023; Ministry of Education, Ghana, 2024). Wireless internet was installed in about 700 senior high schools and several teacher training colleges (Gunu et al., 2022; Abedi et al., 2023). Teachers were trained in ICT, including emergency remote teaching techniques during COVID-19 (Oteng et al., 2024). Ghana also developed an Open Educational Resources repository and platforms like iCampus and iBox to expand digital learning (UNESCO, 2024). Recently, Ghana began revising the 2015 policy and drafting legislation for the Centre for National Distance Learning and Open Schooling (CENDLOS), formalising distance learning structures (UNESCO, 2024; Ministry of Education, Ghana, 2024).

Despite these initiatives, evaluations show mixed results. Many schools still lack functioning equipment and internet (Ahmed & Opoku, 2021; UNESCO, 2023). Graduate digital literacy remains limited, and progress on SDG4 indicators (like youth ICT skills) falls short (UNICEF, 2020; Abedi & Ametepey, 2025). Although Ghana has invested and continues to invest in training and infrastructure, research indicates significant gaps in implementation (UNESCO, 2023). For example, the published strategic plan includes key performance indicators (KPIs) and an M&E framework (Ministry of Education, Ghana, 2019), but public reporting on ICT-specific progress is scarce (Jacobs Foundation, 2020; Yalley, 2022).

While outlined as an ambitious agenda in official documents, Ghana's ICT strategy reveals considerable practical shortcomings in its implementation. This discrepancy underscores the importance of thoroughly analysing the policy content and its execution. Employing the policy triangle framework will facilitate a nuanced examination of the interactions among the policy's context, content, and the actors involved, thereby identifying the underlying factors contributing to these implementation challenges. This approach is critical for fostering a more effective and responsive ICT policy in Ghana.

### **Objectives of the Study**

This research provides a comprehensive, policy-oriented analysis of Ghana's ICT in Education Implementation Guidelines using the Walt and Gilson (1994) Policy Triangle framework. Specifically, the study will:

1. **Examine** the political, economic, and social context that shapes Ghana's ICT in education agenda.

2. **Analyse** the content of the national ICT policy and guidelines – including their goals, strategies, and implementation plans – to assess how they address digital education objectives.
3. **Identify** and evaluate the roles and perspectives of key actors, including government and partners, in formulating and implementing the ICT guidelines.
4. **Assess** the effectiveness and impact of these guidelines in advancing ICT integration in teaching and learning.

By applying the policy triangle, this study will investigate how well the guidelines align with Ghana’s vision for digital skills and 21st-century learning, and what factors enable or hinder their implementation. Ultimately, it will highlight successes and gaps in Ghana’s approach and suggest improvements for making ICT integration more equitable, effective, and sustainable.

# CHAPTER 2

## LITERATURE REVIEW

### **Introduction**

This chapter reviews literature on ICT in education, focusing on Ghana’s national implementation guidelines and related policies through the Walt and Gilson (1994) policy triangle framework. It first outlines global and African trends in school ICT integration, emphasising how policy content typically includes elements like teacher training, infrastructure, and digital content. It then examines Ghana’s ICT-in-education policy evolution and strategies. The chapter analyses equity issues and the digital divide (urban–rural gaps, gender disparity, infrastructure) affecting ICT access and capacity and readiness (teacher training, devices, and curriculum integration). The discussion addresses sustainability and systemic challenges (funding, coordination, governance) for long-term ICT initiatives. Finally, the policy triangle framework is introduced and justified as the analytical lens. Key findings and gaps in the literature – including whether curriculum integration has been effectively implemented or remains largely aspirational – are highlighted to motivate the current study.

Importantly, this review distinguishes policy design (the written guidelines) from implementation (actual practice), since a policy’s ambitious goals may not materialise without effective execution.

### **Global and African Perspectives**

Globally, ICT is recognised as a catalyst for expanding and improving education. Internet access has grown considerably worldwide. UNESCO (2023) reports that global connectivity rose from 16% of the population in 2005 to 66% by 2022, and in 2022, about half of lower-secondary schools had internet. Massive Open Online Courses (MOOCs)

and mobile learning have also surged – by 2021, over 220 million learners had joined MOOCs (Celik & Cagiltay, 2024). ICT can lower costs and increase flexibility, benefiting disadvantaged learners through online and open resources (UNESCO, 2024). Besides, digital innovations can complement and transform education, expanding access and improving quality to meet SDG 4 targets (Manu et al., 2024). However, unequal access can worsen inequalities: poorer households and remote communities often lack devices and connectivity (Takyi et al., 2019; UNESCO, 2024). Digital tools offer new pedagogical methods, such as flipped classrooms, but may widen gaps without addressing equity.

In Sub-Saharan Africa, ICT for education is increasingly prioritised. Continental initiatives (African Union Education Strategy and UNESCO 2030 Agenda) stress national ICT policies, teacher training, and infrastructure to meet quality education goals (African Union, 2017; UNESCO, 2023). African ministries are encouraged to embed ICT in education reforms and align with global targets (UNESCO, 2023; African Union, 2017). Some countries have launched ICT policies (for example, Nigeria’s 2019 guidelines) focusing on teacher training, digital curriculum content, and distance learning (Cappelli & Abdeljalil, 2024).

However, challenges persist, and some of these challenges, including infrastructure deficits, limited teacher training, and weak funding, are common (Celik & Cagiltay, 2024). For example, Kayombo and Mlyakado (2015) found that in Tanzania, most teachers were unaware of the national ICT policy and that many schools had no electricity or computers. Similarly, Mushimiyimana et al. (2025) report that Rwanda’s substantial ICT investments improved teacher training and resource availability, but persistent issues like limited internet access and equipment maintenance continue to

impede full integration. UNESCO (2023) further notes that many African schools still lack basic ICT facilities and that Public-Private Partnerships (PPPs) remain underdeveloped. The analysis suggests that, despite a wealth of global evidence indicating that ICT can significantly broaden educational opportunities, African contexts continue to grapple with the pervasive digital divide. For instance, Tshukudu et al. (2023) find that teachers in Kenya, Nigeria, Botswana, and Uganda face far greater barriers to ICT resources and training than those in wealthier countries. This underscores ongoing capacity constraints across the region.

### **Ghana's ICT Policy Evolution**

Ghana has incorporated ICT in education through successive policies. The 2003 ICT4AD policy aimed to equip all schools and colleges with computers and internet access (Gunu et al., 2022). In 2008, Ghana launched its first ICT in Education Policy to ensure graduates had basic ICT skills and to promote technology-driven teaching (Ministry of Education, Ghana, 2019). Key strategies included upgrading teacher training colleges, providing basic ICT training for all teachers, and making ICT a formal subject at every level (Ministry of Education, Ghana, 2024).

Building on this, the 2015 ICT in Education Policy refined the strategy. It is organised around three pillars: (1) using ICT as a tool for learning and operations, (2) integrating ICT into teaching across all subjects, and (3) promoting ICT as a career option (Ministry of Education, Ghana, 2019; Dwomoh et al., 2022). The 2015 policy also defines thematic areas covering infrastructure and equitable access, curriculum integration, content development, sustainability/support, and monitoring and evaluation (Ministry of Education, Ghana, 2019; UNESCO, 2023). However, evidence suggests a gap. While these policies articulate strong content, implementation often lags due to funding and

capacity limits (Ussif, 2024; Kumi, 2020). This pattern – ambitious design but weak execution – has also been noted in other contexts (Jacobs Foundation, 2020; Ussif, 2024).

In 2018, the Ministry of Education (MoE) launched the 2018–2030 ESP, which explicitly includes ICT reform. It sets goals to develop early ICT interest and skills in children, equip pre-tertiary learners with ICT competencies, incorporate ICT into education management, and modernise teacher training via technology (Ministry of Education, Ghana, 2019). These policies align with Ghana’s broader development agenda and SDG commitments (Ministry of Education, Ghana, 2024).

Ghana has taken concrete steps to implement these policies. The “One Teacher, One Laptop” program provided laptops (and solar charging kits) to teachers in many schools (Abedi et al., 2023; Ministry of Education, Ghana, 2024). Wireless internet was installed in hundreds of senior high schools and several teacher training colleges (Gunu et al., 2022; Abedi et al., 2023). Nationwide teacher training workshops have built ICT skills, including emergency remote teaching training during COVID-19 (Oteng et al., 2024). Ghana also launched an Open Educational Resources repository and platforms like iCampus and iBox for digital content (UNESCO, 2024). Recent efforts include collaborating with UNESCO to revise the 2015 policy and prepare legislation for CENDLOS and the Centre for National Distance Learning, formalising distance learning structures (Ministry of Education, Ghana, 2024; UNESCO, 2024).

Regardless of these efforts, outcomes have been mixed. Many schools still lack working computers or internet (Ahmed & Opoku, 2021; UNESCO, 2023). Ghana’s education system shows limited digital literacy. For instance, UNICEF (2020) reports that many targets related to ICT skills are unmet. While Ghana invests in training and infrastructure, research reveals considerable implementation gaps (UNESCO, 2023;

Celik & Cagiltay, 2024). For example, although the ESP mentions key performance indicators (Ministry of Education, Ghana, 2019), the Jacobs Foundation (2020) notes a lack of publicly available ICT-specific data.

In conclusion, Ghana's approach combines phased programs and quantifiable targets on paper, but resource constraints and monitoring shortfalls hinder full realisation of policy goals (Jacobs Foundation, 2020; Celik & Cagiltay, 2024). This highlights the importance of analysing not only policy content but also how guidelines are executed in practice, justifying the use of the policy triangle to examine context, content, and actors (Walt & Gilson, 1994).

### **Equity, Access, and the Digital Divide**

A significant theme in the literature is Ghana's digital divide. There are stark disparities between urban and rural schools, and between school levels and social groups (Takyi et al., 2019). For infrastructure, national surveys show only about 25% of primary schools have electricity versus 78.6% of senior high schools (Baako et al., 2023). Similarly, only 8.4% of primary schools and 18.7% of junior highs have internet access for teaching, compared to 39.4% of senior highs (UNESCO, 2024). Fewer than 4% of primary schools have computers for teaching (UNESCO, 2023). These numbers reveal an urban and level bias: better-resourced urban and secondary schools are much more likely to have ICT facilities, while rural and basic schools are underserved. As a result, UNESCO (2023) and Takyi et al. (2019) emphasise that Ghana's rural–urban inequities in devices, electricity, and connectivity are growing and must be addressed appropriately.

Gender is another important factor to consider. According to the Ghana Statistical Service (2019), national survey data reveal that overall digital literacy in Ghana remains low. Approximately 21.1% of the population possesses ICT skills, with women falling

behind. This literacy is not evenly distributed; urban residents exhibit much greater ICT capabilities than those in rural areas (30.5% compared to 10.5%, according to the Ghana Living Standards Survey Round Seven). Furthermore, men are significantly more likely than women to have ICT skills, with 27.8% of men possessing these skills versus only 15.0% of women, as reported.

These gender disparities reflect broader inequalities. UNESCO (2024) highlights a persistent gender digital gap in Africa, noting that fewer women are enrolling in STEM and ICT education, which hampers the development of an inclusive digital economy. In Ghana, initiatives like "Girls in ICT" aim to encourage girls to learn programming and engage in technology projects (Sarpong, 2023). However, significant disparities still exist in this area (Takyi et al., 2019). The literature consistently indicates that girls and women often have fewer ICT resources and opportunities. This underscores the need for targeted measures to ensure equitable access to ICT across genders.

Importantly, the availability of technology alone does not ensure equity. Students in under-resourced schools cannot benefit from online resources or virtual instruction when they lack access to electricity or devices (Baako et al., 2023; Cappelli & Abdeljalil, 2024). UNESCO's global report highlights that while ICT can potentially reduce barriers for disadvantaged learners, it also warns that the poorest and most remote students often have the least access to essential devices and connectivity (UNESCO, 2024). In corroboration, the Jacobs Foundation (2020) notes that rural learners and girls frequently fall behind in their use of ICT in Ghana. Sarpong (2023) also notes that specific policies prohibit mobile phones in schools, despite nearly 97% of urban households – and many rural ones – owning these devices. This contradiction hampers students' ability to leverage a widely available technology for learning.

In conclusion, the existing literature suggests that the objectives of Ghana's ICT policy, specifically those aimed at fostering inclusive access to digital education, have not been fully achieved. Considerable disparities rooted in geographic location, gender, and socio-economic status obstruct equitable access to these crucial educational resources.

### **Capacity, Infrastructure, and Curriculum Readiness**

The question of capacity and readiness in the education system is closely related to access (Wiafe, 2021). This includes the preparedness of teachers, the availability of infrastructure and devices, and the integration of ICT into curriculum and pedagogy.

Wiafe (2021) and Lomo et al. (2024) underscore the importance of training teachers to enhance their ICT capacity. The 2008 ICT Policy called for improvements in teacher training colleges and mandated basic ICT training for all in-service teachers (Gunu et al., 2022). In practice, Ghana has organised workshops and courses to develop ICT skills, including emergency remote teaching initiatives during COVID-19 (UNESCO, 2022). However, many teachers still feel unprepared. For example, Aidoo and Chebure (2024) postulate that Ghanaian teacher educators struggled with technical and infrastructural support, leading to low competence in online teaching management. Besides, Lomo et al. (2024) note that numerous educators lack the confidence and skills to effectively integrate computers into their lessons. Similarly, Gunu et al. (2022) find that many basic schoolteachers primarily use ICT for administrative tasks rather than interactive teaching, even after receiving laptops and training. This indicates teacher readiness varies widely and often falls short of ICT integration goals (Abedi & Ametepey, 2025). For example, Aidoo and Chebure (2024) found that Ghanaian teacher educators quickly embraced online teaching during the COVID-19 pandemic, but persistent

technical and infrastructural limitations (such as unreliable internet) undermined their effectiveness. Many Ghanaian educators revert to traditional methods even when technology is available (Abedi & Ametepey, 2025).

Device availability beyond basic access is also limited. Government programs have provided computers, laptops, and solar kits (Lomo et al., 2024), and GIFEC has funded rural connectivity projects (Ministry of Education, Ghana, 2019). However, student-to-computer ratios remain high, and many devices fail without repairs (Anaman et al., 2022). Programs like GALOP and iBox have delivered tech to disadvantaged schools (UNESCO, 2024; Ministry of Education, Ghana, 2024), but the infrastructure is still inadequate overall. Many primary schools have no computers, and even equipped schools face frequent power outages and slow internet, hampering readiness (Anaman et al., 2022).

Ghana has made progress in curriculum readiness. The GES and the NaCCA have developed computing syllabi for primary (Basic 4–6) and secondary levels, treating ICT as a fundamental subject (Ministry of Education, Ghana, 2024). The 2015 ICT policy names curriculum integration a key area (UNESCO, 2023). In core courses, schools are urged to teach basic ICT skills (including typing and internet use). However, literature reports that actual implementation often falls short. Limited resources and insufficient training hinder effective computing instruction, so ICT is rarely taught comprehensively (Anaman et al., 2022; Lomo et al., 2024; Sarpong, 2023). Many students only encounter ICT through infrequent lab sessions or demonstrations, rather than regular classroom integration (Sarpong, 2023; Africa Education Watch, 2025). Thus, although Ghana's curricula include digital literacy frameworks, execution is inconsistent across schools due to practical limitations.

## **Sustainability and Systemic Challenges**

Long-term sustainability of ICT initiatives has been difficult. A recurring issue is funding. Ghana's education budget is large, but ICT funding is project-based and short-term (Baako et al., 2023). Many programs rely on external donations or corporate support (World Bank, 2021; Kumi, 2020). Lomo et al. (2024) point out that some schools struggle to finance basic ICT maintenance. Consequently, once initial grants end, projects often falter. A World Bank survey warned that, although Ghana's policies are strong on paper, sustainability is a significant concern, with schools unable to cover even minimal maintenance costs (World Bank, 2021). Ghana's ICT levy (introduced in 2019) has struggled to generate sufficient funds (Ussif, 2024; Kumi, 2020).

Coordination and governance challenges also persist. Multiple agencies oversee ICT in education (MoE, GES, NITA, GIFEC), but historically, their cooperation has been weak (Amponash & Kyei-Blankson, 2021). The World Bank (2021) noted poor collaboration between the Education Ministry and agencies and limited private sector partnerships. New administrations often re-prioritise programs, undermining continuity (Levy, 2022). For example, the Free SHS initiative was expanded by one government and later restructured by another, illustrating how flagship reforms can shift with politics. These governance issues mean even well-designed guidelines may not be systematically followed.

On the positive side, some policy continuity exists. The ESP and ICT policies have largely persisted across administrations, with governments opting to revise rather than scrap them. UNESCO (2023) reports active government efforts to revise the 2015 ICT policy and to formalise distance learning via the CENDLOS Act. This suggests a commitment to sustaining ICT initiatives through stronger legal frameworks. However,

contradictions remain: Ghana's policies stress transparency and clear procedures (Ministry of Education, Ghana, 2019), yet reports have found little assessment of how well these procedures are enforced (Jacobs Foundation, 2020).

In conclusion, the literature portrays Ghana's ICT-in-education reforms as well-intentioned but hampered by systemic obstacles. Fragmented funding, inconsistent administration, and capacity limitations hinder long-term impact (Lomo et al., 2024; Baako et al., 2023). For instance, ICT-driven projects like the Eneza SMS tutoring service have expanded access but depend heavily on donor backing (Aidoo & Chebure, 2024). Although policy documents emphasise sustainability and monitoring (UNESCO, 2023; World Bank, 2021), reviewers argue that significantly more effort is needed to integrate ICT into Ghana's education system financially and institutionally sustainably (Ussif, 2024; Levy, 2022). These insights highlight the importance of analysing Ghana's guidelines not just as documents, but in light of context, actors, and processes.

### **Theoretical Framework: Policy Analysis Triangle**

This study adopts the Walt and Gilson (1994) Policy Analysis Triangle to examine Ghana's ICT implementation guidelines. The Policy Triangle breaks policy into four interrelated elements: **context** (political, economic, and social environment), **content** (the actual policy design and guidelines), **actors** (stakeholders involved), and **process** (how the policy is developed and implemented). Walt and Gilson (1994) argue that practical policy analysis requires looking at all four facets, rather than focusing only on written policy content. The framework is appropriate here for several reasons.

First, integrating ICT in education is inherently multi-dimensional. Its success depends on contextual factors (for example, Ghana's national priorities and economic situation), on the policy's content (specific standards, curricula, and resource allocations),

on key actors (government ministries, teachers, donors, communities), and implementation processes (training programs, pilot projects, regulations). The Policy Triangle provides a comprehensive lens to capture these dynamics.

Second, this framework has been widely applied in education and health policy studies, including Ghana (Sodi et al., 2021). For example, Opoku (2025) used it to analyse Ghana's Free SHS policy, illustrating how politics and stakeholder interactions shaped outcomes. This track record supports its suitability for complex educational reforms.

Third, by requiring consideration of context (for instance, Ghana's socio-political climate and SDG commitments) and actors (for example, MoE, UNESCO, school communities) along with content, the Policy Triangle aligns with this study's aim to understand not just what the ICT guidelines say, but why they were formulated and how they are carried out.

In conclusion, the Policy Triangle provides a rigorous framework to analyse Ghana's ICT-in-education guidelines from multiple angles.

### **Summary and Conclusion of Literature Review**

The literature review highlights several key themes. Internationally, ICT is recognised as a critical tool for improving education access and quality, in line with SDG4 on inclusive learning (World Bank, 2021; African Union, 2017; Cappelli & Abdeljalil, 2024). Ghana has taken proactive steps, introducing national ICT policies in 2003, 2008, and 2015 that articulate ambitious visions for digital education (Ministry of Education, Ghana, 2019). These policies aim to integrate ICT across the curriculum and boost digital literacy. Initiatives such as providing laptops to teachers, expanding connectivity, and running ICT training programs have been launched to support implementation (Yidana, 2018).

Nonetheless, the literature also reveals persistent gaps and contradictions. Ghana's digital divide is profound: many rural schools still lack electricity, internet, or computers, while urban schools are better equipped (Anaman et al., 2022). Women have far fewer ICT skills than men (Ghana Statistical Service, 2019). Teacher capacity is uneven, with many educators lacking sufficient training to use ICT effectively (Abedi et al., 2023; Lomo et al., 2024). Funding and coordination issues limit the reach of ICT programs (Ussif, 2024; Levy, 2022). These challenges suggest that while Ghana's policies are forward-looking and aligned with educational goals, actual implementation lags. The identified contradictions and gaps in the literature motivate the current study to apply the policy triangle framework for a detailed analysis.

## CHAPTER 3

### ANALYSIS OF THE NATIONAL GUIDELINES

#### **Introduction**

This chapter analyses Ghana’s National Implementation Guidelines for ICT in Education using the Policy Triangle Framework (content, context, actors, process). It examines the political, economic, social, and educational environments that shape ICT policy, dissects the ICT guidelines’ substance, maps the key actors involved, and traces the policy development and implementation processes. The analysis draws on recent (2018–2025) secondary literature and official documents, ensuring that up-to-date scholarly or governmental sources support each thematic finding. We explicitly highlight where the guidelines’ provisions align or conflict with actual implementation. This analysis explicitly highlights contradictions between the policy content and implementation realities. The focus is on how well the guidelines’ provisions and implementation strategies align with Ghana’s stated commitments and capacities, identifying strengths and gaps.

#### **Context Analysis**

Context analysis examines the broader environment in which ICT-in-education guidelines were formulated. It highlights political commitment, economic resources, and social-educational readiness, per the policy triangle’s “context” dimension.

#### ***Political Context***

Ghana’s political leadership consistently affirms the importance of ICT in education (Levy, 2022). The 2018–2030 ESP, approved in 2018, explicitly lists ICT as a strategic reform area and aligns it with national development goals and global SDGs (Ministry of Education, Ghana, 2019; Asare et al., 2023). However, the ESP notes limited

resources and calls for prioritising policies that impact learning and equity most (Ministry of Education, Ghana, 2024). This implies that ICT initiatives must compete with other pressing needs, such as reducing teacher absenteeism (Asare et al., 2023). Nonetheless, the government has incorporated ICT objectives into key frameworks. For example, the 2019 ICT in Education Policy and the Digital Learning Strategy underscore ICT's role in teaching, learning, and literacy (Asare et al., 2023; Ministry of Education, Ghana, 2024).

Regionally, Ghana actively participates in African ICT and education initiatives (African Union, 2017). National leaders emphasise ICT skills as essential; the education minister stated that ICT competencies are “no longer optional” (UNESCO, 2023). Ghana's strategies consistently highlight ICT competence as a priority. However, Ghana's multi-party system and frequent administrative changes can disrupt continuity (Levy, 2022). At the same time, programs like UNESCO-KFIT (2022–2023) indicate renewed ministerial commitment to ICT education, competing priorities and limited budgets often temper sustained support (Ussif, 2024).

The findings indicate that Ghana's political environment is predominantly conducive to integrating ICT in educational settings. However, the practical execution of these initiatives may be inconsistent due to limited resources and the shifting priorities accompanying government leadership changes.

### ***Economic Context***

Funding and affordability shape ICT implementation. Ghana's education budget is constrained, with only a small share for ICT initiatives (Ussif, 2024). Major ICT projects have depended heavily on donors. For example, the Ghana Accountability for Learning Outcomes Project (GALOP, 2020–2024) received about \$150 million from the World Bank and IDA, while the government contributed roughly \$4.5 million (World

Bank, 2021). UNESCO (2024) notes that Ghana’s ICT teacher competency framework was developed with UNESCO-KFIT grant support. These external funds have enabled ambitious pilot programs – GALOP delivered online lessons to 4.45 million students and launched a national Learning Management System (LMS) (Gunu et al., 2022). However, reliance on donor funding poses sustainability risks if support declines.

Domestic affordability of ICT is low. Only 7.9% of Ghanaians age five and older own a computer, and 16.8% of households have internet (Ghana Statistical Service, 2019). Mobile network coverage remains uneven, especially in rural areas, and fewer than 40% of rural residents own mobile phones (Ghana Statistical Service, 2019). High devices, data, and electricity costs in poor regions limit school ICT use. The government has allocated some of the budget to ICT (for example, laptops for science teachers and school computer labs), often supplemented by donors (Kumi, 2020). The ESP forecasts modest increases in ICT capital spending, but ambitious goals (like one computer per teacher) remain largely unmet (World Bank, 2022).

Evidence suggests that while Ghana has secured significant external support for educational ICT (for instance, e-learning content creation), tight national budgets mean affordability is an ongoing concern. This financial squeeze raises doubts about sustaining ICT programs, especially if foreign aid diminishes.

### ***Social and Educational Context***

Ghana’s population has low digital literacy, with just 39.7% of adults showing basic internet awareness (Ghana Statistical Service, 2019). There is a marked urban-rural divide: 51.6% of urban adults are internet-aware, versus 27.4% in rural areas (Ghana Statistical Service, 2019). Consequently, digital readiness varies significantly by region. In Greater Accra and Kumasi, youths have far more ICT exposure than their peers in

remote regions with limited connectivity. For example, over 60% of adults in Greater Accra own mobile phones, compared to about 36% in the Upper West (Ghana Statistical Service, 2019; Jacobs Foundation, 2020). Mobile money use reflects similar gaps. These figures highlight a significant regional digital divide.

Cultural attitudes also influence ICT uptake. While Ghanaians value education, many teachers and parents are cautious about new technologies (Abedi et al., 2023). Research shows mixed attitudes: some teachers enthusiastically embrace ICT to modernise teaching, while others are wary or unprepared (Abedi & Ametepey, 2025; Asare et al., 2023). Parental attitudes vary by community.

Evidence suggests that the social context in Ghana, characterised by a low baseline of digital skills and a prudent approach towards technology, presents notable challenges in equipping both students and educators to utilise ICT effectively. This environment necessitates targeted interventions to enhance digital literacy and foster a culture of technological receptiveness within educational settings.

### **Content Analysis**

This section examines the substance of Ghana's ICT-in-Education Implementation Guidelines, focusing on their main provisions, strategies, and any gaps or ambiguities.

#### ***Key Provisions of the ICT Implementation Guideline***

The guidelines cover several priority areas common to ICT education plans. They emphasise teacher training, infrastructure development, ICT integration in curricula, and monitoring systems. Ghana's national plans support this framework: for example, the ESP, ICT Policy, and Digital Strategy all highlight building ICT infrastructure and training teachers as fundamental pillars (Ministry of Education, Ghana, 2019). Academic

reviews note that schools urgently need computers and internet access and that all teachers should receive ICT skills training (Ahmed & Opoku, 2021). The 2019 ICT Policy explicitly includes strategies for equitable ICT access, teacher ICT competency training, and curriculum integration (Ministry of Education, Ghana, 2019). The 2020 Digital Education Transformation Initiative even pledged free laptops for teachers and established school ICT labs (Asare et al., 2023).

At the school level, the guidelines specify roles for administrators, teachers, and parents. The National Schools Inspectorate Authority's (NaSIA) E-Learning Guidelines (2020) state that school heads should create e-learning schedules and form ICT teams, while teachers must master basic software (Word, Excel, PowerPoint) and plan online lessons. Parents are encouraged to foster supportive home environments for e-learning (Sarpong, 2023). Infrastructure requirements include providing e-learning teachers with laptops, modems, and data. Curricula are mandated to include computing subjects. The National Curriculum Council has made ICT a core subject from primary through senior high, aligning all subjects with digital content (Ministry of Education, Ghana, 2024). Ghana has developed a national ICT Competency Framework for Teachers, guiding teacher training programs toward specific digital skill levels (UNESCO, 2023; Sarpong, 2023).

The guidelines also include monitoring features. Schools are required to track ICT activities: for example, e-learning plans and lesson logs must be submitted to inspectors (NaSIA, 2020; Ministry of Education, Ghana, 2024). Continuous assessment using digital formats is encouraged. However, standardised ICT indicators are limited.

From these provisions, evidence suggests that the guideline content addresses extensive teacher training (both pre-service and in-service), hardware and network

provisioning, an ICT-integrated curriculum, and some progress-tracking. These elements align with national strategies: for instance, the ESP incorporates KPIs for ICT, such as student-to-computer ratios and curriculum coverage (Ministry of Education, Ghana, 2019).

### ***Implementation Strategies and Benchmarks***

The guidelines outline a phased, target-driven approach. The ESP's Medium-Term Plan (2018–2021) set incremental ICT targets (Ministry of Education, Ghana, 2019). The Digital Learning Strategy (2018–2023) similarly defined five-year targets with annual milestones, like the percentage of connected schools or digital lessons created (Asare et al., 2023). Ghana has rolled out ICT initiatives in stages: early pilots (often donor-funded) paved the way for national scaling. For example, the World Bank's (2022) GALOP launched remote learning content and an LMS in 2020, trained 70,000 teachers by early 2021, and supported a back-to-school campaign. This sequence reflects the guidelines' emphasis on phased implementation and capacity building.

The ESP dedicates a chapter to “Key Performance Indicators” for each education sub-sector (Ministry of Education, Ghana, 2024). The Ministry uses indicators like student-computer ratios and the percentage of ICT-trained teachers to assess progress. In the ICT context, official targets included 100% of senior high schools offering e-learning by 2022 and 100% of teachers trained by 2025 (Sarpong, 2023). While detailed targets are often internal, some progress is reported: by mid-2021, the government noted over 10,000 schools registered on the Edmodo LMS, with 35,000 students and 70,000 teachers using it (World Bank, 2022). These figures, from GALOP reports, serve as de facto benchmarks of ICT tool usage. UNESCO (2023) reports that about 2,000 teachers

completed emergency remote teaching training and that an ICT competency framework was produced, providing clear markers of capacity building.

However, many of these targets proved overly ambitious given existing resources. Plans aimed to train tens of thousands of teachers (World Bank, 2022; UNESCO, 2023), but execution has been spotty (Celik & Cagiltay, 2024). The ESP references a monitoring framework (Ministry of Education, Ghana, 2019), yet the Jacobs Foundation (2020) reports little public ICT indicator data. This mismatch illustrates a contradiction between policy ambition and practical progress: significant targets were set but not systematically tracked or achieved.

The analysis suggests that the implementation of ICT in Ghana is characterised by a phased program approach, frequently guided by external donors, along with the establishment of quantitative benchmarks. However, a notable challenge persists in the realistic pacing and monitoring of these targets, which complicates the efficacy of the overall implementation strategy.

### ***Gaps and Ambiguities***

While comprehensive in scope, the guidelines contain notable gaps. A key concern is overdependence on external funding. Many initiatives assume continued donor support for hardware, connectivity, and training (Kumi, 2020). For instance, guidelines focus on distributing free tablets and using online platforms, but lack clarity on how government budgets will sustain these once grants expire (Kumi, 2020). This funding gap is a vulnerability for sustainability.

Enforcement is another gap. The guidelines assign roles but rarely specify enforcement mechanisms. The e-learning guide, for example, requires lesson plans to be submitted to inspectors (Ministry of Education, Ghana, 2024), but does not outline

consequences for non-compliance. NaSIA focuses on overall teaching quality, with no specific ICT audit checklist. UNESCO (2024) finds that despite emphasising training and infrastructure, challenges persist across schools, suggesting that policy intent is not fully realised.

Some content is vague or broad. The guidelines call for curriculum integration of ICT but do not specify which subjects or provide a model digital content. Infrastructure goals mention device distribution but ignore issues like maintenance funding or off-grid power (World Bank, 2022). They promote “dashboards” and ICT metrics, yet concrete indicators are undefined. For example, no public numeric targets for internet access rates or student-computer ratios make stakeholder accountability difficult (Sarpong, 2023).

In conclusion, while Ghana’s ICT guidelines embody an aspirational vision, they fail to provide the practical details necessary for effective implementation. The guidelines exhibit a considerable dependence on the continuity of donor support and notably lack explicit enforcement mechanisms to ensure compliance. Scholars have observed that the educational policies in Ghana often demonstrate a similar pattern: characterised by ambitious goals yet deficient in enforceability (Kumi, 2020; Levy, 2022). This dissonance between the policy framework and the mechanism for its execution raises concerns regarding the potential outcomes. The analysis of the relevant actors and processes further elucidate these challenges.

### **Actors Analysis**

This section identifies and discusses the leading actors involved in Ghana’s ICT-in-education agenda, their roles, and interactions, following the policy triangle’s “actors” dimension.

### ***Government and Agencies***

The Ministry of Education (MoE) is the central policymaker. It develops strategies (ESP, ICT policies) and sets national ICT goals (Ministry of Education, Ghana, 2019). The MoE's directorates – such as Curriculum Research and Planning – integrate ICT into curricula and allocate budgets. Education officials, including the Minister, publicly champion ICT programs (Dwomoh et al., 2022).

The Ghana Education Service (GES) is the operational arm implementing MoE policies across schools. GES oversees teacher in-service training, issues deployment guidelines, and manages ICT labs. It has an ICT Unit that is responsible for networking and data collection. GES also launched the GES-MIS Dashboard, a digital system for monitoring school data (Ministry of Education, Ghana, 2019). The NaSIA inspects schools: its e-learning guidelines require schools to submit e-learning plans and timetables (Ministry of Education, Ghana, 2024). Thus, although it has limited enforcement power, NaSIA links policy with classroom practice.

Other education-related agencies include the CENDLOS, under the MoE/GES. CENDLOS manages distance and open schooling, creating and distributing digital content. It played a significant role in developing the teacher ICT competency framework (UNESCO, 2023). CENDLOS also oversees radio and TV e-learning (e.g., Ghana Learning TV for remote learners) (Sarpong, 2023).

Though not an education agency, the National Communications Authority (NCA) is important in ICT and education implementation activities. As the telecom regulator, the NCA conducts ICT surveys (like the 2019 Household ICT survey with the GSS) and sets connectivity standards. Its work affects school connectivity by shaping network quality and broadband plans (Ghana Statistical Service, 2019).

Other governmental agencies include the National Council for Curriculum and Assessment (NaCCA), which regulates pre-tertiary curriculum and has integrated ICT into it. NaCCA also helped develop the ICT competency framework (UNESCO, 2023). The National Teaching Council (NTC) accredits teacher education and is beginning to include ICT standards for teacher licensing (UNESCO, 2023). District Assemblies and local education offices collaborate with GES to implement ICT at the school level; they can fund minor ICT projects and engage the community (Ussif, 2024). Lastly, the Ministry of Communications, Digital Technologies and Innovations coordinates the national ICT infrastructure, such as broadband. Although not specific to education, it works with the MoE and NCA to ensure educational ICT needs align with national ICT policy (Jacobs Foundation, 2020).

Ghana's government network forms an interconnected system: MoE sets policy, GES implements it in schools, and regulators like the NCA ensure technical infrastructure. Recent UNESCO-supported projects have drawn multiple agencies (MoE, GES, NaCCA, NTC, CENDLOS) into joint task forces (UNESCO, 2023; Asare et al., 2023). This multi-agency collaboration can improve coherence, though effective coordination remains challenging.

### ***Development Partners and NGOs***

The World Bank is a significant funder and advisor. It finances ICT tools and e-learning (for example, through GALOP) and engages in policy dialogue, including supporting ESP formulation (World Bank, 2022). Its research and reports help Ghana identify ICT gaps (Levy, 2022). UNESCO is also active in policy development and capacity building. In 2023, UNESCO helped create the ICT Competency Framework for Teachers. It also runs training programs (like emergency remote teaching courses) and

provides educational resources and country profiles that influence Ghana's standards (UNESCO, 2024).

UNICEF focuses on children's access and equity. While not central to ICT policy, UNICEF Ghana supported educational radio and TV broadcasts during COVID-19 (Sarpong, 2023) and piloted school digital literacy programs (UNICEF, 2020). For instance, UNICEF helped establish community tech centres and youth digital skills training (UNICEF, 2020). The Global Partnership for Education (GPE) has also co-financed Ghana's education sector plans, including the ICT components of GALOP (World Bank, 2022), and it strengthens planning and monitoring capacity through the MoE.

Local NGOs and civil society work primarily at the community level. They pilot ICT projects that may later scale up under national guidelines (Kumi, 2020). Education NGOs and teacher unions, such as the Ghana National Association of Teachers (GNAT), participate in policy consultations and advocate for ICT training, though their technical input varies (Yidana, 2018; Jacobs Foundation, 2020).

### ***Teachers, Students, and Communities***

Teachers are both implementers and targets of ICT policy. By late 2023, UNESCO (2024) reported that about 2,000 Ghanaian teachers completed emergency remote teaching training and had the ICT framework integrated into their training. However, many teachers still lack confidence with ICT (Asare et al., 2023; Abedi et al., 2023). Teacher unions often press for more professional development while noting increased workloads (Lomo et al., 2024). The guidelines expect teachers to adopt blended ICT pedagogy, but surveys show mixed readiness: some embrace it, while others struggle without adequate support (Abedi et al., 2023; Gunu et al., 2022). Thus, Teacher readiness

emerges as a crucial theme: guidelines presuppose that teachers will integrate technology, but evidence indicates that many teachers feel overwhelmed by new tools and lack sufficient training to use them effectively. Engaging teachers entirely in the process is essential for success.

Students (learners) are the ultimate beneficiaries of ICT in education. Their digital skills depend on home and school resources. Urban students often have home internet, whereas some rural students have never used a computer (Ghana Statistical Service, 2019). During COVID-19, Ghana broadcast lessons on TV and radio to reach students without internet; about 975 out of 1,201 TV lessons were also available online (World Bank, 2022). However, there is limited systematic feedback from students on ICT use. Some districts collect data through the Education Management Information System (EMIS), but there is no comprehensive survey of student attitudes toward ICT (Anaman et al., 2022). Community engagement is called for in e-learning guidelines, but in practice, many parents (especially in poor areas) lack digital literacy to support their children (Lomo et al., 2024).

Parents and communities are indirect stakeholders. The e-learning guidelines allow parents to create quiet home learning spaces with internet access (Ministry of Education, Ghana, 2019). In reality, the capacity of parent-teacher associations (PTAs) varies widely: urban PTAs may fund school ICT projects, whereas rural communities often lack resources (Anaman et al., 2022; Lomo et al., 2024). Formal feedback channels from communities to policymakers are weak. District education offices occasionally gather input, but there is no structured national process for parents. Civil society and media sometimes voice concerns, such as poor connectivity in rural areas (Baako et al., 2023), but systematic community involvement in decision-making is limited.

Evidence suggests that Ghana’s ICT-in-education actors range from national entities (MoE, GES, NCA, etc.) to local participants (teachers, students, parents). Development partners (World Bank, UNESCO, UNICEF) provide funding and expertise, shaping policy content and pace through programs like UNESCO-led training and World Bank ICT rollouts. Teachers and students are both implementers and beneficiaries; their preparedness is crucial, but they often lack a direct voice in policy design. Parents and communities play supportive roles but usually lack the resources or channels to influence decisions. Recognising these actors clarifies why some initiatives succeed while others lag. The policy’s outcomes depend not only on written guidelines but also on the interests and capacities of these actors.

### **Process Analysis**

Process analysis examines how the policy was developed, adopted, and implemented, considering stakeholder inputs, timelines, and feedback loops, which aligns with the “process” component of the policy triangle.

### ***Policy Development and Adoption***

Ghana’s ICT policy framework emerged through multiple documents rather than a single plan. The 2015 ICT in Education Policy established foundational objectives and stakeholder roles. It was followed by related strategies: the 2018–2023 Digital Learning Strategy and a revised ICT Policy (2019) crafted by the MoE with input from various stakeholders (Asare et al., 2023). These documents were created through consultations involving MoE, GES officials, ICT experts, and development partners. Ghana collaborated with UNESCO to refine these policies, indicating multiple stakeholder workshops (UNESCO, 2023).

During the COVID-19 emergency, the NaSIA developed National E-learning Guidelines in 2020. This rapid response involved internal MoE, GES teams, and international guidance (UNICEF, 2020). Because of urgency, there was limited external consultation, leading to several subsequent revisions (Ministry of Education, Ghana, 2019). The policy adoption process has been top-down: the Cabinet-approved ESP set the vision, followed by ministerial policy releases often backed by UN support. New policies and guidelines are disseminated through MoE press releases and training sessions, but are not always effectively communicated to frontline teachers (Dwomoh et al., 2022). The process has been iterative: for example, the 2019 ICT Policy was built on the 2015 version, and the 2020 E-learning guidelines updated earlier distance learning recommendations.

Pilot programs have informed policy development. GALOP piloted the Edmodo LMS and accelerated learning methods in select schools before nationwide rollout (World Bank, 2022). These pilots yielded insights – for instance, on how many lessons could be delivered via TV or online. However, Yalley (2022) argues that Ghana lacks a formal culture for piloting all new ICT policies before adoption; most pilots remain tied to specific projects rather than fully integrated into policy design.

In conclusion, Ghana's ICT policy formulation involved multiple stakeholders (government and donors) but often lacked broad public consultation. The result is a suite of complementary documents (ESP, ICT Policy, E-learning Guidelines) developed in different contexts (strategic planning, emergency response). This has led to some inconsistencies between the guidelines. For instance, policies designed for urban schools sometimes overlook rural realities. Adoption has been led by government directives with external technical support, without comprehensive reviews involving all users.

Consequently, some policies may not fully reflect on-the-ground realities, potentially hindering implementation.

### ***Implementation and Disparities***

The rollout of the guidelines has been uneven. Implementation has been strongest in well-resourced urban areas like Greater Accra and Ashanti (Yalley, 2022). For instance, many Greater Accra schools now have computer labs and tablet programs, and teachers regularly receive ICT training from GES and partners (Asare et al., 2023; Africa Education Watch, 2025). By 2020, over 10,000 public and 6,000 private schools were registered on the Edmodo platform (World Bank, 2022), reflecting high uptake where connectivity exists. In contrast, progress in rural and poorer regions is limited. National surveys show that only 36% of adults in the Upper West Region own a mobile phone, compared to 73% in Accra (Ghana Statistical Service, 2019). As a result, few rural schools have functional labs or internet, despite the MoE targets (Africa Education Watch, 2025).

The COVID-19 crisis underscored these disparities. Although the government provided nationwide TV, radio, and printed lessons (MoE Ghana, 2019), participation varied by region (Anaman et al., 2022; Yalley, 2022). Baako et al. (2023) reported that northern regions saw fewer students engage in online learning due to electricity and bandwidth issues. Data from GALOP show that most of the 975 broadcast video lessons reached middle- and high-income districts (World Bank, 2022). Notably, while almost 100% of students returned when schools reopened (Dwomoh et al., 2022), many teachers reverted to traditional methods after the pandemic (Oteng et al., 2024). Urban schools more closely followed ICT guidelines, given their resources and trained staff (Takyyi et al., 2019). Rural districts often struggle even with basic ICT: Anaman et al. (2022) and

Lomo et al. (2024) note that although ICT is a subject in some rural schools, it is usually taught without laboratories or qualified instructors.

In conclusion, Ghana's implementation of ICT integration in education has shown mixed outcomes. In regions with robust resources and leadership, notable advancements have been made; however, many areas remain considerably behind. This disparity stems from the policy's assumption of a baseline infrastructure and skill set, prerequisites that numerous schools, particularly in underserved regions, do not possess (Takyi et al., 2019; Gunu et al., 2022). To foster equitable implementation, targeted support must be directed towards these disadvantaged areas, alongside the consideration of alternative low-tech strategies that may better suit their unique challenges.

### ***Monitoring, Evaluation, and Feedback***

A robust M&E system is essential for sustained implementation, yet Ghana's remains weak. The ESP contains a comprehensive M&E framework (Ministry of Education, Ghana, 2019), and the GES uses digital dashboards (GES-MIS) to collect general school data (NaSIA, 2019). However, ICT-specific monitoring is nascent. No national ICT education dashboard or publicly accessible indicator set exists (for example, the percentage of schools with internet). UNICEF (2020) notes that few African countries track ICT in education systematically. This lack of data makes it difficult to assess progress or identify problems. Feedback mechanisms are also limited. There is no formal system for teachers, students, or parents to report issues with ICT implementation. District offices gather input, and some ICT data are included in annual reports (GES, 2024), but stakeholders lack structured channels for voicing concerns. Without strong M&E and feedback loops, adapting the implementation or ensuring accountability is challenging.

## **Ranking of Policy Triangle Elements Based on Priority**

From the analysis, the actors element can be considered the highest priority, as the policy's outcomes heavily rely on stakeholders' interests and capacities. Engaging teachers, understanding donor roles, and fostering community involvement are particularly critical. As emphasised, "the policy's outcomes depend not only on written guidelines but also on the interests and capacities of these actors." Therefore, teachers and local implementers' active participation is essential for success.

The context follows the actors element, given that economic and social factors - such as funding, infrastructure, and the digital divide - strongly influence feasibility. Ghana's ICT projects have leaned significantly on donor funding and face budget constraints. Resource limitations and uneven access create the conditions necessary for any policy's success, underscoring the importance of context.

Next, the content element is considered the third priority, as the guidelines are comprehensive but contain practical gaps. They articulate ambitious goals for ICT integration—covering curriculum, hardware, and training—but often lack detailed implementation plans or enforcement mechanisms. The aspirational nature of the content must be matched with realistic resource planning.

Finally, the process is the element that can be considered the least emphasised. While important, implementation processes are top-down and have not been prioritised. The execution of the guidelines has shown inconsistency, with weak monitoring and feedback systems. Enhancements to process mechanisms, such as participatory planning and monitoring and evaluation (M&E), can be addressed once the actors and context are solidified.

This ranking indicates that the success of Ghana's ICT-in-education policy is contingent upon strengthening stakeholder roles (actors) and contextual support. At the same time, content clarity and process improvements are necessary, but they come after these primary focuses.

# CHAPTER 4

## OUTCOMES AND EVALUATION

### **Introduction**

This chapter examines the impacts of Ghana’s national ICT-in-education policy implementation guidelines, highlighting achievements and challenges. It focuses on outcomes, including changes in technology access, teacher capacity, learning processes, and unintended consequences. The evaluation employs policy analysis frameworks and recent empirical studies to assess how the guidelines have been realised in practice. Specifically, the policy triangle framework is explicitly applied to consider how contextual factors, stakeholder roles, and implementation processes influence outcomes. As noted by Manu et al. (2024), Abedi and Ametepey (2025), and Asare et al. (2024), effective integration of ICT in education necessitates strong policy support and infrastructure in Ghana. The analysis is structured into sections on positive impacts, negative consequences, and sustainability prospects, all grounded in empirical and policy literature.

### **Positive Impacts**

Ghana’s ICT guidelines have produced notable benefits. First, access to technology in schools has increased substantially. From 2017 to 2020, the MoE distributed computers to primary, secondary, and some tertiary institutions (Gunu et al., 2022; Jacobs Foundation, 2020). As a result, the digital gap at the senior-high level has narrowed: 34.9% of SHSs now have computers for teaching (Sarpong, 2023), compared to much lower rates previously. Strategic investments have equipped hundreds of classrooms with ICT tools, creating a foundation for digital learning.

Second, teacher ICT training has expanded. UNESCO’s “Transforming Education” project delivered an Emergency Remote Teaching course to hundreds of Ghanaian teachers (UNESCO, 2023). By the 2022–23 school year, 413 junior and senior high school teachers completed UNESCO-Ghana ERT modules (UNESCO, 2023). These trainings covered essential skills for using platforms like Moodle and Zoom. The program will scale up: it plans to train up to 15,000 teachers via a national learning platform (Manu et al., 2024). Simultaneously, UNESCO and GES have developed a national ICT Competency Framework and updated teacher education curricula to include digital pedagogy (Ministry of Education, Ghana, 2024). As a result of these initiatives, some educators now routinely use multimedia tools – projectors, audio recordings, internet searches – in class, enriching instruction (Asare et al., 2023; Yalley, 2022). Manu et al. (2024) confirm that schools integrating ICT often report higher student engagement and better academic outcomes.

NGO-led pilots and programs have also had a broad reach. For example, the “Making Ghanaian Girls Great” (MGCubed) satellite TV program delivered live lessons in math, English, and life skills to over 36,000 learners nationwide (Sarpong, 2023). Similarly, the Eneza Education SMS platform (an SMS-based tutoring service) has trained over 6,500 teachers and reaches roughly one million students (Sarpong, 2023; World Bank, 2022). Other innovations, like solar-powered computer labs by GIFEC and internet-linked schools, have proven feasible (Jacobs Foundation, 2020). These programs demonstrate how ICT initiatives can extend learning to underserved areas.

Emerging evidence shows positive educational outcomes. Studies by Lomo et al. (2024), Yalley (2022), and Manu et al. (2024) find that ICT use in Ghanaian schools boosts student engagement and learning outcomes. Teachers report that students are more

motivated by multimedia and interactive activities than traditional lectures. Some exam statistics suggest improved scores in computer-assisted subjects (Yalley, 2022). While comprehensive data are still being collected, these early indicators align with global research showing that well-implemented ICT enhances understanding of complex concepts and supports differentiated learning (Abedi et al., 2023).

Ghana has also successfully embedded ICT skills into its curriculum. Recent reforms institutionalized digital literacy: the basic education curriculum (2019–2021) and the secondary curriculum (2023) explicitly recognize ICT and 21st-century skills as core competencies (Ministry of Education, Ghana, 2024). As a result, students at all levels are exposed to ICT concepts such as digital citizenship and basic programming as part of their regular studies, not just as optional topics. Celik and Cagiltay (2024) note that by embedding technology skills into national standards, Ghana is creating sustained demand for ICT resources and strengthening teacher training initiatives. This alignment between curriculum reform and ICT policy is a promising foundation for long-term impact.

There have also been some unintended positive outcomes. For instance, the rapid shift to online tools during COVID-19 accelerated the development of national e-learning infrastructure (e.g., LMS platforms and educational broadcast networks) that can be repurposed for future crises. Community digital centers established around schools have provided ICT access to broader communities, fostering digital literacy beyond the classroom. Additionally, the emphasis on ICT has spurred a nascent ecosystem of local educational technology development, as Ghanaian entrepreneurs create apps and content to meet growing demand. These unexpected benefits show that even imperfect implementation can generate lasting value.

In conclusion, Ghana’s ICT guidelines and related initiatives are beginning to yield results. More schools have computers and internet, teachers receive targeted training, and innovative projects have expanded access for tens of thousands of learners. Early improvements in student engagement and digital skills suggest the policy’s objectives are partially being met. These achievements provide a strong base for future growth, despite challenges.

### **Negative Consequences and Unintended Effects**

Despite progress, unintended drawbacks have surfaced. A significant issue is the persistent equity gap. Even with overall gains, ICT benefits have not been evenly distributed (Ghana Statistical Service, 2019; Takyi et al., 2019). Rural and low-income schools lag far behind urban ones. For example, Baako et al. (2023) report that only about 25% of primary schools have electricity, compared to 79% of senior high schools. Internet access is similarly unequal. The Africa Education Watch (2025) and the Jacobs Foundation (2020) describe Ghana’s school ICT infrastructure as “weak” overall, with stark rural–urban disparities. These gaps hinder equity goals: wealthy urban schools are much more likely to use e-learning and have labs, while many village schools have no ICT resources. The Ghana Statistical Service (2019) finds that only 3.5% of primary schools have one computer, versus 35% of SHSs. Such data show a digital divide that the policy has not yet overcome. This uneven distribution risks widening educational inequality and undermining the guidelines’ inclusivity objectives (Gunu et al., 2022; Manu et al., 2024).

Infrastructure bottlenecks also have adverse effects. Frequently reported problems include power outages, unreliable internet, and outdated equipment (Baako et al., 2023). Many schools lack dedicated computer labs or fall victim to technical breakdowns

without support (Africa Education Watch, 2025). Abedi et al. (2023) and Yalley (2022) observe that even when laptops or projectors are provided, schools often do little to maintain or train teachers to use them effectively. Limited budgets make ongoing maintenance difficult (Kumi, 2020; Ussif, 2024). As a result, some ICT equipment remains unused or quickly deteriorates. Thus, the lack of electricity, connectivity, and technical support has hindered expected returns on ICT investments.

An emerging challenge is “digital overload” for educators. The rapid push to adopt ICT has sometimes overburdened teachers. During the COVID-19 closures, many teachers had to switch to online teaching with little preparation, causing stress (Ahmed & Opoku, 2021). More generally, teachers report being overwhelmed by multiple, overlapping technological initiatives – various online platforms and systems on top of their regular duties (Abedi et al., 2023). Although specific studies on “digital overload” in Ghana are limited, global reviews warn that excessive screen time, constant connectivity, and high expectations can lead to fatigue and reduced learning quality (UNICEF, 2020). Ghanaian teachers have noted that extra ICT demands can distract from core teaching without proper support, rather than enhance it (Abedi et al., 2023; Lomo et al., 2024). Therefore, while technology offers new opportunities, it also risks placing too much emphasis on tools at the expense of fundamentals. This balance requires careful management and adequate ongoing support for teachers.

Finally, some policy regulations have had unintended adverse effects. For example, Ghana enforces a strict ban on student mobile phone use in schools (Sarpong, 2023). This overlooks that over 90% of households (even in rural areas) own at least one mobile phone (Ghana Statistical Service, 2019). The policy shuts out a widely available learning tool by prohibiting these devices. Critics (Yalley, 2022) argue that this phone

ban is counterproductive, given the abundance of educational apps on mobile platforms. Similarly, the Jacobs Foundation (2020) points out that some past initiatives have introduced technology faster than training or content, leading to underuse. These examples show the need for ICT policies to adapt to on-the-ground realities (like mobile internet ubiquity) or risk undermining their goals.

In conclusion, the unintended consequences of inequity, infrastructure challenges, teacher overload, and restrictive regulations highlight that guidelines alone cannot solve all problems. They reveal areas where implementation faltered and underscore the necessity of complementary measures, such as greater infrastructure investment, policy adjustments, and support systems, to fully realize ICT's benefits. The literature suggests that without addressing these factors, the potential gains of Ghana's ICT reforms could be compromised (Sarpong, 2023; Anaman et al., 2022).

### **Sustainability and Future Prospects**

The long-term success of Ghana's ICT-in-education efforts depends on stable funding, local capacity, and integration with broader reforms. Historically, Ghana's ICT initiatives have relied on a mix of government budgets, donor grants, and private partnerships (Kumi, 2020). By policy, a portion of the education budget is allocated for ICT (Ussif, 2024), but this often falls short (Levy, 2022). Many programs depend on intermittent external support. For example, UNESCO and the World Bank have funded teacher training modules, and GIFEC has financed connectivity pilots (Ministry of Education, Ghana, 2019).

To ensure sustainability, stakeholders recommend institutionalising ICT funding within the annual budget and broadening public-private partnerships. Creative solutions like technology levies, vouchers, and NGO-industry co-funding have been advocated

(Kumi, 2020; Ussif, 2024). Ghana has begun this shift: a recent blended financing of \$80 million (Scale/GALOP) by private donors and the World Bank for education shows openness to such models (Global Partnership for Education, 2025). Ensuring ICT is included in these investments – not just traditional needs like textbooks – is crucial.

Building local capacity is equally essential. UNESCO (2023) notes that Ghana now has ongoing digital literacy programs by the GES and Ghana Society for Education Technology (GSET), alongside courses from the NTC. These initiatives are developing a homegrown cohort of ICT-proficient educators. However, many rural schools still lack IT support staff, and trained teachers may move into other roles (Gunu et al., 2022). Stakeholders stress creating career pathways for ICT specialists and strengthening teacher training institutions in ICT (Cappelli & Abdeljalil, 2024; Yidana, 2018). Continued capacity-building – through institutionalised training programs, mentoring, and peer networks – is vital, rather than one-off workshops (Abedi et al., 2023). Training should also cover inclusive practices, enabling teachers to adapt technology for diverse learners. Addressing the current gap in hands-on practice and support is critical for teachers to use ICT confidently (Abedi et al., 2023).

Finally, ICT must become mainstream in Ghana's education strategy. Encouragingly, national reforms are moving in this direction. The 2018–2030 ESP and new curricula explicitly include ICT and 21st-century skills (Ministry of Education, Ghana, 2024). Major initiatives like Free SHS and Ghana Beyond Aid increasingly acknowledge digital skills (Kumi, 2020; Opoku, 2025). Asare et al. (2023) observe that ICT is framed as a cross-cutting enabler rather than a standalone project. Collaboration between the MoE, NaCCA, and technical bodies (GIFEC, Ghana Health Service) will help embed ICT across education and other sectors. For example, using digital

management information systems in planning can highlight the importance of ICT in all reforms (Manu et al., 2024).

Sustainability hinges on political commitment, reliable funding, and local ownership. Recent policy dialogues, such as UNESCO's Korea Funds-in-Trust (KFIT) seminars, show a consensus that technology-enabled learning is a long-term priority (UNESCO, 2024). If current training programs, infrastructure projects, and curricula receive full support and expansion, Ghana is well-positioned to build a more resilient and tech-savvy education system. Public-private partnerships (like those in Scale/GALOP) and community engagement will be essential to maintain momentum beyond election cycles.

## **Conclusion**

Ghana's ICT guidelines have produced a range of positive outcomes and lessons. On the bright side, access to ICT in schools has significantly increased, and teacher competencies are improving. Hundreds of schools now have computers and internet connections, and innovative projects have reached tens of thousands of students (Sarpong, 2023). Government and donor-supported teacher training programs are beginning to transform classroom practices (Global Partnership for Education, 2025). Early evidence indicates higher student engagement and growth in digital skills, suggesting that the policy's primary goals are being partially achieved.

However, essential shortcomings remain. Significant equity gaps persist. For instance, rural schools still lack basic ICT infrastructure (Takyi et al., 2019), and many women and disadvantaged students have been left behind (Ghana Statistical Service, 2019). Specific policies, like the mobile phone ban, have inadvertently limited students' access to affordable technology (Sarpong, 2023; Baako et al., 2023). Support services for

teachers and students have not kept pace with the rollout of hardware, leading to underuse and frustration.

Sustainability is crucial. This means securing reliable funding through government budgets and partnerships, and developing local expertise via ongoing training. It also requires fully integrating ICT into teaching and the curriculum (Oteng et al., 2024), making technology a regular part of education rather than a separate program (Manu et al., 2024). Ghana's recent curriculum reforms and multi-stakeholder investments suggest promising progress. Nevertheless, technology must serve broader educational goals, not become an end in itself (Asare et al., 2024; Yalley, 2022). Insights from the initial implementation – both successes (expanded access, trained teachers, innovative content) and gaps (infrastructure deficiencies, inequities, policy misalignments) – should guide the next phase of policy refinement. By building on practical elements while addressing shortcomings, Ghana can move closer to its vision of an inclusive, future-ready education system.

## CHAPTER 5

### CONCLUSIONS AND POLICY RECOMMENDATIONS

#### Summary of Key Findings

Applying the Policy Triangle framework yields several insights. **Contextually**, the guidelines are well-aligned with Ghana’s 2018–2030 ESP and broader ICT development objectives. The Ministry of Education (2019) emphasises that the ICT policy was designed to comply with the ESP and to standardise ICT initiatives through clear guidelines. This alignment reflects strong political commitment and donor interest (UNESCO, 2024; GPE, 2025). However, socioeconomic challenges – especially the digital divide – impact implementation. Data show only 2% of the most disadvantaged basic schools have functional ICT labs, despite a national curriculum that includes computing (Africa Education Watch, 2025). Electricity access is uneven: 77% of well-resourced schools have power versus only 37% of underserved schools (Baako et al., 2023). These gaps constrain ICT deployment. Thus, while policy context is supportive in principle, significant resource constraints create barriers to success.

**Content-wise**, the guidelines present comprehensive measures from infrastructure standards to teacher training and curriculum integration (UNESCO, 2023; Ministry of Education, Ghana, 2024). The policy calls for ICT integration at all levels and for appropriate hardware/software for teachers. It also commits to transparency and systemic enhancements. However, critical issues are evident. The guidelines articulate goals like transparency and standardised procedures (Ministry of Education, Ghana, 2019) but often lack detailed implementation plans or specific funding for rural schools (Ussif, 2024). Evidence from the analysis suggests that although teacher capacity building and content integration are emphasised, the guidelines do not adequately address the need

for functional computer labs or reliable power. This explains why many mandated ICT courses occur in schools without the necessary tools (Yalley, 2022). Therefore, while the content of the guidelines is ambitious, there are notable gaps in providing essential resources for successful implementation.

In the **actors** dimension, the Ghanaian government (MoE, GES, NCA) leads the initiative, supported by international partners (UNESCO, World Bank, GPE) and philanthropic organisations. For example, the recent SCALE partnership brought private and charitable groups together to fund education reforms (Global Partnership for Education, 2025). School leaders and teachers are identified as actors in policy documents, but their engagement has been inconsistent. Evidence from the analysis suggests that teachers and communities have mostly been recipients rather than co-designers of implementation. With limited input into the process, many teachers face challenges, including a lack of ICT skills and resources (Manu et al., 2024). This highlights a significant gap in the actors dimension: local educators need greater involvement and support for the policy to succeed.

The **process** analysis shows a predominantly top-down approach, driven by Ministry directives. Official documents emphasise stakeholder involvement, but actual execution has been inconsistent and fragmented across regions. No comprehensive national monitoring system effectively tracks progress (Yalley, 2022). Feedback mechanisms like community reporting are underdeveloped, limiting stakeholders' ability to voice concerns. Early implementation phases focused on "quick wins" (like setting up computer centres) but lacked sustained follow-through. This undermined potential long-term integration and raised concerns about overall effectiveness and sustainability (African Union, 2017).

In conclusion, the Policy Triangle reveals that Ghana’s ICT guidelines are well-intentioned and align with national priorities. However, their implementation is hindered by contextual barriers (infrastructure limits, capacity gaps) and inadequate grassroots engagement. Key findings indicate persistent resource constraints and the digital divide. The guidelines’ emphasis on standardisation and inclusion is promising, but achieving results will require concrete support measures. Effective implementation will depend on strengthening actors, especially teachers, communities and processes, ensuring accountability and sustained support.

### **Recommendations**

To address the identified gaps, the study proposes the following recommendations: infrastructure investment, inclusive design, capacity building, and collaboration. These are summarised in Table 1 below.

*Table 1. Summary of Recommendations by Timeline and Actions*

<b>Recommendation</b>	<b>Timeline</b>	<b>Key Actions</b>
Infrastructure Investment	Within 12-18 months	MoE and GES to equip all schools with functional computer labs, reliable internet, and power (e.g., solar). Set minimum ICT standards (e.g., student-to-computer ratios) and allocate budgets for electricity and networking in underserved areas (Baako et al., 2023).
Inclusive Design and Equity	Within 18-36 months	MoE/GES to incorporate universal and gender-sensitive design in guidelines. Provide accessible e-learning materials (text-to-speech, Braille, local languages) and targeted programs (scholarships, girls’ clubs). Ensure device allocation accounts for special needs (UNESCO, 2024; Cappelli & Abdeljalil, 2024).

<b>Recommendation</b>	<b>Timeline</b>	<b>Key Actions</b>
Capacity Building	Initial within 12 months, then ongoing (Year 1–5)	Teacher Training Institutes and GES to Strengthen pre-service and in-service teacher training on ICT pedagogy, lesson design, and troubleshooting. Introduce certifications or incentives for ICT-proficient teachers. Recruit school ICT coordinators. Include training for administrators and district officers (Yalley, 2022; Abedi et al., 2023).
Multi-sector Collaboration	Within 6-60 months	MoE to establish a national ICT-in-education task force with government, industry, NGOs, and teacher unions. Promote PPPs (e.g., tax incentives for tech donations). Involve parents and communities in ICT committees (Abedi et al., 2023). Implement regular stakeholder forums and transparency mechanisms.

Infrastructure investment is urgent. Within 12 months, the MoE and GES should secure funding (with donors like the World Bank or GPE) to upgrade school ICT infrastructure. All schools must have functional computer labs, reliable internet, and power. This includes equipping classrooms with adequate computers, internet connectivity, and solar power solutions for off-grid areas. For example, by the end of year 2, the guidelines could set minimum ICT standards, such as a target student-to-computer ratio, and allocate budgets for electricity and networking in underserved regions. Infrastructure must include furniture and security for ICT facilities. Within the next 2-3 years, improving electricity access is especially urgent, as “without electricity, no computing instruction is possible” (Baako et al., 2023). Prioritising infrastructure in rural and low-resource schools will help realise the policy’s vision. It can support other goals, such as phasing out the double-track system, by accommodating all students (Opoku,

2025). This focus on strong infrastructure will turn the policy’s hardware and curriculum components into reality and help bridge the equity gap.

Secondly, inclusive design and equity are needed. The ICT guidelines and curricula should explicitly incorporate universal and gender-sensitive design. Content, hardware, and training must cater to diverse learners. UNESCO (2024) highlights ICT’s role in addressing gender, language, and disability inequalities. Therefore, guidelines should require accessible e-learning materials, such as text-to-speech, sign-language videos, local language options, and adaptive devices (screen readers, Braille tablets). Software and platforms should be evaluated for usability by students with disabilities. Gender inclusion is also vital, since evidence shows that without targeted measures, girls and disadvantaged students fall behind (Cappelli & Abdeljalil, 2024; Takyi et al., 2019). Within 18-36 months, the guidelines should include stipends or scholarships for girls in STEM, coding clubs for girls, and support services (like childcare) for teenage mothers. Teacher training must cover gender-responsive and disability-friendly pedagogy. The MoE and GES should integrate these stipulations, ensuring that device distribution and content development consider special needs and local contexts. Embedding equity throughout policy – from platform design to device allocation – will ensure that all students, including those with special needs, can benefit equally (Aidoo & Chebure, 2024; UNESCO, 2024).

Capacity building should also be pursued. Within 6–12 months, Teacher Training Institutes and GES should overhaul teacher education by integrating ICT pedagogy and basic computer skills into all pre-service programs, and expanding in-service professional development. For example, training courses on lesson design with technology and digital classroom management should be mandatory. As part of the recommendation, a two-

pronged approach should be adopted. The first is pre-service training to integrate ICT pedagogy and basic computer skills into all teacher education programs. The second one is in-service training meant to expand professional development across schools with mandatory courses on ICT lesson design, digital classroom management, and basic troubleshooting. To incentivise participation, there should be an offer of certifications or salary increments for ICT-proficient teachers. Recruiting ICT coordinators or technology specialists in schools can help manage resources. Capacity building should extend to school administrators and district education officers so the entire management chain can plan, monitor, and support ICT integration (Yalley, 2022). Likewise, training should be ongoing, not a one-off event: mentoring programs and teacher learning communities can sustain usage. Abedi et al. (2023) note that many teachers struggle with computer literacy and lack hands-on practice. Such training should include AI literacy, equipping teachers to use AI-driven educational tools effectively and ethically (Osondu et al., 2024). This emphasis aligns with UNESCO's recommendation to build AI competency in teachers and students. Addressing this through systematic capacity building is essential. This training should also emphasise inclusive practices, preparing teachers to adapt technology for diverse learners. By building skills at all levels, Ghana can ensure ICT resources (including emerging AI tools) are effectively used.

Lastly, multi-sector collaboration is encouraged. Successful implementation will rely on partnerships across government, industry, nonprofits, and communities. As noted in the SCALE initiative, Ghana has demonstrated effective collaboration with government, donors, and corporations. The ICT guidelines should promote similar models. For example, including tech sector partners, like Microsoft and IBM, could help pilot AI-enhanced learning tools and teacher support platforms. The Ministry could establish a

national ICT-in-education task force that includes technology companies, universities, teacher unions, and parent groups. This task force could co-fund pilot projects, develop local digital content (like e-textbooks or coding platforms), and monitor progress. In exchange for visibility or tax incentives, PPPs can leverage industry donations, such as devices and bandwidth. Civil society and local organisations (PTAs, education NGOs) should be mobilised for grassroots monitoring. Involving parents in school ICT committees can improve accountability (Abedi et al., 2023). The Ministry itself emphasises that transparency and stakeholder involvement foster commitment. Therefore, the implementation plan should include regular dialogue mechanisms, stakeholder forums and community evaluations. According to the Global Partnership for Education (2025), global experience shows that pooling resources and expertise across philanthropy, business, and development partners amplifies impact. Ghana can achieve more sustainable, system-wide progress by modelling such collaborative funding and oversight in ICT education.

In summary, implementing these recommendations will directly tackle the key barriers identified. Improving infrastructure and power access will enable the guidelines' hardware and curriculum components. An inclusive design approach will ensure all learners benefit equally, aligning with Ghana's commitment to equal education. Strengthening capacity will foster effective classroom ICT use, moving beyond just providing equipment. Cross-sector collaboration will mobilise resources and oversight needed to overcome logistical and financial hurdles. Together, these strategies will bolster the guidelines' effectiveness, advance equity in digital learning, and support Ghana's goal of quality education for all. Notably, incorporating AI-driven educational resources and

data analytics into these policies could further enhance learning outcomes and policy responsiveness, in line with UNESCO's guidance on AI in education.

### **Ranked Recommendations by Priority**

The foremost priority in the recommendations is investment in infrastructure. The government must ensure that all schools are equipped with functional computer labs, reliable electricity, and access to the internet. Strong infrastructure is essential; without it, digital learning cannot take place. For instance, schools lacking power are unable to teach computing. It is crucial to secure funding from donors such as the World Bank to upgrade labs and connectivity, as this effort is urgent and promises a significant long-term impact (UNESCO, 2024).

Secondly, there is a critical need for capacity building. It is important to enhance the skills of both teachers and administrators simultaneously. Early investments in professional development (within 6–12 months) are highly feasible and can significantly amplify the benefits of infrastructure improvements. Pre-service and in-service training programs should incorporate ICT pedagogy and AI literacy, equipping educators to effectively utilise technology tools (Osondu et al., 2024). For example, courses on technology-enhanced lesson design, including the use of AI-driven tools and digital classroom management, should be mandatory, with certifications or incentives provided for teachers proficient in ICT.

The next priority is to foster collaboration across multiple sectors. The government should establish sustained public-private partnerships. Medium-term collaboration among governmental bodies, the technology sector, NGOs, and communities is both feasible and essential. A national ICT-in-education task force should be formed, including technology firms, universities, teacher unions, and parent

representatives, to co-fund pilot projects and co-create educational content. For instance, partnering with tech companies such as Microsoft and IBM could facilitate the piloting of AI-enhanced learning tools and platforms to support teachers (Osondu et al., 2024). By pooling resources and expertise, we can enhance innovation and maximise available resources.

Lastly, it is imperative to focus on inclusive design and equity. The government should prioritise the integration of universal design principles alongside targeted support over the long term. Policies must ensure the availability of accessible e-learning materials - such as text-to-speech, local language options, and Braille - as well as the distribution of devices to marginalised groups, including girls, rural students, and learners with disabilities. While the impact of these efforts may be gradual, they are vital for achieving the equity goals outlined in the SDGs.

### **Study Limitations**

This study has limitations. It relies on published documents, reports, and secondary data, which may not capture the most recent field developments or local nuances. The analysis did not include primary data from teachers, students, or schools, so insights into on-the-ground experiences are limited. Additionally, focusing on national guidelines may overlook regional and school-level variations in implementation. Future research involving surveys or interviews with educators and case studies of specific schools would help validate and deepen these findings.

### **Suggestions for Further Research**

Future research should involve longitudinal studies tracking students and teachers to assess the long-term effects of ICT policy. For example, following cohorts before and after receiving ICT resources would clarify how access to technology influences learning

outcomes, digital literacy progression, and retention rates. Such data would fill a gap in understanding ICT's educational impact over time (Manu et al., 2024).

Rigorous impact evaluations – like randomised trials or matched comparisons – should examine specific interventions from the guidelines. Studies could measure the effect of introducing computer labs on student test scores, or compare schools with and without dedicated ICT trainers. This evidence would reveal which policy elements yield the most significant benefits and for which student groups, guiding more effective resource allocation.

Comparative research with other countries' ICT strategies could also yield valuable insights. Many African nations implement similar guidelines; systematic comparisons can highlight best practices and contextual factors. For example, researchers could analyse how centralised versus decentralised implementation affects outcomes or compare countries with strong public-private ICT partnerships to those mainly government-funded. Such cross-national studies would help Ghana refine its policy by learning from regional experiences in stakeholder engagement and infrastructure development.

In conclusion, this study presents a detailed analysis of Ghana's ICT guidelines through the lens of the policy triangle framework. It emphasises the necessity for ongoing research to further this discourse. A rigorous, data-driven assessment is imperative for comprehending the tangible impacts of these policies. Such evaluations will provide insights into their effectiveness and facilitate iterative improvements to Ghana's ICT-in-education strategy, ensuring that it remains relevant and effective in the dynamic educational landscape.

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