



Students' Perceptions on the Use of Electronic Devices as Learning Tools in Public Secondary Schools in Dodoma Region

Okoth Jeremiah & David Opanga
Education Department
St John's University of Tanzania
Email: okothjere@gmail.com

Abstract: *This study examines students' perceptions of electronic devices as learning tools in public secondary schools in Dodoma Region, Tanzania, while addressing institutional challenges and policy contradictions. Employing a mixed-methods approach, data were collected through questionnaires, focus group discussions, and interviews involving 118 participants (100 students, 16 teachers, and 2 school heads). Findings reveal that 60% of students viewed electronic devices positively, citing enhanced academic performance through access to digital resources like tutorial videos and interactive diagrams. However, 30% reported distractions from social media and gaming, highlighting a dual impact. Teachers acknowledged the pedagogical value of devices but faced barriers such as inadequate training (only 30% effectively integrated tablets) and infrastructural limitations, including unreliable electricity and internet connectivity. School policies often restricted device usage due to concerns over distractions and academic dishonesty, conflicting with national ICT objectives like Tanzania's SEQUIP initiative. The study underscores the need for revised regulations, targeted teacher training, and infrastructural investments to align policy with practice. Framed by the Technology Acceptance Model (TAM), the analysis emphasizes the role of perceived usefulness and accessibility in fostering sustainable integration of electronic tools in education.*

Keywords: *Electronic devices, Learning Tools, Secondary Education, Technology Acceptance Model (TAM), and ICT Policies.*

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1. Introduction

The integration of Information and Communication Technology (ICT) in education has transformed pedagogical approaches globally, with electronic devices such as tablets, computers, and mobile phones becoming indispensable tools for modern learning (ITU, 2019). These devices enhance access to educational resources, foster collaboration, and support personalized learning across disciplines (Brown, 2018; Kheider, 2021). In Tanzania, the government has prioritized ICT adoption

in education through policies like the *ICT Policy for Basic Education (2007)* and initiatives such as the Tanzania Secondary Education Quality Improvement Project (SEQUIP), which aim to equip schools with digital infrastructure and teacher training (MoEVT, 2014; SEQUIP, 2021). Despite these efforts, challenges persist in the effective utilization of electronic devices in public secondary schools, particularly in Dodoma Region, where restrictive policies often ban student mobile phone use (COSTECH, 2021).

Globally, 85% of educational institutions in the U.S. and 90% of secondary teachers in the U.K. utilize electronic devices for instruction, demonstrating their

transformative potential (Shaw, 2023; Burning & Moss, 2019). Similarly, African nations like Kenya and South Africa have implemented ICT-driven reforms to address resource gaps (Alaba, 2019; UNESCO, 2020). Tanzania's SEQUIP project has distributed 31,445 computers and trained 15,282 teachers in digital pedagogy, yet studies reveal underutilization of these tools in classrooms (Gibbons et al., 2020). This discrepancy highlights a critical gap between policy goals and practical implementation, exacerbated by infrastructure limitations and sociocultural resistance to mobile devices in schools (Kihwele & Bali, 2022).

This study evaluates students' perceptions of electronic devices as learning tools in Dodoma's public secondary schools. It addresses the following research questions:

1. What are students' perceptions of electronic devices as learning tools?
2. How do teachers view students' use of electronic devices to access learning materials?
3. What challenges and opportunities arise from school regulations on electronic device usage?

2. Literature Review

2.1 Empirical Studies

Electronic devices have redefined learning by enabling access to digital resources, interactive applications, and collaborative platforms. In science education, apps simulating chemical reactions or molecular structures enhance conceptual understanding (Twum, 2019; Williams & Pence, 2020). Language learners benefit from vocabulary-building tools and e-books, which improve retention and engagement (Kheider, 2021). Teachers also leverage devices for lesson planning, resource sharing, and real-time assessments, streamlining administrative tasks (Kihwele & Bali, 2022). Such innovations underscore the devices' adaptability across educational contexts.

2.2 Electronic Devices in African and Tanzanian Contexts

African nations increasingly adopt ICT to bridge educational inequities. In Kenya, the *Elimu* app provides offline access to textbooks for students in remote areas (Porter et al., 2016). Tanzania's SEQUIP initiative emphasizes STEM education through digital tools, yet only 72.2% of secondary schools have electricity, and many lack internet connectivity (Gibbons et al., 2018). While teachers receive tablets for instruction, students face bans on mobile phone use, limiting their access to supplementary learning materials (MoEST, 2024). Pilot projects in Dodoma reveal that 30% of teachers struggle to integrate devices into lessons due to inadequate training (Mtega et al., 2020).

2.3 Challenges and Policy Implications

Restrictive school policies in Tanzania often cite concerns over distraction and academic dishonesty to justify mobile phone bans (COSTECH, 2021). However, such policies contradict the devices' proven benefits, including access to e-libraries, collaborative forums, and real-time feedback (Gafni et al., 2017). Infrastructure gaps, such as unreliable electricity and insufficient devices, further hinder utilization (UNESCO, 2022). Addressing these challenges requires revisiting regulatory frameworks, investing in rural electrification, and expanding teacher training programs to align with global best practices (Mtebe et al., 2019).

2.4 Challenges in Tanzania's Integration of Electronic Devices

Despite Tanzania's ICT policy commitments, implementation faces hurdles. A significant issue is the prohibition of mobile phones in schools, rooted in concerns over academic dishonesty and social distractions (COSTECH, 2021). This contrasts with the government's distribution of tablets to teachers, which lacks complementary infrastructure like reliable internet and electricity (Mtebe et al., 2019). Additionally, inadequate training leaves educators unprepared to maximize device utility (Gibbons et al., 2020). For instance, a pilot project in Dodoma revealed that only 30% of teachers could effectively integrate tablets into lessons, citing limited technical support (Mtega et al., 2020).

2.5 Theoretical Framework

This study is anchored in the Technology Acceptance Model (TAM), which posits that users' adoption of technology depends on perceived usefulness and ease of use (Davis, 1989). Applied to education, TAM helps analyze students' willingness to utilize electronic devices based on their perceived academic benefits and accessibility. The model aligns with Tanzania's ICT policy objectives, providing a lens to evaluate how institutional policies and infrastructural barriers influence students' acceptance of these tools.

3. Methodology

3.1 Design

The study employed a mixed-methods approach to evaluate students' perceptions of electronic devices as learning tools in public secondary schools within Dodoma Region. The target population comprised secondary school students, teachers, and school heads, as

they directly interact with technology integration policies and classroom practices (Stake, 2010). A total of 118 participants were purposively and randomly selected from four secondary school. The sample included 100 students, 16 teachers, and 2 school heads (see Table 1).

Students were selected via simple random sampling to ensure equal representation, while teachers and school heads were chosen purposively for their insights into institutional policies and pedagogical practices (Creswell, 2018).

Table 1: Distribution of Study Sample Size

Category	Number of Participants
Students	100
Teachers	16
School Heads	2
Total	118

3.2 Data Collection

Data were collected through questionnaires, focus group discussions (FGDs), and interviews, aligning with the sequential exploratory design (Creswell, 2018). Quantitative data were gathered using structured questionnaires administered to 100 students. The tool included closed and open-ended questions to capture perspectives on device usage, benefits, and challenges. Qualitative data were derived from FGDs with 40 students (10 per school, evenly split by gender) and semi-structured interviews with 16 teachers and 2 school heads. FGDs explored themes such as frequency of device use, accessibility, and perceived educational value, while interviews focused on institutional policies, supervision, and resource availability. All sessions were conducted in Swahili or English, depending on participants' preferences, and transcribed for analysis.

3.3 Data Analysis

Quantitative data from questionnaires were analyzed using the Statistical Package for Social Sciences (SPSS), Version 26. Descriptive statistics, including frequencies and percentages, were computed to summarize responses. Qualitative data underwent thematic analysis following Creswell's (2014) five-phase framework: transcription, familiarization, coding, theme identification, and interpretation. Recurrent themes, such as "device accessibility," "pedagogical impact," and "policy enforcement," were derived from FGD and interview transcripts. Triangulation of quantitative and qualitative findings ensured a comprehensive understanding of student perceptions and contextual challenges (Johnson & Christensen, 2014).

4. Results and Discussion

This section begins by providing the demographic profile of the respondents. It provides the characteristics of the respondents in terms of gender, age, students' class level, teachers' qualification, and marital status, with a sequence of findings based on the research objective.

4.1 Respondents' Demographic Data

The demographic data reflects a diverse and relevant participant profile that supports the study's objective of evaluating students' perceptions of electronic devices as learning tools. Out of 118 respondents, the majority (84.75%) were students aged between 12 and 20 years, representing Form One to Form Four classes, indicating a sample drawn from the core users of educational technology in secondary schools. The remaining participants included 16 teachers (13.56%) and 2 heads of schools (1.69%), providing a broader institutional perspective. Gender distribution shows a slight male majority (56.78%), ensuring a balanced viewpoint in analyzing gender-influenced digital learning patterns. Teachers' qualifications ranged from diplomas to master's degrees, suggesting varied levels of expertise in integrating digital tools into pedagogy. Additionally, marital status data, though not central to the research focus, offers contextual insights into potential time and availability constraints among adult respondents. Overall, the demographic distribution enhances the credibility of the study by capturing responses from key stakeholders involved in secondary education across Dodoma Region.

Table 2: Demographic Characteristics of the Respondents

Category		Frequency (N=118)	Percentage (%)
Respondent Type	Students	100	84.7%
	Teachers	16	13.6%
	Heads of Schools	2	1.7%
Gender	Male	67	56.8%
	Female	51	43.2%
Age Group	12–20 (Students)	100	84.7%
	25–40 (Teachers)	16	13.6%
	30–40 (Heads)	2	1.7%
Students' Class Level	Form One	25	21.2%
	Form Two	25	21.2%
	Form Three	25	21.2%
	Form Four	25	21.2%
Teachers' Qualifications	Diploma	4	3.4%
	Bachelor's Degree	10	8.5%
	Master's Degree	2	1.7%
Marital Status (Adults only)	Married	11	9.3%
	Unmarried	7	5.9%

The demographic composition of this study provides critical insights into the dynamics of technology integration in Tanzanian secondary education. The predominance of student respondents (84.75%) aged 12–20 aligns with global trends where adolescents are primary consumers of educational technology, reflecting their inherent adaptability to digital tools (Dube, 2023). This age cohort's familiarity with electronic devices, as noted by Kafyulilo and Rugambuka (2022), often correlates with positive perceptions of technology in learning; however, contextual factors such as infrastructure and training moderate this relationship.

The inclusion of teachers (13.56%) and school heads (1.69%) strengthens the validity of the findings by triangulating perspectives from multiple stakeholders. Teachers' qualifications ranging from diplomas to master's degrees highlight disparities in pedagogical readiness for digital integration, a challenge documented in low-resource settings where advanced training in ICT remains limited (Akello & Mtebe, 2024). For instance, while bachelor's degree holders (8%) may exhibit moderate proficiency in technology-aided instruction, those with diplomas (3%) often require targeted professional development to bridge skill gaps (UNESCO, 2023).

The gender distribution (56.78% male, 43.22% female) reflects Tanzania's broader educational enrollment patterns, where male students marginally outnumber females in secondary schools (URT, 2022). However, this slight imbalance does not negate the study's reliability, as research suggests gender differences in technology adoption are less pronounced among digitally native generations (Kafyulilo & Rugambuka, 2022). The inclusion of marital status data for adult respondents, though ancillary, contextualizes potential time-allocation challenges; married teachers (9%) may face competing domestic responsibilities, indirectly affecting their

engagement with technology-driven pedagogy (Mwakisole et al., 2023).

4.2 Electronic Devices Enhance Learning and Academic Performance

A significant portion of students (60%) reported that the use of electronic devices such as smartphones and tablets positively influenced their academic performance. Respondents expressed that access to digital content like tutorial videos, interactive diagrams, and online quizzes enabled better understanding of difficult topics, particularly in science and mathematics. These findings correspond with global trends where mobile learning technologies bridge knowledge gaps in STEM subjects (Smith & Lee, 2023). For instance, interactive diagrams and tutorial videos align with the constructivist learning theory, which emphasizes visual and experiential engagement to build conceptual understanding. This corroborates the student who noted improved comprehension of science topics through dynamic digital content, a phenomenon observed in similar low-resource educational contexts (Mtebe & Twaakyondo, 2022).

The emphasis on self-paced learning mirrors findings by Zheng et al. (2024), who identified personalized learning trajectories as critical for improving confidence and academic achievement in secondary students. Furthermore, the motivational benefits described by participants resonate with studies linking technology-mediated learning to increased intrinsic motivation, particularly among adolescents accustomed to digital interfaces (Nguyen et al., 2023). However, these benefits depend on equitable access and teacher training, variables not explicitly addressed in the study but recognized as barriers in Sub-Saharan African schools (Kafyulilo et al., 2023). Students noted that such content

allowed them to revise lessons independently and at their own pace, which led to improved academic confidence and examination scores. One participant remarked:

“Using my tablet changes the way I study... I can watch videos and see diagrams that help me understand difficult topics much better... Because of this, my grades have improved, and I feel more motivated to learn.”
(Student 1, April 2025)

These findings support the claim that electronic devices, when used effectively, transform traditional study habits into more dynamic, interactive, and personalized learning experiences, especially among digital-native students.

4.3 Electronic Devices as a Source of Distraction

The findings reveal a dual role of electronic devices in educational settings, where they serve as both learning tools and sources of distraction. The observation that 30% of students perceive these devices as disruptive aligns with global concerns about digital multitasking and its impact on academic focus (Cabiria, 2024). Social media notifications and online interactions, in particular, have been identified as major detractors from learning efficiency, as they fragment attention and reduce cognitive engagement with academic tasks (Lee & Kim, 2023). This phenomenon is exacerbated by adolescents’ developmental susceptibility to instant gratification, which undermines self-regulation (Anderson et al., 2023).

The students’ self-reported struggles with time management and screen-time habits resonate with studies highlighting the link between poor digital literacy and diminished academic performance in low-resource educational contexts (Mwakisole & Mtebe, 2024). For instance, in Tanzania, limited exposure to structured digital literacy programs has been shown to hinder students’ ability to navigate online tools responsibly (UNESCO, 2024). The call for institutional policies to regulate device usage echoes recommendations by Lee and Kim (2023), who advocate for “guided usage frameworks” in schools to balance technological benefits with self-discipline. A student emphasized:

“Instead of focusing on my lessons, I end up scrolling through feeds or chatting with friends, which wastes a lot of time... I worry they might harm my academic progress if I don’t learn how to control my habits.” (Student 4, April 2025)

These accounts highlight the importance of guidance and digital literacy education to help learners manage their screen time effectively. As suggested by several participants, establishing institutional policies or usage rules could mitigate these issues and foster responsible use of digital tools.

4.4 Infrastructure and Technical Support Limit Effective Device Use

While students generally recognized the benefits of using electronic devices, 10% cited poor infrastructure particularly frequent power outages, unreliable internet access, and lack of technical support as significant barriers to effective use. These constraints hindered their ability to access online resources, complete assignments, and use learning applications consistently. One student expressed concern, stating:

“When the electricity goes out or the Wi-Fi is slow, I cannot access online resources or complete my assignments... Training teachers and students on how to troubleshoot technical problems would make a big difference.”
(Student7, April 2025)

These challenges underscore the need for strategic investment in school infrastructure, including reliable power supply, affordable internet, and ICT support systems to ensure that the integration of digital tools into the learning environment is sustainable and inclusive.

The findings regarding infrastructure and technical support limitations align with broader challenges observed in Global South education systems integrating technology. Frequent power outages in Dodoma’s schools mirror Tanzania’s rural electrification gaps, where only 37.7% of rural areas had reliable electricity access as of 2024 (World Bank, 2024). This disparity exacerbates inequities, as students in urban centers often benefit from more stable infrastructure (Oyelere et al., 2024). Similarly, unreliable internet connectivity reflects Tanzania’s nationwide challenges, where only 22% of secondary schools had functional broadband in 2024 (Mtebe & Raisamo, 2024). Such limitations hinder the realization of technology-enhanced learning outcomes, as consistent access is critical for engagement with digital resources (UNESCO, 2024).

The lack of technical support reported by students correlates with findings by Aslan and Zhu (2024), who observed that 68% of Tanzanian teachers lacked ICT troubleshooting skills, leaving students unable to resolve device-related issues independently. This gap underscores the necessity of embedding technical literacy training into curricula, a strategy proven to reduce reliance on external support in similar contexts (Kafyulilo et al., 2024). Furthermore, the call for teacher

training aligns with UNESCO's (2024) recommendation that professional development programs prioritize "pedagogical-technological" integration to maximize device utility.

4.5 Summary of Students' Perception

Table 3 below presents a quantitative summary of students' perceptions toward the use of electronic devices in learning:

Table 3: Students' Perception towards the Use of Electronic Devices in Learning

Perception Category	Number of Students	Percentage (%)
Devices improve learning and academic performance	60	60%
Devices cause distraction and reduce focus	30	30%
Devices are effective but limited by infrastructure issues	10	10%

5. Conclusion and Recommendations

5.1 Conclusion

The study revealed that students in public secondary schools in Dodoma Region generally perceive electronic devices as beneficial tools for learning. The majority highlighted that these devices enhance academic performance by improving access to digital learning resources, fostering self-paced study, and increasing motivation. Students found devices particularly useful for understanding complex topics through multimedia content such as videos and interactive diagrams. However, the study also identified notable challenges, particularly the frequent distraction caused by social media, games, and notifications, which negatively impact focus and time management. Moreover, technical and infrastructural constraints such as unstable internet and electricity supply were frequently cited as barriers to consistent and effective device use.

While teachers and students alike acknowledged the educational value of electronic devices, the lack of structured school policies and reliable infrastructure undermines their full potential. Flexible yet well-supervised policies are needed to mitigate distractions and enhance learning engagement. Additionally, disparities in device access, especially for students from underprivileged backgrounds, raise concerns about educational equity. Overall, the findings emphasize the importance of strategic planning, digital literacy training, and institutional support to harness the advantages of technology while minimizing its limitations in Tanzania's secondary school context.

5.2 Recommendations

Based on the research findings, the study puts forward several recommendations aimed at improving the use of electronic devices as learning tools in secondary schools.

1. **Implement Controlled Device Usage Policies.** Schools should develop clear, flexible policies

that allow students to use electronic devices strictly for academic purposes under teacher supervision. This can promote digital literacy while minimizing distractions and ensuring classroom order.

2. **Strengthening Infrastructure and ICT Support.** Investment is needed in electricity, stable internet connectivity, and on-site technical support to ensure devices can be used effectively. Schools should also provide charging stations and offline educational content where internet access is limited
3. **Longitudinal Studies on Learning Outcomes.** Future research should investigate the long-term academic and psychological effects of device usage in secondary schools, especially regarding motivation, performance trends, and screen-time balance.
4. **Comparative Studies on Rural vs. Urban Schools.** Given infrastructure disparities, research should explore how students in different geographic and socioeconomic contexts experience digital learning differently, particularly in terms of access and effectiveness.

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