

Teachers Understanding of ICT and Digital Learning: Expectations versus Classroom Realities in Rural Primary Schools in Tanzania

Beatus B. Mapunda^{1*}, Mariam J Mwakabenga²

^{1,2} Department of Teacher Education-Tanzania Institute of Education

Correspondence e-mail * : beatus.mapunda@tie.go.tz

Abstract : The study focuses on the teachers' understanding of Information and Communication Technology (ICT) and digital learning and how well the new curriculum expectations matched classroom practice in rural primary schools in Tanzania. Guided by Digital Divide Theory, the study employed quantitative cross-sectional survey design. Purposive sampling was used to select three regions such as Arusha, Pwani and Lindi while census approach was applied in which a total of 358 teachers who completed online questionnaire become the eligible sample of this study. The data were analysed descriptively by involving frequencies, percentages, means, and standard deviation. The results indicated that teachers had a fairly positive attitude toward ICT and digital learning ($M = 3.37$, $SD = 1.04$). Teachers indicated that they were familiar with ICT and digital devices ($M = 4.43$) and understood clearly what digital learning was expected in the curriculum ($M = 3.95$). Minor scores were recorded in preparation for digital learning activities ($M = 3.17$), supporting pupils in demonstrating digital skills ($M=2.91$) and integrating ICT across subjects ($M = 2.59$). The study also revealed a significant gap between expectations and reality in terms of ICT resources ($M = 2.25$), infrastructure ($M = 2.40$), professional development ($M = 2.61$), and learner access to digital technologies. The results support the concept of Digital Divide Theory in sense that there are still disparities in access to technology, digital skills, and opportunities for learning in meaningful ways that hinder meaningful ICT integration in rural schools. The study conclude by highlights the need to make strong coordinated investment in the infrastructure of ICTs, equal access to digital resources, regular teacher professional development and strengthening technical support systems to realise digital aspirations of an enhanced curriculum. The study recommends the use of Digital Divide Theory to explore how technology is integrated in resource-limited educational settings and offer policy and practical strategy for how to better implement digital learning in rural primary schools in Tanzania.

Keyword : Digital Aspirations, Digital pedagogy, Information Habitus, Digital Learning, Classroom Realities

Article info: 2026-08-17 | Accepted : 2026-09-13 | Published : 2026-09-14

Copyright © 2026, Authors.

This is an open-access article under the [CC BY 4.0](https://creativecommons.org/licenses/by/4.0/)



INTRODUCTION

Digital transformation has changed teachers from being users of technological tools to designers of digitally mediated learning environments. Effective digital education, therefore, relies not only on the availability of technology but also on teachers' capacity to select, adapt, and pedagogically use digital resources to facilitate learning (OECD, 2023; UNESCO, 2023; Claro et al., 2024). This requirement creates a particular challenge for rural schools, where curriculum goals may change faster than teachers' digital competence, institutional support, and infrastructure. Thus, the critical issue is increasingly not whether digital learning is acknowledged in curricula, but whether such aspirations are known in classroom practice.

Global evidence indicates that this realisation remains uneven. Claro et al. (2024) reported extensive variation in teachers' digital competence, while Lin et al. (2023) reveal a measurable rural-urban divide in teachers' digital teaching competence. Collectively, this evidence challenges the argument that curriculum digitalisation directly produces digitally competent teaching and raises particular concerns for resource-constrained environments. This global disparity becomes more pronounced in the African education context, where digital aspirations frequently coexist with substantial implementation constraints.

In the context of Africa, digital technologies are promoted as a means for improving education and reducing inequalities (African Union, 2020). However, their implementation is still constrained by inadequate infrastructure, unreliable electricity, costly connectivity, and limited teacher competence (Lembani et al., 2020; UNESCO, 2023). Such limitations are specifically pronounced in rural schools. Trucano (2022) stated that ambitious digital reforms may reproduce rather than reduce educational inequalities when implementation conditions are overlooked. Tanzania reflects this wider continental tension between expanding digital expectations and unequal capacity to realise them.

Recent Tanzanian curriculum and policy reforms placed digital literacy and ICT integration as significant competencies for teaching and learning (MoEST, 2023a; MoEST, 2025). Nevertheless, integrating ICT within policy and curriculum does not establish whether teachers, particularly those in rural schools, have the pedagogical competence and enabling conditions necessary to translate these expectations into actual classroom practice. Tanzanian studies have identified existing challenges involving poor internet connectivity, ICT infrastructure, unstable electricity supply and teacher preparation (Mtebe & Sausi, 2021; Anasel et al., 2023; Swai et al., 2023). While these studies give significant evidence about structural

challenges, their emphasis on infrastructure and technology access provides limited understanding of how rural primary-school teachers understand ICT and digital learning under the improved curriculum and whether such understanding translates into pedagogical practice. Consequently, the expectation-reality gap between digital curriculum aspirations and teachers lived classroom experiences remains insufficiently understood at the rural primary-school level.

Therefore, this study aimed to examine teachers' understanding of ICT and digital learning and the gap between curriculum expectations and classroom realities in rural primary schools in Tanzania. Specifically, it addressed two questions: (1) How do teachers understand ICT and digital learning under the improved curriculum? and (2) What gaps exist between digital expectations and lived classroom experiences?

Literature Review

This section presents theoretical and empirical literature relevant to teachers' understanding and implementation of ICT and digital learning. Also, the section concludes by identifying the empirical gap addressed by the present study

1. Theoretical Framework

Digital Divide Theory, as developed by Jan van Dijk and Paul DiMaggio (1990s), guided this study.

The theory states that there are disparities in access and use of ICT among social groups. Digital inequality is thus multidimensional, comprising access to technology, digital competences and the results of ICT use (Van Dijk, 2020). In the educational environment, these inequalities affect the extent to which teachers can incorporate the use of ICT in education. The digital divide in rural primary schools is experienced at both the first level (digital access) and second level (digital skills and use), and is reflected in limited infrastructure, unreliable access to and supply of electricity and lack of professional training for teachers in using the internet and ICTs as promoted in the policy and curriculum.

This theory is suitable for this study because it gives a clear direction and focus for the study of the gap between the policy/curriculum expectation and the classroom, as seen by the teachers of ICT. It illustrates that the effective application of ICT is not just about technological and/or equipment availability but also about teachers' expertise, support and environmental factors. When these factors are lacking, teachers' use of ICT in teaching becomes minimal, hence leading to a mismatch between intended and actual practice (Msambwa & Daniel, 2024; Kalinga, 2024). Based on this, the theory was used as a lens to critically examine the understanding of ICT and digital learning and inequalities in terms of

access, skills and usage, and to highlight why the transformative potential of ICT in rural classrooms is not being realised.

2. Conceptual Framework

The conceptual framework is based on the Digital Divide Theory and assumes that the set of factors that contribute to successful digital learning are related to the curriculum expectations, access to ICT resources, teachers' digital competence, and institutional support. The curriculum is enhanced, which encourages ICT integration and the development of learners' digital skills. The realisation of these expectations is, however, dependent on the availability of digital infrastructure, internet connection, teacher-professional development, technical support and teachers' pedagogical ability to implement the use of ICT in the teaching-learning process (Msambwa & Daniel, 2024; Kalinga, 2024).

The framework also assumes that if teachers' knowledge, skills and support of ICTs and digital learning are improved, the digital learning practices in classrooms will be better, with better outcomes on the digital competences of the learners. At the other end of the spectrum, however, a lack of resources, inadequate teacher preparation and weak institutional support can lead to the misalignment of intent with experience. The expectation–reality gap is thus considered as a consequence of digital inequalities, which impact the

ability of teachers to effectively implement digital curriculum aspirations in classroom activities in rural primary schools (Ramrathan & Moodley, 2024).

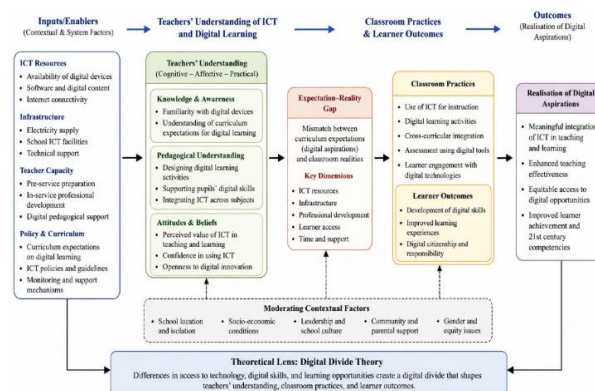


Figure 1.
Conceptual Framework

3. Empirical Literature Review

a. Teachers' Understanding and Pedagogical Application of ICT and Digital Learning

The learning of teachers about ICT and digital learning is built on a social process of professional training, school contexts, policy and curriculum requirements, and views on technology and development in society. Teachers' concept of ICT is also influenced by their peers, the discourses surrounding the national policies, the curriculum, and their experiences with the use of ICT and digital tools in their educational contexts (Nungsari et al., 2023).

In global contexts, ICT and digital learning competencies are now increasingly considered as digital competence, instead of simply technological literacy, among teachers. The European Commission's

DigCompEdu framework defines digital competence as the capacity to select, adapt, create and evaluate digital resources for facilitating learner-centred instruction and assessment (Redecker, 2022). New OECD data shows that teachers with higher levels of digital competence are more likely to use it in a meaningful way for learning and teaching, increasing levels of learner engagement and collaboration (OECD, 2023). Likewise, UNESCO (2023) states that teachers' knowledge of digital learning has a profound impact on the level of technology integrated into teaching to enhance learners' critical thinking, creativity and problem-solving abilities. In many instances, teachers relate ICT to enhanced teaching effectiveness, relevance of the job to teaching and learning and socio-economic development of the learners. Digital learning is frequently understood as a route to modernisation of education, and to making the classroom or classroom practice more "go global". But these perceptions are shaped by dominant policy narratives that see the integration of ICTs as a universal and important aspect of quality education, taking contextual constraints into account. Consequently, school teachers can feel that ICT can be a teaching aid, as well as a symbol of advancement and professionalism, even if its use is not easy (Nungsari et al., 2023).

Teacher's involvement in the use of ICT/digital learning is influenced by self-efficacy beliefs, outcome

expectations and environmental factors (Kaya-Kasikci et al., 2023; Paetsch et al., 2023). When teachers are self-assured in the use of ICTs and are supported by institutions, there is a high likelihood of using ICTs in teaching. On the other hand, teachers who are not very confident in their own abilities, have a limited amount of professional development opportunities, perceive their resources as inadequate, and lack institutional support may lower their expectations and limit their integration of digital technologies into their classroom routines (Wang, H., & Zhang, H. (2024)). The idea that teachers' conceptions of ICT are dynamic and dependent upon their competency and context is presented.

Recent research has shown that teachers' knowledge of digital learning goes beyond how to use technological devices. A scoping review of digital pedagogy in early childhood education by Li et al (2024) revealed that digital learning is a complex process that demands the teacher to be technologically literate, make pedagogical decisions, provide engagement strategies and be able to adapt to context. Likewise, Shonfeld et al. (2021) state that the classroom is best when teachers can incorporate technology alongside a collaborative, student-centred and inquiry-based strategy. The results indicate that teachers' ICT knowledge goes beyond technical knowledge and needs to be studied in relation to the ability to apply the technology in meaningful

ways in pedagogical contexts. In Africa, teachers' knowledge of ICTs remains contextual. The study in Kenya, Rwanda and South Africa shows that teachers as a whole have positive attitudes towards digital learning, but that they have varying levels of digital competence as a result of the unequal access they have to digital technology and limited professional learning opportunities (Njuguna et al., 2025; Nsengimana et al., 2023).

Additional research shows that teachers' confidence in the use of ICT has a strong correlation with institutional support, access to ICT, and opportunities for continuous professional development (Aina & Mhlongo, 2024). Some empirical research is emerging in Tanzania that teachers recognise the value of ICTs in enhancing educational quality, but many still face difficulties in putting this into practice. Chandafa et al (2026) reported that teachers tend to have positive attitudes towards digital learning, but also encounter constraints of pedagogical integration, technical support, and access to instructional technologies. Likewise, Lubuva et al. (2022) noted the significant differences in the level of ICT competence of teachers based on training opportunities and contexts of the schools, especially between urban and rural schools.

b. Digital Curriculum Expectations and Rural Classroom Realities

Curriculum reforms expect teachers to integrate ICT across teaching and learning so as to develop learners' digital knowledge and skills. However, the degree to which these expectations are realised relies on the factors within which teachers are working. In a rural context, teachers' experiences with digital learning are shaped by access to digital resources, professional learning opportunities, technological infrastructure, and institutional support. Recent studies show that rural teachers always experience weaker access to digital resources and opportunities for developing sophisticated digital teaching practices than teachers in better-resourced contexts (Hawley et al., 2023; Zhao, 2024). Consequently, teachers may conceptualise the value and expectations of ICT integration while having constrained opportunities to translate this understanding into meaningful pedagogical practice.

This discrepancy reflects a broader digital divide between curriculum expectations and classroom realities. Across African education systems, ICT and digital competencies have been integrated into curriculum and policy frameworks, their implementation remains limited by poor infrastructure, unreliable electricity supply, limited digital resources, poor internet connectivity, and insufficient teacher support

(African Union, 2024; UNESCO, 2023). These inequalities are significant in rural schools, where resources are limited, leading teachers to have basic or routine uses of digital technologies rather than learner-centred and innovative digital pedagogy. Thus, the presence of ICT expectations in the curriculum does not necessarily guarantee their meaningful enactment in classroom practice.

Evidence from Tanzania shows a similar policy-practice tension. Although recent curriculum and policy reforms insist on ICT integration and learners' digital competence (MoEST, 2023a; MoEST, 2025), teachers continue to work under an uneven implementation environment. Recent studies show that inadequate digital resources, teacher preparation, connectivity and institutional support limit teachers' ability to translate ICT-related curriculum expectations into pedagogical practice (Anasel & Swai, 2023; Kalinga, 2024; Msambwa & Daniel, 2024). Kalinga (2024), for example, reported that although teachers were familiar with ICT-related educational policies and acknowledged the value of technology, many of them struggled to integrate ICT pedagogically. Similarly, Msambwa and Daniel (2024) demonstrate that effective ICT integration requires alignment among digital resources, teachers' and learners' digital competence, curriculum requirements and supportive implementation conditions.

Recent rural education evidence further suggests that these limitations should not be viewed as teachers' resistance to digital learning. Mustafa et al. (2024) reveal that persistent rural-urban inequalities in connectivity, infrastructure, and technological support continue to shape technology integration in rural schools. Similarly, Ramrathan and Moodley (2024) indicated that rural teachers could have positive perceptions of digital technologies despite experiencing contextual challenges to their classroom application. Such evidence recommends that teachers may acknowledge the educational potential of ICT while slowly adapting their practices to what is realistically possible within resource-constrained settings. The expectation-reality gap is therefore shaped by the interaction between teacher competence and the structural and institutional factors available for digital teaching.

These contextual limitations have significant implications for teachers' professional practice and learners' opportunities. Limited access to digital resources and professional support can restrict teachers' confidence and opportunities to explore learner-centred digital pedagogies, while few opportunities may be available to pupils to develop and apply digital skills across curriculum areas. Conversely, the presence of professional development, institutional support and opportunities for sustained participation with

technology can strengthen teachers' capacity to integrate ICT effectively (Paetsch et al., 2023; OECD, 2023). Therefore, bridging the gap between digital curriculum aspirations and rural classroom realities needs more than technological provision; it requires strong, coordinated attention to infrastructure, professional learning, teacher digital competence, technical support and learners' opportunities to participate effectively with digital technologies.

METHODOLOGY

The study employed a quantitative approach using a cross-sectional survey design to examine teachers' understanding of ICT and digital learning expectations in the improved curriculum and the extent to which these expectations corresponded with classroom practices in rural primary schools in Tanzania. The design was appropriate because it enabled data to be collected from a relatively large number of teachers at a single point in time and allowed patterns in teachers' understanding, access, competence and classroom implementation of ICT to be examined. The regions such as Arusha, Pwani and Lindi were purposively selected to capture variations in rural educational contexts and ICT-related conditions. Thereafter, a census approach was employed whereby all eligible primary school teachers within the selected study sites were invited to participate to fill in the online survey. A total of

358 rural primary school teachers from the three regions succeed to complete the survey and regarded as a sample of this study. Teachers were considered appropriate participants because they were directly responsible for translating curriculum expectations concerning ICT and digital learning into classroom practice. Data were collected using a structured online questionnaire distributed electronically, including through WhatsApp. The questionnaire consisted primarily of closed-ended items measuring teachers' understanding of ICT and digital learning, classroom use of ICT, availability and accessibility of ICT resources, and perceived challenges affecting digital learning implementation. The items were rated on a five-point Likert scale, ranging from Strongly Disagree (1) to Strongly Agree (5). Data were analysed using descriptive statistics. Frequencies and percentages were used to summarise categorical responses, while means and standard deviations were computed to establish patterns in teachers' understanding of ICT and digital learning and their experiences of classroom implementation. The results were subsequently organised around the study objectives and presented in tables accompanied by narrative interpretations to demonstrate the extent of alignment or discrepancy between curriculum expectations and actual digital learning practices in rural primary schools.

RESULTS AND DISCUSSIONS

This section presents and discusses the findings in relation to the study objectives. The results are organised into two themes: teachers' understanding of ICT and digital learning under the improved curriculum, and the gap between digital curriculum expectations and lived classroom experiences.

Teachers Understanding of ICT and Digital Learning Under the Improved Curriculum

The first target aimed at a deeper understanding of how teachers understand the role of ICT and digital learning in the improved curriculum. The descriptive analysis showed that the level of understanding of teachers on the three variables was moderate (composite $M = 3.37$, $SD = 1.04$, $\alpha = .88$). The highest scoring indicators were that teachers were very familiar with the digital devices used in their schools ($M = 4.43$, $SD = 1.40$), very clear about the expectations of the curriculum in relation to ICT and digital learning ($M = 3.95$, $SD = 1.76$) and that pupils' understanding of ICT and digital learning had improved due to the enhanced curriculum ($M = 3.79$, $SD = 1.84$). Lower mean scores were found for preparing digital learning activities ($M = 3.17$, $SD = 1.29$); pupils' demonstration of digital skills ($M = 2.91$, $SD = 1.33$); pupils' understanding of the role of ICT in learning ($M = 2.80$, $SD = 1.27$); pupils' application of ICT across subjects ($M = 2.59$, $SD = 1.96$).

The results show teachers have a reasonable conceptual understanding of ICT and digital learning, but this has not yet been put into practice in the classroom and in a learner-focused way in digital learning.

The findings reveal an important distinction between technological familiarity and pedagogical digital competence. Although teachers demonstrated relatively strong familiarity with ICT and digital devices, they were less competent in preparing digital learning activities, developing pupils' digital skills and integrating ICT across subjects. This pattern is consistent with Claro et al. (2024), whose systematic review found that teacher digital competence research tends to report stronger emphasis on using ICT for planning and teaching than on designing learner-centred digital activities and developing pupils' digital capabilities. Similarly, Msambwa and Daniel (2024) argue that effective ICT integration requires technological knowledge to be combined with pedagogical understanding, curriculum objectives and an enabling learning environment. Thus, the present findings reinforce the view that familiarity with digital devices alone cannot be interpreted as readiness to implement meaningful digital learning.

This gap between understanding and classroom application is particularly consistent with evidence from Tanzania. Kalinga

(2024) found that although teachers were generally aware of ICT-related education policies and understood the benefits of ICT for competency-based education, 85% did not integrate ICT as a pedagogical tool and many struggled to connect their classroom practices with policy expectations. The present study extends this evidence from secondary education to rural primary schools, suggesting that the policy-practice gap is not confined to one educational level. However, whereas Kalinga (2024) relied primarily on qualitative evidence from 139 participants, the present survey of 358 teachers gives quantitative evidence indicating more specifically where this gap occurs in lesson preparation, learner digital skills and cross-curricular ICT integration. The convergence of these findings suggests that the central challenge may be less about teachers recognising the importance of ICT and more about translating such recognition into pedagogically meaningful practices.

The comparatively weak indicators of pupils' digital participation further demonstrate that limited pedagogical integration has implications beyond teachers themselves. Teachers reported relatively low levels of pupils' digital competence, understanding of ICT in learning and use of ICT across subjects. This finding corresponds with Msambwa and Daniel (2024), who conclude from their systematic review that effective ICT integration requires

alignment among curriculum objectives, teachers' and learners' digital skills, maintenance of technological resources and supportive learning conditions. However, their review largely synthesised evidence from secondary education, whereas the present findings indicate that these conditions are equally important at the rural primary-school level, where early opportunities to develop digital competence may be particularly constrained.

Generally, the findings demonstrate an expectation-practice gap: teachers therefore, recognise ICT and digital learning expectations, but this understanding has not yet translated into consistent learner-centred digital practice. This interpretation supports recent Tanzanian evidence showing a continuing disconnection between ICT policy aspirations and actual classroom implementation (Kalinga, 2024; Msambwa & Daniel, 2024). The findings therefore suggest that professional development should move beyond basic ICT literacy towards pedagogical digital competence, particularly digital lesson design, learner engagement, cross-curricular integration and practical opportunities for teachers to use technology in instruction. At the same time, professional development alone is unlikely to close the gap unless it is accompanied by adequate infrastructure, functioning digital

resources and sustained institutional and technical support.

Gaps exist between Digital Expectations and Lived Classroom Experiences

The second objective examined the gap between digital learning expectations in the improved curriculum and actual practices in rural primary schools. The findings reveal a clear expectation-reality gap. Teachers reported relatively strong agreement that digital learning expectations were clear ($M = 3.95$, $SD = 1.76$), yet considerably lower ratings were recorded for the sufficiency of ICT resources ($M = 2.25$, $SD = 1.39$), adequacy of infrastructure ($M = 2.40$, $SD = 1.91$), teacher-training opportunities ($M = 2.61$, $SD = 1.40$), and pupils' regular application of ICT skills ($M = 2.58$, $SD = 1.96$). At the same time, teachers reported difficulties integrating ICT into teaching ($M = 3.88$, $SD = 1.80$) and strongly expressed the need for additional support to bridge policy and practice ($M = 4.06$, $SD = 1.26$). Collectively, these results suggest that curriculum expectations have advanced faster than the conditions required to implement them.

This pattern is consistent with recent evidence from Tanzania. Kalinga (2024) similarly found that although teachers were aware of ICT-related educational policies, most struggled to translate policy expectations into pedagogical practice, with 85% not integrating ICT as a pedagogical tool.

Msambwa and Daniel (2024) likewise conclude that successful ICT integration in Tanzania requires more than curriculum alignment; it depends on teachers' and learners' ICT skills, motivation and attitudes, together with sustained availability and maintenance of technological resources. The present study, however, extends these findings by demonstrating quantitatively that the disconnect is also evident among rural primary-school teachers, particularly in infrastructure, professional development and opportunities for pupils to practise digital skills. This suggests that the problem extends beyond individual teacher readiness to the broader conditions under which curriculum reform is implemented.

The findings also correspond with evidence specifically concerning rural education. Mustafa et al. (2024), in a systematic review of technology integration in rural schools, found that the rural-urban digital divide continues to constrain technology integration and contributes to educational inequality. Similarly, Ramrathan and Moodley (2024) found that rural teachers could hold positive views about digital technology despite contextual challenges associated with rurality. This is particularly comparable with the present findings: teachers did not appear to reject digital learning expectations; rather, their capacity to realise them was constrained by resources, infrastructure and support. However,

while Ramrathan and Moodley (2024) examined one rural primary school ethnographically, the present study provides broader survey evidence from 358 teachers across three Tanzanian regions, strengthening the argument that positive attitudes towards technology do not necessarily translate into meaningful classroom integration when enabling conditions are inadequate.

Viewed through the Digital Divide Theory, these results demonstrate that digital inequality extends beyond physical access. Limited infrastructure and ICT resources reflect an access divide, whereas inadequate professional development, difficulties integrating ICT pedagogically and limited opportunities for pupils to practise digital skills point to inequalities in meaningful use and competence. This interpretation is reinforced by Maro et al. (2024), whose Tanzanian study demonstrates the difficulties of implementing technology-supported teacher professional development in contexts characterised by limited internet connectivity and demanding ICT infrastructure requirements. Nevertheless, professional learning can make a difference: Tanzanian evidence from Msambwa et al. (2024) shows that collaboration, practice-based learning and engagement with digital tools within professional learning communities can strengthen teachers' ICT integration practices. Thus, infrastructure and teacher competence

should not be treated as competing explanations; both are interconnected conditions for translating curriculum intentions into practice.

Overall, the findings demonstrate that the gap between digital curriculum expectations and classroom realities in rural primary schools is systemic rather than solely a teacher-level problem. Teachers generally recognise digital learning expectations, but inadequate resources, infrastructure, professional learning and opportunities for pupils to engage directly with technology restrict their implementation. The findings therefore suggest that curriculum reform needs to be accompanied by coordinated investment in digital infrastructure, equitable access to ICT resources, practice-oriented teacher professional development and sustained technical and institutional support. Without these enabling conditions, digital learning expectations risk remaining stronger at the curriculum level than in pupils' everyday learning experiences.

CONCLUSION

The study concludes that although teachers recognise the importance of ICT and understand the digital expectations of the improved curriculum, translating these expectations into meaningful classroom practice remains constrained. Bridging this expectation-reality gap requires coordinated improvements in digital infrastructure, teacher professional development,

institutional support and equitable opportunities for learners to engage meaningfully with digital technologies

Recommendations

The study recommends strengthening practice-oriented teacher professional development to move teachers beyond basic ICT awareness towards effective pedagogical integration of digital technologies. The government and education stakeholders should also prioritise equitable provision of ICT infrastructure, reliable connectivity, digital learning resources and sustained technical support in rural primary schools. These efforts should be accompanied by increased opportunities for pupils to use digital technologies meaningfully across subjects, thereby reducing the gap between curriculum expectations and actual classroom practice.

REFERENCES

- African Union. (2020). *Digital transformation strategy for Africa (2020-2030)*. African Union Commission. <https://au.int>
- African Union. (2024). *Continental education strategy for Africa (CESA) implementation report*. African Union Commission.
- Aina, A. Y., & Mhlongo, N. Z. (2024). Curriculum responsiveness to digital transformation and future workforce demands in higher education institutions in Nigeria. *International Journal of Learning, Teaching and Educational Research*, 23(4), 145-163.
- Anasel, M. G., & Swai, I. L. (2023). Factors to determine the adoption of online teaching in Tanzania's universities during the COVID-19 pandemic. *PLoS ONE*, 18(10), e0292065. <https://doi.org/10.1371/journal.pone.0292065>
- Chandafa, M. J., Kambona, W. L., & Ndibalema, P. (2026). Teachers' knowledge and attitudes toward instructional media and technology integration in Tanzanian higher education. *Discover Education*, 5(60). <https://doi.org/10.1007/s44217-026-01560-4>
- Claro, M., Castro-Grau, C., Ochoa, J. M., Hinostroza, J. E., & Cabello, P. (2024). Systematic review of quantitative research on digital competences of in-service school teachers. *Computers & Education*, 215, 105030. <https://doi.org/10.1016/j.compedu.2024.105030>
- Hawley, E., Mocatta, G., & Milstein, T. (2023). The place of the teacher: Environmental communication and transportive pedagogy. *Environmental Communication*, 17(4), Kalinga, T. (2024). Teachers' technological literacy for ICT integration to implement competence-based curriculum in public secondary schools in Tanzania. *Educational Technology Quarterly*, 2024(2), 135-151.

- <https://doi.org/10.55056/etq.708>
- Kaya-Kasikci, S., Zayim-Kurtay, M., & Kondakci, Y. (2023). The role of leadership in developing a climate of technology integration in public schools. *Teaching and Teacher Education*, 132, 104234. <https://doi.org/10.1016/j.tate.2023.104234>
- Lembani, R., Gunter, A., Breines, M., & Raghuram, P. (2020). The same course, different access: The digital divide between urban and rural distance education students in South Africa. *Journal of Geography in Higher Education*, 44(1), 70-84. <https://doi.org/10.1080/03098265.2019.1694876>
- Li, H., He, H., Luo, W., & Li, H. (2024). Early childhood digital pedagogy: A scoping review of its practices, profiles, and predictors. *Early Childhood Education Journal*, 52(4), 675-690. <https://doi.org/10.1007/s10643-023-01508-9>
- Lin, R., Chu, J., Yang, L., Lou, L., Yu, H., & Yang, J. (2023). What are the determinants of rural-urban divide in teachers' digital teaching competence? Empirical evidence from a large sample. *Humanities and Social Sciences Communications*, 10, 422. <https://doi.org/10.1057/s41599-023-01933-2>
- Lubuva, E. E., Ndibalema, P., & Mbwambo, E. (2022). Assessment of tutors' level of ICT competencies in teaching in teacher education in Tanzania. *Journal of Learning for Development*, 9(3), 454-472.
- Ministry of Education, Science and Technology. (2023). *Teacher education curriculum for diploma in teacher education*. Tanzania Institute of Education.
- Ministry of Education, Science and Technology. (2025). *National digital education strategy 2024/25–2029/30*. Government Printer.
- Msambwa, M. M., & Daniel, K. (2024). A systematic literature review on the ICT integration in teaching and learning: Lessons for an effective integration in Tanzania. *European Journal of Education*, 59, e12696. <https://doi.org/10.1111/ejed.12696>
- Mtebe, J. S., & Sausi, J. (2021). Revolutionization of revenue collection with Government E-Payment Gateway System in Tanzania: A public value creation perspective. *The African Journal of Information Systems*, 13(1), 1-26.
- Mustafa, F., Nguyen, H. T. M., & Gao, X. (2024). The challenges and solutions of technology integration in rural schools: A systematic literature review. *International Journal of Educational Research*, 126, 102380.

- <https://doi.org/10.1016/j.ijer.2024.102380>
- Nsengimana, T., Mugabo, L. R., Ozawa, H., & Nkundabakura, P. (2023). Science teachers' knowledge, understanding and perceptions of competence-based curriculum in three secondary schools in Rwanda. *European Journal of Educational Research*, 12(1), 317-327.
<https://doi.org/10.12973/eujer.12.1.317>
- Njuguna, E. W., Kimotho, M., & Nduku, E. (2025). The extent to which teachers' attitudes and beliefs influence ICT use in teaching among public secondary school teachers in Kipipiri Constituency, Nyandarua County, Kenya. *Journal of Popular Education in Africa*, 9(2), 30-43.
- Nungsari, M., Chin, J. W., Ngu, K., Abdullah, M. F. S., & Flanders, S. (2023). Dreams vs reality: Urban and rural female youth aspirations. *Journal of Career Assessment*, 32(1), 79-100.
<https://doi.org/10.1177/10690727231177911>
- Paetsch, J., Franz, S., & Wolter, I. (2023). Changes in early career teachers' technology use for teaching: The roles of teacher self-efficacy, ICT literacy, and experience during COVID-19 school closure. *Teaching and Teacher Education*, 135, 104318.
<https://doi.org/10.1016/j.tate.2023.104318>
- OECD. (2023). *Digital education outlook 2023: Towards an effective digital education ecosystem*. OECD Publishing.
<https://doi.org/10.1787/b2715bba-en>
- Redecker, C. (2022). *European framework for the digital competence of educators: DigCompEdu*. Publications Office of the European Union. https://joint-research-centre.ec.europa.eu/digcompedu_en
- Ramrathan, L., & Moodley, S. C. (2024). Digital integration in rural schools: Perspective of teachers teaching in such schools. *Southern African Review of Education*, 29(2), 50-68.
- Shonfeld, M., Cotnam-Kappel, M., Judge, M., Ng, C. Y., Ntebutse, J. G., Williamson-Leadley, S., & Yildiz, M. N. (2021). Learning in digital environments: A model for cross-cultural alignment. *Educational Technology Research and Development*, 69(4), 2151-2170.
<https://doi.org/10.1007/s11423-021-09967-6>
- Swai, C. Z., Mtebe, J. S., & Mbwanbo, B. P. (2023). Digital learning in Tanzanian basic education: Teachers' experiences, opportunities and implementation challenges.

- Journal of Learning for Development*, 10(3), 456–473.
- Trucano, M. (2022). *Knowledge maps: ICTs in education*. World Bank.
- Wang, H., & Zhang, H. (2024). Rural teachers' digital competence: Impediments and developmental responses. *Journal of Education and Educational Research*.
<https://doi.org/10.54097/sbh3a880>
- Van Dijk, J. (2020). *The digital divide*. Polity Press.
- UNESCO. (2023). *Global education monitoring report 2023: Technology in education-A tool on whose terms?* UNESCO.
<https://www.unesco.org/gem-report/en/technology>
- Zhao, W. (2024). A study of the impact of the new digital divide on the ICT competences of rural and urban secondary school teachers in China. *Heliyon*, 10(9), e29186.
<https://doi.org/10.1016/j.heliyon.2024.e29186>

AUTHOR CONTRIBUTIONS

Conceptualization : All Authors;

Methodology : All Authors ;

Investigation :All Authors ;

Writing—original draft preparation
: All Authors ;

Writing—review and editing : All
Authors ;

Visualization: All Authors.

All authors have read and agreed to the published version of the manuscript