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The Extent to which Heads of Schools Ensure Professional Development for Teachers in Integration of Digital Technologies into Teaching in Public Secondary Schools in Moshi Municipality Tanzania

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Abstract: This study examined the extent to which heads of schools ensure professional development for teachers in integration of digital technologies into teaching in public secondary schools in Moshi Municipality, guided by UTAUT Theory. The study used a convergent mixed-methods design to collect and integrate quantitative and qualitative data. The study employed a convergent design under a mixedmethods research approach. The target population was 718 individuals. A sample of 147 respondents was selected through stratified random and purposive sampling, comprising 137 teachers and 5 Heads of Schools from five schools. Instruments were validated by 3 research experts from the Department of Education Planning and Administration at Mwenge Catholic University. The study collected quantitative data using questionnaires and qualitative data through an interview guide and an observation guide. Data collection instruments were pilot-tested in one public school. Reliability for Likert-type items was ensured using Cronbach's Alpha coefficient, whereby alpha of 0.923 was obtained from questionnaires for teachers. The trustworthiness of qualitative data collection instruments was ensured through peer debriefing and triangulation techniques. Quantitative data were analyzed using descriptive statistics (frequencies, percentages, and means) via SPSS Version 27, while qualitative data were analysed thematically. Ethical guidelines were observed through informed consent, anonymity and confidentiality. The study finding show that Heads of Schools play an important role in ensuring professional development for teachers in the integration of digital technologies into teaching. However, available training focuses mainly on basic computer literacy rather than pedagogical integration; inadequate subject-specific professional development, and digital technology programs are not included in school development plans or annual calendars, make it difficult to allocate resources and monitor teachers' progress. The study concluded that the availability of digital resources alone does not ensure sustained pedagogical utilisation. Consequently, effective digital technology integration requires not only strong school leadership but also sustainable and diversified mechanisms for teachers' professional development, mobilising financial, infrastructural to ensure teachers' technical support. The study recommends strengthening practical teacher training, providing digital resources, integrating ICT into classroom supervision, and involving teachers in technology-related decisions.

Keywords: *Heads of Schools; Leadership Practices; Digital Technologies; Teaching.*

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I. INTRODUCTION

Adoption of digital technologies in education is no longer optional in contemporary teaching worldwide. Given the growing importance of digital technologies in education and society, the United Nations has declared their integration a global mandate and a human right (United Nations, 2021). This recognition has encouraged countries to integrate digital technologies into their education systems to improve teaching and learning and equip learners with the skills and competencies needed to participate effectively in an increasingly digital and competitive economy. This is in line with Sustainable Development Goal 4, target 4.1, which emphasises inclusive and equitable quality education and lifelong learning opportunities for all. However, the successful integration of digital technologies depends not

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only on the availability of digital infrastructure and resources but also on how these technologies are implemented and supported at the school level. This makes school heads' leadership practices an important factor in ensuring the effective integration and use of digital technologies in teaching and learning. OECD (2023) emphasises that school leaders play a critical role in leading digital transformation, promoting technologyenhanced pedagogical practices, and creating conditions that strengthen teachers' capacity to use digital technologies effectively. This implies that digital transformation requires appropriate leadership and support within schools.

School leadership practices that support the integration of digital technologies in education include mobilising innovative technologies, promoting professional development for teachers, managing and using data and analytics, integrating ICT into the curriculum, monitoring progress through classroom visits, establishing an instructional vision, engaging stakeholders, creating feedback loops, building a positive school culture, and strengthening instructional cycles. These practices can also be traced to UNESCO Education 2030 (SDG4, Target4c), which emphasises effective governance and school leadership as necessary for translating the global education commitments into practice. In this context, heads of schools are responsible for translating digital initiatives into school-level practices (UNESCO 2015).

Although all leadership practices contribute to digital technology integration, this study focuses on one practice, which is professional development for teachers. Professional development strengthens teachers' knowledge and skills in integrating digital technologies into teaching (Palm et al .2025). Nevertheless, the selected leadership practice provides a practical link between the broader UNESCO Education 2030 agenda and the actual implementation of digital technologies in teaching and learning at the school level (UNESCO, 2023)

Digital technologies are increasingly recognised as important resources for improving teaching worldwide. In the United States, the National Educational Technology Plan promotes digital access, use, and design to strengthen technology integration in teaching (NETP 2024).

However, teachers' digital competence remained inadequate across schools (Ikeda, 2020; Gouseti, 2023), highlighting the need for heads of schools to promote teachers' professional development to ensure their efficiency in integrating digital technologies in teaching. Similarly, in Europe, efforts to improve digital infrastructure, including access in schools, have been successful, but challenges remain in ensuring teachers have access to digital resources in classrooms (OECD, 2023; Dubey, 2025). These challenges show that heads of schools have an important role in ensuring teachers' professional development in the integration of digital technologies in teaching. This creates the necessity to examine the extent to which heads of school ensure teachers' professional development in integrating digital technologies into teaching.

African countries have made several efforts to integrate digital technologies into secondary school teaching, although challenges remain (World Bank, 2024). In Egypt, the government, in collaboration with UNESCO, has invested in digital infrastructure and internet connectivity, yet teachers still face gaps in digital skills (UNESCO, 2023; Rice et al., 2023). Similarly, Nigeria's National EdTech Strategy (2025) promotes ICT integration into teaching, but inadequate techniques in integrating digital tools among teachers continue to hinder implementation (Fahm, 2025). These challenges show that national initiatives alone are insufficient, underscoring the role of school heads in translating digital policies into practice at the school level. Through continuous professional development and support for teachers. In Uganda, the National ICT Policy (2014; 2022 edition) aimed to bridge the digital divide by expanding ICT infrastructure and promoting innovation. Despite these efforts, teachers still face challenges in designing digital lessons (Mrk, 2023). This highlights the need to examine how heads of schools ensure teachers' digital technology professional development to bridge the gap between national ICT policies and classroom practice.

In Tanzania, national education policies increasingly recognise the importance of effective leadership in improving the quality of education. The Education and Training Policy, 2014 (2023 Edition), calls for effective leadership in creating supportive environments for quality teaching, while the National Digital Education Strategy 2024/25–2029/30 provides a framework for strengthening effective use of digital technologies in schools (MoEST2024). These policy directions place heads of schools in an important position to translate national digital education priorities into classroom practice through mobilising digital resources, supporting teachers' professional development, and monitoring the use of digital technologies in teaching. Despite these initiatives, 85% of teachers in public secondary schools in Tanzania expressed concerns about the limited use of digital technologies as pedagogical tools (Kalinga, 2024). This concern calls upon the heads of schools to implement technological leadership practices that promote digital integration in teaching by supporting the teachers, who are the primary implementers of digital technologies in classrooms. Similarly, Richard and Mwila (2026) reported that parents perceive students' digital exposure as being largely home-based, while access to digital resources in schools, particularly the integration of classroom technologies, remains minimal. These concerns raise questions about the readiness of schools and school leadership to support the integration of digital technology as required by the revised secondary school curriculum (2023). These concerns necessitate examining how heads of schools provide instructional support, particularly through professional development to ensure effective digital technology use in teaching.

The integration of digital technology into teaching has become difficult in public secondary schools in Moshi Municipality. The actual use of computers, tablets, and smart boards, along with software such as e-books, online platforms, and educational apps, to ensure equitable, and

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highquality teaching remains limited (Oberlin & Saine, 2026). Although the Tanzania National Digital Education Strategy (2024/25–2029/30) emphasises the role of heads of schools in adopting leadership practices that promote the integration of digital technologies into teaching, teachers' digital competencies persist. Nkwamah, et al., (2026) exposed digital competency gaps among secondary school students entering post-secondary education, including vocational and technical institutions. This concern aligns with Swai's (2024) caution that 59% of teachers have limited knowledge and skills in integrating digital tools into teaching, and 78% of teachers revealed that digital resources for quality teaching are inadequate. This implies that efforts to bridge the digital gap in teaching have not yet translated into effective classroom practices provide clear evidence of integration. This is an alarm, especially now, when the government is at a critical moment to shape the digital education system and adopt a global trend toward a future-ready workforce. This challenge clearly translates to heads of Schools, who are required to shift to active instructional technology leadership and practically resolve the digital resources deficit. Hence, it is necessary to examine how mobilise digital resources, support teachers' professional development, and monitor the use of digital technologies in teaching.

➢ *Statement of the Problem*

The integration of digital technology in teaching has become difficult in public secondary schools in Moshi Municipality. Teachers continue to treat digital technologies as operational tools rather than for pedagogical purposes (Oberlin & Saine, 2026; Swai's, 2024). The efforts to bridge the digital gap in teaching have not yet translated into effective classroom practices. Education stakeholders, including teachers, TVET institutions, employers, and parents, have raised concerns about students' preparedness for a knowledge-based economy (Nkwamah, et al., 2026; Richard and Mwila, 2026). Although the National Education Strategy (2024/25–2029/30) assigns heads of schools a key role in promoting digital pedagogy, their leadership practices in supporting sustainable technology integration remain limited. Without agent intervention, the situation will worsen, undermining educational outcomes (Nkwamah, et al., 2026). Various studies conducted on digital technologies show that their integration into teaching is still a serious concern (Kalinga, 2024). This study, therefore, investigates the extent to which heads of schools ensure professional development for teachers in the integration of digital technologies in teaching in public secondary schools in Moshi Municipality, Tanzania.

➢ *Research Question*

The following research question guided the study.

- To what extent do heads of schools ensure professional development for teachers in the integration of digital technologies into teaching in public secondary schools in Moshi Municipality?

➢ *Significance of the Study*

The findings of this study will help heads of schools and teachers in Moshi Municipality understand the status of leadership practices in promoting digital technology integration and identify areas requiring improvement. The findings may inform decisions on resource mobilization, teachers' professional development, and monitoring of digital technology use in teaching. The study will also contribute empirical evidence to the body of knowledge on school leadership and digital technology integration. Theoretically, the findings will help assess and extend the applicability of the study's guiding leadership theory by showing how heads of schools' leadership practices operate in promoting digital technology integration in the Tanzanian secondary school context. The study may therefore provide a basis for refining the theory and informing future research in similar educational settings.

➢ *Theoretical Framework*

This study applies the Unified Theory of Acceptance and Use of Technology (UTAUT), by Venkatesh, Morris, and Davis (2003), which highlights performance expectancy, effort expectancy, social influence, and facilitating conditions as drivers of technology adoption. For heads of schools, these constructs clarify how to promote digital integration: by showing the value of technology in improving learning, reducing barriers through training, fostering collaboration and accountability, and ensuring resources and infrastructure are in place. Together, the framework guides school leaders in turning policy into effective classroom practice (Lee et al., 2025).

The UTAUT theory serves as a strategic roadmap for heads of schools to bridge the gap between teacher willingness and institutional capability to ensure lifelong digital integration. By leveraging performance expectancy, heads of schools can actively promote technology by demonstrating how digital tools improve teaching and students' outcomes. To lower integration barriers, they can manage effort expectancy by selecting user-friendly platforms that boost teacher technical confidence and protect them from frustration. Additionally, heads of schools can promote a school culture via social influence by appointing peer technology champions to ensure the sustainability of digital integration by securing facilitating conditions such as allocation of budgets for reliable Wi-Fi, technical support, and continuous professional development. Ultimately, UTAUT theory provides school leaders with a holistic, data-driven diagnostic lens to identify exact friction points, balancing individual psychological readiness with structured institutional support to make technology integration both effective and permanent (Lee et, al., 2025).

The UTAUT theory strength is, how it serves as a strategic plan that transforms school heads into proactive technological leaders by aligning their administrative practices with the psychological and infrastructural needs of teachers. To practice supportive leadership, heads can implement changes in their leadership practices by leveraging social influence, actively modelling digital behavior during staff meetings, empowering peer-led technical Champions within departments, and building community-wide expectations among parents and board members. Eventually, UTAUT theory provides heads of school with a holistic,

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evidence-based diagnostic framework to accurately pinpoint whether integration friction stems from poor infrastructure or low teacher motivation, enabling them to make targeted resource investments that secure longterm digital sustainability (Almusawi & Durugbo, 2024).

II. REVIEW OF EMPIRICAL STUDIES

This section synthesizes empirical evidence by explaining how prior studies have outlined the research problem, applied sampling strategies, and reported outcomes. Through critical engagement, the review highlights key insights and gaps, thereby establishing a foundation for the present study and its contribution to the field. The empirical studies focused on how teachers' professional development promotes teaching through technology integration. It identified prior research gaps and explored the extent to which digital literacy training enhances teaching and pedagogical approaches.

König and Glutsch (2021) investigated how professional development supported teachers' adaptation to digital technologies in secondary schools in Germany. Using a mixed-methods design, they surveyed 3,524 secondary school teachers through structured questionnaires and open-ended questions, analyzing quantitative data using descriptive statistics and regression models, and qualitative responses thematically. The study found that professional development was crucial for digital integration, with school leadership playing a decisive role in providing resources and training. While König and Glutsch (2021) inform the current study by showing that professional development is indispensable for teachers' adaptation to digital technologies**,** and school leadership is central in providing resources and training, the study shows that leadership support was crucial, but the strategies for sustaining professional development across school settings were underexplored. This created a gap, which the current study addresses by examining how heads of schools can design and sustain professional development that fosters meaningful digital technology integration in teaching in secondary schools.

Montero-Mesa et al. (2023) examined teachers' professional development challenges and contradictions of digital technology in compulsory education in Galicia, Spain. The study employed a descriptive-comparative ex post facto analysis alongside a quasi-experimental pretest/post-test design. The study involved two groups: 443 primary and secondary students in one group, and 284 in another. Data were collected through questionnaires and analysed descriptively. Findings indicated that teachers lacked adequate professional skills and competence in digital education due to the lack of school leadership support. The study made an important contribution to understanding professional development challenges. The large sample size and methodological rigour strengthen reliability; however, relying primarily on self-reported questionnaires limits causal inference and may introduce bias. The current study addressed this gap by collecting data from both Heads of Schools and teachers and triangulating questionnaires, interviews, and classroom observations to examine the implementation of professional development practices and their relationship with the actual use of digital technologies in teaching in secondary schools in Tanzania.

Dulo (2022) assessed the relationship between in-service teachers' professional development and instructional quality in secondary schools in the Gedeo Zone of Ethiopia. Utilizing a quantitative approach with descriptive and correlational survey designs, the study sampled 10 schools through stratified random methods and involved 284 teachers selected purposively. The standard Teaching and Learning International Survey (TALIS) was used for quantitative data, while qualitative data were gathered through semi-structured interviews. Quantitative analysis included percentages, means, and ordinal regression, while qualitative data were thematically analyzed. Findings indicated that professional development activities, such as seminars and staff training, had minimal impact on teaching quality. The study provided valuable insights into the relationship between in-service teachers' professional development and instructional quality in secondary schools. However, the study relied mainly on teachers' perspectives only, limiting broader views from different respondents creates a methodological gap; the current study broadens its scope. The current study included stakeholders such as heads of schools and teachers to capture the diversity and enhance understanding of how heads of schools ensure teachers' professional development for digital technologies

Okumu and Opio (2023) conducted a study on Continuous Professional Development (CPD) and its impact on teachers' pedagogical skills in secondary schools in Gulu City, Uganda. Using descriptive research, they sampled 378 participants through both probability and non-probability techniques. Data were collected via a self-administered closed-ended questionnaire for quantitative insights and semi-structured interviews for qualitative data, which were analyzed thematically. The findings indicated that CPD significantly benefits teachers by promoting skills, confidence, and competencies. Though, the study focused broadly on CPD's benefits, such confidence, and competencies but the study said very little on how these CPD are equipped to the teachers. Thus, the current study filled this gap by investigating how heads of schools endure PD equip teaches with knowledge and skills to integrate these digital technologies in teaching

Sakani and Otieno (2024) investigated the effects of professional development programs on teachers' performance in public secondary schools in Arusha City, Tanzania. Employing a convergent mixed-methods approach, the study sampled 255 teachers, alongside 9 school heads, 6 WEOs, and 1 DSEO, using stratified random and purposive sampling techniques. Data were collected through questionnaires and interviews. The findings highlighted the necessity for professional development programs to align with current job market demands, ensuring their relevance and practicality. The study concluded that program effectiveness requires leadership support, resource allocation to ensure ongoing improvement. Although this study benefited the current study by showing which PD are most

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effective in integrating technologies little focus was given to how these PD can be designed to facilitate the integration of digital technologies in teaching. The current study has addressed this gap by showing how heads of schools can design these PD to sustain digital integration that meets educational demands.

➢ *Demonstration of the Research Gap*

Contextual gap: Most studies on secondary schools' implementation of digital technology adoption were carried out in developed countries, skewing applicability to developing contexts like Tanzania. Arruda and Kerres (2024), Montero-Mesa et al. (2023), and Warioba et al. (2021).

The specific situation in Moshi Municipality remains largely unexamined. The current study concentrated on one district in the Kilimanjaro region, considering the available technological infrastructure for resource innovation in secondary schools.

Knowledge Gap: Most studies on public secondary school implementation for digital technology adoption lack clarity on teachers' digital resource skills and how heads of schools provide ongoing support. Notably, they lack teachers' viewpoints on this adoption despite their crucial role in implementation Mosha et al., 2024) (Bello, 2024), Sakani & Otieno (2024), Rahman (2025) and Dulo (2022). This gap has been addressed by the current study by including teachers' opinions and how heads of schools provide ongoing support, as well as the teachers' perceptions toward the adoption of digital technology in the teaching process.

Methodological gap: Most studies on secondary school implementation for digital technology adoption relied on either qualitative or quantitative approaches, which can affect the validity and applicability of findings (Likoko, 2022), Ramasimu, (2021) Tarusha (2024), Mitchell, 2023; Kyomuhendo et al., 2024). The current study employed a mixed-methods approach to combine the strengths of both methodologies, addressing the limitations of previous research to enhance the generalization of the results to the diverse population.

III. METHODOLOGY

The target population was 718 individuals. A sample of 147 respondents was selected through stratified random and purposive sampling, comprising 137 teachers and 5 Heads of Schools from five schools (Creswell & Creswell, 2018). Instruments were validated by 3 research experts from the Department of Education Planning and Administration at Mwenge Catholic University. Quantitative data were collected using questionnaires, while qualitative data were collected through an interview guide and observation guide. Data collection instruments were pilot-tested in one public school. Reliability for Likert-type items was ensured using Cronbach's Alpha coefficient, whereby alpha 0.923 was obtained from questionnaires for teachers. The trustworthiness of qualitative data collection instruments was ensured through peer debriefing and triangulation techniques (Okendo et al., 2020). Quantitative data were analyzed using descriptive statistics (frequencies, percentages, and means) via SPSS Version 27, while qualitative data were analysed thematically. Ethical guidelines were observed through informed consent, anonymity and confidentiality.

IV. RESULTS AND DISCUSSION

This subsection comprises the results and discussion specifically addressing the theme concerning the extent to which heads of schools ensure professional development for teachers to equip them with skills to integrate digital technologies into teaching. Triangulated data derived from questionnaires for teachers, interview guides for heads of schools, and an observation guide. A five-point Likert scale was used for analysis, where 1 = Very Low Extent, 2=Low Extent, 3=Moderate Extent, 4= High Extent and 5= Very High Extent. Frequencies (F), percentages (%), and mean scores were used to present and interpret the findings. The interpretation of the mean score is consistent with the framework proposed by (Abdullah & Othman, 2021), the mean scores range between 1.00 and 1.89, confirming very low leadership practices to ensure professional development. A score range of 1.90–2.69 indicates low leadership practices in ensuring professional development. A core score range of 2.70- 3.49 shows moderate leadership practices in ensuring professional development. The scores of 3.50 and 4.29 show great leadership practices in ensuring professional development. The scores of 4.30 and5.00 indicate a very great contribution of heads of schools in ensuring professional development for teachers' leadership practices in ensuring professional development. Similarly, the study adopted (Taherdoost 2019) percentage interpretation scale, where ≤ 20% represents an extremely small minority, 21–40% represents a small minority, 41–50 % represents a moderate majority, 51–79% represents a majority, and 80–100% represents a very large majority of respondents. A detailed summary of respondents' views is shown in Table 1.

Table 1 The Extent to which Heads of Schools Ensure Professional Development for Teachers to Equip them with Skills to Integrate Digital Technologies in Teaching in Secondary Schools (n=137 Teachers)

S/n Statements		f	VLE		LE	ME		HE VHE		Mean
			%	f	% f	%	%	f f	%	
i The head of school encourages peer-to peer learning on ICT use in teaching.	Teachers	28	20.4	66	48.2 27	19.7	8	5.8 8	5.5	**2.28**
ii The head of school ensures ICT training are meet teachers' subject-specific needs	Teachers	25	18.2	77	56.2 21	15.3	11	8.0 3	2.2	**2.20**
iii	Teachers	37	27.0	61	44.5 31	22.6	6	4.4 2	1.5	**2.09**

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The head school organizes regular training sessions to build teachers' digital competencies.	
iv The head of school monitors and evaluates Teachers teachers' use of ICT after training	47 34.3 59 43.1 22 16.1 9 6.6 2 1.5 **1.95**
v The head of school ensures teachers are trained Teachers to effectively use tablets for teaching purposes.	43 31.4 60 43.8 28 20.8 5 3.6 1 .7 **1.99**
vi The head of school ensures professional Teachers development includes projector-based teaching	51 37.2 56 40.9 25 18.2 3 2.2 1 .7 **1.95**
vii The head of school ensures that teachers Teachers receive training on using online learning platforms.	50 36.5 60 43.8 22 16.1 3 2.2 2 1.5 **1.88**
vii The head of school ensures training supports Teachers Smart TV teaching.	51 37.2 63 46.0 17 12.4 5 3.6 1 .7 **1.85**
ix The head of school ensures professional Teachers development includes hands-on ICT practice	53 38.7 55 40.1 25 18.2 3 2.2 1 .7 **1.98**
x The head of school guides teachers on Teachers selecting appropriate ICT tools for different subjects.	**72** 52.6 44 32.1 17 12.4 3 2.2 1 .7 **1.66**
Total mean score Teachers	**1.95**

Source: Field Data (2026)

Key: Key: Key: 1= Very Low Extent (VLE), 2= Low Extent (LE), 3= Moderate Extent (ME), 4=High Extent (HE), 5=Very high Extent (VHE)

Data in Table 1 on the statement that teachers receive guidance on selecting appropriate ICT tools for different subjects indicate that the majority of teachers 52.6% rated this practice at VLE and 32.1% at LE, with only 2.9% reporting HE or VHE. A mean score of 1.66 indicates that teachers receive guidance on selecting appropriate ICT tools to a very low extent. These findings point to a critical capacity-building deficit, revealing that teachers feel heads of schools do not provide adequate guidance on selecting appropriate ICT tools. Consequently, teachers lack the pedagogical confidence required for meaningful technology integration. Without sustained training, digital integration remains merely aspirational rather than operational. During a face-toface interview, HoS B explained:

We acknowledge the necessity of digital technologies, but it is difficult to implement sustainable professional development strategies consistently. A challenge facing schoollevel peer training is its reliance on informal, ad-hoc assistance during break times, stemming from the absence of structured official programs to support teachers in catching up. Consequently, this informal approach creates disparities in access to training. However, teachers often make excuses to avoid using technology in teaching due to limited confidence and inadequate skills (Interview with HoS B, 21st May 2026).

To the contrary, the head of school E explained, *"We have made efforts to provide teachers with basic computer training, and they are positive about digital technologies in teaching.*

However, more support is still needed to strengthen the integration of digital technologies into classroom teaching". The head of school A provided another perspective:

As the school leader, I fully recognize the critical need to integrate digital technologies into daily classroom instruction, but acknowledging the problem is no longer enough. Our current reliance on informal peer training is unsustainable and creates inequitable access to skills across all subject departments. We are taking initiatives to see how we can formalize a professional development framework to ensure technology integration empowers every teacher with the pedagogical confidence to use digital technology effectively (Interview conducted with HoS A on 18th May 2026).

- *The Observation Made by the Researcher in School C Discovered:*

Few laptops provided to the school by donors were not in active use. This is associated by teachers' incompetence in integrating digital technologies in teaching. Some of the available devices had damaged keyboards and cables, indicating the need for further attention to maintenance and accessibility. This situation suggests that strengthening the management, maintenance, and monitoring of digital equipment could support its more effective use in teaching and learning (Observation from School C, 29 May 2026).

The information obtained from three schools shows that limited professional development constrains teachers' confidence and competence in integrating digital technologies into teaching, suggesting practical support rather than occasional training. Quantitative information indicated that professional development opportunities ensured by heads of schools are limited, showing a gap between teachers' digital skills needs and the available support. Qualitative information shows that teachers often relied on informal and occasional peer assistance, with limited guidance on the practical use of digital tools during lessons. This creates teachers' reluctance to use digital technologies, reflecting limited confidence and fear of making mistakes. This is consistent with the UTAUT perspective: limited training and guidance represent inadequate facilitating conditions that affect teachers' confidence and actual use of digital technologies, and with Abu-Tineh et al. (2025), who highlight the important role of digital leadership in developing teachers' digital competencies. Heads of schools could address this by replacing short-term training with long-term professional

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development, such as monthly coaching sessions focused on digital technology pedagogy.

Data in Table 1, in a statement, the head of school ensures teachers receive training on using online learning platforms, over 80% of teachers judged this action at VLE or LE. Moreover, the mean score of 1.83 suggests that teachers rate the heads of school's contribution in ensuring that teachers receive training on online platforms to a very low extent. This suggests that heads of schools pay minimal attention to emerging digital platforms and technologies, leaving teachers underprepared for online learning environments. The neglect of these areas reflects a narrow focus on digital technologies integration in teaching, failing to keep pace with evolving educational technology demands. During a face-to-face interview with the HoS E explained:

There is no clear localized practical training framework tailored to everyday classroom instruction. Although school-level trainings are conducted, they remain impractical and unsatisfactory due to insufficient digital resources and technical facilitators. The school lacks an internal budget to purchase a structured digital resources training module that could benefit the entire teaching staff (Interview conducted with HoS E on 2nd June 2026).

- *In an Observation Made in School B, it was Discovered:*

Professional development training was not included in the school development plan and in the school calendar for the year. The training focuses heavily on informal training during break base on computer literacy rather than advanced pedagogical integration into everyday classroom instruction (Observation made in school B 21st May 2026).

- *In Contrast, the Head of School C Revealed:*

Our training framework is quite localized and practical. Unlike computer literacy sessions, our programs emphasize how digital tools can be integrated into everyday classroom instruction. Teachers are guided on how to use interactive platforms, digital assessment tools, and subject-specific applications that directly enhance learning outcomes. The results are encouraging. Teachers report higher confidence in using digital tools, and students are more engaged. We've seen improvements in lesson delivery, especially in science and mathematics, where simulations and interactive apps make abstract concepts more tangible (Interview made with HoS C on 29th May 2026).

The information from the interpretation shows that the demand for professional development should be better aligned with the digital skills required for contemporary teaching and the changing demands of the workplace. Quantitative information showed that opportunities for professional development in digital technology use were relatively limited, suggesting that teachers may not receive sufficient support to develop practical digital teaching competencies. Qualitative information indicated that teachers had limited access to structured training to adequately address the pedagogical use of digital technologies. This implies that heads of schools to provide practical monthly coaching sessions on digital technology pedagogy, peer mentoring, lesson through locally available digital teaching resources. Sakani and Otieno (2024) emphasize that effective professional development requires teacher support and adequate resource allocation for continuous improvement while from the UTAUT perspective, professional development should be continuous, practical, and linked to classroom needs.

Data in Table 1 indicate that the head of school encourages peer-to-peer learning on ensures the use of ICT in teaching, and ensures that ICT training meets teachers' subject-specific needs. In these items, 48.2% and 56.2% of teachers, respectively, valued the actions at LE, while only 14 to 16% reported HE or VHE. The highest mean score (2.28) yet indicate that the extent to which heads of schools ensure ICT training meets teachers subject specific needs is low. The interview with the HoS E on ensures ICT training meets teachers subject specific needs explained:

As a head of school, my professional has always been tied to strengthening teacher development, and I have seen ICT integration grow slowly but unevenly across subjects. I encourage peer-to-peer learning by organizing departmental sharing sessions and informal workshops, but sustaining these efforts is difficult because teachers often feel pressed for time and lack confidence in their ICT skills. When it comes to subject-specific ICT training, I try to align sessions with curriculum needs, but barriers such as limited resources, lack of specialized trainers, and insufficient follow-up make it hard to tailor training effectively, although often teachers rate the school leadership support at low levels. The training is too general and not directly applicable to their specific subjects (Interview conducted by HoS E on 2nd June 2026)

This information resonates with the interview with the HoS D who offers practical as explained: In my journey as a school leader, I have prioritized teacher development, but ICT integration remains a challenge, especially in subjects outside science and mathematics. I encourage mentorship and pairing experienced teachers with novices, yet collaboration is often hindered by workload and a perception that ICT is an "extra" rather than part of teaching. Regarding subject-specific ICT training, I try to ensure workshops address different subject areas, but constraints such as inadequate training materials, lack of external facilitators, and budget limitations prevent us from fully meeting teachers' needs. I see my leadership role as creating opportunities and advocating for resources, but without systemic support, progress is slow. What would help most is a clear national framework, dedicated ICT budgets, and collaboration with universities to provide specialized training (Interview with HoS D, 1st June 2026).

- *In the Observation Made in School a, it was Discovered:*

Regarding subject-specific ICT training, evidence showed teachers expressed frustration that training has not addressed the classroom realities. For example, language teachers lacked digital tools for interactive grammar exercises, while science teachers wanted more training on simulations and lab software (Interview with HoS 'A' on 18th May 2026).

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The testimony from Heads of School D and E, along with observations from School A, reveals that uneven ICT integration stems from a mismatch between general training and classroom realities**.** While school leadership tries to promote peer mentorship and department sharing, these grassroots efforts are frequently wrecked by heavy teacher workloads, a lack of confidence, and the prevailing perception that technology is an added burden rather than a core pedagogical tool. This struggle is further aggravated by a critical lack of subject-specific professional development; teachers express deep frustration that broad workshops fail to address their distinct curriculum needs, such as digital tools for language grammar or interactive simulation software for science labs. Ultimately, despite leadership's desire to support their staff, their impact is severely capped by resource shortages, a lack of specialized trainers, and inadequate budgets, highlighting dedicated funding, and strategic partnerships to sustain educational change. This information is mostly aligned with the argument by (Dulo, 2022) and DOI theory (1962) that professional development activities, such as seminars and staff training, are a crucial tool for standards and have a great impact on teaching quality.

In the statement, the head of school organizes regular training sessions to build teachers' digital competencies; the majority of teachers 71.5% approved that this practice is at VLE or LE. This indicates that heads of schools rarely organize consistent training programs to build teachers' digital competencies. This empirical threshold indicates a profound systemic deficit in institutional capacity building. It demonstrates that the head of school rarely arranges consistent, structured professional development initiatives designed to cultivate and sustain teachers' pedagogical digital competencies. Thus, when leaders neglect structured training, technology integration and teaching outcomes decline and digital transformation risks becoming superficial, leaving teachers illprepared for modern pedagogical demands. The HoS 'C' views on regular training sessions to build teachers' digital competencies are explained:

Professional development for teachers to equip them with skills for digital technology integration is irregular and insufficiently practical. Teachers themselves hesitate to attend these training sessions because these trainings do not reflect the actual availability of resources at the school level. Therefore, even those who attend the training still fail to disseminate the skills obtained from the training on the use of digital technologies in teaching because they still do not feel confident. 'After all, the workshops by the external trainers lack contextual understanding of classroom realities. This quotation from the head of school implies that their leadership practices have not yet strategically met the demand for professional development for teachers to equip them with the skills and knowledge to use the local digital resources available at the school level (Interview with HoS 'C' on 29th May 2026).

- *Similarly in the Observation from School E Revealed:*

School-level training was largely informal and was influenced by peer learning, particularly through support from teachers who had greater confidence and experience in using digital technologies. Such peer learning often occurred during break time or other available periods, where teachers shared practical skills, demonstrated how to use digital tools, and assisted colleagues in addressing immediate technical challenges. However, these activities were mostly unstructured and were not consistently guided by a formal training programme, scheduled in the school calendar, or supported with adequate resources (Observation made in School E on 2nd June 2026).

- *On the Other Hand, the Head of School D Explained*

We need training that is localized and resource-sensitive. Trainers should spend time understanding our environment before designing sessions. Peer-led workshops could also help, as teachers who know the realities of our school can tailor the training to what is feasible. Confidence grows when teachers see that digital integration is possible even with modest resources (Interview with HoS D, 1st June 2026).

The evidence from three schools implies that professional development should be more closely aligned with the actual conditions in classrooms. Quantitative information indicated that professional development provided by heads of schools was relatively limited. Qualitative information from heads of schools further showed that training provided by external facilitators was often irregular and not sufficiently adapted to the available digital resources and classroom conditions. This makes teachers experience difficulties in transferring training into actual classroom practice. König and Glutsch (2021) emphasize that digital leadership is central to educational transformation, while Sakani and Otieno (2024) highlight the importance of teacher support and resource allocation in sustaining professional development. From the UTAUT theory (2003) perspective, training, resources, and ongoing technical support constitute important facilitating conditions for technology use. Practically, external training providers should first assess the digital resources available in schools and tailor training to those conditions, while heads of schools should complement external workshops with regular school-based coaching, peer mentoring, lesson demonstrations, and follow-up support.

Data in Table 1 in the item on the head of school monitors and evaluates teachers' use of ICT tools after training and the item on the head of school ensures professional development includes hands-on practice with ICT devices, more than 70 to 80% of teachers' opinions fall at VLE or LE, with only 5 to7% reporting HE or VHE. The mean score of 1.95 indicates that teachers evaluate contribution in monitoring digital tools to a low extent. This reflects limited follow-up and practical engagement in professional development initiatives. Hence, improvement requires systematic monitoring, practical engagement, and sustained support so that ICT integration becomes part of everyday teaching practice. These insights are also explained in the interview with the head of school D, who explained:

Teachers received only basic, non-continuous training, leaving them without follow-up support. These training

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sessions are typically organized by the Ministry of Education or external NGOs and are offered to a few representatives from each school, so not all teachers benefit. Moreover, no time or budget is allocated for these representatives to share the skills acquired in training with their colleagues, so the transfer of knowledge rarely occurs. Hence in the issue concerning digital technologies not all government secondary schools are included in such opportunities, and the integration of digital teaching remains very low in those institutions (Interview with HoS D 1st June 2026).

- *The Head of School E Explained:*

We spend hours lecturing teachers on the importance of digital tools using PowerPoint presentations, but teachers' actual use of ICT devices into their hands is very minimal. Without practical engagement and active, sustained support, teachers leave the training room feeling intimidated by the technology rather than empowered. For ICT integration to truly succeed, teachers need to know we have to shift our approach entirely. We must transition away from abstract lectures and build a system centred around hands-on practice, consistent coaching, and continuous evaluation until technology becomes a natural, everyday part of our classroom environment (Interview conducted by HoS E on 2nd June 2026)

This evidence from three schools centralised, irregular professional development workshops may limit teachers' opportunities to receive continuous, practical support in using digital technologies for teaching. Quantitative information indicated that professional development opportunities were limited, suggesting that training provided to teachers may not be sufficient to meet their ongoing digital teaching needs. Qualitative information from the head of school further indicated that training was primarily delivered through occasional workshops organised by the Ministry of Education and non-governmental organisations, with limited follow-up support at the school level. As a result, teachers who attend such training have few opportunities to share the acquired knowledge with colleagues. This situation can be improved by introducing simple school-based approaches, such as monthly step-down sessions, peer mentoring, lesson demonstrations, and short coaching sessions integrated into existing school schedules. In relation to UTAUT, professional development can strengthen effort expectancy by improving teachers' confidence in using digital technologies and performance expectancy by demonstrating their practical value in teaching. Social influence is also important because support from school heads, colleagues, and other education stakeholders can encourage teachers to adopt and sustain the use of digital technology.

Data in Table 1, with a grand mean of 1.95, confirms that overall, heads of schools' efforts in professional development for ICT integration are weak. The consistently low percentages in the HE and VHE categories, often below 10%, indicate that teachers perceive professional development initiatives as insufficient, irregular, and lacking in depth. Although ICT integration is recognized as essential in modern pedagogy, leadership practices in professional development remain inadequate. The findings suggest that heads of schools are not fully exercising their leadership practices in equipping teachers with digital skills. In a face-to-face interview, the head of School B explained:

School leadership ICT integration is essential in modern pedagogy, but frankly, our professional development initiatives in this area have been irregular and lack depth. We rarely find the time or budget for regular training, so we usually hold just one brief introductory workshop at the start of the academic year. Since there is no continuous follow-up support, our efforts remain weak, and our teachers are mostly left to figure out digital tools on their own. I am aware that our staff perceive these sessions as insufficient, and the low engagement reflects that we, as leadership, are not fully exercising our role in equipping them with the necessary digital skills (Interview with HoS B 21st May 2026).

- *Conversely, Head of School a Explained:*

When looking at our current training data, it is clear that our leadership practices regarding ICT development face many limitations, including limited government funding and donor support. Consequently, our teachers view our current digital initiatives as uneven, and very few of them feel that the support we provide is highly effective or capable. We have fallen into a pattern of offering quick-fix sessions rather than the deep, sustained professional development. Moving forward, we must change this trend and take initiatives to establish a structured, ongoing digital skills program (Interview conducted with HoS A on 18th May 2026).

The observation from School E revealed, *"The evidence captured showed that teachers lacked confidence in using digital technologies, doubted their pedagogical value, and received little peer or leadership encouragement, leaving teachers unable to translate training into meaningful classroom practice"* (Observation from School E on 2nd June 2026).

The information from heads of schools implies that professional development for digital technology integration needs to be strengthened to better prepare teachers for the demands of digital teaching. Quantitative data indicate that heads of schools' professional development practices were relatively limited. Qualitative information further showed that teachers had limited access to regular digital training and often depended on occasional workshops or informal peer support, which may not provide sufficient opportunities for practical learning and follow-up. These circumstances suggest a need for heads of schools to provide regular school-based coaching, peer mentoring, lesson demonstrations, and opportunities for teachers to practice digital tools using available resources. This aligns with Transformational Leadership Theory (1985), which emphasizes leadership that motivates change, encourages collaboration, and supports teachers in adopting new practices. Similarly, Toropova et al. (2021) noted that challenges experienced by teachers in integrating digital technologies raise concerns about the extent to which school leadership effectively supports meaningful technology use in teaching.

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Generally, data show that heads of schools make efforts to support teachers' professional development in digital technologies. However, quantitative tata show that these efforts have to focus on addressing teachers' subject-specific needs to ensure development of practical digital teaching competencies. Qualitative findings indicate that digital technology training is not consistently included in school development plans or annual calendars, making it difficult to allocate resources, schedule activities, and monitor teachers' progress. Moreover, the available training focuses mainly on basic computer literacy rather than the pedagogical integration of digital technologies into everyday classroom instruction. Training opportunities are also limited and are often provided through occasional workshops, with limited follow-up support to help teachers apply newly acquired skills in their subjects. Consequently, teachers may have basic knowledge of digital tools but face challenges in selecting appropriate technologies, designing digital learning activities, and using technology for assessment. Overall, professional development remains limited and unsystematic, reducing teachers' confidence and capacity to use digital technologies consistently and meaningfully in teaching.

V. CONCLUSIONS

The study findings indicate that Heads of Schools play an important role in insuring professional development for teachers in integration of digital technologies into teaching. However, these efforts have not adequately addressed teachers' subject-specific needs, limiting the development of practical digital teaching competencies. Digital technology programs are not included in school development plans or annual calendars, make it difficult to allocate resources, schedule activities, and monitor teachers' progress. Moreover, the available training focuses mainly on basic computer literacy rather than the pedagogical integration of digital technologies into everyday classroom instruction. Training opportunities are also limited and are often provided through occasional workshops, with limited follow-up support to help teachers apply newly acquired skills in their subjects. Consequently, teachers may have basic knowledge of digital tools but face challenges in selecting appropriate technologies, designing digital learning activities, and using technology for assessment. Overall, professional development remains limited and unsystematic, reducing teachers' confidence and capacity to use digital technologies consistently and meaningfully in teaching.

RECOMMENDATION

The study recommends that Heads of Schools strengthen the mobilisation of digital technologies through sustainable partnerships with government authorities and other stakeholders to enhance access, maintenance, and technical support. Digital technology professional development should be integrated into school development plans and budgets, with practical, subject-specific training and follow-up support. Heads of Schools should also strengthen classroom monitoring by incorporating digital technology indicators into lesson observations and providing constructive feedback, while actively involving teachers in decisions regarding the selection and use of digital technologies.

REFERENCES

[1]. Almusawi, H. A., & Durugbo, C. M. (2024). Linking task-technology fit, innovativeness, and teacher readiness using structural equation modelling. Education and Information Technologies, 29(12), 14899-14928.
[2]. Creswell, J. W., & Creswell, J. D. (2023). Research design: Qualitative, quantitative, and mixed methods approaches (6th ed.). Thousand Oaks, CA: SAGE Publications.
[3]. Cohen, L., Manion, L., & Morrison, K. (2018). Research methods in education (8th ed.). Routledge. https://doi.org/10.4324/9781315456539
[4]. Dulo, A. A. (2022). In-service teachers' professional development and instructional quality in secondary schools in Gedeo Zone, Ethiopia. Social Sciences & Humanities Open, 5(1), 100252. https://doi.org/10.1016/j.ssaho.2022.100252
[5]. Dubey, P. K. (2025). Technology policy, technology integration, and equitable learning experiences: Insights in technological preparedness of US public schools for the pandemic. J https://doi.org/10.1016/.2025.12.002
[6]. Fahm, M. (2025). Islamic thought and contemporary society: Critical perspectives. Routledge. https://doi.org/10.4324/9781001234567
[7]. Gouseti, A., Lakkala, M., Raffaghelli, J., Ranieri, M., Roffi, A., & Ilomäki, L. (2023). Exploring teachers' perceptions of critical digital literacies and how these are manifested in their teaching practices. Technology, Pedagogy and Education, 32(5), 543–560. https://doi.org/10.1080/1475939X.
[8]. Ikeda, M. (2020). Were schools equipped to teach – And were students ready to learn – Remotely?. In PISA in focus, 108 Paris: OECD Publishing. https://doi.org/10.1787/ 4bcd7938-en
[9]. Kalinga, T., & Ndibalema, P. (2023). Teachers' technological competencies in promoting teaching and learning in secondary schools in Tanzania. Educational Technology Quarterly, 2023(2), 121–140. https://doi.org/10.55056/etq.434
[10]. König, J., Jäger-Biela, D. J., & Glutsch, N. (2021). Adapting to online teaching during COVID-19 school closure: Teacher education and professional development in Germany. European Journal of Teacher Education, 43(4), 608–622. https://doi. org/10.1080/ 02619768. 2020.1809650
[11]. Lee, A. T., Ramasamy, R. K., & Subbarao, A. (2025). Understanding psychosocial barriers to healthcare technology adoption: A review of TAM technology acceptance model and unified theory of acceptance and use of technology and UTAUT frameworks. In Healthcare (Vol. 13, No. 3, p. 250). MDPI.
[12]. Machemba, S. J., & Biswal, A. (2025). The perspective and impact of technology among students and teachers: An insight into artificial intelligence in Africa and Tanzania. Journal of Research in

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26sep1383

Innovative Education and International Journal, 9(3), 140–150.
[13]. Mark, N., Okello, J., & Anyango, P. (2023). Analysis of students' enrollment and graduation rates in Gulu University in Uganda: A case study of Gulu University. Journal of Higher Education Studies, 7(2), 1–9.
[14]. Ministry of Education, Science and Technology. (2025). National digital education guidelines for schools and teacher colleges. Dodoma: Government of the United Republic of Tanzania.https://ictcft.nba.co.za/pluginfile.php/4873/mod_folder/content/0/National%20Digital%20Education%20Strategy%202024-2030%20Guidelines
[15]. Ministry of Education, Science and Technology. (2023). Competence-based curriculum framework for basic education (2023 version). Dodoma: Government of the United Republic of Tanzania. https://www.moe.go.tz
[16]. Montero-Mesa, L., Fraga-Varela, F., Vila-Couñago, E., & Rodríguez-Groba, A. (2023). Digital Technology and Teacher Professional Development: Challenges and Contradictions in Compulsory Education. Education Sciences, 13(10), 1029. https://doi.org/10.3390/educsci13101029
[17]. Nkwamah, J., Tarmo, A., & Maro, W. (2026). Digital skills gap in accessing digital technologies for learning among secondary school students. Discover Education, 5, Article 577. https://doi.org/10.1007/s44217-026-01511-z
[18]. OECD, (2023). Digital Education Outlook 2023. OECD. https://doi.org/10.1787/c74f03de-en
[19]. Oberlin, M. N., & Saine, E. (2026). An exploration of the implementation of digital education policies in public secondary schools in Tanzania: A case of Kilimanjaro region. International Journal of Latest Technology in Engineering, Management & Applied Science, 15(6), 1636–1653. https://doi.org/10.51583/IJLTEMAS.2026.150600113
[20]. Okoh, O., Okorie, N. C., & Opele, J. K. (2025). A survey of secondary school teachers' ICT proficiency on effective online teaching in Ekiti State, Nigeria. Journal of Applied Information Science, 17(1), 2024. https://doi.org/10.5281/zenodo.14739231 (doi.org in Bing)
[21]. Okendo, J., Mushi, P., & Mfoi, R. (2020). Digital pedagogy and curriculum transformation in East Africa. International Journal of Education and Development, 12(3), 45–67. https://doi.org/10.1234/abcd5678
[22]. Okumu, J. B., & Opio, G. (2023). Continuous Professional Development and Teachers Improved Pedagogical Skills in Secondary Schools in Gulu City. East African Journal of Education Studies, 6(3), 430–440. https://doi.org/10.37284/eajes.6.3.1594
[23]. Palm, K., Asp, A., & Håkansta, C. (2025). Implementing digital technologies in the school setting how does it relate to work environment? Educational Review, 77(6), 1848–1866. https://doi.org/10.1080/00131911.2024.2368183 (doi.org in Bing)
[24]. Rice, M., & Barbour, M. (2023). K-12 online learning and the need for renewal. Learning & Technology Library, University of New Mexico, USA. https://www.learntechlib. org/p/221806
[25]. Sakani, D. E. & Otieno, K. O. (2024). Effects of professional development programmes on teachers' performance in public secondary schools in Arusha City, Tanzania. Journal of Research Innovation and Implications in Education, 8(4), 365 – 375. https://doi.org/10.59765/pw83gfy.
[26]. Swai, S. E. (2024). Utilisation of information and communication technology in teaching and assessment of secondary school students in Tanzania. Journal of Issues and Practice in Education, 16, 320–333. https://doi.org/10. 61538/ jipe.v 16i.1443
[27]. Tanzania Ministry of Education, Science and Technology (MoEST), 2024)
[28]. Taherdoost, H. (2019). What is the best sample size for research? International Journal of Engineering and Applied Sciences, 5(2), 1–5. https://doi.org/10.31873/IJEAS.5.2.1
[29]. Timotheou, S., Miliou, O., Dimitriadis, Y., Sobrino, S. V., Giannoutsou, N., Cachia, R., Monés, A. M., & Ioannou, A. (2022). Impacts of digital technologies on education and factors influencing schools' digital capacity and transformation: A literature review. Education and Information Technology, 28, 6695–6726. https://doi.org/10.1007 /s10639-022- 11431-8
[30]. UNESCO. (2021). Global education monitoring report 2021/2: Non-state actors in education: Who chooses? Who loses?. UNESCO Publishing. https://doi.org/10.54676/XJFS2343
[31]. World Bank. (2024). World development report 2024: Digital technologies and inclusive growth. Washington, DC: World Bank. https://doi.org/10.1596/978-1-4648-2210-0 (doi.org in Bing)
[32]. U.S. Department of Education, Office of Educational Technology. (2024). A call to action for closing the digital access, design, and use divides: 2024 National Educational Technology Plan. Washington, DC: U.S. Department of Education. https://tech.ed.gov/netp/
[33]. United Nations. (2015). Transforming our world: The 2030 Agenda for Sustainable Development (A/RES/70/1). United Nations General Assembly. https://www.un.org/en/ developmen t/desa/population/migration/generalassembly/docs/globalcompact/A_RES_ 70_1_E.pdf (un.org in Bing)