Teachers' Competence in Integrating Technology in Teaching Geography Subject

Jesco A. Mpolya

Ruaha Catholic University

DOI: https://dx.doi.org/10.47772/IJRISS.2025.910000597

Received: 26 October 2025; Accepted: 04 November 2025; Published: 19 November 2025

ABSTRACT

The integration of technology in teaching has the potential to enhance student understanding, engagement, and academic performance, particularly in subjects like Geography that involve complex concepts and spatial analysis. This study investigated Teachers' Competence in Integrating Technology in Teaching Geography at secondary schools in Tanzania. A mixed-methods approach was employed, using a concurrent research design. Data were collected through face-to-face interviews and classroom observations involving Geography teachers across four schools. The findings revealed three distinct levels of competence: high, moderate, and low. Teachers with high competence effectively used multiple digital tools, including PowerPoint, videos, Google Earth, and GIS applications, to deliver interactive and inquiry-based lessons that promoted student engagement and comprehension. Those with moderate competence utilized basic tools such as slides and projectors, improving lesson clarity but avoiding advanced applications, while teachers with low competence relied primarily on traditional methods due to limited skills, training, and infrastructural support. The study emphasizes that teacher competence is a critical determinant of effective technology integration and has direct implications for student achievement. Recommendations include targeted professional development programs, ongoing technical support, and investment in infrastructure to enhance teachers' digital pedagogical skills and improve learning outcomes in Geography subject.

Keywords: Teachers' Competence, Integrating Technology, Geography Subject

INTRODUCTION

The integration of technology into education has become increasingly essential for enhancing teaching and learning processes. Technology offers innovative ways to present complex concepts, engage students actively, and provide real-world contexts that enrich classroom instruction. Enhancing student achievement is a central goal of education systems worldwide, as academic performance is widely recognized as a key indicator of the quality and effectiveness of teaching and learning.

Geography subject equips learners with knowledge about the physical and human processes that shape the world around them (Asad, Hussain, Wadho, Khand, & Churi, 2021). The subject is inherently complex, involving abstract concepts, spatial relationships, and data interpretation, which are often challenging for students to grasp through traditional teaching methods alone. Consequently, effective instructional strategies, including the integration of technology, are crucial in making Geography content more accessible, engaging, and meaningful for learners Narzullaevna, 2020). According to Maxwell (2022) digital tools such as PowerPoint presentations, Google Earth, interactive maps, videos, and Geographic Information Systems (GIS) provide opportunities for students to visualize spatial phenomena, analyze patterns, and understand abstract geographical processes more effectively.

Globally, the use of digital tools such as PowerPoint, Google Earth, interactive maps, videos, and Geographic Information Systems (GIS) has been empirically linked to improved student understanding in Geography. For example, Goga and Roșu (2021) in Romania conducted a mixed-methods study involving 250 teachers and students, finding that technology-based Geography lessons increased interactivity and helped students understand complex concepts faster and retain information longer. Similarly, Kadhim (2020) in Iraq employed

questionnaires and classroom observations with 200 Geography teachers and reported that students performed better when lessons integrated computers, projectors, and online resources.

However, effective technology integration largely depends on teachers' competence. Competent teachers not only operate technological tools but also align them with pedagogical objectives, facilitate inquiry-based learning, and enhance student engagement (Doering, Koseoglu, Scharber, Henrickson, & Lanegran, 2014; Demissie, Labiso, & Thuo, 2022). In Africa, evidence supports this link. Mollel, Minami, Munezero, and Ngayinteranya (2022) conducted a mixed-methods study involving 180 Geography teachers and 900 students in Rwanda and found that teachers with high technological competence fostered student curiosity, critical thinking, and improved performance. Conversely, in Zimbabwe, Madobi (2021) used surveys and classroom observations with 120 teachers and found that students' Geography outcomes remained low when teachers lacked the skills to integrate technology effectively. Similarly, Telore and Dametew (2021) in Ethiopia highlighted that inadequate teacher competence limited students' ability to understand complex geographical processes, even when digital tools were available.

In the Tanzanian context, the government has made significant efforts to integrate technology into education. In November 2022, Prime Minister Kassim Majaliwa launched the distribution of 293,400 tablets to teachers and school quality assurance officers across the country to improve teaching and learning through Information Communication Technology (Daily News, 6th Nov 2022). Despite this initiative, studies indicate that many Tanzanian educators struggle with tablet utilization due to limited digital skills, a lack of relevant training, and insufficient institutional support, such as inadequate internet connectivity, technical assistance, and access to quality educational content (Prosper & Nderego, 2024). Furthermore studies by Elias (2023) and Ndume, Kisanga, and Selemani (2024) focused on assessing teachers' general technological preparedness for technology integration. These studies examined how teachers' use of technology could support students' understanding of lessons and facilitate the teaching process. For example, Elias (2023) investigated teachers' ability to use digital tools for lesson delivery, while Ndume et al. (2024) assessed the extent to which teachers applied technology in preparing lesson notes and instructional materials.

However, these studies did not specifically explore teachers' actual competence in integrating technology within Geography subject, which involves unique challenges due to the subject's concepts. Without understanding the level of teacher competence in applying technology effectively in Geography, there is a risk that the distribution of tablets and other digital tools may not translate into improved student learning outcomes. Inconsistent or ineffective technology use could lead to continued reliance on traditional teaching methods, limiting student engagement, comprehension, and achievement in Geography. This gap highlights the need to investigate teachers' competence in integrating technology specifically for Geography instruction, to ensure that technology initiatives fulfill their intended educational objectives

THEORETICAL REVIEW

The study was guided by Connectivism Learning theory, which according to Goldie (2016) is a pivotal framework in modern education. It was therefore, particularly relevant to the study on the effects of mobile technology in teaching and learning within primary schools. This theory, pioneered by George (2004) and Stephen (2005), explains the profound impact of technology on the learning process. It posits that learners can effectively acquire knowledge and skills through digital media such as social media platforms, online forums, educational videos, and blogs.

Also, the Connectivism Learning Theory advocates that technology changes the way of thinking and learning using technology by turning digital technology in solving problems (Sahin, 2012). Again, the theory suggests that successful learning occurs when people are connected with resources using digital networks and technology rather than the physical interaction of teachers and learners. Generally, the theory insists on the use of digital technology in solving learning problems in order to deepen the understanding of the learnt subject matter.

Applying this theory to the present study, teachers' competence in integrating technology is seen as a critical factor in enabling students to connect classroom content with real-world phenomena. For instance, using tools

such as Google Earth or GIS applications allows students to visualize spatial relationships and global patterns, aligning with connectivism's emphasis on linking knowledge across networks. Furthermore, teachers who are technologically competent can encourage collaborative learning through digital platforms, allowing students to share ideas, analyze data collectively, and engage in problem-solving beyond physical classroom constraints (Dede, 2007).

Thus, connectivism provides a strong theoretical basis for this study by explaining how technology can transform the Geography classroom into a networked learning environment. Teachers' competence in technology integration becomes central to facilitating this process, as it determines how effectively students can engage with, interpret, and apply digital information to improve their understanding and academic performance in Geography.

MATERIALS AND METHODS

This section presents the research design, approach, population, sampling procedures, data collection methods, and data analysis techniques used in the study. The section also highlights the ethical considerations observed during the research process.

Research Approach and Design

The study employed a mixed methods research approach, combining both qualitative and quantitative elements to provide a comprehensive understanding of teachers' competence in integrating technology and its effect on student achievement in Geography. This approach allowed the study to capture both measurable patterns and in-depth insights into teaching practices, classroom dynamics, and learning outcomes. In-terms of research design a concurrent design was adopted, which enabled the simultaneous collection and analysis of qualitative and quantitative data. This design was considered most appropriate for examining the effect of teachers' competence on technology integration in Geography instruction, as it allowed for triangulation of findings, increased validity, and a holistic understanding of the phenomenon

Participants

The target population for this study consisted of Geography teachers from selected public secondary schools. These participants were considered ideal because they are directly responsible for delivering Geography lessons and are the primary users of educational technology in their classrooms. Their experiences, competence, and practices in integrating technology provide critical insights into how digital tools affect student engagement, understanding, and academic achievement. The study focused on teachers with varying levels of experience and technological proficiency to capture a diverse range of perspectives. This allowed for a comprehensive understanding of the current status of technology integration in Geography instruction and its potential impact on learning outcomes.

Data Collection Methods

To ensure comprehensive data collection, the study employed three main methods: face-to-face interviews and classroom observation. This combination allowed for triangulation, enhancing the reliability and depth of the findings. Face-to-face interviews were conducted with Geography teachers to explore their competence in integrating technology into lesson delivery. The face-to-face formats allowed the researcher to observe non-verbal cues, clarify responses in real-time, and build connection with participants.

Direct observation of Geography lessons was conducted to validate and complement the interview data. Observations focused on teachers' actual use of technology, instructional strategies, and student interactions, providing contextual evidence of competence in practice. This method enabled the researcher to identify how digital tools were applied how confidently teachers were in using the technology.

Data Analysis and Ethical Consideration

The data collected from the field were analyzed using thematic analysis, which enabled the identification, examination, and interpretation of patterns and themes relevant to the study objectives. This method was particularly suitable for exploring teachers' competence in integrating technology and its effects on student achievement in Geography.

The analysis process began with a thorough review of all data collection forms, including interview transcripts, observation notes, and questionnaire responses, to gain familiarity and ensure accurate understanding of the content. This was followed by systematic coding, where meaningful segments of data were labeled according to their relevance to the research questions.

For clarity and organization, the four targeted schools were assigned codes: School A (SA), School B (SB), School C (SC), and School D (SD). From each school, two teachers were selected and coded as follows: T1 and T2 for SA, T3 and T4 for SB, T5 and T6 for SC, and T7 and T8 for SD. This coding system allowed the researcher to track and compare responses across different schools and participants, ensuring that themes could be analyzed both individually and comparatively. After coding, data were grouped into themes aligned with the study's specific objectives. Themes were then analyzed in relation to students' perceptions, classroom observations, and teacher interviews, enabling triangulation of findings to enhance validity. Each theme was interpreted to uncover patterns, relationships, and insights regarding the competence of Geography teachers in technology integration and its impact on student learning outcomes.

This study adhered to ethical principles to ensure respect for participants' rights, dignity, and privacy. Informed consent was obtained after participants were clearly informed about the purpose, procedures, and potential implications of the research, with assurance that participation was voluntary and withdrawal could occur at any time without consequences. Formal authorization was secured from the Directorate of Postgraduate Studies at Ruaha Catholic University and the Njombe Regional Administrative Secretary to ensure compliance with institutional and regional ethical standards. Confidentiality and anonymity were maintained by omitting personal identifiers and securely storing all data accessible only to the researcher. Throughout the process, participants' views were respected, and they were encouraged to express their opinions freely without coercion, ensuring that the study was conducted with integrity, fairness, and transparency.

FINDINGS AND DISCUSSIONS

This section presents the results obtained from the field regarding teachers' competence in integrating technology in teaching the Geography subject. The analysis draws from data collected through interviews, and classroom observations conducted in four selected secondary schools coded as SA, SB, SC, and SD. Thematic analysis was employed to identify and interpret patterns emerging from the data in relation to the study objectives. Through this process, teachers' competence in technology integration was classified into three main categories high competence, moderate competence, and low competence. These levels were determined based on teachers' ability to operate technological tools, integrate them into lesson planning and delivery, and facilitate student-centered learning using digital resources.

Teachers with High Competence in Technology Integration

Interviews and classroom observations revealed that four Geography teachers T2 from School A, T4 from School B, T7 from School C, and T8 from School D demonstrated a high level of competence in integrating technology into Geography teaching. These teachers consistently showcased advanced application of digital tools, strong pedagogical alignment in lesson delivery, and noticeable positive impacts on students' learning engagement and comprehension.

Teachers with high competence were characterized by their ability to plan, prepare, and deliver lessons effectively using various technological resources. They did not merely use technology as a decorative or

supplementary tool but as an integral part of their teaching strategies to simplify complex geographical concepts.

Effective Use of Multiple Digital Tools

Teachers with high competence reported frequent and purposeful use of multiple digital technologies to facilitate lessons. For instance, Teacher T2 from School A explained:

In most of my Geography classes, I prepare slides using PowerPoint and include images, maps, and animations. I also project videos and documentaries to help students understand topics like earthquakes and volcanic eruptions. Technology makes abstract concepts more practical for learners.

Classroom observations further confirmed this practice. Teachers such as T2 in School A were observed using PowerPoint presentations, projectors, videos, digital maps, and Google Earth in lesson delivery. They demonstrated the ability to operate technological devices independently without relying on technical assistance. More importantly, these teachers used technology not merely for presentation purposes but as a pedagogical tool to help students visualize and interact with complex geographical processes such as volcanic eruptions, river systems, and population distribution trends.

Integration of Advanced Applications

Teachers with high competence in technology integration demonstrated the ability to use advanced digital applications to enhance the teaching and learning of Geography. Such teachers effectively incorporated platforms like Google Earth, interactive maps, and Geographic Information Systems (GIS) to enrich lesson delivery. These tools allowed students to visualize real-world geographical features such as mountains, rivers, and urban settlements, thereby improving their understanding of spatial relationships and environmental processes.

For instance, some teachers used Google Earth to illustrate topics like population distribution and land use patterns, enabling students to connect theoretical concepts with real-world contexts. The use of GIS further allowed learners to analyze geographical data such as rainfall, vegetation, and settlement trends, fostering inquiry-based learning and critical thinking. Moreover, teachers with high competence demonstrated problem-solving skills by preparing offline resources to mitigate internet challenges, ensuring that lessons remained interactive and effective even in low-resource settings.

Overall, the integration of advanced applications reflected both technical proficiency and pedagogical creativity. Teachers who utilized these tools were able to make Geography lessons more engaging, practical, and relevant, thus enhancing students' motivation and comprehension.

Competence and Independent Operation

The findings revealed that teachers with high competence in technology integration not only used multiple digital tools effectively but also operated them independently without relying on external technical support. For instance, one teacher from School A explained:

I am competent in setting up and using projectors, videos, and other devices on my own. Even when minor technical challenges occur, I troubleshoot quickly so that the lesson continues smoothly. This gives students trust in me and makes the class more engaging.

This illustrates that high competence extends beyond knowing how to use digital tools it also includes the confidence and problem-solving ability to manage them autonomously. Such teachers demonstrate self-reliance and adaptability, ensuring that technological disruptions do not interrupt the learning process. Their independence enables lessons to flow smoothly and strengthens students' confidence in the teacher's expertise.

Ultimately, this operational competence reflects a deeper mastery of technology integration, where digital tools become an integral part of pedagogy rather than supplementary aids.

Teachers with Moderate Competence in Technology Integration

The study also revealed that some Geography teachers demonstrated a moderate level of competence in integrating technology into their teaching practices. Classroom observations showed that these teachers were generally comfortable using basic tools such as PowerPoint slides, projectors, and short educational videos to support lesson delivery. They were able to prepare and present content in an organized and organized manner, often using visual aids to enhance students' understanding of abstract geographical concepts such as climate graphs, population pyramids, and landform development. However, their technology use remained mostly at a supportive rather than an interactive level.

Interviews with teachers including T1 from School A, T5 from School C, and T3 from School B confirmed this moderate competence. One teacher explained:

I often use PowerPoint and videos when teaching topics like weather and population. These tools help students understand better, but I sometimes struggle when it comes to using advanced applications like GIS or Google Earth.

This response reflects the teachers' partial familiarity with technology integration while they appreciated the value of digital resources, they avoided more complex applications that required technical skill or additional training.

Use of Basic Digital Tools

The study revealed that teachers with moderate competence primarily relied on basic digital tools to support lesson preparation and delivery. These tools, such as PowerPoint slides, word-processed documents, and simple animations, were employed to make lessons more organized and to enhance students' understanding of complex concepts.

Teacher T1 from School A explained his approach:

I often prepare my Geography lessons using PowerPoint and sometimes include pictures or diagrams. These make my lessons clearer for students, especially when dealing with topics like population pyramids or climate graphs. However, I don't usually go beyond this, because I have not been trained in advanced software such as GIS.

In School C, classroom observations showed a teacher using a word-processed document to present lesson notes. These notes were both projected and distributed as printed handouts. This method not only saved lesson time but also helped students follow lessons systematically, reinforcing their understanding of the content.

Similarly, in School D, the use of PowerPoint with basic animations was noted during a lesson on tectonic processes. Simple visual effects, such as moving arrows and diagrams, assisted students in grasping the dynamics of plate movement more effectively than traditional chalkboard explanations alone.

Overall, the findings indicate that teachers with moderate competence can effectively use basic digital tools to improve lesson clarity and student comprehension. However, their limited exposure to advanced applications, such as GIS and interactive mapping platforms, restricts their ability to fully harness the potential of technology in teaching Geography.

Competence in Classroom Delivery but Limited Exploration

The study also revealed that teachers with moderate competence were generally able to deliver lessons effectively using basic technological tools, yet they tended to avoid more advanced applications.

Teacher T3 from School B acknowledged:

I use projectors and short videos quite often because they make my teaching easier, and students enjoy them. But when it comes to tools like Google Earth or GIS, I hesitate because I am not confident. I prefer sticking to what I know works best.

This response reflects a cautious approach. Teachers with moderate competence apply technology effectively within their comfort zone but are hesitant to experiment with advanced tools due to limited skills and fear of making mistakes in front of students. Classroom observations confirmed that these teachers relied primarily on projectors, PowerPoint slides, and short educational videos to enhance lesson delivery, while avoiding more interactive or complex platforms.

Overall, teachers with moderate competence occupy a middle ground: they improve lesson clarity and student engagement through basic technology, yet lack the innovation and independent integration demonstrated by highly competent teachers. This highlights the critical role of continuous professional development, targeted training, and infrastructural support. With these measures, teachers could transition from moderate to high competence, thereby promoting more consistent, interactive, and enriched Geography instruction.

Teachers with Low Competence in Technology Integration

Data revealed that a small group of Geography teachers shown low competence in integrating technology into their lessons. Interviews with three teachers (T6 from School C, and T8 from School D) indicated that they struggled even with basic digital tools and relied heavily on traditional teaching methods such as chalkboards, textbooks, and printed notes. These teachers reported minimal exposure to ICT training and expressed difficulty in applying technology meaningfully in lesson planning and delivery.

Limited Competence and Avoidance of Technology

The study revealed that teachers with low competence primarily relied on traditional teaching methods and often avoided using technology due to limited skills and fear of disrupting lessons. Teacher T6 from School C admitted:

I rarely use computers or projectors in my lessons. I feel more comfortable using the chalkboard and textbooks. If I try to use technology and something goes wrong, it interrupts my teaching, so I avoid it.

Classroom observations confirmed that these teachers avoided technology integration tools altogether, depending heavily on chalkboards, printed textbooks, and handwritten notes. They appeared hesitant to engage with digital tools, largely because of limited skills, fear of technical failure, and lack of confidence.

For example, in School B, a teacher conducted an entire lesson on river processes using only the chalkboard and textbook illustrations. Although the content was delivered, much of the lesson time was consumed by manually drawing diagrams, which limited opportunities for interactive learning. Similarly, in School D, a teacher attempted to use a projector but faced setup difficulties and abandoned the effort, reverting to the chalkboard and depriving students of visual aids.

Observations further indicated that classrooms where technology was avoided were generally less interactive. Students were largely passive, listening and copying notes rather than engaging in discussions, analyzing digital visuals, or exploring interactive content. In contrast, in classrooms where technology was effectively integrated, students asked more questions and demonstrated higher levels of curiosity.

These findings suggest that low teacher competence not only restricts the use of technology but also reduces student engagement and limits opportunities to understand complex geographical concepts. Without targeted training and support, such practices may continue to hinder student learning outcomes and widen the gap between classrooms with highly competent and less competent teachers.

Reliance on Traditional Methods

The study revealed that teachers with low competence often relied heavily on traditional teaching methods, avoiding the use of digital tools due to limited skills and confidence. A teacher from School C explained:

For most of my Geography lessons, I rely on the chalkboard and sometimes maps from the textbook. I know technology can be useful, but I don't feel skilled enough to prepare slides or operate videos in class.

Classroom observations supported this view, showing that lessons were predominantly teacher-centered, with students mostly copying notes and limited opportunities for interactive engagement. This reliance on conventional approaches often restricted students' exposure to dynamic and multimedia content, which could have enhanced understanding of complex geographical concepts.

These findings suggest that without targeted professional development and support, teachers with low competence may continue to default to traditional methods, potentially reducing student engagement and limiting the effectiveness of Geography instruction.

Lack of Training and Resource Constraints

The study revealed that teachers with low competence were significantly affected by both personal and infrastructural barriers. Teacher T8 from School D explained:

I have not received much training on how to use digital tools for teaching. Even if I wanted to try, the computers are few and the internet connection is unreliable. Because of this, I just continue with the methods I already know.

This response highlights that low competence is not solely a matter of individual skill but also reflects systemic challenges, including inadequate professional development and limited access to reliable digital resources. Classroom observations confirmed that these teachers' lessons involved minimal technology use, restricting students' ability to visualize complex geographical concepts and reducing opportunities for interactive learning.

The findings suggest that addressing this gap requires targeted professional development, continuous support, and investment in school infrastructure. Such measures would enable teachers to gain confidence, improve their digital skills, and gradually transition from traditional, teacher-centered methods to more effective technology-enhanced Geography instruction.

DISCUSSION

The findings of this study revealed that teacher competence in integrating technology into Geography instruction significantly affects classroom practices and student learning outcomes. Analysis showed that competence occurred at three distinct levels: high, moderate, and low, each with different implications for teaching effectiveness.

High competence

Teachers classified as highly competent (e.g., T2 from School A, T4 from School B, and T7 from School D) demonstrated advanced technical and pedagogical skills. These teachers designed lessons that promoted inquiry-based learning and critical thinking, enabling students to visualize complex processes such as volcanic eruptions, population distribution, and urbanization. Observations confirmed that these classrooms were highly interactive, with students actively engaging with digital content, asking questions, and demonstrating curiosity. This finding is consistent with Doering, Koseoglu, Scharber, Henrickson, and Lanegran (2014), who argue that teacher competence encompasses both technical skill and the ability to integrate technology pedagogically. Similarly, Maria and Daunt (2021) in Romania found that Geography teachers trained in technology integration improved classroom delivery, resulting in greater student understanding and interest. However, while previous studies emphasized general teacher preparedness or training, this study highlights how specific

high-level competence allows teachers not just to use technology but to transform learning experiences. This addresses a gap in the literature where the precise mechanisms by which competence affects lesson interactivity and student engagement were not fully explored.

Moderate competence

Teachers with moderate competence (e.g., T1 from School A, T3 from School B, T5 from School C) were comfortable using basic tools such as PowerPoint, projectors, and short educational videos. They could structure and deliver content effectively, and their use of visual resources improved understanding, however, these teachers tended to avoid advanced technology, including GIS and Google Earth, and often sought technical support when challenges arose. This cautious integration reflects findings from Mensah, Poku, and Quashigah (2022) in Ghana, which reported that while teachers often had strong content knowledge, technological competence varied. The current study adds a piece by showing that moderate competence enables basic improvement in lesson delivery but limits interactive and student-centered learning, suggesting that targeted professional development could help teachers transition to higher competence levels.

Low competence

Teachers with low competence (e.g., T6 from School C and T8 from School D) faced significant challenges even with basic technology tools. They relied heavily on traditional methods, including chalkboards, textbooks, and printed notes, and often avoided attempting digital integration due to fear of technical failure, lack of training, or insufficient infrastructure. Observations confirmed that these classrooms were less interactive, with students largely passive and minimally engaged. This aligns with findings from Kalinga and Ndibalema (2023) and Mwaluko, Musamas, and Tarmo (2023) in Tanzania, where despite government efforts to provide digital tools, the lack of professional development and technical support hindered effective technology use. However, the current study extends this literature by linking low competence directly to classroom dynamics, showing how inadequate skills translate into less interactive teaching, reduced student engagement, and limited opportunities to visualize complex geographical processes.

CONCLUSION

The study revealed that teachers' competence in integrating technology in Geography teaching varies across high, moderate, and low levels. Highly competent teachers effectively use multiple digital tools, including PowerPoint, videos, and GIS applications, enhancing lesson delivery, visualization of complex concepts, and student engagement. Teachers with moderate competence rely on basic tools and avoid advanced applications, while those with low competence primarily depend on traditional methods due to limited skills and inadequate training. These findings imply that teacher competence is crucial for successful technology integration and improved student learning. Low competence restricts interactive learning and may hinder academic achievement, while high competence fosters engagement, understanding, and performance. Therefore, targeted professional development, better access to digital resources, and strengthened infrastructure are essential to enable teachers to utilize technology effectively and enhance Geography education outcomes

Overall, the study emphasizes that teacher competence is a key determinant of successful technology integration in Geography instruction. Addressing gaps in professional development, improving access to digital resources, and strengthening infrastructural support are critical to enabling teachers to harness technology effectively. Enhancing teacher competence has far-reaching implications for improving lesson quality, fostering student engagement, and ultimately elevating academic achievement in Geography

RECOMMENDATIONS

Based on the findings of this study, it is recommended that the Ministry of Education, school authorities, and relevant stakeholders prioritize continuous professional development for Geography teachers to enhance their competence in integrating technology. Training programs should focus not only on basic tools such as PowerPoint and projectors but also on advanced applications like GIS, Google Earth, and interactive mapping platforms, which were underutilized by teachers with moderate or low competence.

Additionally, schools should invest in reliable digital infrastructure, including functional projectors, computers, stable internet connectivity, and access to multimedia teaching resources, to ensure that teachers can implement technology effectively.

The study also highlights the importance of providing ongoing technical support and mentorship, enabling teachers to overcome challenges during lessons and learn from colleagues with higher competence. Finally, integrating technology into the Geography curriculum in a organized manner can help standardize its use across schools, ensuring that all students benefit from interactive, engaging, and meaningful learning experiences, thereby improving comprehension of complex geographical concepts and overall academic achievement.

REFERENCES

1. Asad, A., Hussain, S., Wadho, M. A., Khand, Z. H., & Churi, P. P. (2021). Impact of technology integration on students' academic performance: Evidence from Geography education. Journal of Education and Practice, 12(10), 33–41. https://doi.org/10.7176/JEP/12-10-05
2. Daily News. (2022, November 6). Census tablets distributed to schools, colleges. Daily News Tanzania. https://dailynews.co.tz
3. Dede, C. (2007). Transforming education for the 21st century: New pedagogies that leverage ubiquitous learning. Journal of Learning Sciences, 16(1), 1–21. https://doi.org/10.1080/10508400709336945
4. Demissie, T., Labiso, A., & Thuo, J. (2022). Teachers' digital competence and integration of technology in classroom instruction in Ethiopia. African Journal of Teacher Education, 11(2), 145–163.
5. Doering, A., Koseoglu, S., Scharber, C., Henrickson, J., & Lanegran, D. (2014). Technology integration in geography education: A review of research and implications for practice. Journal of Geography, 113(3), 107–118. https://doi.org/10.1080/00221341.2013.846392
6. Elias, S. (2023). Teachers' preparedness for ICT integration in secondary school instruction in Tanzania. International Journal of Education and Development using ICT, 19(1), 55–69.
7. George, S. (2004). Connectivism: A learning theory for the digital age. International Journal of Instructional Technology and Distance Learning, 2(1), 3–10.
8. Goga, C., & Roșu, D. (2021). Technology-enhanced Geography teaching and learning: A mixed-methods study in Romanian schools. European Journal of Geography, 12(2), 102–115.
9. Goldie, J. G. S. (2016). Connectivism: A knowledge learning theory for the digital age? Medical Teacher, 38(10), 1064–1069. https://doi.org/10.3109/0142159X.2016.1173661
10. Kadhim, A. (2020). The role of technology in enhancing Geography learning outcomes: A case of Iraqi secondary schools. Journal of Educational Technology and Online Learning, 3(4), 22–35.
11. Madobi, M. (2021). Teachers' technological competence and its influence on students' Geography performance in Zimbabwean secondary schools. African Journal of Educational Research, 9(2), 78–90.
12. Maxwell, J. (2022). Digital pedagogy and the enhancement of Geography education through visualization tools. Journal of Educational Research and Innovation, 7(3), 45–60.
13. Mollel, P., Minami, K., Munezero, M., & Ngayinteranya, E. (2022). Teachers' technological competence and student learning outcomes in Rwandan secondary schools. African Journal of Education and Technology, 12(4), 201–217.
14. Narzullaevna, K. M. (2020). The use of information technology in teaching Geography. European Journal of Research and Reflection in Educational Sciences, 8(11), 128–133.
15. Ndume, P., Kisanga, D., & Selemani, F. (2024). Assessing ICT integration and teacher preparedness in Tanzanian secondary schools. Journal of Educational Practice and Policy, 15(2), 88–103.
16. Pantić, N. (2011). Teacher competence as a basis for teacher education: Views of Serbian teachers and teacher educators. CEPS Journal, 1(4), 77–96.

17. Prosper, L., & Nderego, A. (2024). Challenges facing teachers in tablet utilization for teaching and learning in Tanzanian secondary schools. Tanzania Journal of Education and Science, 13(1), 55–70.
18. Sahin, S. (2012). The role of connectivism in learning and teaching through digital technology. Educational Technology Research and Development, 60(4), 757–768. https://doi.org/10.1007/s11423-012-9245-3
19. Telore, A., & Dametew, M. (2021). Teachers' technological competence and barriers to ICT use in Geography classrooms in Ethiopia. International Journal of Educational Technology, 11(3), 89–101