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Identified Effective Teaching Strategies that Promoted the Development of ICT Skills in Students, Tanzania.

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ABSTRACT

The integration of Information and Communication Technology (ICT) in education is pivotal for developing students' digital literacy and preparing them for a technology-driven world. This study investigated effective teaching strategies that promote ICT skill development among secondary school students in Iringa Municipality, Tanzania. Guided by the Technological Pedagogical Content Knowledge (TPACK) framework, the study employed a qualitative approach, collecting data through semi-structured interviews, focus group discussions and classroom observations from 40 participants, including students, teachers, school heads and education officers. Findings revealed that active learning strategies, particularly hands-on practical sessions and Project-Based Learning (PBL), significantly enhance students' ICT competencies. These approaches foster experiential learning, critical thinking, creativity, collaboration and confidence in using digital tools. Students engaged in these methods demonstrated higher motivation, better problem-solving skills and practical application of theoretical knowledge compared to traditional lecture-based instruction. The study concludes that integrating hands-on and project-based ICT activities into secondary education is essential for equipping students with the technical proficiency and 21st-century skills necessary for future academic and professional challenges. Recommendations include the consistent implementation of these strategies, provision of adequate technological infrastructure and continuous professional development for teachers to optimize ICT integration in classrooms.

Keywords: ICT integration, digital literacy, teaching strategies, hands-on learning.

Introduction

The integration of Information and Communication Technology (ICT) into education has become a cornerstone of modern pedagogy, aiming to enhance students' digital literacy and prepare them for a technology-driven world. Effective teaching strategies are pivotal in fostering ICT skills among students, ensuring they not only consume information but also engage critically and creatively with digital tools.

Research indicates that ICT integration, when aligned with pedagogical objectives, can significantly improve student engagement and learning outcomes. For instance, the use of interactive digital tools supports active learning, allowing students to create and interact with content rather than passively receiving information. Such strategies promote deeper understanding and retention of knowledge (Ghavifekr and Rosdy, 2015).

Moreover, incorporating ICT into teaching practices facilitates personalized learning experiences. Adaptive learning platforms, for example, can tailor educational content to meet individual student needs, thereby supporting diverse learning paces and styles. This personalization is crucial in addressing the varying proficiency levels and learning preferences within a classroom (KnowledgeWorks, 2023).

Collaborative learning is another effective strategy enhanced by ICT. Digital tools such as shared documents and discussion forums enable students to work together, share ideas and solve problems collectively. This collaborative approach not only develops ICT skills but also fosters communication, teamwork and critical thinking abilities among students (Piki, 2008).

The development of ICT skills is also closely linked to the creation and management of digital content. Encouraging students to produce digital materials, such as videos, blogs and presentations, allows them to apply their ICT knowledge in meaningful ways. This hands-on approach reinforces learning and builds confidence in using technology effectively (CreativeSonCall, n.d.). Furthermore, the integration of ICT in assessment practices provides opportunities for real-time feedback and reflection. Online quizzes, interactive assignments and digital portfolios enable teachers to monitor student progress continuously and adjust instruction accordingly, ensuring that learning objectives are being met (Teachers Institute, 2023).

Teacher professional development plays a critical role in the successful implementation of ICT strategies. Educators must possess not only technical skills but also pedagogical knowledge to integrate technology effectively into their teaching practices. Ongoing training and support are essential to equip teachers with the necessary tools and confidence to utilize ICT in the classroom (Flewelling, 2024). The impact of ICT integration extends beyond

individual classrooms. At the institutional level, schools that embrace technology can create dynamic learning environments that reflect the digital world students will encounter outside the classroom. This alignment with real-world contexts enhances the relevance and applicability of education, preparing students for future challenges (European Commission, 2025).

In the Tanzanian context, where access to technology may vary, identifying and implementing effective ICT teaching strategies is crucial. Tailoring approaches to local resources and infrastructure, while focusing on fundamental ICT skills, can bridge the digital divide and promote equitable learning opportunities for all students (UNESCO, 2025).

Furthermore, the identification and application of effective teaching strategies are vital in promoting the development of ICT skills in students. By leveraging technology purposefully and supporting both students and teachers, educational institutions can cultivate a digitally literate generation capable of navigating and contributing to an increasingly digital world.

Literature Review

Theoretical Framework

The Technological Pedagogical Content Knowledge (TPACK) theory, developed by Mishra and Koehler (2006), provides a framework for understanding the integration of technology in teaching. TPACK emphasizes the intersection of three primary forms of knowledge: Content Knowledge (CK), Pedagogical Knowledge (PK) and Technological Knowledge (TK). Effective teaching using technology requires educators to not only understand the subject matter (CK) and the most effective instructional strategies (PK) but also how to leverage technological tools (TK) to enhance learning. The framework highlights that knowledge in these areas is interdependent and optimal teaching occurs when educators can integrate all three dimensions seamlessly to design meaningful and engaging learning experiences (Mishra and Koehler, 2006).

This theory is highly relevant to the current study, which investigates effective teaching strategies for promoting ICT skills in students. By applying the TPACK framework, the study can assess how teachers combine their knowledge of ICT tools (TK), teaching methods (PK) and subject content (CK) to enhance students' digital literacy. Understanding the interplay of these knowledge domains allows educators to design lessons that not only convey ICT concepts but also actively engage students in practical, collaborative and technology-driven activities. In essence, TPACK provides a theoretical lens for evaluating the effectiveness of teaching strategies in developing students' ICT competencies, which aligns directly with the objectives of this study (Niess, 2013).

Empirical review

Teaching Strategies that Promoted the Development of ICT Skills in Students

Msambwa (2024) conducted a systematic review addressing the challenges, roles of stakeholders and strategies enabling effective ICT integration in education. The study emphasized that overcoming infrastructural and pedagogical barriers is essential for successful ICT implementation, highlighting the need for comprehensive strategies that involve all educational stakeholders.

Timotheou (2022) explored the impacts of digital technologies on education, identifying factors that influence effective integration. The study found that when digital tools are aligned with pedagogical goals, they can enhance student engagement, motivation and communication skills, thereby improving overall learning outcomes.

Thangarajathi (2024) discussed the role of digital literacy and technology integration in education, emphasizing the importance of critical thinking, information management and responsible online behavior. The paper highlighted that thoughtful integration of technology can revolutionize education by fostering engagement, personalization and collaboration among students.

Llorens (2025) evaluated and proposed effective teaching models that emphasize soft skills acquisition in ICT degree courses. The study underscored the significance of integrating soft skills training into ICT curricula to prepare students for the collaborative and communicative demands of the modern workplace.

A study by UniversePG (2025) revealed that teachers' digital literacy significantly influences ICT integration in teaching. The research indicated that while teachers demonstrated high levels of ICT literacy, their integration into teaching practices varied, suggesting the need for targeted professional development to enhance effective ICT use in classrooms.

Xhomara (2024) investigated the relationship between ICT skills and effective teaching and learning in university settings. The study found a positive correlation, indicating that enhancing ICT skills among educators can lead to more effective teaching practices and improved student learning outcomes.

Msafiri (2023) conducted a systematic literature review on ICT integration in secondary schools, analyzing 51 studies to assess the impact on teaching and learning. The findings highlighted benefits such as improved curriculum coverage, equitable access to resources and personalized learning experiences, reinforcing the importance of strategic ICT integration.

Haleem (2022) discussed the role of digital technologies in education, emphasizing their applications and challenges. The paper highlighted those digital technologies, when effectively integrated, can enhance educational experiences by providing diverse learning opportunities and supporting various learning styles.

Ibrahimi (2024) explored the integration of ICTs in science education, focusing on Albanian science teachers' perceptions and use of ICT in teaching processes. The study found that adequate training and support are crucial for effective ICT integration, particularly in specialized subjects like science. Krause and Zaidi (2025) examined the role of generative AI in education, identifying key competencies students need to engage effectively with AI tools. The study emphasized the importance of integrating AI literacy into curricula to prepare students for future technological advancements.

Research Methodology

This chapter presents the research methodology employed in investigating digital literacy and ICT integration in secondary schools in Iringa Municipality. It outlines the research approach, design, population and sample size, sampling procedures, data collection methods, data analysis, trustworthiness and ethical considerations. The study adopted a qualitative approach to obtain an in-depth understanding of participants' experiences and perceptions regarding digital tools in education. Through interviews, focus group discussions and classroom observations, the study captured rich, contextual insights into how digital literacy was developed and applied in real educational settings.

Iringa Municipality was strategically selected as the study area due to its significant number of secondary schools, availability of educational stakeholders and limited prior research on ICT integration in the region. The target population included students, teachers, heads of schools and educational officers, whose perspectives were crucial for assessing digital literacy in classrooms. Purposive and simple random sampling methods were employed to select participants who had direct involvement with ICT tools, ensuring the collection of relevant and meaningful data. A total of 40 participants were engaged, including two educational officers, five heads of schools, eight teachers and twenty-five students.

Data collection was conducted using semi-structured interviews, focus group discussions and non-participant observations. Interviews provided personal insights from educational officers, teachers and students, while focus group discussions facilitated the sharing of collective experiences and perspectives on ICT integration. Observations allowed the researcher to examine firsthand the use of digital tools and students' engagement in classroom settings. These multiple data collection methods ensured triangulation and enriched the findings by providing both individual and contextual perspectives on digital literacy and ICT practices.

Data analysis followed thematic procedures, coding and grouping responses to identify common patterns and key themes related to ICT use in education. Trustworthiness was ensured through triangulation, transparency, accuracy and conformability of the findings. Ethical considerations were strictly observed, including informed consent, confidentiality and privacy protection, particularly given the involvement of students. Overall, the methodological approach provided a comprehensive framework to explore digital literacy and ICT integration, offering valuable insights for educators, policymakers and stakeholders.

Findings

The findings and discussion presented relied on assessing digital literacy in the teaching and learning of information and communication technology skills among secondary school students. The chapter draws on data collected through interviews, observations and focus group discussions. Specifically, it looked into hands-on activities, which involve students actively engaging with ICT tools through practical exercises, thereby promoting experiential learning and better retention of skills. Hands-on practical sessions involve actively engaging students in real-world, meaningful projects that require the use of diverse digital tools and resources. A view from teacher of School B through discussion had the following view:

When students actively create their own notes online, they engage in a hands-on learning process that reinforces their understanding of both the content and the technical skills involved. Rather than passively listening to a lecture or simply following step-by-step instructions, students analyze the material, determine what key points to highlight and decide how best to present their ideas visually. (FGD - May 2025)

Also a teacher from School C explained that active participation encourages critical thinking, creativity and problem-solving, making the learning experience more meaningful and memorable.

An interview with the Head of school revealed the following:

Regular use of hands-on activities when teaching digital skills provides students with direct experience in operating computers, using software applications and navigating the internet. This method helps students apply theoretical knowledge and develop the confidence to work with technology independently. (Interview-May 2025)

Additionally, by designing their own presentations, Respondents indicated that this approach helps learners develop a deeper grasp of organizing information logically, using visual aids effectively and practicing communication skills. They noted that it fosters higher engagement, boosts confidence and accelerates mastery of the subject matter when compared to passive learning methods.

A view from students through group discussion revealed the following:

I really enjoy the hands-on practical sessions because they make learning more interesting and useful. Instead of just memorizing facts, I get to work on real projects like making videos or websites, which helps me understand the topics better. Working with my classmates also makes it more fun and helps me learn from others. I feel more confident because I can apply what I learn in a practical way and it keeps me motivated to participate. (FGD - May 2025)

The observation made during the computer learning session revealed that there was enhanced engagement and motivation. These are evident as the student's demonstrated interest and enthusiasm through active participation in meaningful tasks. They developed collaborative skills by working effectively in groups, sharing ideas and supporting peers. The use of digital tools such as presentation software, video editing programs and website builders reflects practical skill acquisition and technological literacy. Students also exhibit creative problem-solving by troubleshooting issues and designing innovative solutions. This method not only enhances engagement but also fosters critical thinking and teamwork among students. Instead of passively absorbing information, students are encouraged to explore topics deeply, collaborate effectively with peers and apply their knowledge practically through the creation of diverse digital projects such as presentations, videos, websites and digital reports. By utilizing various digital tools, students develop essential 21st century skills like digital literacy, creativity, critical thinking and teamwork, making their learning more relevant and engaging.

Discussion

Teaching Strategies that Promoted the Development of ICT Skills in Students

The development of students' ICT skills is significantly enhanced through teaching strategies that actively engage learners in hands-on and project-based activities. Hands-on practical sessions allow students to interact directly with digital tools, such as presentation software, video editors and website builders, fostering experiential learning and improving retention of technical skills (Bell, 2010; Harlow, 2020). In these sessions, students not only practice using technology but also develop critical thinking, creativity and problem-solving abilities, which are essential for navigating the digital landscape. Observations from classrooms in Iringa Municipality indicate that such active engagement leads to increased student motivation and collaboration.

Project-Based Learning (PBL) further strengthens ICT competencies by immersing students in real-world, meaningful tasks that require investigation, design and presentation of digital projects. PBL encourages critical thinking, problem-solving and communication skills while allowing students to apply theoretical knowledge practically (Blumenfeld et al., 1991; Mergendoller et al., 2006). Field data show that students involved in PBL demonstrate higher engagement and confidence in using ICT tools, as they are tasked with creating content such as digital reports, videos and websites. The collaborative nature of these projects also reinforces teamwork and peer learning.

Active learning methods, including hands-on practice and PBL, have consistently been shown to outperform traditional lecture-based instruction. By shifting the focus from passive reception to active participation, these strategies increase comprehension, improve knowledge retention and cultivate practical competencies (Freeman et al., 2014; Prince, 2004). Teachers in the study reported that students engaged in these methods are more confident in navigating digital technologies, better prepared to solve problems and more motivated to explore innovative solutions.

Incorporating ICT-focused hands-on sessions into the curriculum enables students to construct knowledge through direct experience, aligning with experiential learning theory (Kolb, 1984). Through the creation of digital content, students enhance their organizational and communication skills while integrating theoretical concepts with practical application. The Municipal and Ward Education Officers emphasized that adequate ICT infrastructure is critical for the success of these approaches, as reliable access to devices and the internet ensures equitable participation and skill development.

Research indicates that active engagement in learning supports diverse learning styles, particularly kinesthetic and visual learners, by allowing students to manipulate materials and observe outcomes firsthand (Fleming & Mills, 1992; Smith, 2017). Practical activities foster a collaborative environment where students communicate, share ideas and problem-solve collectively, reinforcing both technical proficiency and essential soft skills. Such methods are especially effective in developing 21st-century competencies like adaptability, creativity and digital literacy.

Project-Based Learning not only develops ICT competencies but also promotes higher-order thinking and real-world application. By assigning tasks that require students to investigate, design and present solutions, educators prepare learners for future academic and professional challenges (Bell, 2010; Blumenfeld et al., 1991). Observational data from schools indicate that students participating in PBL are more engaged, confident and capable of independent digital problem-solving. These strategies bridge the gap between theoretical knowledge and practical application, providing meaningful learning experiences.

Overall, integrating hands-on practical sessions and Project-Based Learning into secondary education enhances student engagement, ICT skill development and critical thinking. Active learning approaches equip students with the technical proficiency, collaboration skills and confidence necessary for success in a technology-driven world. Consistent with Freeman et al. (2014) and Harlow (2020), these methods promote interactive, student-centered learning environments that improve academic outcomes and prepare learners for real-world challenges

Conclusion

The study concludes that active learning strategies, particularly hands-on practical sessions and Project-Based Learning (PBL), significantly enhance the development of ICT skills among students. These methods engage learners in real-world, meaningful tasks, fostering critical thinking, creativity, collaboration and technical proficiency. Students not only acquire practical digital competencies but also develop confidence and problem-solving

abilities, which are essential for navigating a technology-driven environment. The findings indicate that traditional lecture-based approaches are less effective in promoting ICT skill development, as they do not actively involve students in the learning process.

Recommendations

Based on the study findings, it is recommended that schools integrate hands-on practical sessions and Project-Based Learning consistently across the curriculum to improve students' ICT competencies. Additionally, education authorities should ensure that schools are equipped with adequate technological infrastructure, including computers, software and reliable internet access, to support these teaching strategies effectively. Teachers should also receive continuous professional development on ICT integration and active learning methods to enhance instructional quality and student outcomes. Implementing these recommendations will prepare students to meet the demands of the modern digital world while fostering meaningful, skill-oriented learning.

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