Global Journal of Basic Education (GJBE)
Volume 2 Issue 1 Year 2025 Pages 19 - 30
e–ISSN : 3110-8687 | DOI: 10.61227
e-mail : gjbe.journal@gmail.com
https://journal.pusmedia.com/index.php/GJBE/index

Enhancing Digital Literacy Awareness for Better Learning Processes in Secondary Schools: The Case of Kinondoni Municipal, Tanzania

Celestina Richard[1] , Prospery M. Mwila[2]*

[1] Educator , Kinnondoni Municipal,Tanzania
[2] Academician, Saint Augustine University of Tanzania.

Correspondence e-mail * : Bapropsk@gmail.com

Abstract: This study examined the state of digital literacy in secondary schools in Kinondoni Municipal and its influence on teaching and learning, focusing on students' awareness, use of digital platforms, and the role of digital tools in enhancing the learning process. A mixed-methods approach within a cross-sectional design was employed, involving 200 participants, including 100 students, 46 teachers, 4 school heads, and 50 parents. Purposive, random, and convenience sampling techniques were applied, and data were collected using questionnaires, interviews, classroom observations, and document reviews. Quantitative data were analyzed using descriptive and inferential statistics, while qualitative data were thematically analyzed. The study was guided by the Technology Acceptance Model (TAM), framing the analysis of how teachers, students, and other stakeholders perceive and adopt digital tools in education.Findings revealed that both teachers and students exhibited low to moderate levels of digital literacy, with teachers demonstrating confidence in basic digital skills but limited competency in online safety and information evaluation. Students' digital exposure was largely home-based due to inadequate school infrastructure. Limited access to digital platforms and resources hindered the integration of technology into classroom practices, despite teachers recognizing the benefits of digital tools in lesson delivery, assessment preparation, and student engagement. The study concludes that while digital tools have the potential to enhance learning outcomes, insufficient teacher competencies and resource gaps impede effective integration. Recommendations include increased collaboration for resource provision, targeted professional development, compulsory digital literacy courses for teachers, and structured programs to promote innovative use of digital tools in teaching. These measures are crucial for bridging the digital divide and fostering effective technology-enhanced learning in secondary schools.

Keyword : Curriculum integration, intervention, digital skills, digital awareness, digital literacy.

Article info: Submitted : 2026-01-02 | Accepted : 2026-02-15 | Published : 2026-02-18

Copyright © 2026, Authors.

This is an open-access article under the CC BY 4.0

INTRODUCTION

The integration of digital literacy into contemporary education has significantly transformed learning environments, positioning digital competencies as essential for effective teaching and learning (Prensky, 2001; Ribble, 2015). Defined as the ability to use digital technologies efficiently and responsibly, digital literacy has evolved

alongside rapid technological advancements and the growing influence of internet-based learning platforms (Livingstone & Helsper, 2007). Modern conceptualizations extend beyond basic technical skills to encompass critical thinking, digital communication, and responsible online engagement—key elements of digital citizenship in the 21st century (Eshet-Alkalai, 2004). As educational systems worldwide embrace technology-rich pedagogies, digital literacy has become central to enhancing learner autonomy, collaboration, and overall academic performance.

Globally, the shift toward digital learning has been accelerated by innovations in educational technologies and the expanding demand for digital competencies in the labor market (Higgins et al., 2012; Sung et al., 2016). This transition intensified during the COVID-19 pandemic, which compelled educators and students to adapt rapidly to remote learning modalities (Tamim et al., 2015). The sudden reliance on digital platforms underscored the importance of digital literacy for navigating virtual classrooms, evaluating online content, and communicating effectively in digital spaces (Fu, 2013). However, the period also exposed profound inequalities in digital access, particularly in developing contexts where limited connectivity and inadequate digital infrastructure widened existing educational disparities (Warschauer, 2003). Tanzania reflects these global challenges, with persistent gaps in access to digital tools and the internet disproportionately affecting marginalized learners and exacerbating the digital divide (Norris, 2001; Livingstone & Helsper, 2007; DiMaggio & Hargittai, 2001).

In this context, Kinondoni Municipal in Dar es Salaam presents a compelling case for examining digital literacy in secondary education. Despite being situated in an urban center, many schools in Kinondoni continue to face obstacles such as outdated equipment, unreliable internet connectivity, insufficient teacher training, and socio-economic inequalities that limit students' meaningful use of digital technologies (Gharawi & Khoja, 2015; Olumuyiwa & Segun, 2013). Furthermore, the lack of a coordinated strategy for integrating digital literacy into educational policies heightens these challenges (Rahmawati et al., 2024; Patrobas et al., 2023). Addressing these gaps requires a contextualized understanding of digital literacy needs and practices. Therefore, this study investigates how digital literacy awareness can be enhanced to improve learning processes in secondary schools within Kinondoni Municipal. Specifically, it assesses current levels of digital literacy awareness among students, examines how digital platforms are utilized for learning, and identifies barriers to digital inclusion with the aim of proposing actionable, evidence-based interventions.

Literature Review

The theoretical review highlights that learning in the digital age is increasingly shaped by technology and the networks through which students access and share

information. Connectivism explains that knowledge is created through digital connections among learners, teachers, and online resources, emphasizing that technology is central to modern learning environments (Siemens, 2006; Duke et al., 2013). Complementing this perspective, the Technology Acceptance Model shows that individuals are more likely to adopt digital tools when they believe these tools are useful and easy to use (Davis, 1989). Together, these theories help explain why digital literacy skills are essential for both teaching and learning, and why positive attitudes, confidence, and perceived value strongly influence the integration of digital technologies in schools.

The review also acknowledges the strengths and limitations of these theoretical models. TAM is praised for its simplicity, wide applicability, and strong predictive power regarding technology use (Venkatesh & Davis, 2000), while Connectivism effectively captures the social and technological nature of modern learning. However, both models have shortcomings. TAM is often criticized for overlooking contextual, emotional, and institutional factors that shape technology adoption (Bagozzi, 2007), while Connectivism has been noted for lacking clear guidelines on practical implementation in classroom settings (Bell, 2011). These weaknesses underscore that digital literacy development depends not only on individual perceptions but also on broader issues such as infrastructure, teacher training, and policy support.

The empirical review shows that the integration of digital tools into education can significantly improve learning outcomes, engagement, and student motivation. Numerous studies indicate that digital resources, when used effectively, enhance students' critical thinking, collaboration, and self-paced learning (Higgins et al., 2012; Sung et al., 2016). Research also highlights that multimedia tools, mobile devices, and online platforms support deeper understanding and increase learner participation (Mayer, 2017; Pan et al., 2022). In many contexts, digital platforms have been found to enrich lessons, improve communication between students and teachers, and promote autonomy through personalized learning (Hwang & Wu, 2019; Fullan, 2013).

Despite these benefits, the empirical review identifies significant challenges that limit the full adoption of digital literacy in schools. Studies consistently report disparities in access to devices, internet connectivity, and digital learning resources, especially in low-income or under-resourced communities (Warschauer, 2003; DiMaggio & Hargittai, 2001). Teachers also face barriers such as inadequate professional development, limited confidence, and insufficient institutional support for technology-enhanced teaching (Bingimlas, 2009). Research conducted in Tanzania and similar settings confirms that although students and teachers possess basic digital skills, structural and socioeconomic constraints hinder effective integration of digital tools in learning (Patrobas et al., 2023; Gharawi & Khoja, 2015). Overall, the empirical literature shows that while digital literacy holds significant potential to improve

learning, its success depends on addressing issues of equity, training, infrastructure, and policy alignment.

METHODOLOGY

The study employed a mixed-methods approach within a cross-sectional research design, enabling the simultaneous collection of quantitative and qualitative data to capture a holistic understanding of digital literacy awareness and its influence on learning in Kinondoni Municipal secondary schools. The design allowed the researcher to assess prevailing conditions without manipulating variables, making it suitable for school-based inquiry where time and curriculum constraints limit long-term studies. A total sample size of 200 participants including 100 students, 46 teachers, 4 heads of schools, and 50 parents was drawn from four government secondary schools that met the criteria of possessing at least two digital devices. Purposive sampling was used to select schools and heads of schools based on this criterion; simple random sampling was used to select students and teachers to ensure representativeness; while convenience sampling was applied in selecting parents who were available during school visits. Data were collected using multiple tools, including structured questionnaires for quantitative data, semi-structured interview guides for qualitative insights, classroom observation schedules to capture authentic instructional practices, and documentary reviews of lesson plans, schemes of work, and school records. This triangulation of tools strengthened the richness and credibility of the dataset.

To ensure methodological rigor, the study applied several strategies to enhance validity and reliability. Content and face validity were established through expert review and a pilot study conducted in a non-sampled school, which led to refinement of items for clarity and relevance. Reliability of the quantitative instruments was tested using Cronbach's Alpha, confirming internal consistency of the scales, while qualitative credibility was enhanced through triangulation, member checking, and detailed field notes. Quantitative data were analyzed using descriptive statistics frequencies, percentages, and mean scores supported by inferential analysis where appropriate to explore relationships between digital literacy variables. Qualitative data were analyzed thematically following systematic coding, categorization, and interpretation of recurring patterns related to digital skills, access barriers, and pedagogical practices. Ethical standards were upheld throughout the study by securing official research permission from municipal authorities and school administrations, obtaining informed consent from teachers, parents, and students, assuring participants of confidentiality and anonymity, and securely storing all data. These procedures ensured that the study was conducted with academic integrity, respect for participants, and adherence to professional research norms.

RESULT AND DISCUSSIONS

This section presents the findings and discussions of the study, focusing on the current state of digital literacy and the utilization of digital platforms among teachers and students in Kinondoni Municipal. It examines teachers' and students' awareness, skills, and engagement with digital tools, highlighting the availability of resources, the integration of technology into teaching and learning, and the perceived benefits and challenges associated with digital platforms. The discussion is framed within the Technology Acceptance Model (TAM) to interpret how perceived usefulness, ease of use, and contextual factors influence the adoption of digital tools in schools. Comparisons with previous research provide insight into the broader implications of limited digital resources, teacher competencies, and student access, emphasizing the need for policy interventions, infrastructure development, and professional capacity-building to enhance digital literacy and promote equitable learning outcomes.

Current Level of Digital Literacy Awareness and Usage Among Teachers and Students

The study assessed digital literacy awareness among teachers and students in Kinondoni Municipal. The quantitative data indicated that 12 teachers (60%) exhibited moderate digital literacy awareness, 6 (30%) high, 2 (10%) very high, while 2 (10%) reported low awareness . Regarding specific digital skills, 18 teachers (90%) were confident in internet browsing and social media usage, 15 (75%) in basic computer skills, while only 2 (10%) felt confident in online safety and security, and none (0%) could evaluate online information for credibility. Student findings revealed that 57% (56 students) associated digital literacy with computers, 33% (32 students) with computers and smartphones, and 10% (10 students) with computers and the internet. Interviews further revealed that most students gained digital exposure at home, not school, due to lack of facilities.

These results align with Abayoje et al. (2016), who found that limited access to digital tools contributes to low digital literacy among students. Similarly, Olumuyiwa & Segun (2013) observed that students in schools with limited facilities struggle to develop digital skills, a pattern also evident in Kinondoni where school-based exposure is minimal. He & Wray (2017) further emphasized that environments equipped with digital tools significantly enhance student autonomy and literacy—highlighting the disparities between well-resourced global contexts and the under-resourced schools in Kinondoni. Consistent with Aitokhuehi & Ojogho (2014), the findings show that students with home access perform better, demonstrating the influence of socioeconomic background on digital literacy.

The Technology Acceptance Model (TAM) posits that perceived usefulness and perceived ease of use determine digital tool adoption. Here, teachers' moderate awareness and limited skill in critical areas such as online safety reflect low perceived

ease of use, especially due to insufficient training. Students' reliance on home devices rather than school infrastructure suggests that the school environment reduces perceived usefulness, weakening adoption behavior. The absence of institutional digital resources constrains both perceived behavioral control and self-efficacy, essential constructs influencing technology adoption.

The findings underscore the need for the Tanzanian Ministry of Education to develop policies that ensure equitable access to digital literacy resources. Schools in Kinondoni require structured digital literacy programs, infrastructure investment, and teacher capacity-building initiatives. Policy frameworks should mandate digital literacy integration across subjects, strengthen teacher digital competencies, and prioritize internet connectivity and device provision. Addressing these gaps would bridge the digital divide and support the national goal of a digitally competent youth population.

Utilization of Digital Platforms to Supplement Student Learning

Findings on the availability and use of digital platforms revealed significant shortages. Teachers reported limited access to digital tools, with only 15% (3 teachers) using them daily, 45% (9 teachers) several times a week, and 25% (5 teachers) occasionally, while 15% (3 teachers) used them rarely.Observations in visited schools showed inadequate digital facilities such as few computers, limited projectors, and unreliable internet. Students also reported minimal use of school-based digital resources, with most indicating that their interaction with digital tools occurred at home rather than in school. Interviews revealed that teachers often rely on personal smartphones or tablets for instructional support.

These findings echo Bingimlas (2009) and Nagarajan et al. (2013), who identified lack of digital resources as major barriers to integrating technology in secondary school pedagogy. Warschauer (2003) similarly argued that insufficient access to digital devices entrenches inequalities, particularly in resource-limited contexts. Patrobas et al. (2023) found comparable constraints in Tanzanian secondary schools, noting that digital infrastructure gaps hinder effective teaching and learning. The Kinondoni case confirms these broader regional trends, demonstrating that availability strongly influences utilization.

According to TAM, the limited availability of digital resources negatively influences teachers' perceived usefulness of digital tools. Teachers cannot consistently integrate technology when devices are lacking, lowering their perceived ease of use and reducing adoption intentions. Students, likewise, experience low perceived accessibility in school environments, which diminishes their engagement with digital learning platforms. The inconsistent infrastructure disrupts the formation of positive attitudes toward classroom-based digital tool use.

To improve digital platform utilization, educational stakeholders in Tanzania must invest in school-level digital infrastructure. Policies should prioritize digital device acquisition, stable internet connectivity, and maintenance systems. Moreover, national guidelines should obligate schools to implement ICT integration plans aligned with the Education Training Policy (ETP). Public-private partnerships (PPPs) may play a crucial role in expanding digital resources. Strengthening infrastructure will promote equitable student engagement in digital learning and enhance academic outcomes.

Ways in Which Digital Platforms Enhance the Learning Process

Data from teachers' perceptions indicated strong support for the contribution of digital platforms to the learning process. Specifically, 55% strongly agreed and 35% agreed that PowerPoint saves teaching time; 30% strongly agreed and 50% agreed that it enhances understanding; and 45% strongly agreed and 40% agreed that it increases student interest in learning. Additionally, 70% strongly agreed and 30% agreed that computers simplify test and exam preparation, while 65% agreed that computers simplify recording of results.Teachers' interview excerpts reinforced these findings, highlighting the use of computers for setting examinations, searching instructional materials, and preparing teaching documents.

These findings conform with Mishra & Koehler (2006), who argue that digital tools enrich pedagogy by enabling interactive content presentation and improving teacher productivity. They also align with Goga & Roşu (2021), who emphasized that digital visuals enhance conceptual understanding, particularly in subjects like geography. Internationally, He & Wray (2017) found that integrating digital tools motivates learners and promotes autonomous learning patterns mirrored in the Kinondoni context where teachers acknowledge digital tools' value despite infrastructure constraints.

TAM asserts that perceived usefulness is a primary determinant of technology acceptance. Teachers' widespread agreement that digital tools simplify work, improve learning, and engage students reflects high perceived usefulness, which should ideally promote adoption. However, limited school resources reduce perceived ease of use, restricting effective integration. Thus, even though teachers recognize the benefits, contextual constraints undermine actual system use a gap TAM categorizes as the difference between positive attitude and behavioral intention.

These findings suggest urgent policy action to strengthen teacher digital competencies and expand access to technological tools. The Ministry of Education should mandate digital pedagogy training, integrate ICT competencies in teacher professional development programs, and provide ongoing support for technology integration. Schools should incorporate structured digital learning sessions and allocate budgets for procurement and maintenance of digital tools. National

examination bodies should also consider digitizing assessment processes to align with evolving global standards.

CONCLUSION

This study demonstrates the significant role of digital literacy in enhancing teaching and learning among secondary school students in Kinondoni Municipal. Teachers acknowledge that digital platforms improve lesson delivery, student understanding, assessment preparation, and record-keeping, yet persistent challenges hinder effective ICT integration. These challenges include limited school-based digital resources, insufficient teacher competencies in areas such as online safety and information evaluation, and students' reliance on home-based digital exposure due to inadequate infrastructure. The findings highlight that teachers' current digital skills are not enough to fully leverage technology in education, and that ICT integration should foster broader competencies, including creativity, civic literacy, and global awareness. Equitable access to devices, reliable internet, and structured digital learning programs is essential to bridge the digital divide and prepare students for a rapidly evolving digital world.

To enhance digital literacy in secondary schools, the Ministry of Education, Science, and Technology should collaborate with private sector stakeholders to ensure adequate provision of digital resources and infrastructure. Continuous professional development programs, alongside compulsory digital literacy courses in both pre-service and in-service teacher education, are necessary to strengthen teacher ICT competencies. Schools should organize workshops and seminars to improve practical digital skills and encourage innovation in using digital tools, including online professional development opportunities. Policies should support structured ICT integration across curricula to promote both instructional and student-centered learning. Future research should examine the direct impact of digital literacy on students' academic performance across different regions to inform national strategies for digitizing education and fostering equitable learning outcomes.

REFERENCES

Akkoyunlu, B., & Yılmaz-Soylu, M. (2008). Development of a scale on learners' views on blended learning and its implementation process. *The Internet and Higher Education, 11*(1), 26–32. https://doi.org/10.1016/j.iheduc.2007.12.006

Amoako, A. S., & Brantuo, W. A. (2021). Digitalizing the teaching and learning of mathematics at the senior high schools in Ghana: The case of flipped classroom approach. *American Journal of Education and Practice, 5*(3), 29–37. https://doi.org/10.47672/ajep.869

Benson, V., & Kolsaker, A. (2015). Instructor approaches to blended learning: A tale of two business schools. *The International Journal of Management Education, 13*(3), 316–325. https://doi.org/10.1016/j.ijme.2015.10.001

Chauhan, S. (2017). A meta-analysis of the impact of technology on learning effectiveness of elementary students. *Computers & Education, 105*, 14–30. https://doi.org/10.1016/j.compedu.2016.11.005

Coccoli, M., Guercio, A., Maresca, P., & Stanganelli, L. (2014). Smarter universities: A vision for the fast changing digital era. *Journal of Visual Languages & Computing, 25*(6), 1003–1011. https://doi.org/10.1016/j.jvlc.2014.09.007

Corbett, J., & Spinello, R. A. (2020). Learning is more critical than knowing: Continuous learning in the information age. *International Journal of Information Management, 53*, Article 102127. https://doi.org/10.1016/j.ijinfomgt.2020.102127

Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.

Ertel, A., Latun, V., Bogachev, I., & Nedoseka, L. (2020). Organization of network educational projects in the training of teachers of geography. *E3S Web of Conferences, 210*, Article 18025. https://doi.org/10.1051/e3sconf/202021018025

Eshet-Alkalai, Y., & Amichai-Hamburger, Y. (2004). Experiments with digital literacy. *CyberPsychology & Behavior, 7*(4), 421–429.

Falloon, G. (2023). Twelve years of iPads and apps in schools: What conditions support effective practices in K-6 classrooms? *Frontiers in Education, 8*, Article 1122522. https://doi.org/10.3389/feduc.2023.1122522

Fu, J. S. (2013). Complexity of ICT in education: A critical literature review and its implications. *International Journal of Education and Development Using ICT, 9*(1), 112–125. https://www.learntechlib.org/p/111900/

Gilster, P. (1997). *Digital literacy*. Wiley Computer Publishing.

Gupta, A., Tyagi, S., & Choudhury, A. (2016). Digital literacy and its impact on employability of management students. *International Journal of Advanced Research in Management and Social Sciences, 5*(6), 8–20.

Gurung, B., & Rutledge, D. (2014). Digital learners and the overlapping of their personal and educational digital engagement. *Computers & Education, 77*, 91–100.

Haßler, B., Major, L., & Hennessy, S. (2016). Tablet use in schools: A critical review of the evidence for learning outcomes. *Journal of Computer Assisted Learning, 32*(2), 139–156. https://doi.org/10.1111/jcal.12123

Higgins, S., Xiao, Z., & Katsipataki, M. (2012). *The impact of digital technology on learning: A summary for the Education Endowment Foundation*. Education Endowment Foundation and Durham University.

Hwang, G.-J., & Wu, P.-H. (2014). Applications, impacts and trends of mobile technology-enhanced learning: A review of 2008–2012 publications in selected SSCI journals. *International Journal of Mobile Learning and Organisation, 8*(2), 83–95.

Joy, E. H., & Garcia, F. E. (2000). Measuring learning effectiveness: A new look at no-significant-difference findings. *Journal of Asynchronous Learning Networks, 4*(1), 33–39.

Kalati, A. T., & Kim, M. S. (2022). What is the effect of touchscreen technology on young children's learning? A systematic review. *Education and Information Technologies*, 1–19. https://doi.org/10.1007/s10639-021-10816-5

Kim, H., Choi, J., & Lee, J. (2019). Teacher experience of integrating tablets in one-to-one environments: Implications for orchestrating learning. *Education Sciences, 9*(2), Article 87. https://doi.org/10.3390/educsci9020087

Kinuthia, B. K. (2016). Technology spillovers: Kenya and Malaysia compared. *The Journal of International Trade & Economic Development, 25*(4), 536–569.

Lee, Y. (2018). The role of digital literacy in the development of information literacy. *Library Hi Tech, 36*(1), 72–84. https://doi.org/10.1108/LHT-05-2017-0092

Livingstone, S., & Helsper, E. (2007). Gradations in digital inclusion: Children, young people and the digital divide. *New Media & Society, 9*(4), 671–696. https://doi.org/10.1177/1461444807080335

Livingstone, S., Carr, J., & Byrne, J. (2015). *One in three: Internet governance and children's rights*. London School of Economics and Political Science. http://eprints.lse.ac.uk/64491/

Mayer, R. E. (2017). Using multimedia for e-learning. *Journal of Computer Assisted Learning, 33*(5), 403–423. https://doi.org/10.1111/jcal.12197

Ministry of Education and Vocational Training. (2007). *Education sector ICT policy*. Government of Tanzania.

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record, 108*(6), 1017–1054. https://doi.org/10.1111/j.1467-9620.2006.00684.x

Montrieux, H., Vanderlinde, R., Schellens, T., & De Marez, L. (2015). Teaching and learning with mobile technology: A qualitative explorative study about the introduction of tablet devices in secondary education. *PLOS ONE, 10*(12), Article e0144008. https://doi.org/10.1371/journal.pone.0144008

Ng, W. (2012). Can we teach digital natives digital literacy? *Computers & Education, 59*(3), 1065–1078. https://doi.org/10.1016/j.compedu.2012.04.016

Ngwira, N. (2017). Bridging the digital divide in Africa: A critical analysis of strategies for digital inclusion. *International Journal of Education and Development Using Information and Communication Technology, 13*(2), 76–92.

Ololube, N. P. (2012). *Sociology of education and society: An interactive approach*. SpringField Publishers.

Pan, Y., Ke, F., & Xu, X. (2022). A systematic review of the role of learning games in fostering mathematics education in K-12 settings. *Educational Research Review, 36*, Article 100448. https://doi.org/10.1016/j.edurev.2022.100448

Patrobas, M., Machumu, H., & Mtawa, N. (2023). *Digital skills and learning in Tanzania secondary schools: Students and teachers' influence*. Qeios. https://doi.org/10.32388/QJU9PS

Prior, D. D., Mazanov, J., Meacheam, D., Heaslip, G., & Hanson, J. (2016). Attitude, digital literacy and self-efficacy: Flow-on effects for online learning behavior. *The Internet and Higher Education, 29*, 91–97. https://doi.org/10.1016/j.iheduc.2016.01.001

Quaicoe, J. S., & Pata, K. (2020). Teachers' digital literacy and digital activity as digital divide components among basic schools in Ghana. *Education and Information Technologies, 25*, 4077–4095. https://doi.org/10.1007/s10639-020-10158-8

Rahmawati, S., Abdullah, A. G., & Widiaty, I. (2024). Teachers' digital literacy overview in secondary school. *International Journal of Evaluation and Research in Education, 13*(1), 597–[halaman akhir]. https://doi.org/10.11591/ijere.v13i1.25747

Reza, D., & Shamimeh, H. (2020). Digital literacy of EFL students in a junior high school in Iran: Voices of teachers, students and Ministry directors. *Computer Assisted Language Learning*. https://doi.org/10.1080/09588221.2020.1744664 ❓ (cek ejaan nama penulis di DOI)

Ribble, M. (2015). *Digital citizenship in schools: Nine elements all students should know*. International Society for Technology in Education.

Ruggiero, D., & Mong, C. J. (2015). The teacher technology integration experience: Practice and reflection in the classroom. *Journal of Information Technology Education: Research, 14*, 161–178. https://doi.org/10.28945/2227

Sahronih, S., Purwanto, A., & Sumantri, M. S. (2019). The effect of interactive learning media on students' science learning outcomes. In *ACM International Conference Proceeding Series* (pp. 20–24). https://doi.org/10.1145/3323771.3323797

Schmid, R. F., Bernard, R. M., Borokhovski, E., Tamim, R. M., Abrami, P. C., Surkes, M. A., Wade, C. A., & Woods, J. (2014). The effects of technology use in postsecondary education: A meta-analysis of classroom applications. *Computers & Education, 72*, 271–291. https://doi.org/10.1016/j.compedu.2013.11.002

Sung, Y.-T., Chang, K.-E., & Liu, T.-C. (2016). The effects of integrating mobile devices with teaching and learning on students' learning performance: A meta-analysis and research synthesis. *Computers & Education, 94*, 252–275. https://doi.org/10.1016/j.compedu.2015.11.008

Talan, T., Doğan, Y., & Batdı, V. (2020). Efficiency of digital and non-digital educational games: A comparative meta-analysis and a meta-thematic analysis. *Journal of Research on Technology in Education, 52*(4), 474–514. https://doi.org/10.1080/15391523.2020.1743798

Tamim, R. M., Borokhovski, E., Pickup, D., Bernard, R. M., & El Saadi, L. (2015). *Tablets for teaching and learning: A systematic review and meta-analysis*. Commonwealth of Learning. http://oasis.col.org/bitstream/handle/11599/1012/2015_Tamim-et-al_Tablets-for-Teaching-and-Learning.pdf

Thenga, M., Goldschagg, P., Ferguson, R., & Mandikonza, C. (2021). Teacher professional development and geography teachers' pedagogical practices for climate change education. *Southern African Journal of Environmental Education, 36*. https://doi.org/10.4314/sajee.v36i1.17

UNESCO. (2021). *Digital literacy: Connecting education systems*. https://en.unesco.org/themes/digital-skills/digital-literacy

United Republic of Tanzania. (2003). *National ICT policy*. Government of Tanzania.

United Republic of Tanzania. (2015). *Education and training policy*. Government of Tanzania.

Wang, F., Woo, H. L., Quek, C. L., Yang, Y., & Liu, M. (2019). Investigating the impact of digital literacy on building students' knowledge in technology-enhanced learning environments. *Computers & Education, 144*, Article 103688. https://doi.org/10.1016/j.compedu.2019.103688

Waycott, J., Bennett, S., Kennedy, G., Dalgarno, B., & Gray, K. (2010). Digital divides? Student and staff perceptions of information and communication technologies. *Computers & Education, 54*(4), 1202–1211. https://doi.org/10.1016/j.compedu.2009.11.006

Zheng, B., Warschauer, M., Lin, C.-H., & Chang, C. (2016). Learning in one-to-one laptop environments: A meta-analysis and research synthesis. *Review of Educational Research, 86*(4), 1052–1084. https://doi.org/10.3102/0034654316628645