

Influence of Digital Literacy Skills on Students' Access to Electronic Learning Resources in Public Secondary Schools in Singida Region of Tanzania

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Abstract: This study examined the influence of digital literacy skills on students' access to electronic learning resources in public secondary schools in Singida Region, Tanzania. Anchored in the DigComp 2.2 Framework and Constructivism Theory, the study adopted a pragmatist paradigm and a convergent mixed-methods design. Quantitative data were collected from 261 Form II–IV students using stratified random sampling and a structured questionnaire (Cronbach's $\alpha = 0.85$). Qualitative data were gathered through in-depth interviews with 9 ICT teachers, 9 Heads of Schools, and 7 District Secondary Education Officers, supplemented by six student focus group discussions and 12 classroom observations. Quantitative data were analyzed using descriptive statistics and ordinal logistic regression in SPSS version 20, while qualitative data were subjected to thematic analysis. Triangulation was employed to enhance credibility. Findings revealed that students possessed a moderate overall level of digital literacy. Communication and collaboration skills were the most developed domain ($M = 3.97$), while information and data literacy skills were the least developed ($M = 3.11$). Ordinal logistic regression analysis indicated that information search skills, problem-solving skills, and technical proficiency significantly and positively predicted students' access to electronic learning resources ($p < 0.05$), whereas communication and collaboration skills did not. The model explained 35.4% of the variance in access (Nagelkerke Pseudo $R^2 = 0.354$). Gender emerged as a significant predictor, with female students reporting lower access and utilization than males. Qualitative data highlighted inadequate ICT infrastructure, unreliable electricity and internet connectivity, limited teacher support, and weak curriculum integration as major barriers. The study concludes that specific digital literacy competencies are critical determinants of students' effective engagement with electronic resources. It recommends targeted digital literacy training, infrastructure improvement, and gender-responsive interventions to bridge existing gaps in Tanzanian secondary education.

Keywords: Digital Literacy, Digital Literacy Skills, Access, Electronic Resources, Educational Technology, Public Secondary Schools.

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I. INTRODUCTION

The need for digital literacy has been critical in the contemporary world where it is a fundamental element that guarantees success in learning and lifelong learning. This entails the capability to find, analyze, make, communicate, and use digital data and technology in effective ways. Students who are digitally literate have an easy time

accessing digital learning materials including e-books, online databases, learning portals, digital libraries, and learning management systems, improving academic excellence, and preparing learners for participation in the digital economy (Al-Qallaf & Aljiran, 2022; Soufghalem, 2024).

Many countries around the world acknowledge the significance of digital literacy and have incorporated it into their education programs. In the UK, digital skills have been incorporated into the national curriculum in order to boost student engagement in STEM, and the Singapore government uses the Smart Nation initiative to encourage learners to embrace digital literacy skills. Likewise, Poland and the US have come up with national policies and digital tools aimed at ensuring digital skills are acquired by learners (Polizzi, 2020; Foong et al., 2024; Statti & Torres, 2020).

The promotion of digital literacy in Africa has been intensified greatly, despite difficulties during implementation. For instance, in Ghana, the National Digital and Future Skills Policy has been adopted, with an emphasis on teachers and integration of technology into the teaching-learning process. In Nigeria, South Africa, Kenya, and Uganda, ICT policies have been formulated to ensure digital learning despite infrastructural challenges (Quaicoe & Pata, 2020; Bello & Ajao, 2024; Durodolu & Mojapelo, 2020; Heinrich et al., 2020).

Regarding the promotion of digital literacy in Tanzania at the national level, there is the National ICT Policy (2023), the Education and Training Policy (2023), and the Information and Computer Studies Syllabus for Secondary Education (Form I-IV) (2023). The syllabus has listed competencies that students should acquire for efficient access and usage of electronic educational sources such as information search and retrieval, digital communication, creation of digital content, ethical and safe use of technology, solving problems using digital technology, and computer operation among others (URT, 2023).

Despite these policy measures, however, most public secondary schools in Tanzania still face difficulty in using electronic learning resources owing to a lack of digital literacy skills, poor ICT infrastructure, weak internet connectivity, and inadequate teaching support (Mahundu, 2021; Nyangaka, 2023). This challenge is even more apparent in Singida Region, where many schools have shortage of computers, erratic electricity supply, poor internet access and inadequate ICT teaching skills. Students in such environments struggle to search for information, communicate digitally, solve technological problems, and make effective use of available electronic learning resources.

This research, therefore, examined the effect of digital literacy skills on access to electronic learning resources among secondary school students in public schools in Singida Region, Tanzania. By relying on the DigComp 2.2 Framework and Constructivism Learning Theory, this study concentrated on four major areas of digital literacy skills obtained from the syllabus and theoretical framework. These include information and data literacy skills, communication and collaboration skills, problem-solving skills, and technical skills.

➤ *Statement of the Problem*

Despite the international, regional, and national efforts aimed at improving digital literacy levels and providing access to various electronic learning resources, many students studying in public secondary schools in Singida Region, Tanzania, still face problems concerning low access to and inefficient use of these digital learning resources. Although various types of electronic materials, including those found on the TIE Portal website (URT, 2023), are becoming available to students, the lack of digital literacy among them leads to inefficient usage of these opportunities.

The importance of addressing this issue socially lies in the fact that in our digital era, the lack of proper digital literacy among students creates an obstacle to their successful education and further careers, which widens the gap between those who know how to use technology to learn and benefit from their studies and those who cannot do this due to low digital literacy (Arifudin, 2025).

Despite supportive policies such as the National ICT Policy (2023) and the revised Education and Training Policy (2023), as well as studies by Patrobas et al (2023), Mahundu (2021), Barasa (2021) & Nyangaka (2023) on the integration and infrastructure of ICT in Tanzanian schools, it can be concluded that the body of knowledge regarding digital literacy skills and access to and use of electronic resources among students is relatively inadequate. There is very limited literature on how digital literacy skills (searching for information, problem solving, operations, and collaboration), which are considered key aspects of digital literacy skills, affect students' access to electronic learning resources. The current study was conducted to assess the influence of digital literacy skills on students' access to electronic learning resources in secondary public schools in Singida region, Tanzania.

➤ *Research Objectives*

• *General Objective*

The general objective of this study was to investigate the influence of digital literacy skills on students' access to and utilization of electronic learning resources in public secondary schools in Singida Region, Tanzania.

• *Specific Objectives*

- The following was the specific objective of the study:
- ✓ To determine the influence of digital literacy skills on student's access to electronic resource in public secondary schools in Singida Region, Tanzania.
 - *Research question*
 - ✓ To what extent do digital literacy skills influence students' access to electronic learning resources in public secondary schools in Singida Region, Tanzania?

• *Research Hypothesis*

The following hypothesis was formulated at 0.05 level of significance

- ✓ H₀: Digital literacy skills have no significant influence on students' access to electronic learning resources in public secondary schools in Singida Region, Tanzania.
- ✓ H₁: Digital literacy skills have a significant influence on students' access to electronic learning resources in public secondary schools in Singida Region, Tanzania.

II. LITERATURE REVIEW

➤ *Theoretical Framework*

• *DigComp 2.2 Model*

The DigComp 2.2 refers to a comprehensive European digital competence framework specifying the knowledge, skills, and attitude required for effective digital technologies utilization (Mattar et al., 2022). The framework was created by the European Commission's Joint Research Centre (JRC) to establish a common reference point for all kinds of digital competencies within Europe (Pietowska et al., 2025).

The framework initially contains five major aspects such as Information and Data Literacy, Communication and Collaboration, Digital Content Creation, Safety, and Problem Solving. In this particular study, the following four digital competencies became a concern: Information and Data Literacy, Communication and Collaboration, Problem Solving, and Technical Proficiency. The last aspect – technical proficiency – became necessary to evaluate students' practical capability of working with digital technologies and equipment within the local environment. This particular model was selected owing to the following advantages, namely comprehensive nature, clearly identifiable and measurable indicators, importance of critical thinking and accountability, as well as its adaptability to different situations (Canogullari & Sari, 2026).. This means that, in the course of the study, students' access to learning materials through electronic devices will be interpreted through their capability levels in specific areas of digital competences rather than their general level of competency in using devices. Still, it has some disadvantages within the current context because it was developed for a situation where infrastructure is reliable and thus places emphasis on individual capabilities without considering institutional factors like low internet connection and lack of electricity (Abubakari et al, 2026).

The DigComp 2.2 framework is highly relevant to this particular research due to its ability to form the basis of an analysis of students' digital literacy competences and access to electronic learning resources in public secondary schools within Singida region, Tanzania.

➤ *Constructivism Theory*

The Constructivist Theory by Jean Piaget proposes that learning occurs in an interactive and proactive way in which learners construct knowledge from experience and interactions rather than passive reception of facts (Waite-Stupiansky, 2022). The theory emerged in the 1930s when Piaget proposed his idea of knowledge acquisition among learners within learning environments (Flavell, 2020). The

theory facilitates learning that is student-centered, analytical, cooperative, and involves critical thinking whereby learners critically analyze and evaluate facts rather than just memorize (Efgivia et al., 2021).

The theory promotes the use of electronic media because of its interactive nature in which learners interact with online media, integrate their new knowledge with their existing knowledge and become responsible for themselves (Almulla, 2023). Additionally, this theory is beneficial for improving the digital literacy competencies including communication, collaboration, information evaluation, and technological capabilities necessary to handle challenges in the real world.

However, there are downsides that make it difficult to adopt constructivism in the field of education due to its complexities. This method is too complex and requires adequate support and training, and this may not work for everyone, leading to different outcomes (Wang et al., 2023; Dong et al., 2025). Constructivism is applicable in ensuring e-learning platforms are accessed effectively.

➤ *Review of Empirical Studies*

Research evidence suggests that digital literacy competence is essential for accessing and making productive use of electronic educational resources. As indicated by the DigComp 2.2 framework, digital literacy involves various types of competence including information/data literacy, communication/collaboration, problem solving, security, and digital content creation. It appears from research findings that there is a significant lack of digital literacy competence among many students, including those from developing nations, specifically related to the search for, evaluation of, and application of online information for their academic studies (Al-Qallaf & Aljiran, 2022; Kankam, 2023). Inability to identify trustworthy sources of information and evaluate online information negatively impacts the utilization of electronic learning resources.

Communication and collaboration competencies have become increasingly important within the context of digital learning. Research evidence indicates that digital platforms such as WhatsApp, Google Classroom, and other social media applications enable academic discussions, information exchange, and knowledge construction among students (Shuubi & Kivara, 2023; Kimaro, 2025). On the other hand, lack of good collaboration skills can affect the involvement of students in e-learning communities and their participation in learning activities. As found by Bouton et al. (2021), while social media technologies afford the chance for collaborative learning, many learners tend to engage in such platforms mostly for social communication purposes rather than academic interactions.

A number of studies have also noted various factors acting as contextual barriers to students' access to electronic learning materials. Such factors include poor ICT infrastructure, low speed of internet connections, lack of digital devices, and lack of guidance by teachers (Bendera, 2024; Dai, 2025). Additionally, high prices of accessing the

internet and buying data packages have been cited as one of the barriers to regular access to educational material among students in Sub-Saharan Africa (Njeri & Taym, 2024). Moreover, use of digital devices mainly for leisure activities has been cited to distract learners from education-related tasks (Bi & Ishak, 2025). The policy and regulatory context is another factor affecting students' access to digital technologies. The use of smartphones in most public secondary schools in Tanzania has been regulated based on fears of discipline issues and misuse. Whereas regulations have been made to ensure discipline among students, the measures can also affect the ability of the students to gain access to digital learning materials and learn about digital literacy outside classroom hours in computer laboratories (Nyangaka, 2023). Gender and location have been identified through empirical data as factors that affect digital literacy and access to digital learning materials. Students from urban schools have shown high levels of digital competence compared to students in rural schools since they get adequate exposure to digital technologies, while female students face socio-cultural constraints when accessing technology (Zhao, 2024; Ojong, 2025).

In Tanzania, for instance, Patrobas, Machumu, and Mtawa (2023) conducted a study to examine the effect of digital skills on teaching and learning in secondary schools, finding that digital literacy skills play a significant role in supporting teaching and learning activities. Nevertheless, this study broadly explored digital skills as well as their effects on teaching and learning without focusing on the influence of different digital literacy skills, such as information and digital literacy skills, communication and collaboration skills, problem-solving skills, and technical skills, on accessing electronic learning resources. In addition, the study did not focus on secondary schools in Singida Region, using a convergent mixed-method approach.

Hence, even though there is evidence supporting the importance of digital literacy skills, limited evidence has been generated on how particular digital literacy skills affect students' ability to access electronic learning resources in

secondary schools in Singida Region, Tanzania. The current study aimed at bridging this gap by investigating the influence of information and digital literacy skills, communication and collaboration skills, problem-solving skills, and technical skills on students' access to electronic learning resources

➤ *Conceptual Framework*

The conceptual framework of the current study reveals that there is a direct positive link between the level of digital literacy among students and the extent to which electronic learning resources can be accessed by these students. It implies that the higher the number of digital literacies among the students, the higher their capability of accessing and utilizing the electronic learning resources such as e-books, databases, and websites. Specifically, information literacy assists students in finding relevant academic material, while technical skill facilitates the utilization of electronic devices and content. Problem-solving skill enables students in solving technical problems while communication and collaboration skill enables students in collaborating with each other in looking for relevant academic material.

In spite of that, the connection is influenced by the factors of ICT infrastructure, teachers' function, school setting, gender, and governmental policy. Inability to provide an appropriate internet connection or lack of hardware might be a hindering factor when utilizing information, although students have sufficient abilities in using computers, while teachers' involvement and appropriate atmosphere at school will promote the use of information. The presented framework can be viewed as relevant to my research project since it will allow us to determine the focus, generate hypotheses, collect necessary data, and analyze the results. By applying this theoretical framework, we will be able to understand why the difference in digital literacy causes inequalities when it comes to access to online information. Furthermore, this framework is consistent with the constructivist theory since it implies the active use of various materials and resources in learning.

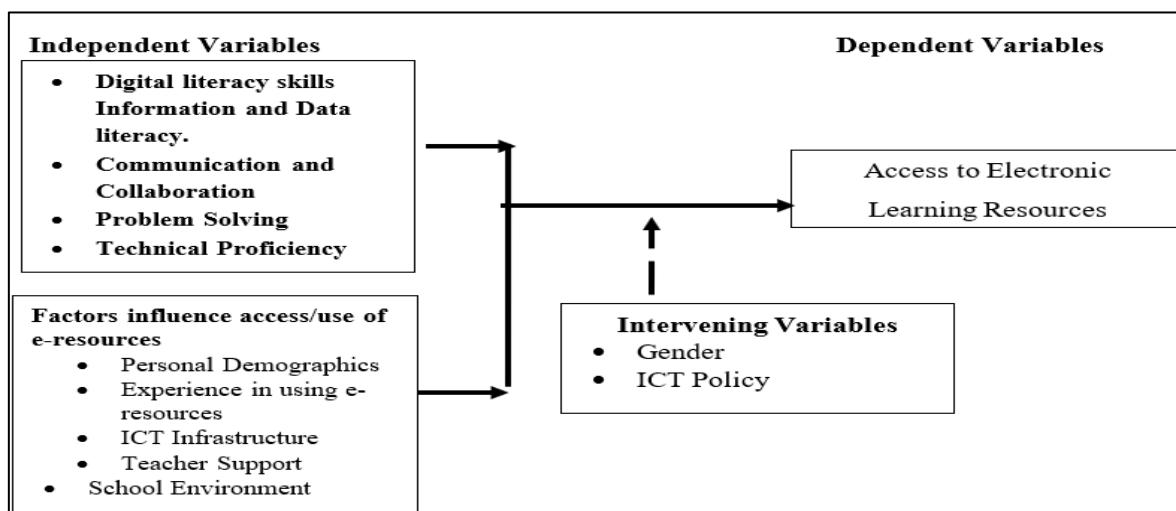


Fig 1: Conceptual Framework Adopted and Modified from Dig Comp Model 2.2.

III. RESEARCH METHODOLOGY

In this research work, the study utilized a pragmatic paradigm and convergent mixed methods design to establish the impact of students' digital literacy skills on their access to electronic learning materials in some chosen public secondary schools in Singida Region, Tanzania. Pragmatism was used to guide the incorporation of the measurement of the quantitative variables with qualitative data from important informants for practical purposes instead of being theoretical.

In quantitative data collection, stratified random sampling was used where a sample size of 261 students (with an overall population of N = 6,670 students) were administered a structured and piloted questionnaire to measure the various constructs of digital literacy skills and devices used. The instrument exhibited a high level of internal consistency (Cronbach's $\alpha = 0.85$). In qualitative data collection, purposive sampling technique was employed where interviews of nine ICT teachers, nine heads of schools, and seven district secondary education officers (n = 25) along with six focus group discussions (6 respondents each) and 12 non-participant observations were conducted.

Quantitative data was subjected to coding and analysis using the Statistical Package for the Social Sciences (SPSS) version 20, with the use of descriptive statistics and ordinal logistic regression in analyzing the association between the

➤ *Demographic Information*

Table 1: Demographic Characteristics of Respondents

Variable	Category	Frequency	Percent
Age	13–15 years	118	45.2
	16–18 years	135	51.7
	19–21 years	8	3.1
	Total	261	100
Gender	Male	117	44.8
	Female	144	55.2
	Total	261	100
Grade Level	Form II	81	31
	Form III	90	34.5
	Form IV	90	34.5
	Total	261	100

Source: (Field Data, July 2025)

The demographic characteristics of the 261 participants who participated in the research on the influence of digital literacy skills and availability of learning resources among public secondary schools in Singida region are summarized in table 1. The participants had gender balance because out of the total number, 55.2 percent were female respondents while 44.8 percent were male respondents. Regarding the ages of the respondents, most of them were young individuals because 51.7 percent were between 16-18 years old, 45.2 percent between 13-15 years old, and 3.1 percent between 19-21 years old. Regarding their educational forms,

digital literacy of students and their access to e-learning materials. Qualitative data gathered from interviews and focus group discussions were recorded via tape recording, transcribed verbatim, coded, and analyzed thematically. The observation data consisted of data gathered from 20 non-participant observations done in five selected schools using an observation checklist and analyzed descriptively in order to validate the presence of ICT facilities, the use of digital devices by the students, support from teachers, and access to e-learning materials. Data triangulation was performed using questionnaires, interviews, focus group discussions, and observation data to increase validity and credibility. Relevant ethical considerations were observed including permission to conduct the research, informed consent from respondents, confidentiality, voluntarism, and the academic purpose of the data collected.

IV. FINDINGS AND DISCUSSION

➤ *Introduction*

This section shows results, analyses, and discussion of findings of the research using the data collected through the quantitative and qualitative methods. The first section of this analysis will be the demographic features of the study participants. Findings will be analyzed considering the investigation on the effect of digital literacy skills on access to electronic learning materials among students in selected public secondary schools in Singida Region, Tanzania.

the respondents were equally distributed among the three forms, Form II (31.0 percent), Form III (34.5 percent), and Form IV (34.5 percent). This means that the research had an appropriate sample of ordinary secondary school students.

➤ *Digital Literacy Skills Possessed by Students*

This study examined four primary aspects of digital literacy among students: information and digital literacy, communication and collaboration, problem solving skills, and technological skills. The findings of the study have been shown in Table 2 below.

Table 2: Digital Literacy Skills Possessed by Students

Digital literacy skills	District	N	Mean	Std. Deviation	P-Values
Information and digital literacy	Singida DC	29	3.483	1.405	0.000**
	Iramba DC	29	3.241	0.951	
	Itigi DC	29	2.897	1.145	
	Singida MC	29	4.517	0.509	
	Ikungi DC	58	2.759	1.467	
	Manyoni DC	87	2.770	1.327	
	Total	261	3.107	1.357	
Communication and collaborations	Singida DC	29	3.966	1.322	0.002**
	Iramba DC	29	3.241	1.244	
	Itigi DC	29	3.828	1.560	
	Singida MC	29	4.345	0.721	
	Ikungi DC	58	4.345	1.101	
	Manyoni DC	87	3.885	1.261	
	Total	261	3.969	1.255	
Problem solving skills	Singida DC	29	3.310	1.073	0.028*
	Iramba DC	29	3.655	0.614	
	Itigi DC	29	3.172	1.037	
	Singida MC	29	3.966	0.865	
	Ikungi DC	58	3.483	0.843	
	Manyoni DC	87	3.437	1.042	
	Total	261	3.487	0.959	
Technical proficiency	Singida DC	29	3.448	1.352	0.076
	Iramba DC	29	3.552	1.021	
	Itigi DC	29	3.345	1.370	
	Singida MC	29	4.138	0.639	
	Ikungi DC	58	3.379	1.211	
	Manyoni DC	87	3.621	1.154	
	Total	261	3.567	1.170	

Source: (Field Data, 2025)

Note: ** Statistically significant at 1% level of significance and * statistically significant at 5% level of significance.

From the results provided above in Table 2, it was observed that the students possessed moderate levels of digital literacy skills. Communication and Collaboration Skills were seen to possess the highest mean score of 3.97, Technical Skills had a mean score of 3.57 and Problem-Solving Skills had a mean score of 3.49, whereas Information and Digital Literacy Skills had the lowest mean score of 3.11. Statistical significance was observed between the six districts in regard to the three digital skills. There were highly statistically significant differences in the case of Information and Digital Literacy Skills ($p = 0.000$), where Singida MC had the highest mean score of 4.52 whereas Ikungi and Manyoni DC had the lowest mean scores of 2.76 and 2.77 respectively.

Contrarily, technical skills did not show any statistically significant variation in all districts ($p=0.076$). This indicates that such skills are not widely known because the level of awareness is low. Consequently, it can be concluded that even if the learners have moderate levels of digital literacy skills, there exists vast inequality between the districts concerning their information and communication skills. Students of Singida Municipal Council performed

much better than those from rural areas.

The conclusions are consistent with Zhao (2024), who showed that urban schools were able to offer better quality student information literacy compared to rural schools due to the availability of infrastructure and ICT teachers. It shows that differences in digital infrastructure and the number of ICT teachers in schools result in disparities in students' proficiency in searching for, evaluating, and utilizing digital learning resources. As stated by Dai (2025), rural schools normally face challenges like poor availability of infrastructure, unstable internet, and inadequate digital literacy among teachers, hence hampering effective use of the internet.

The study further indicates that this inequality in digital literacy is not just a form of assessment of knowledge, but rather a barrier since the learners in poor performing zones are not able to access, interpret and utilize the available online learning tools for their advantage. It can be observed by the researcher that this was consistent with what he witnessed at school B since the lecturers would lecture in print despite power failure in the institution

because they locked the computer laboratory which consisted of only one room even after the requests by learners for internet browsing. This indicates that due to lack of adequate infrastructure, the conventional forms of learning are adopted, thus depriving learners an opportunity to grow into digitally literate learners capable of undertaking self-directed learning. This was consistent with participant 2, who indicated that:

“The pupils enrolled from rural areas know how to use their phone devices but cannot look for material or sources of information. We have an obsolete computer laboratory for many pupils and do not have power and Internet connection. Our teachers do not receive any trainings on working with online sources and therefore our lessons are always on paper.”

From this case scenario, it can be concluded that the infrastructure challenges and training faced by rural schools in Tanzania create a cycle of educational disparity as far as technology is concerned. The students, on the other hand, are facing some challenges that hamper their cognitive abilities with regards to searching and using digital resources due to some factors including closed laboratory, no internet, no electricity and lack of guidance from teachers. They prefer to cheat or copy from older notes instead of doing independent research, *“disparities in access to digital information and guidance by teachers lead to inequality in the search and application of digital information.”* Participant 15 explained the experience.

This indicates that information literacy performance does not depend only on the abilities of the learners but also on the learning environment that makes it difficult for the learners due to issues related to the lack of access to functioning technologies and teacher's support while accessing the information from the internet. Hence, it can be seen that the students, as a result, do not get the opportunities to learn information searching skills, leading to higher chances of memorizing and using out-of-date information as well as low interest in evidentiary researches. In other words, the outcome is consistent with what was mentioned by Participant 20 as;

“There is usually poor or no availability of power supplies, poor internet connections, and there are non-functional computer laboratories within peripheral area schools, making it impossible for educators to leverage the resources provided by the digital world. As a consequence, the learners keep depending on the old fashioned resources

while being unable to gain skills to search for information online”.

It thus emerges that in ICT classes that are held separately, learners only manage to acquire basic technical skills without enough opportunities to apply these skills in the course of curricular assignments such as group projects and problem solving exercises. Given what the study has found out about the learning context, namely that,

“Access to Internet in schools is not reliable, and computers are often unavailable. Students trying to get learning materials in schools have no such materials available, and even when they are, students cannot download the materials owing to weak Internet connections. So, students use teachers' directions and notes of other students.”

It can be said that the inability of students to take full advantage of electronic learning material results from physical limitations that affect them, such as unreliable access to the Internet, inadequate availability of computers, and ineffective provision of support services in schools. In essence, this situation implies that although students might wish to benefit from electronic learning materials, they will fail to do so, because they lack the capability to perform effective searches, being compelled to use the guidance of teachers and their peers instead. Moreover, the above observation is contradictory to the Constructivist theory which stresses on active and learner-centered teaching whereby knowledge is acquired by engaging in meaningful activities, interacting with others and reflecting (Alam, 2023). Constructivism assumes that meaningful learning takes place when students engage themselves in constructive activities, like inquiry, project-based learning and problem solving where they have to use their skills, evaluate their ideas and generate new knowledge rather than being passive recipients of knowledge. Therefore, the inclusion of ICT in the entire curriculum so as to support constructive activities will comply with constructivist theory.

➤ *Influence of Digital Literacy Skills on Access to Electronic Resource*

The effect of digital literacy abilities on students' access and use of electronic learning materials was assessed through ordinal logistic regression analysis. It proved to be a statistically significant model which accounted for a considerable amount of variation (Nagelkerke Pseudo R² = 0.354). Results are shown in Table 3.

Table 3: Influence of Digital Literacy Skills on Access to Electronic Resource

Variable	Estimate	Std. Error	Wald	df	Sig.	95% CI	
						Lower Bound	Upper Bound
Perceived usefulness of digital skills	-2.091	27.009	.006	1	.938	-55.028	50.846
Information search skills	.903	.344	6.909	1	.009**	.230	1.576
Communication and collaboration	.855	.483	3.141	1	.076	-.091	1.801
Problem solving	1.262	.486	6.735	1	.009**	.309	2.215

Technical proficiency	.804	.319	6.350	1	.012*	.179	1.430
Age	1.336	12.862	.011	1	.917	-23.873	26.545
Gender	-.729	.273	7.104	1	.008**	-1.264	-.193
Grade Level	-.204	.275	.551	1	.458	-.743	.335

Source: (Field Data, 2025)

Pseudo R-Square: Cox and Snell=.258, Nagelkerke=.354, McFadden=.228. Link function: Logit.

Note: ** Statistically significant at 1% level of significance; * statistically significant at 5% level of significance.

In Table 3 shown above, the ordinal logistic regression model has been identified as statistically significant at the 5% level of significance (i.e., $p < 0.05$). From these results, it is evident that the null hypothesis, which states that there was no significant effect of digital literacy skills on access to e-learning materials by students, was rejected. Hence, it can be noted that there was a significant effect of digital literacy skills on access to and use of e-learning materials among students in public secondary schools in Singida Region, Tanzania. That means that students who possessed better digital literacy skills, such as seeking information, problem-solving, and computer skills, had been able to access and use e-learning materials. More importantly, since the gender variable was also statistically significant, it indicates that females have been limited in their access and use of e-learning materials. Hence, public secondary schools in Singida Region should implement some strategies to address the issue, including providing ICT training for teachers and students through practice-based approaches.

The results are consistent with the constructivist theory in the sense that it asserts that effective learning is achieved when the learners engage in purposeful activities through the help of learning tools, instructions, and practice. The statistical model is significant and explains much variance (Nagelkerke Pseudo $R^2 = 0.354$). Thus, it can be concluded that the overall model (Likelihood Ratio or Omnibus) test is significant ($p < 0.05$). Therefore, the ordinal logistic regression is significant and significantly predicts the dependent variable of students' access and usage of e-learning resources.

As shown in Table 3, the ordinal logistic regression was significant and explained some variation in students' access to e-learning resources. The pseudo R-square values show that the model was acceptable in terms of explanatory power, which means that the predictors were responsible for the outcome. First, the predictor, which is the perceived usefulness of digital skills, was not significant ($p = 0.938$).

The second predictor, information search skills, was statistically significant ($p = 0.009$) and positively correlated with access to electronic learning resources. In other words, this means that students with good information search skills accessed and used electronic learning resources.

The third predictor, communication and collaboration, was not statistically significant ($p = 0.076$). This means that while communication and collaboration are components of digital literacy, they did not influence significantly students' access to electronic learning resources.

The fourth predictor, problem-solving skills, was statistically significant ($p = 0.009$) and positively correlated with access to electronic resources. It can be said that students with good problem-solving skills tended to access electronic learning resources more frequently.

The fifth predictor, technical proficiency, was also statistically significant ($p = 0.012$) and positively correlated with access to electronic learning resources. It can thus be concluded that students who were technically proficient accessed more frequently electronic learning resources.

In terms of control variables, age was found to be insignificant ($p = 0.917$), implying that age did not play a substantial role in determining access to electronic learning materials.

On the other hand, gender proved to be significant ($p = 0.008$), given that a negative coefficient showed that females had lesser access to e-learning materials than males. This means that both genders do not enjoy equal access to electronic learning materials.

Lastly, form level was found to be statistically insignificant ($p = 0.458$), meaning that the level of forms did not influence access to electronic learning materials significantly. Hence, there was no significant difference between Form II, Form III, and Form IV students regarding the access.

In summary, from table 3, one can note that access to electronic learning materials is determined by search skills, problem solving skills, technical proficiency, and gender, but not perceived usefulness, communication and collaboration, age, and form level.

This was confirmed by Falloon (2024), Kormos & Wisdom (2023), based on the findings of these scholars, if the students have the ability to conduct research and critically analyze the digital information, then they would have the capability to use online learning resources in a constructive way. Additionally, the study conducted by Sarder (2025) and Ben Youssef et al (2022) shows that ICT fundamentals have a crucial role in enabling the students to optimally benefit from the existing digital sources. This implies that ICT courses need to be taken regularly and not occasionally as this would enable the students to develop skills. Gender Coefficient (Estimate = -0.729 , $p = 0.008$) is statistically significant and indicates that compared to their male peers, the female students encounter challenges when it comes to accessing and utilizing learning materials. Thus, the above-mentioned result indicated the existence of a clear gender disparity which needs to be sorted out. The same trend has also emerged in Sub-Saharan Africa in terms of

the study on Ojong (2025), Oganetse & Phiri (2025), whereby the girls found difficulties in using ICT as they lacked access to ICT devices at home, low self-confidence in the usage of ICTs, cultural barriers, and teacher encouragement. This was because as Participant 5 pointed out, *"Many girls do not have the privilege of using the computer in schools because after classes, they feel scared and hence avoid it."*

This indicates that there are social factors responsible for the gender disparity in digital literacy of ICT since the same was due to both social structures and cultural factors which denied them opportunities for using ICT equally. It is also reflected through the statement given by Participant 15 when he said: *"Rural girls place more emphasis on domestic chores rather than computer use after schools and without parental assistance to engage in technological use, girls fall behind compared to boys."* This is an indication that common problems of lack of time, family pressure, and insufficient motivation by parents regarding the application of technology result in a vicious cycle whereby girl students lag behind in developing critical digital skills necessary for educational success.

From the results of this study, it is clear that the findings corroborate the theory of Constructivism. Constructivism emphasizes that learning takes place deeper when it comprises meaningful and purposeful experiences that motivate learners to investigate, experiment, problem-solve, and reflect through mechanisms involving the use of technology and other forms of web-based learning materials (Hsbollah & Hassan, 2022). Under constructivism, learning should always be guided, social interactions between learners and instructors be fostered, and learners should be provided with adequate chances of validating their understandings through experience. Learning is therefore not only about supplying learners with gadgets and creating positive attitudes but also about creating learning experiences for learners involving the use of technologies appropriately.

From the results of the ordinal logistic regression, it is therefore possible to state that there is statistical significance in the regression analysis since the model explains the variation in the dependent variable in a relatively reasonable manner (Nagelkerke Pseudo $R^2 = 0.354$). This implies that both the skills required for searching for information and problem-solving skills, as well as technological skills, have a positive effect, whereas gender has a negative effect. There are also variables such as utility of digital skills, age, and class level which are not statistically significant.

V. CONCLUSION AND RECOMMENDATIONS

➤ Conclusion

However, based on findings of the study, it was found out that the level of digital literacy among the sampled students from the selected public secondary schools was quite high but still varied depending on the type of skill and the districts. For example, the level of skills related to communication and collaboration was very high as opposed

to the skills associated with information and digital literacy, whose levels were quite low.

In addition, there were significant district differences concerning either of information/digital literacy and communication/collaboration skills, implying that the digital information skills among the sampled students were not evenly developed due to the differences in learning environment. On the other hand, the digital literacy skills were also seen to be crucial in determining students' access and use of electronic learning resources. More specifically, it was noted that those students who had highly developed information search, problem-solving, and technical skills made use of such learning resources effectively and highly. Contrary to this, no significance existed between the communication/collaboration and usefulness skills.

Generally, from the research results, the level of digital literacy competency among the students is high but depends on factors such as district and competencies. Secondly, the use and availability of e-learning is influenced by the level of digital literacy competencies among the learners in that the higher the level of competency regarding searching, problem-solving, and technological skills, the higher the availability and use. Moreover, the study indicates that there is gender bias in relation to access and use of e-learning resources which implies that achievement of success in e-learning requires much more than just competencies.

➤ Recommendations

The following recommendations are made on the basis of the findings:

- MoEST develops and adopts a digital literacy program country-wide for Kenya with a special focus on the areas lacking such skills like information and digital literacy. MoEST will conduct pilot tests in six months to under-performing districts, using the train-the-trainer approach and providing free internet lessons in the secondary school curriculum, which should be adopted country-wide within one year.
- The District Education Officers and School Heads conduct bi-annual assessments and interventions on low-performing districts after the conclusion of research, by assessing particular deficiencies in their area (using student assessment) and carrying out intensive skills camp training over three months at school computer labs and other centers, even using donated computers in the case of rural-urban disparities showing large variations.
- MoEST and TCRA will provide support on internet and gadgets availability for schools for technical skills training. Implementation to occur within one year using partnerships between the private and public sectors (telecommunication companies to avail data bundles). The provision of tablets loaded with e-materials will occur in 50% of all secondary schools, especially those with poor access to internet.
- School Administrators should establish gender-based e-learning clubs to attract female students; initiate monthly meetings from the current academic year in school libraries or multipurpose halls, where each girl can

connect to mentors, with common gadgets available for use after classes, and with usage record maintained.

- NGOs and development partners (UNESCO, private companies in educational technologies) shall sponsor infrastructure improvement works, especially the creation of Wi-Fi hotspots powered by solar energy; within two years via community-based programs in poor neighborhoods; educate learners problem solving skills in dealing with electronic content on holidays.
- MoEST and Gender Focal Points are responsible for making gender-based digital education training policies binding from the next academic year, considering socio-cultural sensitivity programs (family involvement initiatives), organized in school assemblies of all districts in response to girls' technological access deficiencies.
- Teachers and DEOs have to organize digital boot camps specifically for female students, in which they get trained on how to search and use digital knowledge, organized quarterly during weekends in the district education centers through incentives like awarding certificates.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

The author (s) declares that no generative artificial intelligence technology like language models (ChatGPT, COPILOT, etc.) and text – to – image generators have been used for writing/editing the above manuscript.

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