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Research Article

Digital literacy as a strategy for Lifelong Learning in libraries

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Abstract

Background: Lifelong Learning, which focuses on the voluntary and self-motivated pursuit of knowledge throughout life, not only for personal but also for professional reasons, is a basic competence required of individuals seeking self-realization. Digital literacy, on the other hand, emphasizes individual and community capacities to understand, appreciate, and utilize digital technologies for resourceful purposes in their lives. With the current technological revolution, coupled with globalization, digital literacy has become a vital component of contemporary society.

Purpose: The purpose of this study is to discuss the role of digital literacy in fostering lifelong learning in libraries.

Methodology: The authors reviewed peer-reviewed articles and conference papers published from 2019 to 2025 and conducted a narrative literature review to examine how digital literacy enhances lifelong learning activities, which are also catalysts for sustainable development.

Results: The study found that digital literacy skills enable one to access information effectively for lifelong learning through using technological tools. The study also found that libraries play key roles in fostering lifelong learning.

Conclusion: The study concluded that digital literacy plays a vital role in promoting lifelong learning in libraries.

Implications: The findings may be used as a basis for designing targeted interventions that will improve lifelong learning through digital literacy strategies among the populace. Librarians can use these findings to assess their library users' digital literacy levels and organize training to improve them.

Keywords: *Digital literacy, Information literacy, Lifelong Learning, Libraries, 21st Century Skills, Sustainable development, Technology.*

Introduction

The Lifelong Learning (LLL) concept is currently a popular theme in research and academia, as it is considered a key driver of personal and community development. Libraries, as citadels of knowledge, learning, and community support worldwide, are integral parts of society that support learners irrespective of their age, gender, religion, etc. (Oinam & Thoidingjam, 2019). As focal points of digital literacy and information repositories, libraries contribute directly to the Lifelong Learning process.

Broadly defined, LLL, according to Sartori and Tacconi (2017), is the process of continuously acquiring knowledge and skills in formal or informal settings. Oinam and Thoidingjam (2019) further describe LLL as learning that is pursued throughout life. Additionally, UNESCO (2022) views LLL as a continuous process that extends across the entire lifespan and encompasses various life phases. Because of these distinctive features, LLL has emerged as a significant concept in both international and national education policies.

LLL, according to Alazie et al. (2019), comprises four dimensions: learning to know, learning to do, learning to be, and learning to live together. Learning to know involves acquiring knowledge of various concepts, analyzing and evaluating information, and solving life challenges. Learning to do is about the practical skills needed to attain set goals and the ability to adapt to a changing environment. Learning to be is all about self-awareness, developing good values, and appreciating diversity in our society. Lastly, learning to live together is about developing interpersonal skills. However, these

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four dimensions are interconnected. For example, learning to know is a basis for learning to do, and learning to live together helps attain the other dimensions through interaction with others.

LLL, which focuses on the intentional, self-directed search for knowledge throughout one's life, for both personal and professional reasons, is a fundamental competence required of individuals seeking self-realization. Digital literacy, on the other hand, emphasizes individual and community capacities to understand, appreciate, and apply technological tools for resourceful purposes.

The proliferation of Information Technology across most, if not all, spheres of life necessitate that one possesses the bare minimum of what we know today as digital literacy. Before the concept of digital literacy emerged, Wu (2024) explained that academia used terms such as Information, Computer, or Media Literacy. Scholars from time to time keep redefining and refining digital literacy, Lanham (1995), Khan and Waheed (2015), etc. Traxler (2018) defines digital literacy as the set of attitudes, knowledge, and skills that help humans and societies thrive in a more digital world. This definition emphasizes the advancement of the world in terms of technology and people's capacity to survive in a fast-changing society.

Similarly, Ahmad et al. (2023) also define digital literacy as a combination of knowledge and skills needed to effectively use digital technologies and the internet. These definitions share some common features of knowledge and skills for digital adoption. This study adopted Ahmad et al.'s (2023) definition, as it draws emphasis on a combination of knowledge and skills for the use of digital technologies and the internet

As the UN 2030 agenda deadline draws closer, this paper highlights how digital literacy can be a key strategy in supporting LLL, a vital component of Goal 4 of the SDGs, whose focus is on quality education, urging partnering nations to "guarantee inclusive and equitable quality education and advocate Lifelong Learning opportunities for all" (UN, 2016). This, according to Vieira (2020), brings the concept of LLL to the core of the debate on sustainable development

Lifelong Learning's growing prominence is evident not only in education and social policy debates but also in its recognition as a critical component for the attainment of many other SDGs (UN, 2015). English and Carlsen (2019) point out goals such as health and wellbeing (SDG 3); decent work and economic growth (SDG 8); gender equality (SDG 5); and climate change mitigation (SDG 13), in which LLL has a trickle-down effect. All these underscores the role LLL plays towards attainment of SDGs.

A review of Akintolu and Uleanya's (2021) work shows that technological literacy and education are also key to sustainable development. They acknowledge the extensive technological advances in the 4th Industrial Revolution (4IR) and emphasize the need for digital literacy competencies among the population as a tool for "survival". Sulak (2022) corroborates this by noting that in today's interconnected world, amid dramatic social changes driven by information technology, digital literacy has increasingly become an essential prerequisite for LLL.

However, although Digital Literacy is a vital component of LLL, Rwotolonya (2023) states that most countries still score lower on the digital index. As an example, Martzoukou and Elliott (2016) hinted at the European region, where less than half of the populace had basic literacy skills, while twelve million adults in the United Kingdom at the time of the study did not have digital skills, necessary for them to posture as Lifelong Learners.

As technology advances in libraries, it compels librarians to update and enhance their skill sets and adapt to new hybrid library services (Subaveerapandiyan et al., 2024). This, however, has proven to be a challenge for

librarians and other LIS professionals in Africa, as they are always confronted with challenges in upgrading their centers and services. Poor ICT facilities, ICT skills deficiency, and internet prohibition issues, according to Emiri (2017) and Salaam (2010), hinder digital literacy initiatives in Nigeria and other African countries

Uganda, like other countries, faces obstacles such as limited access to affordable ICTs and concerns about the internet's vast potential in education, communication, and employment, as noted by Lipeikaite et al. (2022) in their EIFL-PLIP program with the National Library of Uganda (NLU). This paper therefore emphasizes the impact that digital literacy has on LLL, with a focus on its contribution to the SDGs.

While existing literature has focused on digital literacy or LLL in the context of higher education, less attention has been accorded to understanding how digital literacy can be used as a deliberate strategy for achieving LLL, specifically within library contexts.

This review is crucial, as it synthesizes evidence on how libraries can intentionally foster LLL through digital skilling. It systematically presents a strategy-focused framework that library practitioners can use to intentionally design digital literacy interventions that yield measurable LLL outcomes.

Research Questions.

1. What is the role of libraries in promoting LLL?
2. What is the impact of Digital Literacy on LLL?

Theoretical Perspectives

The current study is guided by the TPACK and Van Dijk and Van Deursen's theoretical frameworks. The Technological, Pedagogical, and Content Knowledge (TPACK) model was introduced by Koehler and Mishra (2005), both faculty members at Michigan State University. Initially, this framework was termed TPCK after building on Shulman's (1987) PCK framework (Koehler & Mishra, 2009).

Koehler and Mishra's (2005) efforts to develop this framework arose from the increasing use of technology in education. Therefore, TPACK serves as the basis for integrating technology into learning (Novo et al., 2016; Rosenberg & Koehler, 2015). TPACK best suits this study as it provides a robust and comprehensive lens for examining the complex interplay between technology (digital literacy) and learning. It also aligns with LLL's principles of knowledge acquisition and continuous learning. However, TPACK doesn't clearly describe the elements of digital literacy, hence the incorporation of Van Dijk and Van Deursen's (2014) theory as a supplementary framework

Van Dijk and Van Deursen's (2014) Resources and Appropriation theory emphasizes that digital skills mastery, as a process, encompasses six distinct competences namely: operational, formal, information, communication, content creation, and strategic skills.

Operational skills are the fundamental technical abilities needed to use internet services, such as navigating web applications and saving and downloading files. The formal skills focus on the smooth navigation of websites and other online portals. Information skills enable one to navigate diverse websites to find, select, and evaluate online materials to accomplish a specific goal. Communication skills involve using online communication tools for social interactions, and content creation skills include producing and publishing high-quality digital content in various formats, such as text, audio, and photos. Lastly, strategic skills concern one's ability to use the internet to achieve individual goals. In this study, digital literacy is conceptualized as comprising the skill sets outlined in Van Dijk and Van Deursen's (2014) theoretical framework.

Methodology

The study uses secondary data to examine the relationship between the concepts or variables under study. A narrative review of previous literature is conducted to ascertain the role of digital literacy in fostering LLL in libraries. These enabled researchers to engage deeply and interpretively with the existing literature, as the scope of digital literacy and LLL continues to evolve. Additionally, the study employs a cross-contextual approach by integrating literature from different library types. This is justified by the fact that these initiatives supporting LLL are implemented across diverse library settings; focusing on a single institutional type would be restrictive and limit a comprehensive review.

Literature was retrieved from databases such as Emerald, ERIC, DOAJ, SpringerLink, Research4Life, Taylor & Francis, and Google Scholar. The study focused on journal articles and conference papers published in the English language between 2019 and 2025. This is because the period is characterized by e-learning, including the use of artificial intelligence systems. In addition, this is the period when LLL and other sustainable development programs have been given more attention world over.

Lastly, the rapid evolution of artificial intelligence and other online learning platforms has fundamentally changed how digital literacy supports LLL since 2019. Therefore, including older literature would risk presenting outdated practices and technologies that no longer reflect library users' needs.

The search strategy and Boolean queries for Emerald, Taylor and Francis, and SpringerLink included ("digital literacy" OR "digital skills" OR "digital competence" OR "information literacy" OR "ICT literacy" OR "digital fluency") AND ("Lifelong Learning" OR "continuing education" OR "adult learning" OR "informal learning" OR "self-directed learning") AND ("libraries" OR "library" OR "academic library" OR "public library" OR "school library" OR "library services"). In the ERIC database, we used (DE= "digital literacy" OR digital literacy OR digital skills OR digital competence) AND (DE= "Lifelong Learning" OR Lifelong Learning OR adult learning) AND (DE= "libraries" OR libraries OR library services). In DOAJ, we searched using ("digital literacy" OR "digital skills") AND ("Lifelong Learning") AND ("libraries"). For Research4Life, we used ("digital literacy" OR "digital skills") AND "Lifelong Learning" AND "libraries". Lastly, in Google Scholar, we used ("digital literacy" OR "digital skills") AND "Lifelong Learning" AND (library OR Libraries). To ensure the validity and reliability of the study findings in this review, a formal quality appraisal of all the included studies was conducted.

Articles for inclusion were assessed following a five-criterion checklist adapted from the Critical Appraisal Skills Program (CASP) and prior library science literature reviews. The criteria were scored as 1 point for Yes, 0.5 points for Partly, and 0 for No. Studies that scored 3.5 or higher were included in this study, while those that scored below 3.5 were excluded due to methodological weaknesses. Out of the 141 articles, only 41 passed the quality appraisal.

Systematic searches across seven databases yielded 170 records. Following the PRISMA (2020) guidelines, 50 duplicate records were removed, leaving 120 records for screening. More 50 records were also removed at this stage, leaving 70 full-text articles assessed for eligibility, and of these, 29 were excluded due to being out of line with the study, and inaccessible.

A final total of 41 studies were included in the review, as illustrated in Figure 1.

Role of Libraries in Promoting LLL

Though scanty, literature suggests that libraries, in one way or another, foster LLL among patrons and society at large. In Europe, for example,

public libraries have been unwavering champions of LLL for half a millennium. This is based on a study by Stanziola (2024) on the monitoring and evaluation efforts of LLL initiatives in public libraries in major European Union countries.

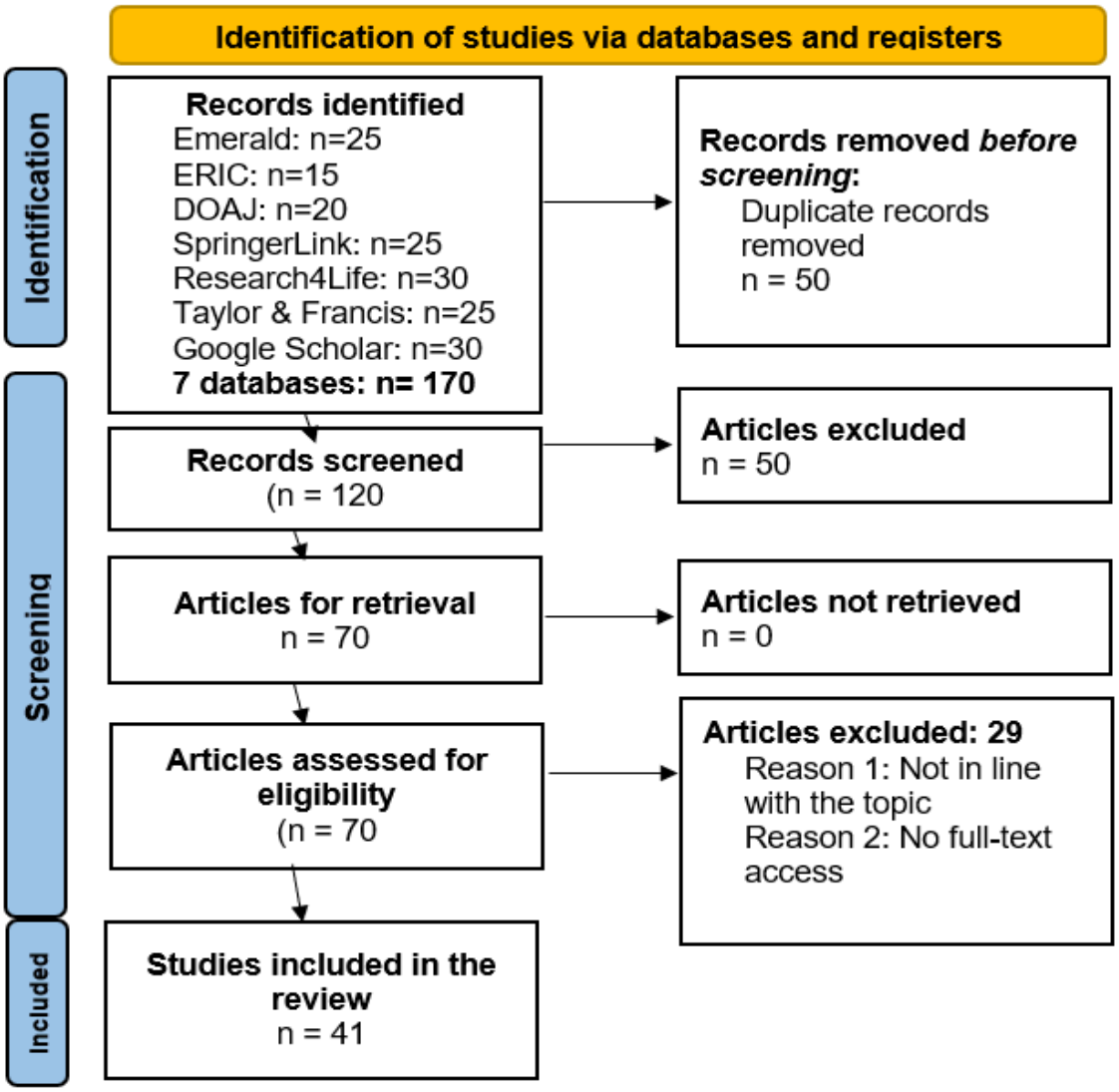

Figure 1:PRISMA 2020 flow diagram illustrating the literature search and selection process

***Source**: Doi: 10.1136/bmj.n71*

Organizing digital literacy trainings

Adeleke et al. (2019), in their study on the use of libraries to ensure LLL in faith-based universities in Nigeria, noted that libraries play a key role in organizing digital and information literacy training for both staff and library users. These training programs equip faculty and learners with the tools and skills they need to search, locate, and evaluate information sources and resources for learning purposes. Additionally, libraries provide a wide range of resources to users, including books, journals, newspapers, and other relevant online materials that support continuous learning (Adeleke et al., 2019; Agyekum, 2022).

Furthermore, Mashroofa (2022) noted that libraries, particularly academic libraries, support teaching, learning, and research activities at

universities and other Higher Education Institutions (HEIs). This support is provided in various forms, such as Information Literacy training, library instruction, and lending services, which, in turn, promote equitable education. These activities are undeniably crucial in fostering LLL.

Similarly, Abeyrathne and Ekanayake (2019) recognize academic libraries in HEIs as key enablers of Self-Directed Learning (SDL), where libraries are no longer just information containers, but vital partners in delivering literacy training, designing user instruction programs for literature search, access, and retrieval, and teaching students and staff how to evaluate, process, and use information in whatever format it might be. All these, together, are catalysts for LLL. Egamberdiyeva (2025) adds that modern libraries have introduced innovative programs, such as language courses, literacy workshops, and professional development sessions, that foster autonomous learning skills that underpin LLL.

Provide access to information and resources

For public libraries, Agyekum (2022) reports that they provide free and universal access to a vast array of information and resources, such as internet services (Wi-Fi) and ICT facilities. Additionally, public libraries also offer a reliable and secure space for learning and sharing knowledge with peers in the form of group activities, thereby promoting social networks, which are valuable for LLL (Agyekum, 2022; Finch, 2018)

Abumandour (2021) indicates that the inauguration and adoption of e-learning services by the Bibliotheca Alexandria public library (BA) in Egypt to deliver Massive Open Online Courses (MOOCS) and other specialized programs positioned it as a focal LLL center, further exemplifying the crucial role that community libraries play towards LLL.

A study by Omar et al. (2024) examined the collaborative efforts between public and school libraries in Zanzibar to create a new, blended LLL ecosystem. The study identified several joint initiatives, such as book box libraries, reading clubs, and children's corners in public libraries, all aimed at fostering a reading culture and extending learning, literacy, and numeracy opportunities for children and youth. These joint efforts were found to nurture reading habits, independent learning skills (SDL), etc., thereby reinforcing the roles libraries play in fostering LLL.

The existing literature suggests that libraries are good platforms for digital learning and that digital literacy is essential for Lifelong Learning. However, little attention is paid to synthesizing other studies to examine how library-led digital learning translates into LLL outcomes.

Digital Literacy and LLL

Digital literacy is one of the vital skills required in the 21st century. Digital literacy is regarded as an essential skill for developing a broad understanding of various aspects of life (Levano-Francia et al., 2019). This is because it enhances one's ability to access the necessary information for learning. A growing body of empirical research establishes that digital literacy is a significant predictor of LLL participation and effectiveness. For example, Alazie et al. (2019) found that digital literacy supports various forms of learning and contributes to individuals' success in the information society.

Similarly, Mokhtari (2023) argued that digital literacy promotes critical thinking and problem-solving skills, which are vital to continuous learning. In another study, Anthonysamy et al. (2020) emphasized that digital literacy fosters learning by enabling learners to handle computerized tasks effectively, thereby supporting successful LLL. In classroom contexts, teachers who integrate digital literacy skills into instruction make

learning more enjoyable for learners (Ahmad et al., 2023). This implies that digital literacy is an essential skill for all kinds of learners.

However, these studies are silent on the concept of LLL in libraries, even though libraries are central to supporting learning and information sharing (Abumandour, 2021). This is because the libraries offer a variety of services, resources, and activities that foster learning.

Similarly, Arono et al. (2022) examined how digital literacy skills and learning styles affect meta-cognitive listening strategies and found that digital literacy skills enhance meta-cognitive listening. The key meta-cognitive listening strategies used in this study include directed attention, problem-solving, planning, and evaluation. These strategies are believed to be relevant to the LLL process. This implies that digital literacy is essential for LLL.

In a study of 335 teacher candidates, Aydin and Seferoglu (2025) found a positive and significant relationship between digital literacy levels and LLL, with digital literacy emerging as the strongest determinant among these variables, underscoring its centrality to sustained learner engagement. Yilmaz et al. (2025) also examined this relationship and found that digital literacy serves as a mediating factor in the relationship between Lifelong Learning tendencies and 21st-century skills development. This implies that although LLL is directly correlated with 21st-century skills, the value of digital literacy cannot be overlooked in this relationship. Therefore, this implies that digital literacy is not only a technical skill, but also a framework for engaging learners and promoting the attainment of instructional outcomes.

The predictive power of digital literacy extends across diverse learner populations. Research examining adults with multiple disabilities in South Korea found that digital literacy emerged as the strongest correlate of learning participation (Park, 2025). This study noted that individuals possessing higher levels of digital literacy were more inclined to engage in LLL activities. Janthapassa et al. (2024) provided a comprehensive framework for conceptualizing digital literacy's role in what they term the "next-normal" educational landscape, identifying three primary functions: promoting educational equity and inclusion, developing 21st-century skills, and improving LLL engagement.

Complementing the above theoretical work, Oteng et al. (2024) offer empirical evidence from older informal employees in Ghana. The study found that participants were willing to learn but faced barriers, including limited digital literacy and a lack of mobile phones. Similarly, D'Ambrosio and Boriati (2023) examined digital literacy among European elderly populations and found that only 25% reported possessing basic digital skills. This was proved to be one of the challenges affecting their learning.

The relationship between digital literacy and LLL is indeed a critical area in contemporary research, particularly as digital technologies fundamentally reshape how individuals learn throughout their lives. Zheng et al. (2024) provide empirical evidence demonstrating that digital literacy significantly and positively predicts online learning power among undergraduate students, with perceived teacher support serving as a crucial mediating variable in this relationship. Their study revealed that digital literacy not only directly enhances learners' ability to engage with online educational resources but also operates through the scaffolding provided by educators in technology-enhanced learning environments. This finding underscores the social dimension of digital literacy development, suggesting that competence in digital domains is cultivated within supportive pedagogical relationships rather than in isolation.

Extending this perspective to broader educational and professional contexts, Mozelius et al. (2024) and Spurava and Kotilainen (2023)

collectively emphasize that digital literacy must be understood as a dynamic, multidimensional competency that evolves alongside technological and societal transformations. Mozelius et al. (2024) identified digital literacy as one of the fundamental skills needed in higher education institutions to provide effective LLL opportunities. The expert panel asserted that technology-enhanced learning should prioritize "human flourishing" over just efficient technology setups, underscoring that digital literacy involves meaningful engagement, not just technical skills.

Supplementing this perspective, Spurava and Kotilainen (2023) revealed that professional digital literacy extends beyond basic techno-practical skills to include critical understanding of digital infrastructures, particularly algorithm-based platforms that increasingly mediate information access and decision-making. Together, these studies converge on the understanding that digital literacy functions as both a foundation for and outcome of LLL, requiring continuous development across educational and professional contexts as technologies evolve and reshape the competencies needed for meaningful participation in contemporary society.

This review confirms that digital literacy functions as both a functional competency for LLL and a critical gateway to educational opportunity in an increasingly digitized world. Various studies have emphasized the need for digital literacy (Alazie et al., 2019; Levano-Francia et al., 2019; Mokhtari, 2023), yet limited attention has been given to libraries, which are central to information dissemination and serve as centers for skills acquisition. Additionally, libraries are crucial for bridging the digital divide by facilitating access to knowledge in a digitally dependent world. Therefore, this underscores the need to explore how libraries can better fulfill this role.

Results

The literature found that libraries help organize digital literacy programs. This is regarded as one of the most important activities libraries undertake to support learning. This was evidenced in studies by Adeleke et al. (2019) and Agyekum (2022). Additionally, four studies noted that libraries provide access to information and learning resources. For example, Agyekum (2022) revealed that libraries provide access to resources such as internet services. Omar et al. (2024) recognized the role of libraries in creating reading clubs and establishing children's corners to foster a reading culture.

Furthermore, studies reveal that digital literacy fosters LLL. Specifically, Mokhtari (2023) and Arono et al. (2022) found that digital literacy fosters critical thinking and other cognitive skills that support learning. Additionally, Yilmaz et al. (2025) found that LLL tends to promote the development of 21st-century skills. Furthermore, Ahmad et al. (2023) noted that integrating digital literacy instructional modes makes learning more enjoyable.

Discussion

The current study examined the role of libraries in promoting LLL. The findings proved the key roles libraries play in fostering LLL. Therefore, LLL is dependent on various factors, including libraries. These libraries can organize workshops and training on digital literacy, equipping participants with the knowledge and resources needed to learn. These findings concur with those of Adeleke et al. (2019) and Agyekum (2022), who emphasized that libraries play important roles in fostering LLL. This suggests that libraries should focus on interactive, skills-based programs and target older populations.

The current study further assessed the impact of digital literacy on LLL in libraries. The findings underscore the vital role of digital literacyin fostering LLL. This implies that a Lifelong Learner may not learn effectively unless some level of knowledge and skills in using digital

devices, such as computers, is attained. Various factors facilitate LLL, especially digital literacy, which provides a platform for continuous learning. This is similar to Mokhtari's (2023) and Kesici's (2022) findings, which revealed a relationship between digital literacy and critical thinking competencies among higher education students, thereby fostering LLL. The level of a student's digital literacy was also found to influence self-directed learning, which is known to be relevant to LLL (Irhandayaningsih, 2022).

However, the findings are contrary to those of Demir et al. (2022), and Yilmaz et al. (2025) who examined digital literacy levels among teachers and found that digital literacy was not related to LLL engagement. The variation in the findings could be explained by the fact that these studies used different samples and were conducted in different contexts. In a nutshell, the findings show that digital literacy fosters LLL, a claim further supported by TPACK's assumptions about integrating technology into learning.

The 41 studies reviewed employed diverse methodologies that shaped the nature and reliability of findings. Some studies (Aydin & Seferoglu, 2025; Yilmaz et al.,2025) used quantitative methods, especially questionnaire surveys that measured digital literacy and LLL levels, while others relied on qualitative methods, including semi-structured interviews and focus groups with library staff and learners. These provided richer insights into how digital literacy supports LLL. However, the studies cannot be generalized to libraries, and also had limited samples. Notably, less attention is given to synthesizing literature to draw more reliable recommendations about LLL.

A striking geographical imbalance emerged across the reviewed literature. Some of the studies were conducted in high-income countries, particularly the United States, Australia, and Canada and specifically in academic libraries. The geographical concentration limits the applicability of findings to libraries in resource-constrained countries, where electricity is unreliable and the internet is not affordable. Some studies focused on academic libraries, making it unreliable to apply the same findings to other kinds of libraries. This enabled the current study to fill this gap by studying all libraries.

Generally, the evidence base linking digital literacy to LLL outcomes in libraries is moderate, but not strong. Using the quality criteria described in the methodology, the studies proved to be acceptable, though not exceptional. Therefore, several limitations affect the confidence in the findings. For example, some studies relied on self-reported measures, which may not guarantee objectivity of findings. Additionally, other studies measured digital literacy and LLL inconsistently, which implies that the effect sizes should be interpreted cautiously. This prompted the current study to use literature to draw conclusions on LLL outcomes.

Conclusion

In a nutshell, libraries play a key role in fostering LLL learning and sustainable development. For example, libraries play a role in organizing digital and information literacy training for both staff and library users. Additionally, they offer a wide range of resources to users, such as books, journals, newspapers, and other relevant online materials. Libraries also provide free, universal access to a wide range of information and resources, including internet services (Wi-Fi) and ICT facilities. Lastly, libraries offer a reliable and secure space for learning and sharing knowledge with peers.

Additionally, digital literacy is relevant for library users who wish to engage in LLL. An individual with digital literacy can easily access the necessary information and is motivated to use technological tools, thereby engaging in continuous learning throughout their life. Additionally, many online courses and

workshops on various topics are available to those who can access them. A digitally literate person can also connect with others to exchange knowledge and solve life's problems; hence, learning will take place. Reviewed literature above indicates that digital literacy plays a key role in fostering LLL. It further positions LLL as a key driver for personal development and the sustainability of society at large, as evidenced in SDG4.

Recommendations

The following recommendations are made based on the findings of the study:

Librarians are advised to ensure that their patrons attain the minimum required competencies and skills in using and applying digital literacy to interact with devices such as computers, smartphones, and others. Since digital literacy is regarded as key to LLL, according to this study's findings, it implies that it is a requirement for one to be a Lifelong Learner. In today's digital age, digital literacy is not just important – it is essential. It is a skill that everyone should acquire in the 21st century.

There is need for libraries to invest more in comprehensive digital literacy programs, that accommodate users at different skill levels, i.e., basic to advanced users. Suggested programs include but are not limited to introductory lessons on hardware and software, internet access and navigation, search engine and database usage to find and retrieve information, using emails and other online communication channels to promote collaborations between users, evaluating information found on the internet, applying for jobs online, ensuring data privacy, avoiding online threats, and many other programs. These innovative programs can significantly simplify the process of LLL, making it more accessible and manageable for everyone.

There is also need to establish Continuous Professional Development initiatives in order to sustain staff proficiency. As educators, librarians require regular comprehensive training in digital technologies and platforms to enable them navigate and utilize these platforms efficiently. Annual or refresher workshops and webinars can be organized to provide digital literacy training for library staff. This is a good strategy for fostering LLL among library staff, who will later impart it to library users through the different strategies, such as user education.

Libraries should expand their digital resources to foster LLL. Libraries should ideally be abundant sources and centers of information, offering a wide range of resources, including online articles, books, and databases. Libraries must prioritize subscribing to high-quality databases to ensure users have access to essential information and uphold the standards of learning and research, which are key to fostering LLL.

Emphasis should be geared towards forming collaborations among libraries. Libraries must establish collaborative relationships with local, regional, and international libraries and associations. This facilitates the pooling of costs associated with acquiring resources and services needed for digital literacy training, which is a vital catalyst of LLL. It also becomes economical when planning seminars, workshops, and other educational events, as they can be scheduled for both in-person and virtual attendance by all their users. Additionally, collaborations can benefit library users and staff by sharing knowledge and experiences with colleagues from other libraries, thereby fostering LLL.

Implications

The current study contributes to the body of knowledge on how digital literacy affects learning by specifically examining digital literacy's role in fostering LLL.

The emphasis on the relevance of digital literacy in fostering LLL also provides practical implications for libraries, education institutions, and learners.The study findings suggest that librarians should ensure that library users have the relevant knowledge and skills to use digital media and tools to find, create, and share content. Furthermore, librarians may use these findings to assess the digital literacy levels among their users and organize targeted interventions to improve their skills. Therefore, LLL can be enhanced, impacting the individual and societal development. The study provides sufficient evidence that digital literacy is key to fostering LLL and emphasizes the importance of acquiring digital literacy skills.

Furthermore, the study informs policymakers, such as the Ministry of Education and Sports, National Planning Authority (NPA), and NLU, on design and implementation strategies such as prioritizing digital literacy programmes in Higher Education Institutions and libraries, alongside internet provision and other technical support, to foster LLL

Limitations of this study

The current study relied on secondary data, which limits generalizability and confidence in the results. Therefore, an empirical study can be conducted to validate the current study's findings. In addition, the current study focused on libraries, which significantly limits its applicability and generalizability to other sectors. Therefore, another scholar can study how digital literacy relates to LLL among higher educational institutions or industries. In conclusion, the suggested studies can help expand the knowledge base by providing additional findings on how digital literacy relates to LLL across sectors and nations.

AI Use Declaration

The authors used Artificial Intelligence (A.I) tools such as Research Rabbit, Perplexity, Connected Papers, and Scite for literature search, discovery, and organization. Quillbot and Grammarly were used to refine language and paraphrase sections of the paper. To ensure accuracy, the authors reviewed and verified all A.I assisted outputs, and the manuscript was verified for originality using Turnitin plagiarism detection software.

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