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DIGITAL LITERACY IN HIGHER EDUCATION - A COMPREHENSIVE REVIEW

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Abstract: **The article describes the concept of digital culture, encompassing the collective understanding and knowledge of information transfer technologies. It emphasizes the relevance of digital literacy in both professional and personal contexts, highlighting the tools and systems involved, such as computers, smartphones, and social media platforms. The compilation includes a diverse array of research studies examining digital literacy's multifaceted dimensions and its impact on education, societal behaviors, and disparities in access and proficiency. Findings underscore digital literacy's critical role in shaping educational strategies, influencing social behaviors, and addressing disparities. The synthesis of reviewed studies reveals themes such as the criticality of digital literacy, the role of educators, demographic disparities, and the significance of digital literacy in global collaboration, research, innovation, and preparation for the workforce. It concludes by emphasizing the transformative role of digital literacy in higher education, providing students with essential skills for the digital age and preparing them for a globalized workforce. The compilation serves as a comprehensive resource for researchers, educators, and policymakers, offering insights into the challenges, opportunities, and evolving dynamics of digital literacy.**

Key Words: **Digital Literacy, Digital Fluency, Higher Education**
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I. INTRODUCTION

Digital culture refers to the collective understanding and knowledge of the population regarding modern information transfer technologies. It encompasses the awareness and comprehension of the functions and capabilities of these technologies. Digital culture also includes the ability to use these technologies correctly and effectively, both in professional/work settings and in personal life. Information transfer technologies are the tools and systems that enable the transmission and exchange of information. These technologies can include various digital devices, software applications, and online platforms. Examples of information transfer technologies include computers, smartphones, the internet, social media platforms, email, and instant messaging applications. Each technology has its own set of functions that allow users to perform specific tasks and activities. Like, computers can be used for tasks such as word processing, data analysis, and internet browsing. Smartphones can be used for communication, accessing online content, and running various applications.

The understanding and effective use of information transfer technologies are relevant in both professional/work settings and personal life. In the workplace, digital culture is important for employees to perform their tasks efficiently, collaborate with colleagues, and stay updated with relevant information. In personal life, digital culture enables individuals to communicate with others, access information and entertainment, and engage in various online activities.Having digital literacy and a strong digital culture can enhance one's overall digital competence and enable them to navigate the digital world effectively.

Modern higher education teachers generally have a high digital literacy rate, but their willingness to use information and communication technologies in the educational process is not high. Vaskov et al., 2021 suggested that high-quality training in working with a digital educational environment can increase the willingness of higher education teachers to work in a digital educational space. The paper emphasizes the importance of digital competencies and digital literacy for teachers in the context of the digital transformation of education.

Digital fluency

Digital literacy is crucial for individuals to access high-quality services and thrive in school, as well as create learning opportunities and foster innovation.

Digital fluency is a critical skill needed in a digitally-connected society, encompassing the ability to use digital technology and construct significant ideas with it. In education, it refers to educators' knowledge of using digital tools creatively to achieve teaching and learning objectives. Digital fluency is not just about the ability to use technology, but also about actively learning new technologies and using them to achieve goals

Digital fluency is a complex concept that goes beyond computer skills or information literacy, requiring adaptive definitions and lifelong, inquiry-based learning. Digital fluency parallels language fluency, adopting socio-cultural linguistic aspects and emphasizing the ability to use digital media with ease for communication and information retrieval (Niessen, 2015).

Competent teacher educators play a crucial role in preparing pre-service teachers, and they need to be digitally fluent to facilitate future teachers effectively. They should be able to interact with online and offline resources, design learning using technology, and employ appropriate digital pedagogies in various learning environments.

In the ever-evolving landscape of education and technology, the cultivation of digital literacy stands as a critical imperative for individuals across various domains. This compilation surveys a diverse array of research studies, each delving into the multifaceted dimensions of digital literacy, its development, and its impact on different sectors of society. From the classrooms of Tanzanian Schools of Education to the familial dynamics during the Covid-19 pandemic and the intricacies of digital fluency among university scholars, these studies collectively contribute to our understanding of the challenges, opportunities, and nuances associated with navigating the digital realm.

The reviewed studies employ a spectrum of research methodologies, ranging from qualitative case studies and surveys to statistical analyses and systematic reviews. These diverse approaches allow for a comprehensive exploration of the intricate interplay between individuals and the digital environment. As we traverse through the findings of each study, patterns emerge, highlighting the pivotal role of digital literacy in shaping educational strategies, influencing social behaviors, and addressing disparities in access and proficiency.

The research journey begins with Fulgence's (2020) qualitative case study, shedding light on the development of digital fluency among teacher educators in Tanzanian Schools of Education. Subsequent studies scrutinize the nuances of digital literacy across demographics, exploring the disparities between digital natives and immigrants (Liu et al., 2018), the awareness and pedagogical strategies of librarians (Sanches, 2022), and the proficiency of individuals in diverse age groups and professions (Hiremath & Bankapur, 2019; Esh & Ghosh, n.d.).

Furthermore, the collection of studies underscores the global nature of the digital literacy discourse, spanning continents from India to Thailand and Europe. The implications of digital literacy extend beyond individual proficiency, influencing the landscape of higher education (B & Kabir, 2018; McGuinness & Fulton, 2019: Choudhary & Bansal, 2023), family dynamics (Angga et al., 2020), and cybersecurity awareness in the context of national digital initiatives (Raut et al., 2022).

In essence, this compilation serves as a comprehensive exploration of the current state of digital literacy research, offering insights into the challenges, advancements, and potential avenues for future exploration. The amalgamation of findings from these diverse studies contributes to a nuanced understanding of the intricate relationship between individuals, societies, and the ever-evolving digital landscape.

Objective: This research aims to conduct a comprehensive review of the literature on digital literacy in higher education, exploring its diverse impacts on individuals, educational strategies, and societal dynamics.

II. MATERIAL AND METHODS:

- Database Search: Conducted systematic searches in prominent academic database (Google Scholar, Academia, Researchgate) using keywords such as "digital literacy," "higher education," and "technology in education."
- Inclusion Criteria: Selected studies published between 2007 and 2023, considering diverse research methodologies and geographic locations to ensure a broad representation of the literature.
- Data Extraction: Extracted essential details from selected articles, including research design, participants, data collection methods, and main findings and conducted a thorough examination of each study to understand its approach and contribution to the overarching theme of digital literacy in higher education.
- Classification of Studies: Primary focus areas (e.g., educators, librarians, students, impact on education). Identified commonalities, disparities, and emerging trends across the studies to reveal patterns and themes in digital literacy research.
- Synthesis and Analysis:
- Thematic Synthesis: Employed a thematic synthesis approach to extract overarching themes and patterns from the reviewed studies.

III. DISCUSSION ON LITERATURE

Bologa et al., (2007) concluded that there is a correlation between the level of digital fluency of young students and their ability to use standard computer applications necessary in everyday life. Increasing the level of digital fluency in the young generation can enhance their abilities to learn how to use computers effectively, which is crucial in the knowledge age. Special tools like SCRATCH are found to be effective in assessing and increasing digital fluency, and they require special attention in the educational process. The efficiency of such tools is still to be investigated in future research related to methods to induce digital fluency, which is one of the main research aims of the authors' teams for the future.

Shopova, (2014) stated that improving digital literacy and skills in using ICTs is crucial for the successful performance and better results in the learning process. Acquiring digital literacy competencies is necessary for expanding access to information and communication technologies and ensuring greater competitiveness in the labor market. Many students lack the necessary skills for using the Internet and information technology effectively in solving scientific problems and performing tasks.

Murray & Pérez, (2014) highlighted the importance of digital literacy and the need for comprehensive strategies to ensure college graduates are equipped with critical technology competencies. The findings of the digital literacy assessment indicate that many college seniors struggle with digital literacy. The study suggests that institutions of higher education should develop coherent and inclusive digital literacy strategies, and that digital literacy should be included in standardized college entrance examinations.

Allen & Berggren (2016) showed the efficacy of incorporating small-scale exploratory practice research projects alongside busy teaching schedules and administrative demands, as well as developing teachers' perspectives on Information and Communications Technology (ICT) in the English as a Foreign Language (EFL) classroom. The results suggest a way forward in promoting the sustainable incorporation of ICT into mainstream English language teaching and encouraging professional development on a collegial level.

Santos & Serpa, (2017) recognized digital literacy as an essential competency in higher education. Higher education institutions should develop specific strategies to enhance students' digital literacy skills. Not all university students have the same levels of digital competency, and some may not have optimal levels upon entering higher education. Diagnostic evaluation is highlighted as fundamental to identify different levels of digital literacy among students. The paper emphasized the importance of promoting explicit and reasoned digital literacy development strategies in higher education. Achieving 21st-century skills, including critical thinking, problem-solving, and information literacy, requires engaging curricular and pedagogical approaches in higher education.

Kaeophanuek et al., (2018) found the information skills of the students high in terms of sharing files on the internet, examining the accuracy of information, evaluating data before sharing it, considering consequences before giving opinions on social media, and evaluating the reliability of information sources. However, their skills in defining keywords for searching expected information and selecting appropriate data for problem-solving were at an intermediate level .The skills in digital transformation of the students were also found to be high in terms of being aware of using others' work without permission, understanding plagiarism, and creating video media for presentations. However, their skills in understanding copyright, sharing works designed by others, and understanding Creative Commons were at an intermediate level. The students were found to have high skills in adapting technology to everyday life, selecting optimal social media for communication, being concerned about privacy etc.

Liu et al., (2018) found that digital natives (individuals of high digital fluency) tend to use WeChat to broaden their social network, while digital immigrants (individuals of low digital fluency) tend to use WeChat to maintain ties with friends and fulfill their information needs.The research model was analyzed using Partial Least Squares (PLS) analysis, which showed that the model explained 46% of the variances in WeChat use. The study emphasized the moderating effects of digital fluency on broadening social networks, maintaining ties, and enjoyment in WeChat use. Overall, the findings of the study enriched the understanding of social media use across different generations and provided insights for researchers and practitioners exploring extensive use of WeChat in the future.

Techataweewan & Prasertsin, (2018) identified four factors of digital literacy for Thai undergraduate students: operation skills, thinking skills, collaboration skills, and awareness skills, each consisting of specific indicators.It came to the conclusion that, in order to transform and improve college learners through the use of digital information, technology, and media, digital literacy is composed up of a dynamic combination of mentality, behaviors, and skills.

Spante et al., (2018) discovered a range of definitions used in the field, varying depending on whether they are defined by policy, research, or both, and whether they focus on technical skills or social practices. The majority of the reviewed publications did not address any specific discipline, with digital literacy being the most commonly used concept in these studies. However, digital competence was dominant in teacher education, economics, and to a small extent in language and informatics. Digital literacy was exclusively used in health and artistic education.

B & Kabir, (2018) found that more social science scholars in the University of Kerala were digitally literate compared to arts scholars. Nearly all respondents were familiar with open access e-books/e-journals. Majority of the social science research scholars used laptops for internet access, while smartphone usage was more common among arts scholars. The study identified constraints faced by research scholars in both faculties when using digital information resources. The study suggests that university and department libraries should provide library orientation programs, digital training programs, workshops, and seminars to enhance the use of digital resources. It also recommends the development of digital literacy courses and comprehensive training programs for both researchers and research guides/supervisors.

McGuinness & Fulton, (2019) found that the e-tutorials make a positive addition to students' learning experience,

reinforcing face-to-face learning and providing a novel learning opportunity. Students' perceptions of the e-tutorials and online-blended learning were generally positive, with students finding the content clear and relevant to their courses and being able to navigate the content with relative ease. Students expressed a preference for blended learning, perceiving classroom or face-to-face learning as valuable in terms of their overall educational experience. They viewed e-tutorials as best suited as supplementary or complementary units of learning to classroom instruction. Technical glitches were reported as challenges, but overall, students successfully engaged with the e-tutorials.

Hiremath & Bankapur, (2019) found that librarians of all age groups in First Grade Degree Colleges of Bagalkot District were well aware of and proficient in digital literacy skills, with no significant effect of age group on their proficiency or awareness. The paper emphasized the importance of digital literacy skills in providing quality library services and attracting members of the academic community to libraries. Digital libraries are an emerging trend, and library professionals are positively embracing the transforming aspect of digital libraries. New applications and services are being developed to adapt to the new digital environment.

Fulgence (2020) adopted a qualitative case study design, providing an in-depth description of the development of digital fluency among teacher educators in Tanzanian Schools of Education. Data collection involved conducting one-on-one interviews with ninety educators. The study found that the teacher education curriculum in Tanzanian Schools of Education did not integrate digital fluency as a key competence, indicating a gap in preparing teacher educators for the contemporary world. Individual mechanisms such as individualized learning, practice, engagement in research and consultancy, as well as institutional mechanisms like training, infrastructure, and the delivery of online programs, were identified as contributing to the development of digital fluency among teacher educators.

Angga et al., (2020) aimed to describe the digital literacy awareness of a family during the Covid-19 pandemic, focusing on knowledge assembly, utilization of digital sources and media, access and hypertextual navigation, and content evaluation. The information obtained from the respondents was interpreted and produced arguments in private or shared with the general public. The proficiency in using digital media varied among the respondents, with some showing good proficiency in using platforms like YouTube, social media, software, and hypertext, while others were limited to using Google or accessing information through television news.

Pawar, (2021) highlighted the importance of digital literacy in the educational system in India, emphasizing the role of teachers and students in acquiring digital skills and knowledge. It emphasized the need for teachers to equip themselves with digital skills to help students become responsible digital citizens. Further it acknowledged the existence of a digital divide in India and the efforts made to make the rural population digitally literate through the introduction of information technology in schools.

A & Sinha, (2021) emphasized the importance of digital literacy in accessing information remotely and addressing the knowledge gap. Digital literacy includes skills in media, computer, and internet literacy. The majority of students at the Central University of Tamil Nadu has good digital literacy skills but still prefer print books as their primary source of reading. The preference for print or electronic books depends on the reading context, such as reading in bed, for pleasure, during travel, sharing with others, accessing a wide collection, reading with children, and quick access to new material. Digital literacy skills among librarians have a positive impact on the delivery of library services, but there are barriers such as lack of digital facilities, funding constraints, and lack of training. Competency development programs and recruitment of digital literate librarians are recommended.

Zan et al., (2021) found that students' skills and awareness about digital literacy varied based on the departments they studied in and their technology usage habits. Ownership of information technology tools, such as computers and mobile phones, played a role in students' digital literacy skills. The study emphasized the importance of university libraries in providing services and training to improve students' digital literacy skills. It was suggested that university libraries should create environments and services to support the development of students' digital literacy skills, taking into account their differences in technology ownership and digital literacy levels.

Sanches, (2022) conducted a questionnaire survey among higher education librarians to understand the pedagogic strategies used to promote digital fluency and received 22 responses from librarians, with most respondents being female. Regarding Information and Media Literacy, some librarians implemented activities to promote it, while others were in the initial or medium stage. Librarians expressed concerns about digital security and developed strategies for responsible use of digital technologies and recognized the importance of collaborative work and digital communication in developing digital fluency skills in students. However, they did not feel comfortable implementing initiatives to promote student well-being in digital environments.

Caton, et al., (2022) highlighted the value of developing digital literacy to improve learners' cognitive flexibility by decreasing technological cognitive load and increasing learning fluency. The paper emphasized the need for scaffolded digital literacy skills, digital tool selection, and expanding college readiness requirements to include digital literacy as a prerequisite skill for learners. It suggests that digital literacy should be established as a core skill for

learners in the digital age, and that it can contribute to increased learning efficiency.

Raut, et al., (2022) emphasized the need for cyber security awareness in India's Digital India mission, as limited digital literacy makes Indian societies vulnerable to cybercrimes. The paper highlighted the various types of cybercrimes, including digital transaction frauds, honey traps using social media, and matrimonial frauds through untrusted websites. It suggests that cyber security awareness is an initiative of digital literacy that can help in the implementation of the Digital India Programme.

Peng & Yu, (2022) provided a comprehensive literature review of students' digital literacy over two decades, focusing on various aspects such as the definition of digital literacy, factors affecting students' digital literacy, the relationship between digital literacy and self-control, technostress, and engagement, and approaches to gauge the level of students' digital literacy.

Yugay, (2023) focused on the key role of developing the level of digital culture of young people in the use of new technologies based on Digital Literacy. It found that improving digital literacy skills and digital security skills positively affect certain value qualities of modern youth and their successful adaptation in the digital environment .It also examined the skills of using digital content in various social spheres of life and the use of interactive technologies in the educational environment. The study found that a significant percentage of young people have internet access and use it for various purposes such as study, work, communication, entertainment, self-development, and information search .

Reddy et al., (2023) proposed a validated digital literacy model that can be integrated with existing educational models to minimize the digital skills gap. The model consists of a digital literacy framework (SPDLF) and a digital literacy tool (digilitFJ). The digital literacy tool has been evaluated and found to be effective, with a moderate effect size on users' digital literacy. There is a statistically significant correlation between the heuristics of the digital literacy tool, student attitude, and student perception, indicating that user satisfaction with the tool leads to a positive perception of its usefulness and usability. Overall, the proposed digital literacy model is reliable and effective in reducing the digital skills gap, and can be used to improve educational frameworks and pedagogies.

Choudhary & Bansal, (2023) identified the most important publications, writers, nations, and articles in the topic. The study highlighted the prominent themes in DL research, including DL conceptualization, antecedents, measurement, training and interventions, and impact and issues. Europe has contributed the most to DL literature, indicating the importance of considering cultural variables, access to digital services and resources, and differences in digital literacy levels between nations.

Vidya et al., (2023) analyzed the correlation between digital fluency and personality traits using Spearman correlation and found that adaptable, flexible, and radical personality traits did not have a significant relationship with digital fluency. Regression analysis revealed that ten personality traits played a role in predicting students' digital fluency. Personality is identified as one of the factors that can be used to understand the development of digital literacy and individual fluency.

Esh & Ghosh (n.d.) conducted a Mann-Whitney U Test to compare the digital literacy level of male and female students. The result was a two-tailed one, indicating that the direction of the difference between genders doesn't matter. The study found no significant difference between male and female students in terms of digital literacy. Additionally, the study explored the association between the frequency of library use and satisfaction with library services. Overall, the study highlighted the importance of digital literacy in the academic landscape and emphasized the need for incorporating digital resources in education and training to empower students.

IV. FINDINGS: THE STUDY FOUND THE FOLLOWING THEMES

Digital literacy as a critical skill: The explored and reviewed articles found digital literacy as a critical skillconsidering its impacts on education, societal interactions, and professional development (Shopova, 2014; Murray & Pérez, 2014; Santos & Serpa, 2017; Techataweewan & Prasertsin, 2018; Spante et al., 2018; B & Kabir, 2018; Pawar, 2021; A & Sinha, 2021; Zan et al., 2021; Peng & Yu, 2022; Caton et al.,2022; Raut et al.,2022; Yugay, 2023; Reddy et al., 2023; Choudhary & Bansal, 2023; Vidya et al., 2023).These studies collectively emphasize the critical role of digital literacy in education, societal interactions, and professional development. They highlight the need for comprehensive strategies, recognition of the digital divide, and the positive impact of digital literacy on various aspects of modern life.

Educational Dynamics: It Investigated the roles of educators, librarians, and institutions in promoting digital fluency (Sanches, 2022) and found that Librarians expressed concerns about digital security, developed strategies for responsible use of digital technologies, and recognized the importance of collaborative work and digital communication in developing digital fluency skills in students.

Demographic Disparities: The studies (Kaeophanuek et al., 2018; B & Kabir, 2018;Zan et al., 2021; Peng & Yu, 2022) found demographic disparities and examined variations in digital literacy levels among different groups, indicating the necessity for tailored educational strategies. These studies collectively highlight the importance of recognizing demographic disparities in digital literacy and tailoring

educational strategies to address the specific needs of different groups. Addressing these variations is crucial for promoting inclusivity and ensuring that educational programs effectively enhance digital literacy skills across diverse populations.

V. CONCLUSION:

This compilation of digital literacy studies provides a panoramic view of the evolving landscape of digital literacy across diverse settings. These studies collectively underscore the multidimensional nature of digital fluency. The studies collectively emphasize the importance of digital literacy in diverse contexts.

In conclusion, this compilation serves as a rich resource for researchers, educators, and policymakers, offering insights into the challenges, opportunities, and evolving dynamics of digital literacy across various domains. The model presented facilitates a systematic organization of study information, participants, and conclusions, allowing for a nuanced exploration of the complex digital literacy landscape.

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