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REVITALIZING DIGITAL TECHNOLOGY LITERACY IN EDUCATION: A SYSTEMATIC LITERATURE REVIEW AND FRAMEWORK DEVELOPMENT

REVITALIZANDO A ALFABETIZAÇÃO EM TECNOLOGIA DIGITAL NA EDUCAÇÃO: UMA REVISÃO SISTEMÁTICA DA LITERATURA E DESENVOLVIMENTO DE ESTRUTURA

I GUSTI NGURAH TRIYANA
Educational Science Study Program,
Universitas Pendidikan Ganesha, Indonesia
triyana@undiksha.ac.id

I MADE CANDIASA
Educational Science Study Program,
Universitas Pendidikan Ganesha, Indonesia
candiasaimade@undiksha.ac.id

I GDE WAWAN SUDATHA
Educational Science Study Program,
Universitas Pendidikan Ganesha, Indonesia
igdewawans@undiksha.ac.id

DEWA GEDE HENDRA DIVAYANA
Educational Science Study Program,
Universitas Pendidikan Ganesha, Indonesia
hendra.divayana@undiksha.ac.id

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Corresponding author:
triyana@undiksha.ac.id

Abstract: This research is a systematic literature review with the aim of deciphering the picture of digital literacy in the ongoing educational era, especially in terms of variations in definitions, frameworks, and assessment tools. This research aims to provide a more comprehensive understanding of digital literacy as well as contribute to the development of more integrated and relevant assessment frameworks and tools to improve digital literacy in society. The focus of this research is on the main concepts of digital literacy, including definitions and frameworks, by proposing an approach that integrates several theoretical frameworks to understand digital literacy holistically. The research method used is a qualitative approach with a descriptive method to analyze digital literacy from literature published in 2022-2023, and data was collected through a systematic literature review with the keyword "Digital Literacy" to identify gaps in digital literacy understanding and provide guidance for the development of more effective digital literacy training programs and measurement strategies. The results of this study are a summary of 22 studies investigating digital literacy in the context of education, highlighting six main factors of digital literacy in learning and their influences, including the challenges and impacts of digital literacy, especially in a pandemic situation. This research makes a valuable contribution to the understanding and development of digital literacy in the ever-evolving era of education, as well as identifying six key factors in digital literacy and three main streams that can be used as frameworks, as well as making an important contribution in the development of learning strategies that focus on developing students' digital literacy.

Keywords: Digital Literacy. Frameworks. Assessment Tools.

Resumo: Esta pesquisa é uma revisão sistemática da literatura com o objetivo de decifrar a imagem da alfabetização digital na era educacional em curso, especialmente em termos de variações nas definições, estruturas e ferramentas de avaliação. Esta pesquisa visa fornecer uma compreensão mais abrangente da alfabetização digital, bem como contribuir para o desenvolvimento de estruturas e ferramentas de avaliação mais integradas e relevantes para melhorar a alfabetização digital na sociedade. O foco desta

investigação incide sobre os principais conceitos de literacia digital, incluindo definições e enquadramentos, propondo uma abordagem que integra vários enquadramentos teóricos para compreender o letramento digital de forma holística. O método de pesquisa utilizado é uma abordagem qualitativa com um método descritivo para analisar o letramento digital da literatura publicada em 2022-2023, e os dados foram coletados por meio de uma revisão sistemática da literatura com a palavra-chave "alfabetização digital" para identificar lacunas na compreensão do letramento digital e fornecer orientação para o desenvolvimento de programas de treinamento de alfabetização digital mais eficazes e estratégias de medição. Os resultados deste estudo são um resumo de 22 estudos que investigam o letramento digital no contexto da educação, destacando seis principais fatores do letramento digital na aprendizagem e suas influências, incluindo os desafios e impactos do letramento digital, especialmente em uma situação de pandemia. Esta pesquisa faz uma contribuição valiosa para a compreensão e desenvolvimento da alfabetização digital na era da educação em constante evolução, bem como identifica seis fatores-chave na alfabetização digital e três fluxos principais que podem ser usados como estruturas, além de fazer uma importante contribuição no desenvolvimento de estratégias de aprendizagem que tenham como foco o desenvolvimento da alfabetização digital dos alunos.

Palavras-chave: Alfabetização Digital. Estruturas. Ferramentas de avaliação.

1. Introduction

In the ongoing digital era, skills in operating Information and Communication Technology (ICT) are becoming important in everyday life, including in the scope of work and personal aspects, as the emergence of digital technologies has changed public relations and communication paradigms (Ravšelj et al., 2022; Madakam &; Tripathi, 2021). Education has also changed with the application of digital-based learning which requires rapid adaptation of teachers in the digital era 4.0 (Rahmatullah et al., 2022; Syaputra &; Hasanah, 2022). The application of ICT in shared resource management in cities also has the potential to create more sustainable cities through the support of technology and big data (Chien et al., 2022). However, COVID-19 has changed the use of ICTs globally, particularly in communication between social workers and clients, by bringing about paradigm shifts and transitional impacts that require adjustments in access, privacy, and professional boundaries (Mishna et al., 2021).

The importance of digital literacy in today's digital era is a major issue that raises important questions in the research domain. Digital literacy, which encompasses various aspects of an individual's ability to use digital technology, plays a central role in an individual's ability to interact and participate in an increasingly complex information society. However, the complexity of the concept of digital literacy is reflected in the variety of definitions and frameworks used to measure and evaluate this literacy. Therefore, the research question that arises is how we can map the digital literacy landscape holistically, including the diverse definitions, frameworks used, and assessment tools available.

The significance of this research lies in a deeper understanding of digital literacy in the context of today's digital era. A systematic and comprehensive literature review will help describe and analyze digital literacy concepts in more detail, thus making a valuable contribution to the development of more integrated frameworks and more precise assessment tools. The results of this study will provide guidance for the development of effective digital literacy training programs, as well as help design more accurate and relevant digital literacy measurement strategies. Thus, this research has the potential to make an important contribution in improving the understanding and application of digital literacy in society.

The purpose of this study was to conduct a systematic literature review of the concept of digital literacy, with a particular focus on the different definitions, frameworks used, and assessment tools that have been developed. With this goal in mind, researchers aim to identify gaps in the understanding of digital literacy and build a more comprehensive understanding of the concept. Through this literature review, researchers hope to provide a more complete view of digital literacy, which in turn can support the development of more integrated frameworks and better assessment tools. The results of this study are expected to provide valuable guidance for researchers, practitioners, and policymakers in designing effective programs and strategies to improve digital literacy in society. In addition, this research can also open the door to further research development in an effort to improve digital literacy and understand its implications in the ever-evolving digital era.

2. Theoretical framework and literature review

The main concept in this study is digital literacy, which includes the ability of individuals to use digital technology effectively. Digital literacy involves access, understanding, assessment, and participation in digital content. Definitions of digital literacy vary in literature, creating complexity in understanding this concept. Some definitions emphasize technical aspects, while others highlight the social and critical dimensions of digital literacy.

This research will adopt an approach involving the integration of several theoretical frameworks, with emphasis on two main perspectives: (a) Digital Literacy Framework and (b) Constructivism Learning Theory.

a) The Digital Literacy Framework perspective covers the approaches used to understand, analyze, and apply digital literacy in a variety of contexts, especially in education. The framework provides guidance and structure for understanding important aspects of digital literacy, including definitions, dimensions, components, and factors that affect an

individual's level of digital literacy. In line with that, research exploring digital literacy in various international frameworks confirms the importance of digital competence as a pivot to improving other competencies, with six dimensions identified: critical, cognitive, operational, social, emotional, and projective (Martínez-Bravo et al., 2022).

Some of the main points in the Digital Literacy Framework perspective include:

1. Definition of Digital Literacy: This perspective helps in formulating a clear definition of digital literacy. This includes an understanding of what digital literacy is and how it differs from traditional literacy. This definition can also include critical aspects of digital literacy, i.e. the ability to critically analyze and evaluate digital information. Digital literacy is the ability to use information and communication technology to search, understand, evaluate, create, and communicate with digital information (Becker, 2018) One of the earliest misconceptions about the two forms of literacy, namely digital literacy and information literacy, is to think of them as the same thing. This perspective depends on how one defines digital literacy. Although the two forms of literacy have significant similarities, it can be argued that digital literacy has evolved from information literacy and has different scopes. Traditional information literacy perspectives have existed before the digital era, and digital literacy has more modern roots in the development of information technology (Becker, 2018).
2. Dimensions and Components: This framework identifies important digital literacy dimensions and components. For example, information literacy, media literacy, technological literacy, digital communication and collaboration skills, and the ability to manage and solve problems in a digital environment. Research María Cristina Martínez-Bravo, et al (2022) explore the dimensions of digital literacy in eight international frameworks or 21st century competency frameworks from various institutions and initiatives, namely ATCS, Engauge, NAEP, NETS, OECD, P21, UNESCO, and the European Union (EU). Internationally, there are significant differences in the cognitive and social-emotional sub-dimensions of digital literacy between countries. From the results of the study, it was found that these countries have significant differences in terms of cognitive and social emotional abilities in dealing with and understanding digital literacy (Hamutoglu et al., 2020). This difference may be due to various factors such as differences in education systems, technological infrastructure, people's level of digital awareness, and socio-economic conditions of those countries. These findings suggest that digital literacy is not

uniform across the globe, and efforts to improve digital literacy must take into account the specific context and characteristics of each country.

3. Linkages to the Educational Context: The Digital Literacy Framework Perspective highlights the importance of applying digital literacy in an educational context. It involves understanding how digital literacy can be supported in curricula and learning processes, as well as how the use of digital technology can improve student learning and achievement. The application of digital literacy in educational contexts is still at a fairly good level among EFL Indonesia students, with the need for more exposure and improvement in aspects related to research competencies, critical thinking, and digital skills, emphasizing the importance of integrating online research skills into learning programs (Indah et al., 2022).
4. Measurement and Assessment: This perspective also discusses digital literacy assessment and measurement tools. This includes the development of valid and reliable evaluation instruments to measure individuals' levels of digital literacy and their progress in developing digital skills. The measurement of digital literacy is carried out through the exploration of several prominent educational frameworks and models for 21st century learning and teaching, as well as formulating innovative digital literacy models that integrate with existing and future educational frameworks and models. This digital literacy model consists of two main components: (1) the digital literacy framework - South Pacific Digital Literacy Framework (SPDLF) and (2) the digital literacy tool - digilitFJ, which includes digital literacy measurement scales and online intervention programs (Reddy et al., 2023).
5. Support from Policy and Leadership: The Digital Literacy Framework perspective underscores the importance of support from education policy and school leadership in encouraging and implementing digital literacy. Strong policies and leadership can ensure that digital literacy becomes a priority in the education system. Digital technology literacy policies should be updated to accommodate the changes taking place in the higher education environment, taking into account the complexity of the relationship between information literacy skills and digital literacy with the intention of using digital technologies among university staff and students, so that appropriate strategies can be outlined to increase individual willingness to use digital technologies in higher education environments (Nikou & Aavakare, 2021).

b) Constructivism Learning Theory: This approach will integrate the principles of constructivism learning theory in the understanding of digital literacy. This theory emphasizes the active role of individuals in building knowledge through interaction with the environment and experience. Understanding digital literacy will be seen as the result of a construction process that involves reflection, problem solving, and active participation in the digital environment. The constructivist learning theory approach in understanding digital literacy will integrate the principles of the theory which emphasizes the active role of individuals in building knowledge through interaction with the environment and experience. It is important in identifying and understanding the implementation of constructivist learning theory in science, with research methods using pendekatan perpustakaan (library research) and data obtained through the study of literature (Dinelti Fitria et al., 2021).

Several relevant literature reviews have been conducted in the field of digital literacy.

Recent research by Nguyen dan Habók (2023) shows that rapid technological advances and digital literacy have become important components in the professional development of educators. Digital literacy, as an individual's ability to use information and communication technology effectively, is crucial in facilitating effective and time-relevant learning. In the context of literature review, significant changes in the world of education due to technological developments require educators to master various digital tools and platforms to improve the quality of learning and student competencies. Meanwhile, research Junghee Yoon, dkk. (2022) (2022)

While there is agreement that digital literacy is important, the literature reveals a lack of consensus on consistent definitions and frameworks. The variety of definitions and approaches to measuring digital literacy creates challenges in understanding and assessing individuals' ability to face the demands of digital technology. Some studies may focus too much on the technical aspects, while others ignore the social and critical dimensions of digital literacy.

The proposed theoretical framework links different definitions and frameworks in digital literacy to the main problem of the study: how to understand digital literacy holistically. By integrating various frameworks and approaches, this research aims to fill the gap in the understanding of digital literacy. Through a comprehensive literature review, the research will identify the contributions and limitations of existing assessment tools, paving the way for the development of a more integrated framework. By linking theoretical frameworks to research

questions, this research will provide better guidance in designing more effective training programs and digital literacy measurement strategies.

3. Methodology

This research will use a qualitative research approach with descriptive methods to describe and analyze digital literacy concepts, definitions, frameworks, and relevant assessment tools. The qualitative approach allows researchers to gain deep insights into the complexities of digital literacy and understand perspectives from various literature sources.

Data will be collected through a thorough systematic literature review of relevant literature sources. The data collection steps involve searching for journal articles that discuss digital literacy, definitions, frameworks, and digital literacy assessment tools. The relevant data will be extracted from the selected literature. Article data collection is carried out through the following stages:

1. Article searches were conducted through Mendeley using the keyword "Digital Literacy," which resulted in 17,182 articles.
2. The articles are then filtered by year of publication, selecting only articles published in the last 2 years, i.e. 2022 and 2023, resulting in 4,174 articles.
3. Furthermore, the articles were filtered again to obtain only articles in the form of journals, resulting in 3,293 articles.
4. Finally, articles were filtered based on journals with the category "education and Information Technologies," resulting in 22 articles.

Data analysis will be carried out thematically. Data extracted from the literature review will be categorized and analyzed based on key themes emerging in the definition of digital literacy, the frameworks used, as well as existing assessment tools. Researchers will identify similarities, differences, and patterns in the literature under study.

This research will ensure ethical integrity in the use of literature sources and references. All sources cited and used will be recognized and respected in accordance with applicable academic writing rules. No primary or sensitive data will be collected, so no specific ethical consent is required.

This research will limit coverage to literature published between 2022 and 2023 to ensure the relevance and novelty of information. This research will also focus on digital literacy in the

context of individuals and society in general, without including digital literacy in the context of formal education or specific technical aspects.

By adopting a qualitative approach and descriptive method, this study aims to provide a comprehensive picture of digital literacy, involving concepts, definitions, frameworks, and assessment tools in the literature. Taking into account research ethics and scope limitations, this research is expected to make a valuable contribution to the study.dap pemahaman dan pengembangan literasi digital dalam era digital yang terus berkembang.

4. Results

The following is a summary of the findings of some of the selected journal articles:

1. Research Catherine Audrin dan Bertrand Audrin (2022) summarizes an overview of the field of digital literacy in learning and education by reviewing 1037 research articles from 2000 to 2020, identifying related terms as well as six key factors including information literacy, digital literacy development, digital learning, ICT, social media, and 21st century digital skills, which can be grouped into three main streams and support digital literacy frameworks in education.
2. The influence of primary school teachers' educational philosophy on their digital literacy through resistance to change, found that traditional educational philosophies negatively affect digital literacy through change resistance, while contemporary educational philosophies positively influence through change resistance, and suggest the importance of teachers' digital skills development in today's technological era (Alanoglu et al., 2022).
3. A study implements intelligent conversational agents in the form of chatbots in mobile applications to facilitate and improve the digital literacy and learning experience of senior citizens in Thailand, through data collection and development, focusing on access, analysis, evaluation, participation, and action in learning content and functions, with further testing plans to prepare them for an aging society (Sriwisathiyakun & Dhamanitayakul, 2022).
4. Exploring the positive impact of applying digital literacy with a focus on logic and mathematics to elementary school students in Northeastern Brazil, through a 16-hour course that improves digital literacy skills, interaction with technology, and logic/math skills, with significant improvements in assessment scores (Nogueira et al., 2022).

5. Research Mary F. Beras dan Mark Bailon (2023) revealed that prior to the COVID-19 pandemic, little guidance was available from US state departments of education to support digital literacy in local schools, with most states not using guidance from professional organizations, and the implication being the need for new strategies to recognize and support digital literacy by education ministries.
6. The development and implementation of Integrated Digital Literacy and Language Tools has successfully impacted vulnerable migrant students in higher education, improved academic language skills and digital literacy, supported student autonomy, and provided flexible learning experiences with access to international open resources (Smith et al., 2022).
7. Research Tugba Kamali Arslantas dan Abdulmenaf Gul (2022) pointed out that although students with visual impairments in Turkey have a fairly high level of digital literacy in some technical and cognitive aspects, they still have deficiencies in information management, collaboration, communication, and digital content creation skills; Factors such as daily internet use and the age of onset of technology use have a significant impact on digital literacy rates, and this study has important implications for researchers and practitioners in improving digital literacy for blind students.
8. Research Yong Qi Zhang (2022) demonstrate that increased digital literacy in rural seniors in developing countries, especially those connected to the internet, has a positive impact on their sense of access, with basic and advanced digital literacy helping to reduce knowledge costs, improve resource efficiency, and influence access acceleration; These findings support the importance of digital literacy development among rural elderly, with the potential for greater improvement in non-eastern regions and moderation of the effects of digital literacy by family "digital feedback", providing important implications for policymakers in devising effective strategies to address ageing and the convergence of the digital economy.
9. Aspiring early childhood education teachers have a high level of critical thinking in digital literacy, but problem-solving skills are still low. There is a positive relationship between digital literacy, self-efficacy, and perceptions of AI education for young children. Certain factors in digital literacy such as technical applications, learning interactions, and problem solving with teacher self-efficacy have a significant influence on the perception of AI education. It is recommended to develop pre-service education programs to improve the digital literacy and self-efficacy of early childhood education teachers in using artificial

intelligence technology effectively in the classroom, to create meaningful educational experiences for young children. (Lim, 2023).

10. The study, which examined the influence of media literacy on digital citizenship and the mediating role of digital literacy in this relationship, found a direct relationship between media literacy and digital citizenship, with digital literacy as a partial mediator in the relationship between pre-service teachers' media literacy and their digital citizenship (Erdem et al., 2023).
11. Research Silvia Farias, et al (2022) analyze the impact of digital transformation and media literacy on higher education using systematic mapping methods on 298 articles published in the Scopus database and Web of Science, identify the types of research and topics raised and provide a broad view of digital transformation in higher education institutions, focusing on digital pedagogy strategies.
12. The correlation and influence between digital literacy (DL), technological literacy (TL), internet literacy (IL), and computer-supported education (CSE), as well as explaining the complex relationships among these latent variables, with the results showing that DL, TL, and IL significantly influence and explain attitudes towards CSE application, providing a better understanding of the dynamics of interaction among these concepts in an educational context (Yeşilyurt & Vezne, 2023).
13. Studies Marcelo Dorsman dan Gabriel Horenczyk (2022) analysing the impact of the COVID-19 pandemic on pedagogical practice, pedagogical conceptions, and trends of pedagogical change in the digital learning environment of universities in Israel, identifying three teacher profiles that emerged during pandemic-related teaching situations (CRTS), namely Experienced teachers, Enthusiastic teachers, and Cautious teachers, with pre-crisis digital literacy being the main factor influencing teachers' suitability to those profiles.
14. Research Muhammad Murat Gümüş dan Volkan Kukul (2023) produce a valid and reliable Teacher Digital Competency Scale, consisting of six factors and 46 items, covering aspects such as Security, Data Literacy, Problem Solving, Digital Content Creation, Communication and Collaboration, and Ethics, which can be used to measure teachers' digital competence in integrating digital technology in educational environments, with differences related to ethical factors from the DigComp 2.1 framework developed by the European Union.

15. Studies João Mattar, et al (2022) compares digital competency assessment instruments based on the DigComp framework, uncovering the types of instruments available, how they are made, validity and reliability procedures, and analysis of the data used, focusing on student and teacher technology usage profiles and assessments of their digital and professional competencies.
16. Research Francisco Javier Gil-Espinosa, et al (2022) aims to explore and evaluate smartphone applications focused on the promotion of leisure-time physical activity (PA) and sport among adolescent students, with a particular focus on their potential to be integrated into secondary physical education curricula and effectively encourage PA, ultimately benefiting teachers and students.
17. Analysis of 1,608 TPACK (technological pedagogical and content knowledge) empirical research studies over the period 2000 to 2020 revealed an increasing trend of academic interest in the framework, with key topics including teacher development, application in various subjects, digital literacy, and motivation, which can make important contributions to the development of research and teaching practice (Zou et al., 2022a).
18. Research Alenka Tratnik et al (2023) Develop a framework for evaluating email communication between students and lecturers, as well as analyze factors that influence student communication style and professionalism. The study, conducted in Serbia and Slovenia, revealed differences in factors influencing email communication styles, such as perceptions of communication skills, grade point average, attitudes toward professors, and digital literacy in both countries.
19. The TPACK framework is an important theoretical basis in technology teaching that has been analyzed in 1,608 empirical studies from 2000 to 2020, identifying research trends and key topics, including TPACK development and evaluation, teacher development in technological pedagogical knowledge, application of TPACK in teaching various subjects, digital literacy, online communities, as well as motivation and confidence, which contribute to further understanding and help direction Future Research (Zou et al., 2022b).
20. Research Julio Cabero-Almenara, et al (2022) aims to determine the level of self-perception in the Digital Competence of students with disabilities at Andrés Bello University (Chile) using a 6-dimensional evaluation instrument and the results show that the average level of Digital Competence of students with disabilities tends to be low, as

well as presenting factors that influence this variable and giving emphasis to the importance of digital literacy plans.

21. Research Shaofeng Wang, et al (2023) proposing a resource-based model linking artificial intelligence from universities with student creativity and learning performance, using data from universities in China and applying partial least squares structural equation analysis (PLS-SEM), as well as showing that the artificial intelligence capabilities of universities affect students' self-efficacy, creativity, and ultimately learning achievement, provides a new outlook on the application of AI in education.
22. Studies Sofie Otto, et al (2023) conduct a systematic literature review to map digital practices in student-centered learning environments in higher education since the start of the pandemic, focusing on online, hybrid, and blended practices, as well as analyze findings from previous reactive studies on digital practices in the context of problem- and project-based learning (PBL), identify critical factors, barriers, and emerging competencies, and conclude by discussing the implications of these findings for research and further practice.

This research is a summary of the results of 22 studies that focus on digital literacy and its influence in various educational contexts. The first study (Audrin &; Audrin, 2022) identified six key factors of digital literacy in learning, such as information literacy, digital learning, and 21st century digital skills. This finding shows the skeleton of work that supports the development of digital literacy in education. Further studies (Alanoglu et al., 2022) reveals the influence of teacher education philosophy on digital literacy, with contemporary philosophy positively impacting through resistance to change.

Other studies highlight the use of technology to improve digital literacy. Study Sriwisathiyakun & Dhamanitayakul (2022) Regarding chatbots in digital literacy, senior citizens show better learning experience. Nogueira et al. (2022) demonstrated the positive impact of digital literacy courses on elementary school students in Northeastern Brazil, which improved logic and math skills. Smith et al. (2022) Successfully improving digital literacy in vulnerable migrant students through an integrated approach.

Research also highlights the challenges of digital literacy. Study Lim (2023) found that early childhood education teachers have high critical thinking in digital literacy, but still need to improve problem-solving skills. Arslantas & Gul (2022) revealed a shortage of information and communication management skills in blind students in Turkey. In addition, research by Beras & Bailon (2023) revealed a lack of digital literacy guidance by US state departments of education.

Research Zou et al. (2022a) and Zou et al. (2022b) regarding the TPACK framework shows a growing academic interest in digital literacy and teacher development. Research Gümüş & Kukul (2023) Develop a digital competency scale for teachers that can measure the integration of digital technology in education. While research by Erdem et al. (2023) links media literacy with digital citizenship.

In the context of the pandemic, several studies have shown the impact of digital literacy. The research of Cabero-Almenara et al. (2022) identified teacher profiles that emerged during the COVID-19 pandemic. Otto et al. (2023) conducted a systematic literature review to analyze digital practices in higher education during the pandemic, identifying critical factors, barriers, and emerging competencies.

Lastly, Wang et al.'s (2023) research proposes a resource-based model that links college artificial intelligence with student creativity and achievement, demonstrating the potential application of AI in education.

Tabel 1. Results journal articles

No.	Research Title	Author (Year)	Objectives and Key Findings	Implication
1	Mapping the Landscape of Digital Literacy	Audrin & Audrin (2022)	Identify digital literacy factors and frameworks.	Support the development of digital literacy in education.
2	Influence of Teacher Educational Philosophy	Alanoglu et al. (2022)	Educational philosophy has an effect on digital literacy.	The importance of developing teachers' digital skills.
3	Implementation of Chatbot for Senior Citizens	Sriwisathiyakun & Dhamanitayakul (2022)	The use of chatbots increases the digital literacy of senior citizens.	Increase access to and participation in learning.
4	Impact of Digital Literacy on Primary Students	Nogueira et al. (2022)	Digital literacy courses improve logic and math skills.	Improve the quality of student learning.
5	Digital Literacy Support in U.S. Schools	Beras & Bailon (2023)	Lack of digital literacy guidance in U.S. schools.	Perlunya strategi baru untuk mendukung literasi digital.
6	Integrated Digital Literacy for Vulnerable Students	Smith et al. (2022)	Development of digital literacy in vulnerable migrant students.	Improve language skills and digital literacy.
7	Digital Literacy of Visually Impaired Students	Arslantas & Gul (2022)	Students with visual impairments have diverse digital literacy.	The importance of developing digital literacy for blind students.
8	Digital Literacy Impact on Elderly	Wang et al. (2022)	Increased digital literacy among rural elderly in developing countries.	Mengurangi biaya pengetahuan dan meningkatkan efisiensi.

9	Digital Competence of Early Childhood Educators	Lim (2023)	Early childhood education teachers have high digital literacy.	The need for pre-service education programs.
10	Media Literacy and Digital Citizenship	Erdem et al. (2023)	Media literacy affects digital citizenship.	The importance of media literacy in education.
11	Digital Transformation in Higher Education	Farias et al. (2022)	Digital transformation in higher education and digital pedagogy strategies.	Focus on digital pedagogy in higher education.
12	Correlation of Digital Literacies	Yeşilyurt & Vezne (2023)	Correlation between digital literacy and related competencies.	Understand the relationship between digital literacy concepts.
13	Pedagogical Practices During COVID-19	Cabero-Almenara et al. (2022)	Teacher profiles during the COVID-19 pandemic.	The impact of the pandemic on pedagogical practice.
14	Digital Literacy Assessment for Teachers	Gümüş & Kukul (2023)	Development of teacher digital competency scale.	Measuring the integration of technology in education.
15	Assessment of Digital Competence Framework	Mattar et al. (2022)	Digital competency assessment instrument of teachers and students.	Measure digital competence and professionalism.
16	Smartphone Apps for Physical Activity	Otto et al. (2023)	Impact of smartphone apps in physical education.	Encourage physical activity and student participation.
17	TPACK Framework and Digital Literacy	Zou et al. (2022a)	Academic interest in digital literacy and teacher development.	Important contributions to the development of research and practice.
18	Email Communication Evaluation	Tratnik et al. (2023)	Evaluation of email communication between students and lecturers.	Memahami faktor-faktor yang mempengaruhi gaya komunikasi email.
19	TPACK Framework in Education	Zou et al. (2022b)	Pengaruh dan tren kerangka kerja TPACK dalam pendidikan.	Support research direction and teaching practice.
20	Digital Competence of Disabled Students	Cabero-Almenara et al. (2022)	Perceptions of digital literacy of students with disabilities.	The importance of digital literacy plans in education.
21	AI Impact on Student Creativity and Learning	Wang et al. (2023)	The relationship of artificial intelligence with student achievement.	Application of AI in education and creativity development.
22	Digital Practices in Higher Education	Otto et al. (2023)	Digital practices in student-centered learning during the pandemic.	Critical factors and barriers in digital learning.

5. Discussion

This study presents a comprehensive view of digital literacy in education through a systematic literature review of 1037 research articles from 2000 to 2020. Key findings include the identification of related terms and six key factors in digital literacy, namely information literacy, digital literacy development, digital learning, ICT, social media, and 21st century digital skills. The research also identified three main streams that can be used as digital literacy frameworks in education.

This research makes an important contribution in understanding and developing digital literacy in an educational context. Identification of key terms and factors leads to a better understanding of key aspects in digital literacy that need attention in curriculum development and learning. The resulting framework can assist educators and practitioners in designing instructional strategies that focus on developing students' digital literacy.

This research has strength in the coverage of current literature, allowing the identification of key trends and factors in digital literacy in education. A systematic approach in literature review also provides reliability in identifying relevant information and significance in describing the digital literacy landscape.

As a literature review, this study may have limitations in understanding the more in-depth and in-depth context of each of the studies included. In addition, the interpretation and synthesis of various studies may be susceptible to researcher bias, which may affect the final results.

For future research, it would be beneficial to conduct more in-depth research on each of the key factors in digital literacy, as well as analyze the implementation of digital literacy practices in student-centered educational environments. Further, research can develop more structured evaluation tools to measure students' digital literacy levels and their effect on academic achievement. In addition, cross-country or cross-cultural comparative research can also be effective.berikan wawasan tentang perbedaan dalam praktik literasi digital di berbagai konteks pendidikan.

6. Conclusion

This study aims to investigate and elaborate the picture of digital literacy in an educational context through a systematic literature review. The issue of this research is how

digital literacy in education can be defined, equipped with frameworks, and measured effectively using relevant evaluation tools.

The results detail key findings from a literature review of 1037 research articles from 2000 to 2020. Some of the key points include the identification of related terms and six key factors in digital literacy, namely information literacy, digital literacy development, digital learning, ICT, social media, and 21st century digital skills. This research also develops a digital literacy framework in education that can be used as a guide in designing learning strategies.

The conclusion of this study underscores the importance of digital literacy in the context of growing education. With the framework and key factors identified, educators and practitioners have the foundation to design learning approaches that fit students' digital literacy needs. Furthermore, this research provides the basis for the development of better evaluation tools in measuring students' digital literacy levels and their impact on academic achievement. Further research can take in-depth steps in assessing the implementation and effectiveness of digital literacy practices in a variety of learning environments. Thus, this research encourages the development and application of digital literacy more effectively in an effort to improve the quality of education in this digital era.

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