



Digital Literacy as a Fundamental Competency in the 21st Century Education

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Abstract

Introduction to The Problem: This research aims to explore the role of digital literacy in improving the quality of learning in the 21st century through several main aspects, namely digital literacy in the context of education, in the learning process the role of teachers in supporting digital literacy and the application of digital literacy in education. Digital literacy plays an important role to help students and educators utilize technology effectively in the learning process. However, this ease of access does not always mean that the information obtained can be used immediately without in-depth understanding. **Purpose:** The main purpose of this study is to develop a deeper understanding of the importance of digital literacy in education and provide a clearer direction in implementing digital literacy in educational institutions in Indonesia. **Design/methods/approach:** This research uses descriptive qualitative research through a library study approach. The method of collecting sources in this research uses literature review on books and scientific articles published online and research related to the types of research in quantitative and qualitative research. The data is related to the role of digital literacy in improving the quality of learning in the 21st century. **Findings:** This study concludes that digital literacy in developing quality learning in the 21st century confirms the importance of digital literacy skills as a fundamental aspect of modern education. Digital literacy gives students and teachers the ability to adapt to rapid technological change, allowing for more interactive, collaborative and contextualized learning experiences.

Keywords: Digital literacy; Learning quality; 21st century; Education; Technology

Introduction

Literacy in Latin is called literatus, which means a person who learns. Initially, literacy was defined as the ability to read and write well. From this definition, it was thought that literacy

determined language skills. The meaning of literacy became more complex and changed over time. Literacy according to the National Institute for Literacy is a person's ability to write, read, calculate, speak and solve problems at a certain level according to the field of expertise relevant to everyday life, such as in family, community and work (Zamista & Pd, 2022).

As the digital era is rapidly developing, the skills to understand, access and use technology-based information are becoming increasingly important in various aspects of life, especially in education. This creates the need for broader and more complex skills, namely digital literacy. Digital literacy can be defined as the ability to access, evaluate and manage information through digital media wisely and effectively (Aufa, 2023). This ability not only includes basic skills in using technological devices, but also includes a deep understanding of how digital information can be utilized in everyday life, including in the context of learning. Digital literacy has become an essential element that supports 21st century skills such as creativity, critical thinking, collaboration and communication, all of which are necessary for students to compete in an increasingly complex and global environment.

Digital literacy plays an important role to help students and educators utilize technology effectively in the learning process. This century, access to information has become easier and faster, thanks to the internet and other digital technologies. However, this ease of access does not always mean that the information obtained can be used immediately without in-depth understanding. With good digital literacy, students and educators can sort out information that is relevant and valid for learning, and avoid content that is inaccurate or even misleading. Digital literacy allows students to be more critical in evaluating the information they find, so that they can distinguish between factual and unreliable information. This is important in facing the challenges of the digital era, where misinformation and hoaxes are increasingly easy to spread (Chaerani et al., 2024).

Not only does it impact students' ability to find information, but digital literacy can also improve the quality of learning through more interactive and collaborative teaching methods (Nurjannah, 2022). In traditional learning, the teaching and learning process is generally one-way with the teacher as the main source of information and students as passive recipients. However, with digital technology students can be more active in finding information, discussing with peers and working together on digital-based projects (Laurensi Br Kaban et al., 2023). Digital-based learning allows students to collaborate with their peers. Not only in the same class, but also with students around the world through the internet network. This opens up opportunities for students to gain broader insights and diverse perspectives, which are difficult to obtain in conventional learning (Ningsih et al., 2021).

Digital literacy also allows the use of various types of innovative learning media such as videos, simulations and interactive applications that can help students understand complex concepts in a more interesting and understandable way (Nurjannah, 2022). With these various media, the learning process becomes more varied and less monotonous, thus increasing students' interest in the material being studied. In addition, digital literacy allows students to learn according to their own pace and learning style (Rasyidnita et al., 2024). Some online learning platforms, for example, provide features that allow students to repeat lessons as many times as necessary or accelerate their learning if they have mastered certain material. This provides much-needed flexibility in modern learning, especially for students with diverse learning needs (Reddy et al., 2023).

However, the success of digital literacy in education cannot be separated from the role of teachers as facilitators of digital learning. Teachers must have adequate digital literacy skills to guide students in using technology effectively and safely. The challenges faced in developing digital literacy in the school environment are limited technological infrastructure and the availability of adequate digital devices for all students. In addition, not all teachers have sufficient skills or knowledge in digital literacy, so training that supports the development of digital literacy for educators is important. Education that prepares young people for the world of work and life in the 21st century must ensure that teachers and students can utilize digital literacy to effectively achieve learning objectives (Nurjannah, 2022).

Therefore, digital literacy is not only a good additional skill to have, but an integral part of 21st century education that cannot be ignored. This article aims to explore the role of digital literacy in improving the quality of learning in the 21st century through several main aspects, namely digital literacy in the context of education, in the learning process the role of teachers in supporting digital literacy and the application of digital literacy in education (hasanah, 2023). Based on the description above, the research is entitled “Digital Literacy As A Fundamental Competency In 21st Century Education”. Through this discussion, it is hoped that a deeper understanding of the importance of digital literacy in education will be developed and provide a clearer direction in implementing digital literacy in educational institutions in Indonesia.

Literature Review

In this section, a literature review of various studies relevant to previous research that discusses Digital Literacy as a 21st Century Fundamental Competency will be presented:

The first research is research from the journal E'first Ar1 and Arlin Astriyani entitled “Webinar on the Role of Pedagogical Competence and the Importance of 21st Century Digital

Literacy to Build a Resilient Generation Z” the material presented is the role of pedagogical competence, digital literacy learning and various applications that can be used by us as students and educators. The results and discussion in this study conducted activities carried out by Real Work Lecture students by providing material through webinars which contained an understanding of pedagogical competence and its role, understanding the importance of digital literacy, encouraging participants to develop digital literacy in learning and analyzing the needs of generation Z. The training was divided into two sessions: The first session by Arlin Astriyani, M.Pd, with two materials: 1. definition of pedagogical competence and 2. the role of pedagogical competence. And the second session by Aswir, M.Pd with three materials: 1. Definition of digital literacy, 2. Urgency of digital literacy and 3. Challenges of generation Z education. (Ar & Astriyani, 2021).

The second research is research from the journal Puspa Mawarni, Burhanudin Milama, and Rizqy Nur Sholihat entitled “Perceptions of Prospective Chemistry Teachers Regarding Digital Literacy as a 21st Century Skill” This study aims to determine how prospective chemistry teachers perceive digital literacy as a 21st century skill. Respondents are chemistry education students at Syarif Hidayatullah State Islamic University Jakarta class of 2016, 2017, and 2018. The research data were obtained from the answers of 187 respondents to the questionnaire given. The results showed that in the media and information literacy component, chemistry teacher candidates had a very good perception with an average percentage of 81.06%, as well as in the ICT literacy component, chemistry teacher candidates had very good perception criteria with a percentage value of 84.47%. Thus, it can be seen that the overall perception of prospective chemistry teachers regarding digital literacy has very good perception criteria with the average percentage of all indicators of 82.19% (Mawarni et al., 2021).

Methods

This research uses descriptive qualitative research through a library study approach, namely data collected through the study of previous journals and articles (library research) which we take from relevant data from 2020-2024 (Wulandari et al., 2023). The source collection method in this research uses literature review on books and scientific articles published online and research

related to the types of research in quantitative and qualitative research (Syahrizal & Jailani, 2023). The differences that exist in this article with previous articles can be concluded that, in previous articles, many explain the roles of digital literacy in general. Not many and not many have explained in detail about the role of digital literacy for students and educators, its urgency, and its development as well as the impacts and effects contained in the application of digital

literacy, finally in this article discussing the opportunities and challenges contained in the application of digital literacy for both educators and students in several different perspectives.

Data analysis techniques use data reduction in the form of taking theories that are considered important from books and articles related to the theme of this research, then presenting data and drawing conclusions from the data that has been collected and deemed relevant to the theme of this paper and can be accounted for its validity. The data used are books, journals and articles that support the writing of this article (Sundaro, 2022). his review was conducted to explore information on the role of digital literacy in improving the quality of student learning. The data obtained from the reviews were then analyzed based on the theory of the role of digital literacy in improving learning.

Result

Overall, digital collaboration and communication in digital literacy offers great opportunities for 21st century learning, by developing students' access to a wide range of materials and interactions, opening up opportunities to work together without geographical boundaries, and training them with communication skills relevant to the future world of work (Suwanto et al., 2022). Digital literacy enables students to develop critical thinking skills as they have to sort out information from diverse digital sources, assess its validity and relevance, and integrate new knowledge into existing understanding.

This process requires in-depth analysis, which motivates students to be more critical and selective in their learning. Many studies have found that students who have good digital literacy are able to achieve higher learning outcomes compared to students less familiar with digital technology (Muflihini, 2020). In a digital literacy-based learning environment, students' mastery of technology also enhances their ability to work collaboratively through various online platforms. These include learning platforms such as Google Classroom or Microsoft Teams that allow students to discuss, and share ideas without the limitations of physical space. This ability to collaborate is important in 21st century learning, as these skills are needed in an increasingly global and connected world of work (Dinata, 2021).

On the other hand, mastering digital literacy helps students to be better prepared for technology-based learning outcomes evaluation, such as online exams and digital project-based assessments (Widiansyah et al., 2024). These assessments not only assess understanding of the subject matter, but also students' skills in utilizing digital tools, organizing information, and conveying their ideas clearly and effectively. The use of technology in evaluation allows for a more comprehensive assessment of various aspects of students' skills, such as creativity and

communication skills, which cannot always be measured in traditional tests.

Previous research also shows that digital literacy plays a role in increasing students' motivation to learn, as students feel more interested and motivated by learning that involves technology (Saefullah et al., 2023). For example, through the use of learning videos, simulations and interactive tools, students are more enthusiastic about understanding the material presented. These digital tools often offer a more enjoyable and relevant approach to learning for students, thus improving their participation and learning outcomes. In addition, digital literacy helps students to prepare themselves for the challenges of the digital era by developing information management skills, where they are trained to manage, store and utilize information effectively (Cynthia & Sihotang, 2023). This experience is beneficial for students in continuing higher education or entering the workforce, as these skills are needed in various fields.

However, the effectiveness of digital literacy in measuring learning outcomes is also faced with challenges, such as the availability of adequate infrastructure and the need for training support for teachers (Gunawan et al., 2024). Several studies have shown that in schools with limited access to technology, students tend to lag behind in digital literacy and their learning outcomes are relatively lower. Teachers' readiness to integrate digital literacy into learning also affects the effectiveness of technology-based learning, so training and improving digital competence for teachers is also an important need (Reddy et al., 2023).

Digital literacy has a significant role in developing the quality of learning in the 21st century, both through improving students' analytical and problem-solving skills, collaboration, and learning motivation. Digital literacy not only develops academic understanding but also helps students to be better prepared for life in the evolving digital era (Pare & Sihotang, 2023). Digital literacy is not just an additional skill, it is an important part of 21st century education and cannot be ignored. The role of digital literacy aims to consider improving the quality of learning in the 21st century through the educational context in the learning process, the role of teachers in supporting digital literacy, and the application of digital literacy in education. It is hoped that through the above discussion, the importance of digital literacy in education is better understood and a clearer direction is given for the implementation of digital literacy in Indonesian educational institutions.

Discussion

This research highlights the important role of digital literacy in developing the quality of 21st century learning, which is characterized by critical thinking, creativity, collaboration and communication skills. Based on the library research method of Indonesian journals related to the

title, digital literacy is identified as a key skill that helps teachers and students make optimal use of technology in teaching and learning activities (Juldial & Haryadi, 2024). The following are some of the main results obtained from the literature study:

Urgency of Digital Literacy Implementation

The challenges in implementing digital literacy in 21st century learning highlight the various obstacles faced in integrating digital technology effectively in educational settings. Although digital literacy offers many benefits, there are still various aspects that need to be improved to optimize the role of technology in learning (Sugiarto & Farid, 2023). The challenges involved in this include:

a. Unequal access to technology and the internet

In remote and lower-middle-income areas, this limited access hinders the equitable implementation of digital literacy. Many students and teachers still experience difficulties in obtaining digital devices, such as laptops or smartphones, as well as stable internet networks. These inequalities widen the digital divide in society and limit the potential for improving the quality of education for all.

b. Limited technology infrastructure in schools

Digital infrastructure such as computer labs, internet access and hardware are often inadequate or outdated. In some cases, schools have to share devices interchangeably, which causes the teaching and learning process to not run optimally. This lack of infrastructure often makes digital literacy a difficult thing for students and teachers to achieve, especially at the primary and secondary education levels.

c. Lack of digital training and skills in teachers

This has a significant impact on the quality of digital literacy. Many teachers are still not familiar with digital tools or applications for learning purposes. In fact, mastering digital skills is essential to integrate technology into the teaching and learning process effectively. When teachers do not have sufficient competence, the digital-based learning process tends not to take place optimally and tends to rely on traditional methods.

d. Cultural and Psychological Challenges

Some students and teachers still have doubts or resistance to the use of technology in education. In some educational environments, digital technology is perceived as complicated or even disruptive to conventional methods that they are more familiar with. This discomfort often results in low motivation to utilize technology in learning.

e. Digital safety and ethics

The use of digital devices increases security risks, such as misuse of personal data and

inappropriate negative content for students. Effective digital literacy should not only teach students how to operate technology, but also provide an understanding of cybersecurity, internet etiquette, and the impact of the digital footprint they leave behind (Myke Lastri Miyanti & Muhammad Izzy, 2024). However, this aspect is often overlooked, and students do not always get an adequate understanding of digital responsibility (Maulana Ahmad et al., 2024).

f. Lack of supporting policies and education funding

Some regions and educational institutions do not have specific regulations that support digital literacy programs or do not receive adequate budget allocations for training programs, infrastructure or technology access. Weak policies or limited funds often lead to digital literacy programs not running or not being sustainable.

g. Effectiveness of digital literacy in learning outcome measurement

The effectiveness of digital literacy in measuring learning outcomes shows a significant impact on improving the quality of learning in the 21st century. Digital literacy is proven to support the teaching and learning process in various ways that enrich students' educational experience (Susanto, 2021). Mastery of digital literacy not only makes it easier for students to access wider learning resources but also encourages them to be more active in seeking additional information, which in turn strengthens their understanding of the material being studied.

Mastery of Technology for Teachers and Students

In the discussion of digital literacy, mastery of technology for both teachers and students plays an important role in developing the quality of learning in the 21st century. Based on research results from various journals and articles, digital literacy is seen as an essential skill that enables both students and teachers to access and use information effectively, as well as supporting a more innovative and responsive learning process.

For teachers, mastering technology provides an advantage in designing and delivering interactive and engaging learning materials. Teachers who master digital technology can utilize various platforms and devices, such as online learning modules, video conferencing, and collaborative applications, which facilitate distance and face-to-face learning. Research shows that teachers' mastery of technology helps to make learning more inclusive and diverse, so that students access materials and interact actively (Wati & Nurhasannah, 2024). Teachers with digital literacy are also able to tailor teaching strategies to individual student needs, utilizing learning data collected through digital platforms to understand student development and needs more deeply.

On the student side, good digital literacy enables them to access information independently and responsibly. Students who have digital literacy skills are able to search, evaluate and use

information from various sources wisely, and utilize technology to support their learning (Cynthia & Sihotang, 2023). Mastery of technology gives students the freedom to explore knowledge, have critical, creative and collaborative thinking skills, required by the future world of work. With the ability to access a variety of digital learning resources, students can also develop autonomy in their learning.

The importance of digital literacy for teachers and students in this modern era is increasingly recognized, given its major role in supporting learning methods that are oriented towards developing 21st century competencies, such as critical thinking, collaboration, communication and creativity. Based on literature studies, strong digital literacy not only promotes better teaching quality, but also provides a foundation for students to become independent learners who are ready to face global challenges.

Currently, both public and private schools are trying to reorganize their education system. Many programs are offered to the community, be it majors or school status in the form of superior, model, SSN, international, acceleration including infrastructure (Salsabila & Agustian, 2021). This is related to the development of competencies in the 21st century, which will encourage critical thinking, collaboration, communication, and creativity. Based on the literature review, strong digital literacy not only promotes better teaching quality but also provides a foundation for students to become independent learners who are ready to face global challenges.

Improving Critical Thinking and Creativity

In 21st century learning, digital literacy plays an important role in developing students' critical thinking and creativity. Digital literacy allows students to access, analyze and evaluate information from various digital sources, which stimulates their critical thinking

skills. In teaching and learning activities, teachers often utilize digital platforms to introduce students to diverse content, ranging from articles, videos, to digital simulations that allow them to explore learning topics in greater depth. As such, digital literacy encourages students to ask critical questions, identify information bias, and understand the relevance and quality of the information sources they encounter.

This critical thinking ability is closely related to students' creativity in compiling, analyzing and presenting information in a more dynamic form. In digital-based learning, students are often tasked with creating presentations, videos, infographics or other digital products that require creativity. Various digital applications and tools give students the opportunity to design and convey their ideas in interesting and innovative ways (Putra & Pratama, 2023). In addition, the digital environment allows them to collaborate virtually with their peers, where this process of exchanging ideas also develops critical thinking skills and encourages students to think outside

the conventional mindset.

The application of digital literacy also enriches students' problem-solving skills. Students are encouraged to analyze complex problems, find creative solutions, and overcome challenges in an effective way (Leorince et al., 2021). Digital technologies provide access to various simulation models, software, and collaborative platforms, so students can learn to solve problems in a more innovative and collaborative way. For example, they can take part in virtual simulations of experiments or practice making decisions through problem-based learning scenarios.

A number of studies have suggested that the improved critical thinking and creativity generated by digital literacy has a significant impact on the quality of learning. Students who are familiar with the process of critical thinking and innovation tend to be more active in class, more courageous in expressing ideas, and more open to varied learning approaches (Reddy et al., 2023). This results in a more interactive, dynamic and meaningful learning process, where students do not just receive information, but are involved in the process of developing knowledge themselves. Digital literacy helps to create an adaptive learning environment, where students are encouraged to explore new ideas, face challenges with a positive attitude, and see opportunities in every problem they (Yusuf, 2024).

Thus, digital literacy not only helps students develop technical skills, but also hones soft skills that are essential in facing the demands of the 21st century. The critical thinking skills and creativity gained from digital literacy play a vital role in preparing young people to become lifelong learners who are able to adapt and innovate in a changing world.

Collaboration and Digital Communication

Digital collaboration and communication is an important element of digital literacy that plays a significant role in developing the quality of 21st century learning. Digital literacy enables students and teachers to connect in learning spaces that are not limited to physical boundaries, utilizing a variety of interactive communication platforms and tools. Platforms such as Google Classroom, Microsoft Teams, and other video conferencing applications are the main facilities that support collaborative learning, where students can work on group projects online, discuss through forums, and share their work in real-time (Reddy et al., 2023).

In the context of digital collaboration, digital literacy helps students to understand how to effectively work with peers, organize tasks, and distribute responsibilities despite being in different places. Through digital literacy skills, students learn to understand how to use technology for collaborative purposes while respecting the ethics of communication, whether through written, video or voice messages. Digital literacy also promotes understanding of the roles and perspectives of team members, enriching their learning experience. Effective digital

communication requires an understanding of appropriate ways of conveying messages and active listening, including using appropriate media. This allows students and teachers to stay connected without having to meet face-to-face, which is particularly beneficial in online or distance learning contexts. Digital literacy also helps students manage communication in a more structured way, for example using assignment management apps or organizing meeting times online. For teachers, good digital communication makes it easier for them to give quick feedback, monitor student progress and provide additional learning materials according to student needs.

Conclusion

The conclusion of the research on digital literacy in developing quality learning in the 21st century confirms the importance of digital literacy skills as a fundamental aspect of modern education. Digital literacy gives students and teachers the ability to adapt to rapid technological change, enabling more interactive, collaborative and contextualized learning experiences. These skills encourage students to think critically, communicate effectively and work collaboratively in a learning environment that is increasingly enriched by technology. Based on the library research method of Indonesian journals related to the title, digital literacy is identified as a key skill that helps teachers and students make optimal use of technology in teaching and learning activities.

At the student level, digital literacy enhances critical thinking and creativity, two skills needed to solve problems and find innovative solutions in a highly connected world. The utilization of technologies such as interactive simulations and educational apps encourages student engagement in the learning process, increasing their motivation and ultimately contributing to better learning outcomes.

For teachers, digital literacy is a means to design learning experiences that are more in line with the needs of 21st century students. Through mastery of digital technology, teachers can integrate a variety of diverse learning media and methods, such as project-based learning, virtual collaboration and technology-based assessment. These skills help teachers create a classroom that focuses not only on academic achievement but also the development of students' social and emotional skills, which are crucial in shaping workforce-ready individuals.

However, challenges in implementing digital literacy still exist, especially in terms of gaps in access to technology in some areas and the need for teachers to be able to utilize technology optimally. However, digital literacy has great potential to enrich the quality of learning if supported by adequate infrastructure, appropriate education policies and active involvement from various parties. With proper integration, digital literacy will continue to be an important foundation for innovative, competitive and inclusive education in the 21st century.

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