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# The Role of Digital Literacy in Shaping Students' Critical Thinking Skills in the Era of Educational Transformation

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**ABSTRACT**

Digital transformation in the world of education has brought major changes to the way students acquire, process, and utilize information. The development of information technology provides easy access to various learning resources, but at the same time also presents challenges in the form of increasing the spread of invalid information, misinformation, and students' low ability to evaluate digital information. This condition shows that digital literacy is an important competency that students must possess in order to be able to use technology effectively, critically, and responsibly. This study aims to analyze the role of digital literacy in shaping students' critical thinking skills in the era of educational transformation. This research uses a qualitative approach with a literature study method through the analysis of various relevant national and international journal articles on digital literacy and critical thinking skills. The results of the study show that digital literacy has a significant contribution to the development of students' critical thinking skills, especially in the aspects of the ability to access information, evaluate the credibility of sources, analyze digital data, solve problems, and make decisions based on valid information. Digital literacy is not only related to the ability to use technological devices, but also includes cognitive and ethical abilities in understanding and utilizing digital information. Therefore, the integration of digital literacy in the learning process is an important strategy to form students who are able to think critically, adaptively, and competently in facing the challenges of 21st century education.

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## 1. INTRODUCTION

The development of information and communication technology has brought fundamental changes in various aspects of human life, including in the field of education. The era of digital transformation has changed the learning paradigm from the conventional teacher-centered system to more flexible, open, and technology-based learning. Today's students not only obtain information through textbooks and teacher explanations, but also through various digital platforms such as search engines, social media, learning applications, and internet-based information resources. These changes provide great opportunities in improving the quality of learning, but also present new challenges in the form of students' ability to filter, evaluate, and use information appropriately.

The ease of access to digital information has caused the amount of information available to increase significantly. However, not all information available through digital media has quality and truth that can be accounted for. The phenomenon of spreading fake news, misinformation, and uncredible digital content is an increasingly complex problem in the world of education. Students who do not have adequate digital literacy skills have the potential to receive information passively without conducting an analysis and

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evaluation process first. Therefore, the ability to use technology must be followed by the ability to think critically so that students are able to use digital information wisely.

Digital literacy is one of the important competencies in facing changes in education in the 21st century. The concept of digital literacy was first introduced by Gilster (1997) who explained that digital literacy is not only the ability to use computers or technological devices, but the ability to understand and utilize information from various digital sources. Digital literacy includes the ability to search for information, understand the meaning of information, evaluate the credibility of sources, and use the information to solve certain problems. Thus, digital literacy has a broader dimension than just technical skills in operating technology.

Eshet-Alkalai (2004) explained that digital literacy is a set of abilities that include cognitive, social, emotional, and technical aspects in using the digital environment. This perspective shows that a person who has digital literacy is not only able to use technological devices, but also able to understand the context of information, think critically about digital content, and behave ethically in the digital space. In the context of education, this ability becomes increasingly important because students are faced with various forms of information that require analysis and evaluation skills.

Critical thinking skills are one of the main skills that must be developed in modern education. Critical thinking refers to a person's ability to analyze information, evaluate evidence, identify assumptions, formulate arguments, and make rational decisions. Facione (2015) explained that critical thinking includes several main skills, namely interpretation, analysis, evaluation, inferences, explanations, and self-regulation. These abilities are indispensable in a digital environment because students must be able to determine whether information can be trusted or not.

The relationship between digital literacy and critical thinking skills is increasingly important in the context of technology-based learning. When students use the internet as a learning resource, they must have the ability to compare various sources, identify information biases, and determine the validity of information. Digital literacy provides a foundation of skills that allow students not only to become technology users, but also to become individuals who are able to think reflectively and critically about the information they receive.

Previous research has shown that digital literacy has a positive relationship with students' critical thinking skills. Ng (2012) explained that digital literacy in education has three main dimensions, namely technical, cognitive, and social-emotional dimensions. The cognitive dimension in digital literacy is closely related to critical thinking skills because it involves the process of understanding, evaluating, and creating digital information. Students who have a high level of digital literacy tend to have better ability to evaluate information and solve problems compared to students with low levels of digital literacy.

In the context of 21st century learning, digital literacy is an important part of developing students' competencies. Van Laar et al. (2017) explained that digital skills are closely related to high-level thinking skills such as problem-solving, creativity, communication, and critical thinking. This shows that technology is not only a tool to accelerate access to information, but also a means to develop students' cognitive abilities if used appropriately in the learning process.

However, the implementation of digital literacy in education still faces various challenges. Some students have technical skills in using digital devices, but do not have the critical ability to evaluate the information obtained. This condition shows that there is a gap between the ability to use technology (*digital skills*) and the ability to understand and

use technology critically (*digital literacy*). In addition, the limitations of teachers' digital competence, the lack of technological facilities, and the lack of optimal integration of digital literacy in the curriculum are factors that affect the success of digital literacy development in schools.

Several studies show that learning that integrates digital literacy can improve students' critical thinking skills. Research by Izzah et al. (2022) shows that the integration of digital literacy in social-science issue-based learning is able to improve the critical thinking skills of secondary school students. Another study by Rejeki et al. (2022) also shows that the application of online problem-based learning is able to improve the critical thinking skills as well as digital literacy of elementary school students.

Based on this study, it can be understood that digital literacy has a strategic role in shaping students' critical thinking skills. However, a more in-depth study is still needed on how digital literacy can be integrated in the learning process to produce students who are able to face information complexity in the era of educational transformation. Therefore, this study aims to analyze the role of digital literacy in shaping students' critical thinking skills and identify strategies that can be applied in the educational environment.

This research is expected to make a theoretical and practical contribution to the development of technology-based education. Theoretically, this research enriches the study of the relationship between digital literacy and high-level thinking skills. Practically, the results of this research can be an input for teachers, schools, and education policymakers in designing learning strategies that are able to develop digital literacy skills while improving students' critical thinking skills.

## 2. METHODS

This research uses a qualitative approach with the literature *review* method which aims to analyze in depth the role of digital literacy in shaping students' critical thinking skills in the era of educational transformation. The literature study method was chosen because this study focuses on the study of various previous research results that discuss the relationship between digital literacy, the use of technology in learning, and the development of students' critical thinking skills. Through this method, the research can gain a comprehensive understanding of the concepts, theories, and empirical findings that have been developed by previous researchers.

The data sources in this study come from various scientific articles published in national and international journals that have relevance to the research topic. The literature used includes research on the concept of digital literacy, students' digital competence, technology-based learning, critical thinking skills, and digital literacy integration strategies in learning. The selection of literature sources is carried out based on several criteria, namely articles published in reputable academic journals, have a direct relationship with research variables, and provide methodological information and research results that can be analyzed.

The data collection process is carried out through several stages, namely literature identification, article selection, content analysis, and synthesis of research results. The identification stage is carried out by searching for various scientific articles using keywords such as *digital literacy*, *critical thinking skills*, *digital competence in education*, *technology-based learning*, and *21st century skills*. After the identification process, the articles obtained are then selected based on the suitability of the topic and the quality of the source. The selected articles are then analyzed to find the pattern of the relationship between digital literacy and students' critical thinking skills.

The data analysis technique used in this study is content *analysis*. The analysis is carried out by examining the main concepts, research methods, research results, and implications of various literature that have been selected. The results of the analysis are then categorized based on several main themes, namely the concept of digital literacy in education, the relationship between digital literacy and critical thinking, digital literacy development strategies in learning, and the challenges of implementing digital literacy in the educational environment. Through the analysis process, this research produces a synthesis of the role of digital literacy in shaping students' critical thinking skills.

## 3. RESULT AND DISCUSSION

The results of the literature review show that digital literacy has an important role in shaping students' critical thinking skills in the era of educational transformation. The development of digital technology has changed the way students obtain information, interact, and build knowledge. If previously students' learning resources came mostly from textbooks and teachers' explanations, now students have access to various digital information sources that are widely available. This condition provides a great opportunity to improve the quality of learning, but it also requires special abilities so that students are able to manage information appropriately. Digital literacy is a competency that allows students not only to use technology, but also to understand, evaluate, and use digital information critically.

The concept of digital literacy in education has developed from just a technical ability to a multidimensional ability that includes cognitive, social, emotional, and ethical aspects. Gilster (1997) explained that digital literacy is the ability to understand and use information from various digital sources effectively. This view shows that a person who has digital literacy is not only able to operate technological devices, but must also have the ability to determine the quality of information obtained. In the educational environment, this ability is closely related to the ability to think critically because students must be able to analyze, compare, and evaluate information before using it as a source of knowledge.

The results show that one of the main contributions of digital literacy to critical thinking skills is the improvement of students' ability to evaluate information. The digital environment provides a huge amount of information, but not all of the information has the same level of accuracy and credibility. Students who have high digital literacy will be better able to identify reliable sources of information, distinguish facts and opinions, and recognize information that contains bias or errors. This ability is an important part of critical thinking because it involves an evaluation process of available evidence and arguments.

These findings are in line with Ng's (2012) research which explains that digital literacy has three main dimensions, namely technical, cognitive, and social-emotional dimensions. The cognitive dimension is the most related aspect to critical thinking skills because it includes the ability to understand, assess, and create digital information. Students who have digital literacy skills at a good cognitive level are not only able to search for information, but also able to question the validity of the information. Thus, digital literacy serves as a basis for building reflective and analytical thinking patterns.

In addition to the ability to evaluate information, digital literacy also plays a role in improving students' problem-solving skills. The era of educational transformation requires students not only to be able to memorize information, but also to be able to use this information to solve real problems. Digital technology provides a variety of resources and

tools that can be used to find alternative solutions, but the success of its use depends on the ability of students to analyze problems and determine relevant information.

Van Laar et al. (2017) explain that digital skills have a strong relationship with 21st century skills, including critical thinking, creativity, communication, and problem-solving. The use of technology in learning can improve high-level thinking skills if students are not only passive users, but also involved in analysis, evaluation, and information creation activities. Therefore, digital literacy is a supporting factor in developing critical thinking skills because technology provides space for students to explore various perspectives and build a broader understanding.

The integration of digital literacy in learning also provides changes to the role of teachers and students. Teachers are no longer the only source of information, but rather act as facilitators who guide students in choosing and using digital learning resources. Meanwhile, students are required to be active learners who are able to search, process, and evaluate information independently. This paradigm shift shows that digital literacy is not only related to the use of technology, but also changes in learning culture towards more independent and critical learning.

In learning practice, the development of digital literacy can be carried out through various strategies, such as project-based learning, problem-based learning, discussions using digital sources, and information analysis activities from various media. These strategies allow students to interact directly with digital information so that their evaluation and analysis skills can develop. *Problem-based learning*, for example, provides opportunities for students to search for information, identify problems, and develop solutions based on evidence obtained from various digital sources.

Research by Siddiq et al. (2016) shows that technology and information literacy skills are related to students' ability to use information effectively for academic activities. Students who have better digital competence tend to be able to evaluate information more systematically than students who only have technical skills using digital devices. This shows that the development of digital literacy must be directed at high-level thinking skills, not just operational skills.

However, the results of the study also show that the implementation of digital literacy in education still faces various challenges. One of the main challenges is the gap between the ability to use technology and the ability to understand and evaluate digital information. Many students have skills in using digital devices, but have not been able to assess the credibility of the information they find. This condition shows that digital literacy needs to be understood as the ability to think critically in a digital environment, not just the ability to use technology.

In addition to the student factor, the teacher's digital competence is also an important factor in the success of digital literacy development. Teachers have a strategic role in designing learning that is able to integrate technology meaningfully. Without teachers' ability to utilize technology and develop digital learning strategies, the use of technology can be an activity that has less impact on the development of students' critical thinking skills.

The concept *of Technological Pedagogical Content Knowledge* (TPACK) developed by Mishra and Koehler (2006) explains that teachers need to have the ability to integrate technology, pedagogy, and learning materials at the same time. This ability is important because technology will only provide educational benefits if used with the right pedagogic strategy. Therefore, increasing students' digital literacy needs to go hand in hand with improving teachers' digital competence.

Strengthening digital literacy in the educational environment requires a systematic strategy so that technology is not only used as a learning tool, but also as a means to develop students' high-level thinking skills. Digital literacy must be placed as an integral part of the learning process, not as an additional competency that stands alone. This integration can be done through the development of learning activities that encourage students to seek information, analyze sources, evaluate the truth of information, and produce ideas or products based on digital technology.

One of the effective strategies in improving digital literacy and critical thinking skills is the application of *project-based learning*. This learning model provides opportunities for students to face real problems that require the process of searching for information, data analysis, collaboration, and decision-making. In this process, digital technology functions as a medium to obtain information and produce solutions. Students not only use technology to access information, but also learn to understand how the information can be used appropriately to solve certain problems.

Project-based learning is closely related to the development of 21st century skills. When students undertake technology-based projects, they must be able to identify problems, determine relevant sources of information, evaluate alternative solutions, and communicate the results of their thinking. This process directly trains critical thinking skills. Thus, digital literacy not only improves students' technical skills, but also builds the cognitive skills needed to deal with the complexity of digital information.

In addition to project-based learning, another strategy that can be applied is *problem-based learning*. This model places students in problem situations that require investigation and problem-solving. In a digital environment, students can utilize various sources of information to understand the problems given. However, the success of this process is highly dependent on digital literacy skills because students must be able to choose credible and relevant information.

Research shows that the use of a problem-based learning approach combined with digital technology can improve students' critical thinking skills. This happens because students are actively involved in the process of analyzing and evaluating information. They not only receive knowledge from teachers, but also build understanding through the process of finding and processing information independently. This condition is in accordance with the constructivist learning paradigm that places students as knowledge builders through learning experiences.

The role of teachers is an important aspect in the success of digital literacy integration in schools. Teachers have the responsibility to guide students to be able to use technology productively and responsibly. The ability of teachers to choose quality digital sources, design technology-based learning activities, and provide direction in evaluating information are factors that determine the effectiveness of digital literacy development.

Teachers' digital competence is an important part of educational transformation because teachers play a role as a link between technology and the learning process. Teachers who have good digital competence are able to utilize technology to create more interactive, collaborative, and contextual learning. On the other hand, the limitations of teachers' digital competence can cause technology to be used only as a tool for delivering information without having a significant impact on the development of students' thinking skills.

The teacher digital competency framework developed by Redecker (2017) through *the European Framework for the Digital Competence of Educators (DigCompEdu)* explains that teachers' digital competencies include the professional ability to use technology, the ability

to create digital learning resources, the ability to facilitate student engagement, and the ability to develop students' digital literacy. The framework shows that teachers not only need to understand how to use technology, but also understand how technology can be used to improve the quality of learning.

In addition to teachers, the support of educational institutions also has an important role in the development of digital literacy. Schools need to provide an environment that supports the use of technology, both through the provision of digital infrastructure, teacher training, and the development of school policies that encourage learning innovation. The availability of technology facilities is a supporting factor, but the success of educational digital transformation still depends on how the technology is used pedagogically.

The gap in access to technology is still one of the main challenges in the implementation of digital literacy. Not all schools have adequate digital facilities, especially schools in areas with limited technological infrastructure. This condition can cause inequality in students' opportunities to develop digital competence. Therefore, the development of digital literacy needs to be accompanied by a policy of equal access to technology so that all students get the same learning opportunities.

In addition to limited facilities, another challenge in developing digital literacy is the low awareness of digital ethics. The ability to use technology must be balanced with an understanding of responsibility in the digital space. Students need to understand the importance of maintaining privacy, respecting copyright, avoiding the spread of false information, and communicating ethically through digital media. This aspect shows that digital literacy has moral and social dimensions, not just technical and cognitive aspects.

Research by Martin and Grudziecki (2006) explains that digital literacy includes the ability of individuals to understand, evaluate, and use technology appropriately in various life contexts. This view emphasizes that digital literacy is a complex ability because it involves aspects of knowledge, skills, and attitudes. In education, these three aspects need to be developed in a balanced manner so that students are able to become critical and responsible users of technology.

The relationship between digital literacy and critical thinking can also be seen from students' ability to deal with increasingly complex information flows. Students who have high digital literacy do not easily receive information directly, but carry out the verification and analysis process first. This attitude shows the ability to think critically because students are able to question information sources, identify arguments, and make decisions based on evidence.

The transformation of digital education is ultimately not only related to the use of technology in learning, but also changes in the way of thinking in acquiring and using knowledge. Technology provides access to a wide range of information, but the ability to think critically determines how the information is utilized. Therefore, digital literacy is an important foundation in forming students who are able to adapt to changing times.

Based on the overall results of the study, it can be understood that digital literacy has a great contribution in shaping students' critical thinking skills. Digital literacy allows students to develop the ability to find information, evaluate sources, analyze various perspectives, and make decisions based on valid information. Thus, the development of digital literacy must be an important part of the strategy to improve the quality of education in the digital transformation era.

## 4. CONCLUSION

Based on the results of the studies that have been conducted, it can be concluded that digital literacy has a strategic role in shaping students' critical thinking skills in the era of educational transformation. Digital literacy is not only related to technical abilities in using technological devices, but also includes cognitive, social, emotional, and ethical abilities in understanding and utilizing digital information. These skills are becoming increasingly important because students today face a complex information environment with various digital sources that have different levels of credibility.

Digital literacy contributes to the development of critical thinking skills through improving students' ability to search, analyze, evaluate, and use information appropriately. Students who have good digital literacy are able to distinguish between valid and invalid information, understand various perspectives, and make decisions based on available evidence. Thus, digital literacy is one of the important competencies in building students who are able to think reflectively and rationally.

The development of digital literacy in education requires the involvement of various parties, especially teachers, schools, and education policymakers. Teachers have an important role in creating learning that integrates technology meaningfully through strategies such as project-based learning and problem-based learning. In addition, improving teachers' digital competence, providing technological infrastructure, and strengthening digital ethics need to be a concern so that digital education transformation can run optimally.

Overall, digital literacy is not only an additional ability in modern learning, but also a fundamental competency needed by students to face the challenges of the 21st century. The integration of digital literacy in the education system is expected to be able to produce a generation that is not only able to use technology, but also able to think critically, creatively, and responsibly in utilizing technology for academic and social life.

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