

Analysis of learning processes that integrates digital technology to enhance students' digital literacy

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ABSTRACT

This study aims to describe the implementation of digital literacy in elementary school learning and analyze the factors that support and hinder the use of digital technology by teachers and students. However, previous studies have primarily focused on general digital literacy practices without clearly examining how digital technology is integrated into actual classroom learning processes and how this integration influences students' ability to critically evaluate information. This study used a qualitative approach with a case study design. The research subjects consisted of two sixth-grade teachers and students in their classes at an elementary school, selected using snowball sampling based on their involvement in technology-integrated learning. Data were collected through non-participant observation, structured interviews, and documentation. The results show that even though schools already provide digital facilities and have official websites as learning resources, their use is not yet optimal. Students often search for information freely on the internet without guidance, thus accessing unreliable sources and their ability to select appropriate information is still low. The need for teacher guidance and the lack of use of official school digital resources are the main obstacles. Teachers also consider it important to improve digital literacy by providing useful digital content so that students can develop in accordance with the needs of the 21st century. These findings imply that improving digital literacy requires not only the availability of digital facilities but also structured teacher guidance, the integration of official digital learning resources, and the development of students' critical information filtering skills. Therefore, schools need to design more guided and structured digital learning activities to ensure that students can use digital technology accurately, responsibly, and effectively.

Keywords: digital literacy, elementary school, educational technology, information digital

INTRODUCTION

In the 21st century, marked by advances in information and communication technology, the role of technology as a learning medium has become very significant. The rapid development of digital technology has had a major impact on the world of education. Technological developments have facilitated the learning process and the search for various learning resources, because learning today is no longer limited by space and time (Sanita & Saparia, 2023). In today's digital era, the quality of education is required to be increasingly advanced so that it is easily accessible to all groups (Nopilda & Kristiawan, 2018). This century requires a comprehensive transformation of education, so that the quality of teachers who are able to advance knowledge, training, student equity, and student achievement can be developed (Ngongo et al., 2019).

In line with the demands of this transformation, the use of technology has become an important factor that cannot be separated from efforts to improve the quality of education. Science continues to advance over time, and this progress in the field of science supports the birth of technological innovations that indicate a shift in the times. This is in line with Tondeur's Sudarsri (2020) opinion, which states that digital technology has now begun to be applied in educational institutions as a medium to support the learning process, both as a source of information, i.e., as a medium for obtaining information, and as a learning aid, i.e., as a medium that supports learning activities and tasks. The education sector, as a place where technology develops, it is only logical that education also utilizes technology to facilitate the teaching and learning process, hence the term educational technology emerged. Educational technology refers to a planned approach to designing, using, and evaluating all teaching and learning activities by considering both technical and human resources and the relationship between the two, thereby resulting in a

more efficient educational process (Shihab et al., 2023). The rapid advancement of digital technology has given educators the opportunity to renew their teaching methods to be more creative by using various types of technological tools.

These technological developments have not only influenced teaching methods, but have also encouraged a fundamental shift in the concept of literacy, which has evolved into a more complex form. Traditionally, "literacy" has been understood as the ability to read and write. However, literacy is not limited to basic reading and writing skills, but also encompasses broader aspects. According to Gordon Wells' literacy model, there are four levels of literacy, namely performative, functional, informational, and epistemic (Wells, 1987; Putrayasa et al., 2024). This is in line with the definition of literacy produced by UNESCO experts at a meeting in Paris, which signaled the need to broaden the understanding of literacy. Literacy encompasses a learning process that enables individuals to achieve goals, develop their knowledge and potential, and interact fully in society and the wider community (Pamungkas, 2021). Digital literacy has become one of the government's initiatives included in the 2021-2024 digital literacy roadmap. Furthermore, the digital literacy movement is not only an initiative of the government but also involves academics and communities. Digital literacy is considered a preventive measure to deal with these negative impacts (Sulzby, 2024). However, previous studies on digital literacy have largely focused on conceptual definitions, general benefits, or broad implementation issues, without sufficiently explaining how digital technology is integrated into actual classroom learning processes at the elementary school level. As a result, there is still limited understanding of how students access, process, evaluate, communicate, and produce digital information during real learning activities.

In line with the function of digital literacy as a protective measure, its application in education has had a variety of positive impacts on the teaching and learning process. *Online* learning, digital libraries, technology-supported school management, and the use of interactive media are concrete examples of how technology can improve the efficiency of the educational process (Icha et al., 2025). Significant advances in the world of technology have brought about many transformations in various sectors. Digital technology, including computers, the internet, and educational applications, has created new opportunities to improve the quality of education. The integration of technology in education has enabled the emergence of learning methods that are more interactive, collaborative, and adaptable to students' needs (Wahyudi & Jatun, 2022). In addition, most previous studies tend to emphasize the availability and use of digital technology, rather than examining how students interact with digital information and how they develop the ability to evaluate and filter information critically (Haleem et al., 2022).

This situation shows that digital literacy skills need to be instilled early on so that all school members can use technology appropriately and in line with learning needs. Digital literacy at the elementary school level is a skill that both teachers and students need to have in order to use digital media appropriately, accurately, and responsibly to obtain learning information, find solutions to various problems, complete academic assignments, and interact in various

learning activities with other individuals in the educational environment. Mastery and improvement of digital literacy will help training participants adapt to rapid developments in information technology (Purba et al., 2022). The current digital era, especially in elementary schools, encourages all members of the school community to utilize digital literacy in academic aspects. Teachers and basic education institutions need to be strengthened in various dimensions, including curriculum, methods, strategies, and the application of learning approaches that support the development of 21st-century literacy skills. One important step is to strengthen literacy skills among teachers and educational institutions, shifting from traditional literacy, which includes reading, writing, and arithmetic, to more modern literacy (technology, data, *human resources/humanism*) (Ahsani et al., 2021). Teachers are expected to be able to adapt to changes and adjust themselves so that they can guide and direct students effectively. They need to take the right position to continue to be the figures needed in the educational process, by motivating, designing learning, and providing effective guidance in the (Aliyah & Masyithoh, 2024).

Teachers' efforts to adapt to the digital era also need to be balanced with the development of digital literacy as the basis for building 21st-century skills in students. In addition, digital literacy provides opportunities for students to realize the impact of technology on themselves and their environment, thereby building awareness of digital ethics and responsibility when socializing *online*. This integration also helps students expand their empathy and tolerance towards various views and experiences found in the virtual world, strengthening their character in terms of diversity (Arifin et al., 2024). The benefits of implementing digital literacy include the ability to expand vocabulary, optimize brain function, obtain the latest knowledge and information quickly and accurately, improve interpersonal skills, improve communication skills, improve analytical and thinking skills, and strengthen the ability to compose words. Through the digital literacy movement for elementary school students, it is hoped that positive character can be formed in children. Character education for children can be carried out through various methods, including collaboration between parents and teachers in utilizing technology in this modern era (Pentianasari et al., 2022). Literacy and character education are interrelated, where literacy contributes to the development of a strong character for students in facing the challenges of the digital world, while character education provides guidance on the use of literacy based on ethical values and social responsibility (Sugiarto & Farid, 2023).

Conditions in the field indicate that efforts to integrate digital technology into learning in order to strengthen students' digital literacy skills in the *Society 5.0* era face challenges. The rapid pace of digitalization provides convenience and tools for learning, but on the other hand, access without sufficient supervision creates risks of ethical and behavioral problems, such as *cyberbullying*, the spread of false information, and other digital crimes, which indicate a lack of moral values. Therefore, the implementation of digital literacy in schools should not only focus on technical skills in using the internet, but also needs to be balanced with the strengthening of moral values, ethics, and social

responsibility. This requires the presence of teachers as mentors who have broad knowledge and integrity so that digital technology can function optimally as a means to shape students' strong and responsible character. This study is important because elementary school students are at an early stage of digital literacy development, where habits of accessing, evaluating, and using digital information are first formed. Understanding how digital literacy is implemented in real classroom practices is essential to support more effective teaching strategies and to ensure that students develop critical and responsible digital behavior.

Several previous studies have examined digital literacy in educational contexts (Irhandyaningsih, 2020; Nurjanah et al., 2017; Wahyuni et al., 2025). However, these studies tend to focus on methodological differences or the number of indicators used, rather than analyzing how digital literacy is implemented in actual classroom learning processes. In addition, most studies emphasize outcomes rather than examining the learning process and students' interaction with digital information. Therefore, there is a need for a more in-depth study that focuses on how digital literacy is practiced in real classroom settings, particularly at the elementary school level.

Students still find it difficult to select accurate information, check whether internet sources are reliable, and understand the material on their own without simply copying from websites. This shows that their digital literacy skills are not yet well developed and they are still very dependent on teacher guidance. Identifying these difficulties is expected to enable this study to provide more appropriate advice for teachers in designing effective digital learning, providing appropriate assistance, and maximizing the use of technology in schools. This condition indicates a gap between the availability of digital technology and students' actual ability to use it critically and responsibly, which has not been sufficiently explored in previous studies.

This study offers a novel contribution by focusing on the actual learning processes in which digital technology is integrated, rather than merely examining digital literacy as a conceptual or outcome-based construct. It also provides a context-specific analysis of how elementary school students develop digital literacy through guided classroom practices. Based on the above background, this study aims to analyze students' digital literacy in elementary school learning through the following aspects:

1. Processing and building information from digital sources,
2. Presenting information and developing critical thinking skills,
3. Using information filters when accessing digital content,
4. Communicating information through digital media,
5. Collaborating using digital technology,
6. Filtering incoming digital information critically,
7. Producing and publishing digital works.

RESEARCH METHOD

Research Design

This study uses a qualitative approach with a case study research design. A qualitative approach was chosen to explore the phenomenon in depth in its natural context, as explained by Aspers and Corte (2019) that qualitative research aims to comprehensively understand the experiences, views, and behaviors of individuals. Case studies were chosen because they provide an in-depth understanding of specific programs or activities through careful and intensive observation, in accordance with the opinion of (Lichtman, 2023).

Participants

The research was conducted at SDN Serang 03 with two sixth-grade teachers as subjects. The sampling technique used was snowball sampling, which is a technique that asks initial respondents to recommend other individuals who meet the research criteria so that the sample grows through social networks (Korstjens & Moser, 2018). The study was conducted over a period of approximately five months. In addition, the learning activities observed involved two classes consisting of approximately 30 students each, resulting in a total of around 60 students participating in the observed learning processes. The initial participants were selected purposively, consisting of sixth-grade teachers who were actively involved in implementing digital technology in classroom learning. These initial participants then recommended additional participants who had relevant experience, allowing the researcher to obtain more comprehensive and in-depth data. To maintain confidentiality, the participants are referred to as Teacher 1 and Teacher 2. Both teachers teach at the same grade level and have similar qualifications and teaching responsibilities. They were selected because they were directly involved in implementing digital technology in classroom learning, making them relevant to the focus of this study.

Data Collection

Data was collected through structured interviews, non-participant observation, and documentation. Structured interviews were used to obtain targeted information because each question had been prepared in advance (Edelbrock & Bohnert, 2023). The interview instruments consisted of semi-structured questions focusing on teachers' strategies in guiding students' digital literacy, students' ability to evaluate information, and the challenges encountered during the learning process. Non-participant observation was conducted to directly observe the learning process that integrated digital technology without the researcher's involvement in classroom activities (Widodo et al., 2023). Observation guidelines were designed to capture students' interactions with digital tools, collaboration processes, and their behavior in accessing and processing information. Documentation was collected from various printed and digital documents, such as photos of activities, learning notes, and student work, and analyzed to reinforce the findings from interviews and observations (Ardiansyah et al., 2023; Odden et al., 2024). The documentation showed the digital literacy learning process, such as activities to search for information about planets using cell phones, student presentations, the creation of digital

posters using Canva, and the publication of student work on the school's Instagram account.

Data Analysis

The data analysis technique used in this study employs the interactive model technique from Miles and Huberman (2019), which consists of data reduction, data presentation, and conclusion drawing/verification. The three stages are described in more detail below: (1) data reduction, defined as the process of selecting, focusing on simplification, abstraction, and transformation of raw data that emerges from written notes in the field; (2) data presentation, Miles and Huberman define presentation as a structured set of information that allows for the drawing of conclusions and the taking of action, (3) drawing conclusions, according to Miles and Huberman, is only part of a whole configuration of activities. Data collection was conducted until data saturation was reached, indicated by the repetition of information and the absence of new significant findings during subsequent observations and interviews. The data analysis process involved coding and categorization, where data from interviews, observations, and documentation were systematically organized into themes based on the seven indicators of digital literacy.

Trustworthiness

The data validity technique in this study uses an interactive model technique from *Trustworthiness* consists of: (1) credibility criteria, credible or reliable from the perspective of the participants in this study, because from this perspective, the objective of qualitative research is to describe or understand phenomena that are of interest from the participants' perspective. (2) *Transferability*, this technique requires researchers to report their research results in detail, so that the explanations provided are thorough. These explanations must specifically describe everything necessary for readers to understand the findings obtained. (3) *Dependability*, to ensure that the research results are reliable in accordance with the concept of quantitative research, an

audit process is carried out on the existing dependencies. (4) Confirmability, to obtain objective data, an audit is also carried out on the accuracy of the data (Korstjens & Moser, 2018).

Ethical Consideration

Ethical considerations were taken into account throughout the research process. Participants were informed about the purpose of the study, and their participation was voluntary. Informed consent was obtained from all participants, and anonymity was ensured by not disclosing any identifiable personal information. In addition, the use of documentation, including visual data shared through school media, was conducted with careful consideration of student privacy and confidentiality.

RESULTS AND DISCUSSION

The findings of this study are presented based on the seven research aims, focusing on students' digital literacy practices in classroom learning processes, including information evaluation, collaboration, communication, and content creation. These findings correspond to the research aims, particularly in understanding how students interact with digital information and how teachers facilitate digital literacy practices in classroom settings.

Processing or Building Information

The results of research based on observations of this aspect show that schools do have official websites (in **Figure 1**) that can be used as learning resources, but they are not being used optimally. When teachers ask students to find material about the planets in the solar system, some students prepare writing materials and cell phones to search for information, while others do not bring digital devices. Teachers then divide students to search for information about planets based on the results of a game draw. In fact, students tend to search for information directly through the internet in general, rather than through the school website or more reliable and secure



Figure 1. Official website (<https://www.sdnserang03.sch.id/>)

learning resources. This shows that the implementation of digital literacy, especially in information searching, is still not optimal due to a lack of direct guidance and utilization of the school's official digital resources.

In addition to conducting observations, researchers also interviewed teachers to reinforce the research results by asking teachers questions about how they convey information from various reliable sources to students. The results of the teacher interviews explained that

The use of digital literacy is highly dependent on the subject matter being taught. If students are asked to search for information themselves, teachers usually provide reference links in advance to limit students' searches so that they remain relevant to the core material. However, if students are asked to search for information without being given references, the search results tend to be too broad, and may even include material that is not appropriate for their level of education.

The teacher emphasized that the best strategy to improve students' ability to organize knowledge is to provide a database of digital school content, such as articles, educational videos, educational games such as *coding games*, and interactive questions such as *Quizizz*. According to the teacher, this database can help students avoid getting lost in irrelevant sources of information. The teacher also mentioned that schools can create digital newsletters containing students' work, which can be shared with parents as part of a broader digital literacy implementation.

Field research shows that there's a gap between digital tools and the learning process. In terms of infrastructure, schools have set up resources to support digital literacy, including official websites that are supposed to be learning resources. But these resources aren't being used to their full potential by students or teachers. During a lesson on the solar system, some students did bring their cell phones to search for information on the internet, but they tended to choose sources whose accuracy was unclear. This illustrates that the use of reliable digital learning resources is still very minimal. These findings are in line with research by Kunz et al. (2024), which shows that a lack of guidance from teachers regarding technology makes students more likely to rely on untested online sources. In addition, research by Zhang et al. (2023), emphasizes that elementary school students often have difficulty distinguishing between reliable and unreliable information because they are not accustomed to the practice of verifying information. The occurrence of inaccurate information can be categorized as frequent, as it appeared repeatedly during classroom observations and was consistently reported by teachers during interviews. Similarly, Gameil et al. (2023), found that the lack of utilization of official digital platforms in schools is closely related to the lack of regular guidance from teachers in the process of improving digital literacy.

Presenting Information and Critical Thinking

Based on observations, it appears that not all students are able or willing to verify the information provided by their friends with the contents of books or other sources. Many



Figure 2. Students presenting the results of the internet (Source: Field study)

students simply listen without making comparisons. However, some students show a higher level of curiosity, such as when they find differences between the information provided by their friends, the information they find themselves, and the information contained in books. This shows that some students are beginning to demonstrate critical thinking skills, although these skills are still limited. The majority of students still copy information without analyzing it, and limited digital facilities are also an obstacle to applying digital literacy in this aspect. Based on observations, as shown in **Figure 2**, it appears that not all students are able or willing to verify the information provided by their friends with the contents of books or other sources. Many students simply listen without making comparisons.

Figure 2 illustrates students presenting information obtained from the internet. This indicates that although students are actively involved in presenting information, their ability to critically evaluate and verify information is still limited, as many of them rely on unverified sources. In addition to conducting observations, researchers also interviewed teachers to reinforce the research results by asking them questions about how they guide students to present accurate information. Based on the results of interviews with teachers, it was stated: "I guide students by asking them to compare two different texts or sources. From there, they can find the similarities and differences themselves." In this way, students can conclude the most important information themselves. Teachers also acknowledged that preventing students from copying information directly is not easy, so schools encourage students to cite sources of information as a way to reduce plagiarism. In addition, teachers ask students to make summaries or conclusions so that they truly understand the information independently. As shown in **Figure 3**, students actively search for learning materials using the internet during classroom activities.

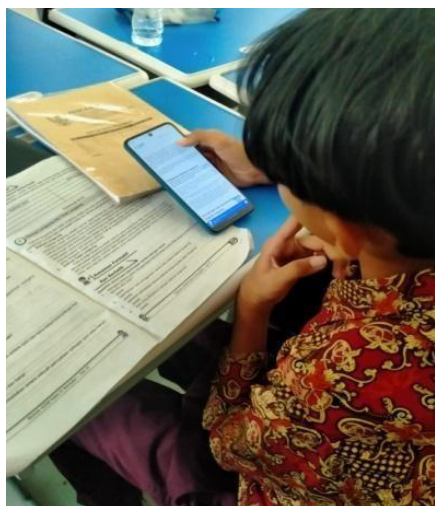


Figure 3. Students searching for materials on the internet (Source: Field study)

Figure 3 shows students searching for information on the internet. This reflects the integration of digital technology in learning; however, it also highlights students' dependence on general search engines without sufficient guidance in selecting reliable sources. Generally, research shows that not all students have the ability or desire to double-check information received from their peers using references such as books or other sources. This makes them prone to passively accepting information without going through a verification process. Many students simply listen and copy information without conducting additional analysis, reflecting their low ability to sort through information. This situation is in line with the findings of Hassoun et al. (2023), which reveal that elementary school students are still in the early stages of digital acceptance, namely accepting digital information without critical assessment. In addition, Hong et al. (2021), also state that the low level of skill in validating sources among students is caused by a lack of habit in comparing information from various sources. Furthermore, research by Gameil et al. (2023), found that students' critical thinking skills in a digital context are greatly influenced by the availability of infrastructure and learning tools. Therefore, the limited digital facilities in schools are a major obstacle that exacerbates students' low ability to apply digital literacy, especially in the aspects of information verification and evaluation.

Use of Information Filters

The results of the observation support this statement. Students often receive information from the internet without questioning its accuracy. However, some students show concern when information from books and the internet differs. For example, when a student dared to ask the teacher about the difference between what his friend said and what was written in the book. The teacher then explained the difference and encouraged students to be more careful in checking their sources of information. Overall, students are still not accustomed to conducting independent verification, so the use of information filters is still highly dependent on the teacher's assistance. The results of the observation, as illustrated in **Figure 4**, support this statement. Students often receive



Figure 4. Teacher telling students to filter information (Source: Field study)

information from the internet without questioning its accuracy.

Figure 4 shows the teacher guiding students to filter information. This demonstrates that teacher intervention plays a crucial role in helping students develop information filtering skills, as students are not yet accustomed to verifying information independently. In addition to conducting observations, researchers also interviewed teachers to reinforce the research results by asking them questions about how they develop students' critical thinking skills in searching for and processing information from various sources. Teachers mentioned that they had found incorrect or incomplete information when students presented their search results. After that, teachers provided additional guidance so that such mistakes would not be repeated. Teachers also explained that the early signs of students' critical thinking skills appeared when they began to ask questions about the differences between information from books and information from the internet. However, teachers acknowledged that these critical thinking skills had not developed evenly because there were no specific activities routinely carried out to train students to check whether the information obtained was valid or not.

Research reveals that many students still obtain information from the internet without verifying its accuracy, and some of them feel anxious when they find discrepancies between the content of books and online information, so they ask their teachers for explanations about these inconsistencies. Teachers then remind them of the importance of checking sources as part of digital literacy. These findings are in line with the research by Fauziah et al. (2021), which states that students are easily influenced by online information due to their lack of ability to evaluate sources. This is also reinforced by VanZyl et al. (2020), who emphasize that critical thinking skills are a key competency in assessing the reliability of digital information at the primary education level. In addition, a study by Hong et al. (2021), shows that students' low ability to validate information is related to a lack of habit in comparing various sources and the absence of teaching strategies that specifically train information



Figure 5. Students communicating information (Source: Field study)

assessment. Therefore, education needs to offer planned, tiered, and continuous learning experiences so that students can verify information independently without relying entirely on teachers.

The Convenience of Communicating Information

Based on observations, it appears that students are more active and enthusiastic when communicating directly in class. When the teacher greets them, students respond enthusiastically. When sharing information, the classroom atmosphere is lively, even if occasionally punctuated by jokes. In contrast, learning via *Google Meet* seems less enjoyable, fraught with technical obstacles, and lacking in enthusiasm for learning. Although students' ability to convey information digitally is quite good, its application is still more optimal in face-to-face learning. Based on observations, as shown in **Figure 5**, students are more active and enthusiastic when communicating directly in class.

Figure 5 illustrates students communicating information during classroom activities. This indicates that face-to-face learning environments provide more effective opportunities for students to express ideas and engage actively compared to online settings. In addition to conducting observations, researchers also interviewed teachers to reinforce the research results by asking them questions about how they facilitate students in conveying information through digital media during the learning process. Teachers explained that students feel more comfortable conveying information in class directly using digital media such as *PowerPoint* or video, rather than through platforms such as *Google Meet*. This was due to several obstacles in online learning, such as internet connection problems, a lack of digital devices, and students' inability to operate the technology. Teachers emphasized that every student was given the same opportunity to present information using digital media. Students were more motivated when using digital or video presentation formats because both media were more interactive and allowed them more freedom to express themselves.

Students show greater interest and enthusiasm when interacting directly in class, as reflected in their enthusiastic



Figure 6. Students discussing (Source: Field study)

responses to the teacher's greetings and a more dynamic learning atmosphere when sharing information with each other. This situation contrasts with learning via *Google Meet*, which feels less enjoyable and often experiences technical problems such as connection interruptions, digital device limitations, and difficulties in using technology. These results are in line with the opinion of Öncü et al. (2024), who stated that the level of student engagement in online learning is usually lower than in face-to-face learning. Furthermore, research by Bond et al. (2021), shows that online learning is less capable of building deep social interactions, which leads to low student motivation and focus. In addition, Yates et al. (2021), also highlight that students feel more confident and effective in conveying information directly using digital media such as *PowerPoint* or video, compared to virtual platforms that often experience technical obstacles. These findings are reinforced by a study conducted by Akpen et al. (2024), which describes that the use of interactive digital media in face-to-face learning can increase student participation, strengthen interaction, and encourage higher learning motivation. **Figure 6** shows students engaging in group discussions during the learning process.

Awareness of Network Access as a Source of Reference and Assistance

Based on observations, digital collaboration among students has not been going well. When teachers gave group assignments to research planets, some students seemed confused about which tools or applications to use. Some students asked other groups for help, while others asked teachers about appropriate websites or sources of information. There is a considerable dependence on one or two group members who have the devices or understand the applications. This shows that even though digital collaboration has been introduced, this skill has not developed evenly among all students. Based on observations, as shown in **Figure 7**, digital collaboration among students has not been going well.

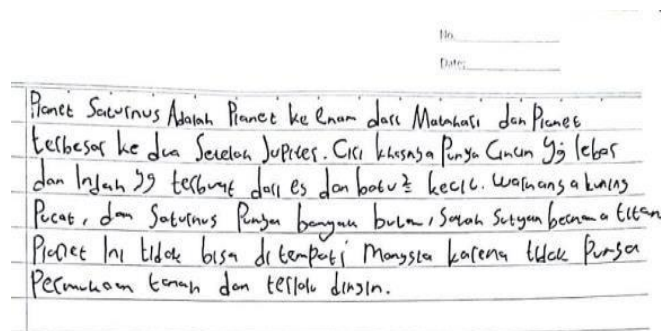


Figure 7. Students' writing results (Source: Field study)

Saturn is the sixth planet from the Sun and the second largest planet after Jupiter. It is characterized by its wide, beautiful rings made of ice and small rocks. It is pale yellow in color and has many moons, one of which is named Titan. This planet is uninhabitable because it has no land surface and is too cold.

Figure 7 presents the results of students' written work. This shows that although students are able to produce learning outputs, the process still depends heavily on certain group members who have better digital skills. In addition to conducting observations, researchers also interviewed teachers to reinforce the research results by asking them questions about how they encourage student collaboration through the use of digital media in learning. Teachers explained that they often gave digital-based group assignments, such as making posters using *Canva* or searching for information together on the internet. Through these activities, students learned to share roles and help each other in completing tasks.

Based on observations, digital collaboration among students has not been running efficiently. Some students appear confused when deciding which tools or applications to use, and only one or two people in the group are truly proficient in using the application. This situation is similar to the findings of Kwiatkowska and Wiśniewska-Nogaj (2022), who stated that students with better digital skills tend to take the lead in group tasks, while students with lower skills tend to be passive. Similar results were also revealed by Bond et al. (2021), who stated that inequalities in digital literacy among students cause significant differences in participation and contribution when performing technology-based tasks. In addition, a study by Purnamasari et al. (2021), shows that the success of digital collaboration is largely determined by teacher support, student understanding of digital media, and the availability of appropriate tools. Therefore, even though digital collaboration has been introduced in the classroom, the development of this skill still requires intensive guidance from teachers, infrastructure improvements, and ongoing digital literacy training so that all students can participate actively.

Filtering Information That Comes In

The teacher emphasized that he always stresses the importance of being sceptical about all information on the internet. He gave examples of how to verify information sources, such as checking who the author is, where the information site comes from, and whether there is supporting

evidence. However, based on observations, it appears that students are still not accustomed to applying these steps. There are still students who easily believe viral information. For example, one student believed that Indonesia would experience snow in 2026 simply because he saw a video that looked like a news report. The teacher then corrected the information circulating in the class.

Based on observations, it appears that digital collaboration practices in schools are not yet optimal, even though teachers have directed students to work in groups to complete digital-based tasks, such as creating posters and searching for information on the internet. Teachers not only assigned group tasks, but also guided students by dividing roles within groups, encouraging peer support, and monitoring group interactions to ensure active participation from all members. This approach was intended to reduce dependency on more digitally skilled students and to promote more balanced collaboration among group members. Although the process of creating digital posters was not directly observed during learning activities, documentation shows that the students' posters were published on the school's official Instagram account. These posts illustrate that students have produced digital work and are engaged in digital literacy practices, even though the creation process was not directly observed during the observation. During the production process, students showed varying levels of comfort. Some students appeared confident when using digital tools, while others required continuous guidance from the teacher, particularly when selecting information and organizing content. This indicates a limitation in directly observing the process; therefore, the analysis relies on documentation and interview data to understand how students engage in digital content creation.

This incident shows that students still need to improve their ability to filter information through more focused and in-depth practice. This is in line with research conducted by Wineburg and McGrew (2019), which revealed that many students prefer vertical reading, i.e., relying on a single source without verification, rather than lateral reading, which involves comparing sources, making them more susceptible to unverified information. This finding is reinforced by Haverkamp et al. (2024), who state that students with low digital evaluation skills tend to trust information that appears convincing without thinking about its credibility. Additionally, a study by Wineburg and McGrew (2019), shows that the ability to verify digital sources among elementary and middle school students is still low due to a lack of direct experience in cross-checking various websites. Furthermore, research by Kirschner and Stoyanov (2020), emphasizes the importance of systematic, structured, and repetitive learning in developing critical thinking skills online so that students can reject misinformation and rely on trusted sources. Therefore, improving the ability to filter information should be the main focus in developing digital literacy in schools. **Figure 8** illustrates the teacher assisting students in filtering information during the learning process.



Figure 8. Teachers help students filter Information (Source: Field study)

From Digital Publications

Regarding the publication of digital works, the teacher explained that he often assigns tasks such as making videos or posters. Although the process of creating digital works was not directly observed during the observation, documentation shows that several student works have been successfully published on the school's official Instagram account. The digital posters displayed showcase the students' talents and their confidence in presenting their work in the digital space. This publication also reflects the school's contribution in appreciating students' digital creativity.

Based on the observations, it appears that teachers have attempted to instill the importance of digital information filtering skills in students by providing examples of how to check the credibility of sources, such as paying attention to the origin of the website and who the author is. However, students do not seem to be accustomed to applying these skills in practice. These findings indicate that information filtering training has indeed been provided, but it is still theoretical and has not become a habit embedded in students' learning behavior. In addition, although the process of creating digital works was not directly observed, documentation shows that the students' work, in the form of attractive digital posters, has been published through the school's official Instagram account. This publication illustrates that students have been involved in digital literacy practices and feel comfortable enough to display their work in public digital spaces, while also showing the school's support in appreciating students' creativity and digital expression.

These findings are consistent with research conducted by Ahmad (2019), who stated that the use of digital posters can increase student engagement and give them the opportunity to act as content creators, not just consumers. International research also supports this finding. Misirli et al. (2025), found



Figure 9. Publication of Student Work (Source: Field study)

that when students are given the opportunity to create digital products such as videos, presentations, or posters, they show a significant increase in creativity and emotional engagement while learning. In addition, research by Novianti et al. (2025), confirms that digital content creation activities encourage students to be more active in exploring ideas and utilizing various digital resources, thereby helping to develop more advanced digital literacy. On the other hand, Zhang et al. (2023), mention that the publication of students' digital work, such as through school platforms or official social media, can increase their internal motivation because students feel that the work they produce has real value and a real audience. Therefore, even though the internal process of creation is not yet fully apparent, the publication of digital work is an important step in implementing digital literacy while supporting creative learning in schools. Regarding the publication of digital works, as shown in Figure 9, the teacher explained that he often assigns tasks such as making videos or posters.

CONCLUSION

Based on the results of research and discussion, the application of digital literacy in schools shows a striking difference between the availability of facilities and the development of student independence. In terms of knowledge processing and the use of information filters, students are highly dependent on teacher assistance. They tend to search for information directly on the internet (from invalid sources) even though the school has an official website. In addition, most students are still passive in receiving information and are not yet accustomed to verifying information independently, and are easily influenced by false information. Critical thinking and information presentation skills are also uneven. Students often copy without analysis even though teachers have tried to guide them to use the method of comparing two sources. This deficiency is exacerbated by the lack of routine activities that train information filtering skills, so that students' critical skills only appear occasionally when they find striking differences between books and the internet.

However, there are positive aspects in terms of the convenience of communicating and publishing information. Students feel more comfortable and enthusiastic about communicating directly in class using digital media (presentations), even though they are less interested in *online*

communication (*Google Meet*) due to technical issues. Most notably, the school has successfully supported the publication of students' digital work (posters and videos) through the school's official social media platform. This demonstrates strong institutional support and students' comfort in expressing their creativity in the digital public sphere. In conclusion, the development of digital literacy in the future must focus on shifting from passive behavior to becoming critical and independent digital users, by increasing the use of official school resources and expanding structured information filtering training programs.

However, this study also reveals several significant challenges. Students still face difficulties in selecting reliable sources of information, tend to copy without analyzing, and are not yet accustomed to verifying the accuracy of information found on the internet. Their dependence on educators to filter information and build understanding remains very high. In addition, digital collaboration is not yet widespread due to differences in technological skills among students, as well as limitations in equipment and technical challenges in online learning. This situation shows that students' digital literacy skills are still in their early stages and require intensive guidance.

To address these challenges, this study emphasizes the need for strategies to improve digital literacy through the habit of verifying sources, utilizing official references from schools, designing structured learning, and providing digital projects that encourage analysis, creativity, and publication of work. Educators must also strengthen guidelines on the use of digital media and provide curated learning resources so that students do not rely too heavily on free internet searches. In this way, the development of digital literacy needs to be directed towards building critical thinking skills, digital responsibility, and student independence in managing information. Planned efforts and support from institutions are essential so that technology can be used properly, safely, and meaningfully in the learning process.

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