



## **The relationship between digital literacy and critical thinking skills of SMAN 1 Pundong students on the digestive system**

Rohmi Dwi Saputri<sup>1</sup>, Atik Kurniawati<sup>1\*</sup>

<sup>1</sup>Department of Biology Education, Universitas Negeri Yogyakarta, Indonesia

\*E-mail: [atik\\_kurniawati@uny.ac.id](mailto:atik_kurniawati@uny.ac.id) (corresponding author)

**Abstract.** This study aims to (1) determine the digital literacy of students of SMA Negeri 1 Pundong in biology learning on the topic of the digestive system; (2) determine the critical thinking skills of students of SMA Negeri 1 Pundong in biology learning on the topic of the digestive system; (3) determine the relationship between digital literacy and critical thinking skills of students of SMA Negeri 1 Pundong in biology learning on the topic of the digestive system. The type of research used is correlational research. Data collection techniques included tests, questionnaires, interviews, and analysis of learning documents. The research subjects were 74 students of class XI MIPA of SMA Negeri 1 Pundong. The sampling method in this study was saturated sampling. Data analysis used descriptive analysis and also Pearson product-moment correlation analysis. The results of the analysis showed that: 1) Digital literacy of students of SMA Negeri 1 Pundong in the moderate category (42%); 2) Critical thinking skills of students of SMA Negeri 1 Pundong in the moderate category (47%); 3) There is no relationship between digital literacy and critical thinking skills of students of SMA Negeri 1 Pundong, with a sig value  $> 0.05$  ( $0.167 > 0.05$ ). The results of this study indicate that increasing digital literacy has not automatically led to improved critical thinking skills, so a biology learning design is needed that explicitly integrates digital literacy activities with problem-based learning strategies, inquiry, or HOTS-based learning to more effectively stimulate critical thinking skills.

**Keywords:** *Critical thinking skills, Digestive system, Digital literacy*

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### **INTRODUCTION**

Education in the 21st century can be defined as an effort to develop human resources (Mukhlis & Paidi, 2025). This is characterized by an increase in knowledge, skills, abilities, and behavior through learning activities. The development of information and communication technology impacts all areas of life, including education (Majir, 2020). The impact of ICT development on education requires students to develop mastery of ICT (Pratama et al., 2024). This development is used in the learning process and aims to achieve learning objectives. Thinking and learning skills represent new literacy (Saefi et al., 2025). The skills needed in the 21st century are digital literacy and critical thinking skills. Digital literacy and critical thinking skills are interrelated (Silalahi et al., 2022).

Sutrisna (2020) stated that digital literacy is a crucial aspect that requires attention. This is because anything found on the internet will be responded to with critical thinking and critical evaluation so that it can be applied in life (Golumbic et al., 2022). Digital literacy requires not only the ability to use technology and information and communication devices, but also social skills, learning skills, and critical, creative, and inspiring thinking (Putrisari & Subiantoro, 2022). The Ministry of Communication and Informatics, together with the Kata Data Insight Center (KIC), released the results of a 2021 survey on Indonesia's Digital Literacy Status. The survey results showed that respondents with a high school education or less had a digital literacy index score of 51.5%, which is categorized as low (Annur, 2022). The current development of digital media has not been matched by the ability to process information, either in filtering what is received or in what is shared. Information obtained

through digital media is simply accepted without in-depth analysis of its content and accuracy.

According to [Lismaya \(2019\)](#), the ability to process information is part of critical thinking skills, namely, conceptualizing, applying, synthesizing, and/or evaluating information. Information can be obtained through observation, experience, reflection, thought, or communication. Critical analytical skills are essential to learning science, including biology. [Sudarisman \(2015\)](#) states that biology material is not only related to scientific facts about concrete natural phenomena but also to complex objects or things. Complex material beyond students' daily experiences makes it difficult for them to understand ([Apriani & Sudrajat, 2025](#)). This complexity is often found in the topic of the digestive system. The digestive system is one of the most complex biological systems, so studying it requires digital literacy to help increase students' interest in learning and thinking ([Atiqoh & Suhandoyo, 2022](#)).

Based on the results of limited interviews with biology teachers at SMA Negeri 1 Pundong, the school has made efforts to implement digital literacy through several subject teachers. The availability of adequate facilities and infrastructure supports these activities ([Ammar et al., 2024](#); [Syahlan et al., 2023](#)). Digital literacy provides benefits that support the teaching and learning process, including access to reading materials. This is because digital literacy services can facilitate access to a wide range of information and learning resources. However, based on measurements conducted by teachers using questions requiring critical thinking, students have not been able to meet teacher expectations. Given these problems, further analysis is needed into digital literacy and its influence on students' critical thinking skills. Therefore, it is necessary to conduct research to determine the relationship between digital literacy and critical thinking skills of SMA Negeri 1 Pundong students in biology learning on the topic of the digestive system.

## **METHOD**

This study employed a mixed methods approach with a sequential explanatory design, beginning with quantitative data collection and analysis, followed by qualitative data analysis ([Cohen et al., 2018](#)). The research instruments consisted of a digital literacy questionnaire and a critical thinking skills test. The questionnaire was used to measure students' digital literacy, encompassing their ability to access, evaluate, use, and communicate digital information. The test also measured students' critical thinking skills on the digestive system, including the ability to analyze, evaluate, interpret, and draw conclusions. Prior to use, the instrument was tested for validity and reliability to ensure its suitability as a measurement tool. After obtaining the quantitative data, the study proceeded to a qualitative phase using semi-structured interviews. The interviews were conducted to further explore students' digital literacy and critical thinking skills, and how they developed during biology learning on the digestive system. Qualitative data were analyzed through data reduction, data presentation, and conclusion drawing.

The population of this study comprised all 11th-grade students at SMA Negeri 1 Pundong in the 2024/2025 academic year, across three classes. Due to the relatively small population and the feasibility of reaching the entire population, this study employed a census sampling technique (saturated sampling); thus, all 11th-grade MIPA students were selected as research subjects. Quantitative data analysis was conducted using descriptive statistics to determine the categories of each variable, as well as a Pearson Product-Moment correlation test to determine the relationship between digital literacy and critical thinking skills. All analyses were conducted at a 5% significance level.

## **RESULTS AND DISCUSSION**

### **Results**

Based on the research conducted, the results are as shown in Figure 1.

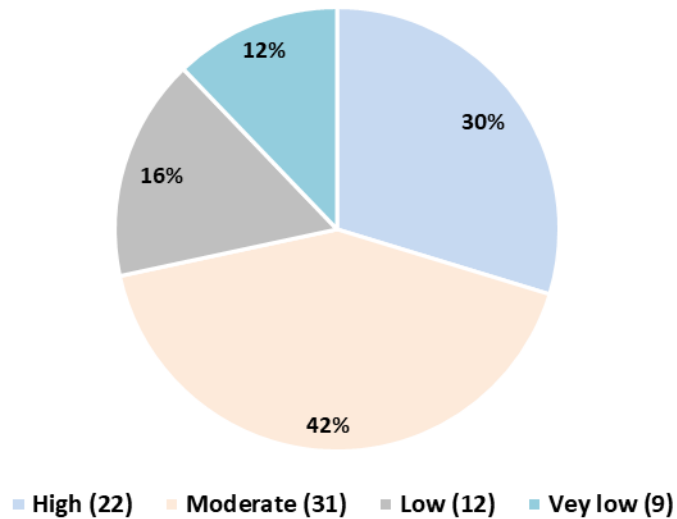


Figure 1. Students' digital literacy diagram

The digital literacy of students was found to be high for 22 students (30%), moderate for 31 students (42%), low for 12 students (16%), and very low for 9 students (12%). Therefore, it can be seen that the digital literacy of students at SMAN 1 Pundong is in the moderate category.

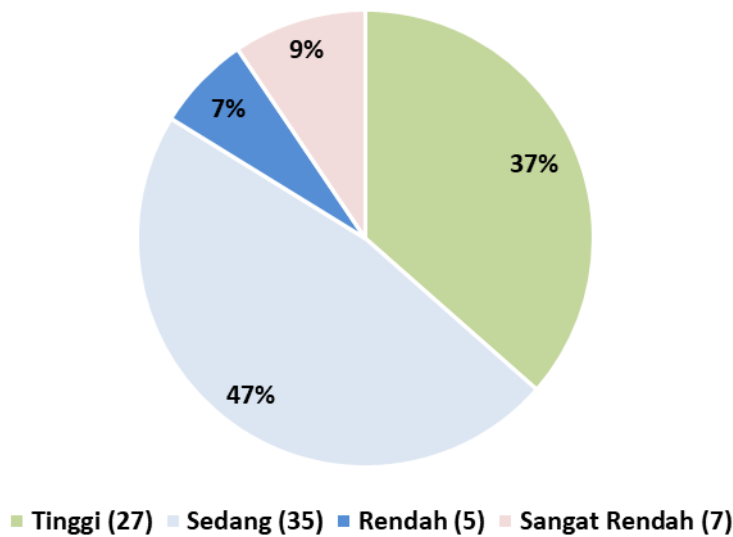


Figure 2. Students' critical thinking skills diagram

The critical thinking skills of students (Figure 2) are known to be in the high category for 27 students (37%), in the medium category for 35 students (47%), in the low category for 5 students (7%), and in the very low category for 7 students (9%). It can be seen that the critical thinking skills of students at SMA N 1 Pundong fall in the medium category. The results of the Pearson Product-Moment test are shown in Table 1.

Based on Table 1, digital literacy is not related to students' critical thinking skills. This is evident from the significance value of 0.167, which exceeds 0.05, indicating no significant relationship between digital literacy and critical thinking skills. The correlation coefficient is 0.165.

**Table 1. Correlation test results**

Variable		Digital literacy	Critical thinking skills
Digital literacy	Pearson		
	Correlation	1	0,165
	Sig. (2-tailed)	–	0.167
	N	74	74
Critical thinking skills	Pearson		
	Correlation	0.165	1
	Sig. (2-tailed)	0.167	–
	N	74	74

## Discussion

The digital literacy of students at SMA Negeri 1 Pundong is in the moderate category. This is due to students' lack of literacy skills, such as difficulty distinguishing good websites to browse, gathering information from various sources, and understanding internet features. This is due to the lack of application of information and communication technology (ICT) in schools. [Youssef et al. \(2022\)](#) stated that students in the experimental group who had been equipped with good and correct ICT skills had strong knowledge of how to obtain information, increased digital competence, and positive attitudes and perspectives toward digital use and transformation. [Handayani \(2020\)](#) also explained that digital literacy is not only the skill of searching, sharing, and using digital media but also the ability to critically evaluate information, choose applications and devices, and understand information obtained from the media. Students need to have the ability to use digital devices or ICT-related skills so they can use digital equipment and the virtual world to be flexible and proficient ([Li et al., 2023](#)). The competency required in digital literacy is the ability to build a convincing combination of information from various sources.

The critical thinking skills of students at SMA Negeri 1 Pundong are also moderate. This score is driven by the diverse learning models used. Diverse learning methods are necessary because they provide students with the space to think critically and hone these skills. Students' critical thinking skills are influenced by two factors: internal and external ([Bardoe et al., 2023](#)). Internal factors include student characteristics, reading ability, learning motivation, writing ability, and student habits ([Diniyyah et al., 2022](#)). External factors include the teacher's implementation of learning and the teacher's habituation of the students. [Ewing \(2011\)](#) stated that direct learning, with the teacher as the center of information delivery, depends on the teacher's quality and abilities, which is crucial. This can result in information obtained being limited to what the teacher provides because communication is one-way.

Interviews and analysis of lesson plan documents evidence this. Interviews with biology teachers revealed that SMA Negeri 1 Pundong still uses teacher-centered learning methods and only conducts hands-on practical work a few times. Furthermore, the learning media used have not yet utilized digital media. This indicates that the learning process has not fully supported active student engagement or the development of higher-order thinking skills, as students tend to be passive recipients of information rather than active participants in constructing knowledge ([Torres-Porras et al., 2024](#)).

This condition is closely related to teachers' limited ability to use digital media. Previously, when using digital tools, teachers needed assistance from others to operate them, which reduced their confidence and independence in integrating technology into the classroom. As a result, teachers often avoid using digital media altogether. This highlights the need for continuous professional development and training programs to improve teachers' digital competence, enabling the effective integration of technology into biology learning ([Darmastuti et al., 2025](#)).

A correlation test revealed no correlation between digital literacy and critical thinking skills among students at SMA Negeri 1 Pundong. This is likely due to the biology learning

process not optimizing digital literacy and critical thinking skills, and the lack of a scientific approach to learning. Ease of accessing information should influence critical thinking. As Hidayati et al. (2024) stated, improving students' critical thinking skills is influenced by their ease of accessing information during the learning process. Critical thinking skills are closely related to digital literacy because they connect theoretical and practical components (Nurhasanah et al., 2025). Through these theoretical and practical components, students can find optimal ways to achieve a goal. Thus, critical and evaluative thinking are applied exclusively here, as are analysis, synthesis, abstraction, concretization, classification, and analogy. Digitally literate students need to develop search skills and strategies for using search engines to find existing information and find information that suits their needs (Reddy et al., 2023).

## CONCLUSION

Based on the research results, it can be concluded that the digital literacy of students at SMA Negeri 1 Pundong falls in the moderate category, at 42%. This finding indicates that students have not optimally utilized and applied digital literacy skills, both in daily life and in the biology learning process. Students' critical thinking skills are also in the moderate category, at 47%, indicating that their abilities to analyze, evaluate, and draw conclusions still need improvement. The results of the correlation test showed no significant relationship between digital literacy and critical thinking skills, with a significance value of 0.167 ( $>0.05$ ) and a correlation coefficient of 0.165, which falls within the very low category. This indicates that students' digital literacy levels are not directly related to critical thinking skills in learning about the digestive system. This study shows that improving digital literacy alone is not enough to develop students' critical thinking skills. Therefore, an integrated learning design is needed that combines digital literacy activities with learning strategies oriented towards developing Higher Order Thinking Skills (HOTS). Further research could consider other variables that could potentially influence critical thinking skills, such as learning models, learning motivation, or digital learning environments, and involve a wider sample to obtain a more comprehensive picture.

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