



# Investigation Effects Digital Literacy on Primary Student Attitude in Indonesia

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## ARTICLE INFO

### Article history:

Received November 20, 2023

Accepted February 10, 2024

Available online February 25, 2024

### Kata Kunci:

Sikap, Literasi Digital, Sekolah Dasar

### Keywords:

Attitudes, Digital literacy, Elementary school



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## ABSTRAK

Perkembangan teknologi yang sangat pesat telah membawa perubahan yang signifikan dalam dunia pendidikan di semua tingkatan sekolah. Untuk meningkatkan kualitas pembelajaran, pemanfaatan Teknologi Informasi dan Komunikasi (TIK) menjadi semakin penting. Penelitian ini bertujuan untuk mengevaluasi profil literasi digital siswa dan menginvestigasi dampak dimensi literasi digital terhadap sikap siswa dalam menggunakan TIK untuk pembelajaran. Penelitian ini menggunakan metode campuran dengan tipe eksplanatori sekuensial, dengan data yang dikumpulkan melalui survei terhadap 415 siswa di Malang, Indonesia. Data dikumpulkan melalui kuesioner dengan 17 atribut yang mewakili variabel sikap dan literasi digital. Analisis data meliputi statistik deskriptif untuk menilai tingkat sikap dan literasi digital serta analisis regresi untuk menguji pengaruh literasi digital terhadap sikap siswa dalam memanfaatkan TIK. Selain itu, wawancara semi-terstruktur dengan dua belas partisipan dilakukan untuk mengkonfirmasi temuan mengenai tingkat sikap dan literasi digital. Hasil dari survei dan wawancara menunjukkan bahwa sikap siswa terhadap pemanfaatan TIK mendapatkan nilai tertinggi, diikuti oleh dimensi sosial-emosional, teknis, dan kognitif. Hasil uji regresi menunjukkan bahwa variabel teknis, sosial-emosional, dan kognitif secara signifikan mempengaruhi sikap siswa terhadap TIK.

## ABSTRACT

The rapid development of technology has brought significant changes in education at all school levels. To improve the quality of learning, the utilization of Information and Communication Technology (ICT) is becoming increasingly important. This study aims to evaluate students' digital literacy profile and investigate the impact of digital literacy dimensions on students' attitudes towards using ICT for learning. This study utilized mixed methods of the sequential explanatory type, with data collected through a survey of 415 students in Malang, Indonesia. Data was collected through a questionnaire with 17 attributes representing attitude and digital literacy variables. Data analysis included descriptive statistics to assess the level of attitude and digital literacy and regression analysis to examine the influence of digital literacy on students' attitudes in utilizing ICT. In addition, semi-structured interviews with twelve participants were conducted to confirm the findings regarding the level of attitudes and digital literacy. Results from the survey and interviews showed that students' attitudes toward ICT utilization received the highest score, followed by the social-emotional, technical, and cognitive dimensions. Regression test results revealed that technical, social-emotional, and cognitive variables significantly influenced students' attitudes toward ICT.

## 1. INTRODUCTION

Advances in information technology, characterized by the abundance of smart and multifunctional devices, have revolutionized daily routines. These advancements have especially improved access to information and communication, which is beneficial for social interaction and formal education (Ngubane-Mokiwa & Khoza, 2021; Zhang et al., 2022). The evolution of technology allows students to engage with the latest digital tools and communicate effectively to acquire knowledge. Optimal use of digital technology has the potential to improve the quality of learning, as students can use various smart devices and multifunctional equipment for educational purposes (Koes-H et al., 2021; Nenohai et al., 2022; Oktavianti et al., 2018; Widiasih et al., 2023). However, if students do not have the skills to utilize these technological advances, it is feared that learning will become uninteresting. Therefore, integrating digital technology into education must be accompanied by developing operational skills. Digital literacy refers to the competence in using digital technologies safely and effectively to access and manage information (Cetindamar et al., 2021; Meyers et al., 2013; Ukwoma et al., 2016). Digital literacy consists of three dimensions: technical,

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cognitive, and social-emotional (Ng, 2012). Through digital literacy, students can proficiently access, organize, evaluate, and communicate information to their communities (Radovanovic et al., 2015; Sparks et al., 2016). Therefore, students need accurate information to improve these skills effectively. A key indicator of digital literacy is the ability to use digital devices well. Given the many smart devices and tools available, learning digital literacy is crucial in the digital age.

In 2018, the Program for International Student Assessment (PISA) highlighted that several Asian countries, including Indonesia, reported relatively low levels of digital literacy among students. Specifically, in Indonesia, PISA results showed that digital literacy levels at all school levels were categorized as low. In addition, statistics from the Indonesian Internet Service Providers Association (APJII) show that only 2.2% of Indonesian students aged 10-14 use the Internet to search for school-related information, indicating a significant shortfall (APJII, 2018). It emphasizes the need for a substantial increase in utilizing the Internet for learning among elementary school students to promote improved digital literacy skills.

Research on students' digital literacy profiles covering technical, cognitive, social-emotional, and attitudinal factors is urgent in this digital era (Martínez-Bravo et al., 2022; Milenkova & Lendzhova, 2021). During rapid technological development, students' ability to understand, use, and interact with digital technology is an additional skill and a fundamental need (Anthonysamy, 2020; List, 2019). Technical factors include understanding hardware and software, while cognitive factors include analyzing and evaluating digital information (Kesici et al., 2009). Social-emotional includes aspects of social and emotional interaction in digital technology. In addition, students' attitudes towards technology use also significantly impact their learning effectiveness. Therefore, an in-depth investigation of the influence of digital literacy factors such as technical, cognitive, and social-emotional dimensions on students' attitudes toward using digital technology is necessary to provide a more comprehensive and in-depth understanding of the challenges and opportunities students face in digital learning.

Research on students' digital literacy profile that includes technical, cognitive, social-emotional, and attitude factors, as well as investigating the influence of digital literacy, especially in the dimensions of technical, cognitive, and social-emotional factors on students' attitude, has a very important urgency in the context of modern education. Digital literacy is a key skill that students must have to face the increasingly advanced digital era (Anthonysamy, 2020; List, 2019). Technical, cognitive, and social-emotional factors are important aspects of digital literacy that influence how students interact with digital and information technologies (ElSayary et al., 2022; Nikou et al., 2018; Saleha et al., 2022). This research helps identify students' digital literacy levels and attitudes toward using technology in learning. More importantly, it provides insights into how technical, cognitive, and social-emotional factors influence students' attitudes toward using technology in learning, which can be an important basis for the development of more effective educational programs to improve students' digital literacy and promote positive use of technology in the educational process.

Several previous studies have investigated digital literacy among students. A survey in Beijing, China, revealed that digital literacy skills including critical understanding and technical skills in fifth and sixth graders were influenced by parental participation (Zhang, 2016). Another study examining digital literacy in Spain found that the use of digital technologies in out-of-class learning can improve students' digital literacy skills compared to in-class learning that focuses on traditional approaches (Moreno-Morilla et al., 2021). Research results also show that secondary school students have a higher level of digital literacy than primary school students (Tham, 2021). In addition, research related to students' digital literacy during the COVID-19 pandemic shows that digital literacy contributes positively to online risk management and self-control (Purnama et al., 2021). Research on students' digital literacy shows that most of them have digital literacy skills at a basic to intermediate level (Putri et al., 2022).

Based on previous research, two gaps in digital literacy research at the primary school level in Indonesia can be identified. The first gap is that, to date, no research has comprehensively investigated the digital literacy profile of primary school students in Indonesia. Although digital literacy is increasingly important in the current technological era, the focus of research tends to be centered on secondary and higher education levels. This results in a lack of in-depth understanding of the extent to which students at the primary level have adequate digital literacy skills. The second research gap is that there is no in-depth research on the impact of digital literacy on students' attitudes toward using ICT for learning at the primary school level. This research is important to understand the extent to which the level of digital literacy affects students' attitudes and engagement in utilizing ICT as a learning tool. By filling these two gaps, this study provides a deeper insight into how digital literacy affects students' learning experience at the primary level.

This research is essential because it explores the profile of digital literacy, providing insight into students' skills in filtering, assessing and using digital information effectively. In addition, understanding students' attitudes towards digital literacy can be the basis for designing learning strategies that are more appropriate and support the development of skills appropriate to the current digital era. Therefore, the

contribution of this research becomes very important in an effort to improve the quality of learning and prepare students for future changes that are increasingly related to technological advances. This study aims to evaluate students' digital literacy profile and investigate the impact of digital literacy dimensions on students' attitudes towards using ICT for learning.

## 2. METHOD

This research applied mixed methods with an explanatory sequential type. This approach consisted of two main stages. The first stage involved collecting quantitative data to evaluate primary school students' digital literacy levels and attitudes towards using ICT in learning. After data analysis, the second stage was implemented by conducting semi-structured interviews to enrich the research. Research question RQ 1 was answered by averaging participants' responses to each statement in the digital literacy and attitude dimensions. Meanwhile, RQ 2 was answered through regression analysis to understand the influence of digital literacy dimensions and attitudes on ICT utilization in learning. The sample of this study was selected with the aim of generalization from the population of primary school students in Indonesia, especially in Malang City, East Java. From a total of 195 public primary school students in Malang City, nine students were randomly selected to be the sample population. The research participants comprised 415 students in grades 4, 5, and 6, as these levels significantly use digital devices in teaching and learning. In the second stage, 12 respondents were interviewed, and four students represented each class.

The research instrument was adapted from a previous study (Ng, 2012) and was pilot-tested to ensure accuracy. The questionnaire was used in the first stage to collect quantitative data. Seventeen attribute questionnaire statements described the attitude variables and digital literacy dimensions, detailed in Table 1 and Table 2. The validity and reliability of the research instruments were also tested. The results show that all aspects of digital literacy attitudes and dimensions are reliable and valid for this study. The Cronbach Alpha reliability values for each variable also show high consistency in respondents' answers.

**Table 1. Attitude Towards ICT-based Learning for Learning**

No	Statement	Attribute
1	I am more motivated to learn by using ICT.	A1
2	Learning is more enjoyable with ICT.	A2
3	I learn better with ICT.	A3
4	I like using ICT for learning.	A4
5	Many digital devices can be used for learning.	A5
6	Teachers should use ICT when teaching.	A6
7	ICT can encourage me to learn independently.	A7

**Table 2. Dimensions of Digital Literacy**

No	Statement	Attribute
<b>Technical</b>		
1	I have skills in using digital devices.	T1
2	I can solve technical problems.	T2
3	I know the differences between some apps.	T3
4	I can learn new apps easily.	T4
5	I keep up with new technology.	T5
6	I have good ICT skills.	T6
<b>Cognitive</b>		
1	I can search for information by utilizing digital devices to complete assignments.	C1
2	I can select information on the internet that is appropriate for the task.	C2
<b>Social-emotional</b>		
1	I can communicate with friends at school through digital apps to complete assignments.	SE1
2	Digital apps help me to collaborate with friends in completing school assignments.	SE2

In the second stage, data was collected using semi-structured interview instruments to dig deeper into important findings on each attitude variable and digital literacy dimension. In this study, the survey was conducted using Google Forms. Participation in the survey was voluntary and confidential. Meanwhile, interviews were conducted face-to-face. Students were asked about their identities and statements of digital literacy and attitudinal dimensions. Surveyors recorded and coded students' answers into a Likert scale.

Participants took the survey and interview voluntarily and confidentially. Important participant answers were recorded and sorted as findings (Miles et al., 2018). The level of students' digital literacy skills and attitudes were categorized into five levels: 1.00-1.80 (very low), 1.81-2.60 (low), 2.61-3.40 (fair), 3.41-4.20 (good), 4.21-5.00 (excellent). Regression tests were conducted to test how much influence the dimensions of digital literacy have on attitudes.

### 3. RESULT AND DISCUSSION

#### Result

This study revealed a digital literacy profile on seven attributes related to students' attitudes toward using ICT in learning. Of the seven attributes evaluated, six were rated as excellent by students, namely attributes A1, A2, A3, A4, A5, and A7, while attribute A6 was rated good. Results show that attribute A1, which indicates students' motivation to utilize ICT in the learning process, obtained the highest score with an average of 4.663. It illustrates that primary school students show a high level of motivation in utilizing ICT in learning, enabling them to access diverse sources of information on the internet, including images, videos, and animations, which can increase interest in learning. Furthermore, attribute A5, which focuses on the availability of digital devices for learning activities, received an average score of 4.610. Meanwhile, attribute A2 (excitement in learning with ICT) achieved an average score of 4.542. Attribute A3, which relates to the effectiveness of learning with ICT, has an average score of 4.501. Attribute A4 (students' enjoyment in using ICT for learning) and attribute A7 (the influence of ICT in encouraging students to learn) obtained mean scores of 4.164 and 4.361, respectively.

However, it should be noted that only attribute A6 (Teachers should use ICT when teaching) was categorized as good with a mean score of 3.928. This finding indicates that students believe teachers can integrate ICT into learning. However, there is still room for improvement in teachers' competence in utilizing ICT for learning activities. Overall, the analysis of the seven attributes in this attitude variable shows that primary school students in Indonesia show a high interest in utilizing ICT in the learning process, with an average attribute score of 4.395. This result can be categorized as excellent, and this finding aligns with the results of interviews conducted with students, where most of them stated that they use ICT for learning activities. Students' statements from the interviews that confirm this finding are presented as follows.

*"I search for information on the internet and YouTube using my smartphone, laptop, computer, and tablet when I get assignments from school. The digital device I use most often is my mobile phone."*

The research results on the technical dimension of digital literacy, which consists of six attributes, paint an interesting picture. Of the six attributes, four were rated as good performance, indicating strong skills from students. Attribute T1, which reflects students' skills in using digital devices, received an encouraging average score of 3.412. Similarly, attribute T4, regarding students' ability to learn new applications quickly, stood out with an average score of 3.672. Then, attributes T5 and T6, which relate to students' ability to keep up with technological developments and ICT mastery, received favourable ratings with average scores of 3.511 and 3.424, respectively.

Even so, two attributes indicate the need for more attention. Attribute T3, which relates to knowledge of the differences between several applications, received a fair assessment with an average score of 2.860. It indicates that students need additional knowledge regarding the functions of different types of apps used in digital learning. Furthermore, attribute T2, which assesses students' skills in solving technical problems, was rated low with a mean score of 2.424. This finding reflects students' difficulties in overcoming technical problems that may arise in ICT learning. They also need help in determining concrete steps to solve these problems.

Overall, the mean score of the attributes of the technical dimension reached 3.217, indicating that primary school students have an adequate understanding of the technical operation of ICT devices for learning purposes. The findings show that students can operate digital devices independently, an aspect reinforced by the interview results, which confirmed students' skills in using digital devices independently without assistance from other parties. Students' statements from the interviews that confirm the findings on this technical dimension are presented as follows:

*"I am able to operate digital devices such as mobile phones, laptops, tablets and computers independently. If I have problems operating digital devices, I search for information on YouTube."*

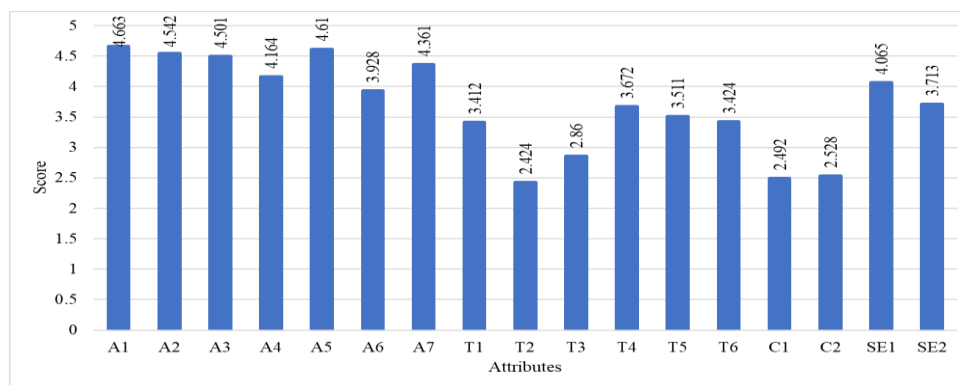
Meanwhile, students were also able to explain some of the functions of the apps used. It shows that students understand the function of the application for learning activities. This finding is also evidenced by the interviews of students who can explain the functions of digital devices well. Student statements from the interviews that confirm this finding are as follows.

*"Some app functions include YouTube for watching videos, Google for searching for information and photos, WhatsApp for communication, Instagram for uploading photos, videos, and communication, TikTok for searching for information in the form of videos, Facebook for communication and uploading photos."*

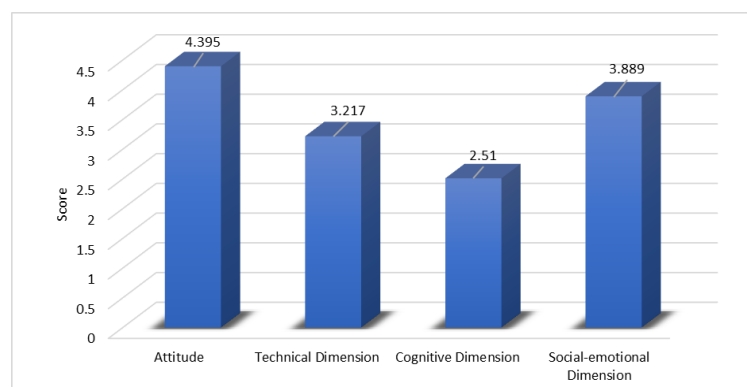
Based on the research findings, the cognitive dimension of digital literacy of students in primary schools consists of two main attributes, namely C1 (the ability to search for information using digital devices to complete a task) and C2 (the ability to select relevant information from the internet for a given task). The measurement results show that these two attributes exhibit low skill levels, with C1 achieving an average score of 2.492 and C2 achieving an average score of 2.528. From these results, it can be concluded that students in elementary schools lack skills in selecting relevant information from the internet. In addition, overall, the cognitive dimension of digital literacy obtained an average score of 2.510, which indicates that students' ability to filter and select relevant information on ICT tools for learning purposes still needs to be improved.

The results of interviews with some students also provide additional understanding related to the low cognitive dimension of digital literacy. Students rarely use digital devices for school purposes and are less able to evaluate the credibility and usefulness of information obtained from the internet. The findings from these interviews strongly support the findings from the measurements, indicating that further efforts are needed to improve students' digital literacy skills at the primary school level. The results of the student interviews are presented below.

*"I rarely use digital technology for school purposes but I use digital devices to play games, watch movies, communicate, watch videos, and search for information related to entertainment content."  
"When I search for information on the internet, the information I use is the information that appears first and the longest description on the initial menu."*



**Figure 1.** Digital Literacy Profile On Each Attribute



**Figure 2.** Digital Literacy Profile on Each Dimension and Attitude

Based on the research findings in Figure 1, it can be concluded that in the social-emotional dimension, attribute SE2 (Digital apps can help me collaborate with friends in completing assignments) scored the highest with an average of 4.065. On the other hand, attribute SE1 (students can communicate with friends at school through digital apps to complete tasks) received an average score of around 3.713. Overall, based on Figure 2, the social-emotional dimension achieved a score of 3,889, which can be categorized as good. It shows that students can use ICT to communicate and collaborate effectively in the learning process. This finding also supports the interview results, where most respondents expressed their ability to communicate and collaborate using digital devices. Thus, it can be concluded that integrating digital applications into learning can positively contribute to students' social-emotional aspects. The results of student interviews are presented as follows:

*"I communicate with my friends when I have school assignments through WhatsApp group. In addition, I also do videocalls with group members to communicate. We can also communicate using Telegram."*

In this study, we present a profile of digital literacy on various dimensions, as well as students' attitudes towards ICT, as shown in Figure 2. These findings aim to provide answers to research question 1 (RQ1). The results show that the attitudinal aspect has the highest score of 4.395, followed by the social-emotional dimension with a score of 3.889, the technical dimension with a score of 3.217, and the cognitive dimension with a score of 2.510. It indicates that students' overall attitude towards ICT is very positive. When observing digital literacy, the social-emotional dimension had the highest score, followed by the technical and cognitive dimensions. The average score on attitudes and social-emotional aspects shows that students have more positive attitudes than social-emotional aspects of ICT. These results illustrate that students feel satisfaction when using ICT but are often confused when dealing with new software or programs. In addition, they also often experience tension when faced with problems in the information technology domain.

This section presents the research results to answer Research Question 2 (RQ2). The analysis is based on multiple linear regression tests. The results of the analysis show that the Digital Literacy Dimension has a significant influence on students' attitudes towards the use of ICT, as shown in Table 3. The F test for each dimension, namely Technical, Social-emotional, and Cognitive on attitude, also shows that digital literacy has a significant effect on attitude ( $\text{sig (F)} < 0.05$ ). Partial tests on the Technical, Social-emotional, and Cognitive dimensions also provide consistent results. The t-test results on the technical dimension support Hypothesis 1, with a  $\text{sig (t)}$  value of  $0.023 < 0.05$ , indicating that this dimension affects attitude.

Similarly, the t-tests on the Cognitive ( $\text{sig (t)} = 0.000 < 0.05$ ) and Social-emotional ( $\text{sig (t)} = 0.000 < 0.05$ ) dimensions also validated Hypotheses 2 and 3, respectively. These results indicate that the Social-emotional dimension significantly contributes to attitude, reflected by the higher coefficient value of the variable compared to the other dimensions. In addition, students' frequency and skill level in using ICT also illustrate their positive attitude towards this technology. This research consistently confirms that digital literacy shapes students' attitudes toward ICT use.

**Table 3. Results of the Effect of Digital Literacy Dimensions on Attitude**

	<b>B (Coefficients)</b>	<b>t</b>	<b>Sig (t)</b>
Technic	0.046	0.020	0.023
Social	0.171	0.023	0.000
Cognitive	0.101	0.020	0.000
F		37.720	
Sig (F)		0.000	

Based on the results, it can be concluded that strong digital literacy technical skills, especially in operating digital devices independently, play a crucial role in increasing the effectiveness of ICT use among students. In addition to technical aspects, the cognitive dimension of digital literacy also plays an important role in shaping students' attitudes towards using ICT. Students' skills in searching and selecting relevant information to complete their assignments also influence their attitudes toward using the Internet. This finding suggests that students with high cognitive skills tend to be able to more effectively obtain information through ICT, which in turn has a positive impact on their attitude towards this technology. It also reflects the student's motivation to seek and select information they will utilize in learning actively.

Based on the research results, it was found that students experienced ease in solving problems when assisted by ICT. They can access various information through digital devices such as smartphones, laptops, and tablets, which are used to complete school assignments. Before utilizing the information obtained, students conduct analysis and summarization to obtain the necessary results. This use of ICT has been found to increase students' knowledge, which positively impacts their attitude towards learning.

The self-assessment results also show that the social-emotional dimension shapes students' attitudes. Social interaction through ICT affects students' attitudes, especially regarding communication skills. Expressions, voice intonation, and conversation content become important indicators in describing individual attitudes toward the material covered. Thus, the application of ICT affects students' cognitive aspects and has significant implications on the social-emotional dimensions that influence attitudes and responses to learning.

The results show that social-emotional skills are closely related to individual attitudes. ICT allows students to interact and cooperate with friends in distant locations, enabling effective communication without the limitations of time and place. As a result, students are no longer tied to physical meetings or specific locations to communicate and collaborate. As such, this may influence students' attitudes toward utilizing technology continuously in their communication and collaboration processes. This research confirms that ICT significantly improves the readability and effectiveness of social-emotional interactions in educational contexts.

## Discussion

This research illustrates the close relationship between students' motivation and positive attitude towards ICT utilization and their skills. The results show that ICT gives students access to pedagogical, content, and technological knowledge, ultimately improving their learning outcomes (Falloon, 2020; Stoilescu, 2015). Findings show that primary school students are motivated to learn through ICT, as it makes it easier for them to complete school tasks. They even show interest and satisfaction in the learning process with ICT.

In addition, the study also revealed that students tend to use the internet, particularly through mobile devices, as the main source of information to complete their assignments. This finding aligns with the results of a previous study (Akour et al., 2020; Mandasari & Aminatun, 2020), which confirmed that ICT motivates students and enhances their self-learning ability. Although primary school students are skilled in searching and finding information through digital media, there are challenges in the cognitive dimension of digital literacy.

Students appear to underutilize ICT for learning activities, potentially hindering their ability to evaluate the credibility and usefulness of information sources from digital devices. This research highlights the importance of teaching students to critically assess the accuracy of information they encounter on digital platforms (Claro et al., 2012; Méndez et al., 2017). On the other hand, in the social-emotional dimension, students can collaborate and communicate effectively using the WhatsApp application, which is frequently used and easy to operate. It reinforces using digital literacy to access knowledge in a digital environment (Scheerder et al., 2017).

In addition, the results show that students feel more capable of solving learning problems with the help of ICT. They use various digital devices such as smartphones, laptops, and tablets to collect relevant information before analyzing and using it. It suggests that students' cognition is related to positive attitudes toward ICT (Krelova et al., 2021; Mantoro et al., 2017).

It is important to note that students' social-emotional skills were also shown to be closely related to their attitudes towards ICT use. Findings suggest that ICT enables students to communicate and collaborate effectively without being constrained by distance or time. These results provide a deeper understanding of how ICT affects students' cognitive aspects and plays an important role in their social and emotional development.

Although this study provides an in-depth insight into the digital literacy profile of primary school students and its influence on their attitudes towards using ICT for learning, some limitations must be acknowledged. First, the research sample was limited to primary schools in a particular area, so generalizing the findings to a wider population may require additional research. In addition, the measurement of digital literacy may need to be expanded or elaborated to accommodate specific aspects that may not be covered in the instruments used in this study.

For future research, several directions can be explored. Extending this study to higher education levels or different school environments could provide a more comprehensive understanding of students' digital literacy. In addition, exploring external factors such as the influence of home environment and access to technology may provide additional insights into how these factors influence students' attitudes towards using ICT for learning. In addition, considering mediating or moderating variables in the analysis could

deepen the understanding of the relationship between digital literacy dimensions and students' attitudes. Considering these limitations and suggested future research directions, it is hoped that this study can make a meaningful contribution to developing students' digital literacy and ICT utilization in educational.

#### 4. CONCLUSION

The findings emphasize the importance of considering social-emotional aspects in building students' digital literacy and improving technical skills and conceptual understanding. This is important because the dimensions of digital literacy, involving technical, social-emotional and cognitive aspects, significantly impact students' attitudes towards using Information and Communication Technology (ICT) for learning. The findings provide a basis for planning more effective learning strategies, which not only cover the technical aspects of ICT, but also pay attention to the cognitive aspects, social-emotional dimensions of students in the context of digital literacy.

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