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Student's Digital Literacy and an Evaluation of Awareness of Ethics, Privacy, and Online Safety

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ABSTRACT

Purpose: Digital literacy is a vital and crucial aspect in ensuring that students can use technology wisely and responsibly. This study aims to identify the level of digital literacy among students, with a focus on online ethics, privacy, and security. **Methods:** The method used quantitative approach, data were collected an online questionnaire distributed via Google Forms and analyzed using descriptive statistics and ANOVA. The sampling technique applied was non-probability sampling, specifically convenience sampling, involving 105 junior and senior high school students aged 13–18 years who participated in digital literacy activities in the City and Regency of Bima. **Findings:** Majority of students fall into the moderate level of digital literacy (79%), followed by high (18%), and low and very low levels (each 2%). The ANOVA results reveal positive correlation between internet usage frequency and digital literacy levels. Additionally, internet usage frequency is associated with exposure to valid and invalid content, online security practices, and difficulties in distinguishing accurate from inaccurate information. **Research Implications:** That improving digital literacy is essential not only to enhance technical skills but also to strengthen critical thinking, ethical awareness, and online safety practices among students. Educational institutions and policymakers are encouraged to design structured digital literacy programs that emphasize information evaluation, privacy protection, and responsible digital participation. **Originality:** This study lies in its integrated analysis of digital literacy, online behavior, and safety awareness among students within the local context of Bima, providing empirical evidence that highlights the multidimensional nature of digital literacy in the digital era.

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INTRODUCTION

Digital literacy is a multidimensional concept that refers not only to technical skills in operating digital devices and applications, but also encompasses cognitive, social, and ethical skills in understanding, evaluating, and using information responsibly in a digital environment (Churchill, 2020). In this context, digital literacy is an essential competency that students must possess amid rapid technological advancements. The development of digital technology has become an integral part of students' lives, particularly students. Digital technology not only offers opportunities but also presents significant limitations and challenges. While digital technology facilitates access to learning opportunities, it also carries risks. Adolescents possess the skills to use devices and applications, yet they are often unaware of ethical, privacy, and security issues related to digital technology (Morgan dkk., 2022). Adolescents are vulnerable to risks such as data misuse, the spread of harmful content, and the potential for digital addiction. The importance of ethics, privacy, and security cannot be overlooked, given the risks posed by the irresponsible use of digital technology.

Information literacy is necessary so that information ethics are not merely theoretical knowledge, but lead to objective knowledge based on informed decision-making and informed consent. Information ethics is related to law and cybercrime. The ITE Law (Information and Electronic Transactions) regulates digital information and transactions, thereby raising issues such as legal ethics and morality. Solving problems in the information media requires cooperation from stakeholders and all parties, particularly regarding issues related to digital life (Choiriyati dkk., 2019).

Data breaches on social media are often caused by negligence on the part of service providers. Security, generally defined as "the quality or state of being secure and free from danger," must be enhanced through privacy measures such as strong passwords. It is important to protect data privacy because it safeguards human rights and protects

medical confidentiality in accordance with health laws. This is particularly true in the era of big data within the digital economy, which prioritizes privacy (Yel dkk., 2022).

The majority of Indonesians spend 6 hours a day online and have a low level of personal data protection (Annur, 2023). Indonesia's digital readiness index in Southeast Asia is relatively low, and the country's digital technology adoption rate scores below the global average (Muhamad, 2023). According to a 2022 survey by Kominfo in collaboration with KIC (Katadata Insight Center), Indonesian digital literacy scores were 3.84 for digital culture, 3.68 for digital ethics, 3.53 for digital skills, and the lowest score of 3.12 for digital safety (Biro Humas Kementerian Kominfo, 2023). This makes the public vulnerable to digital crimes.

Japelidi criticizes the inadequate level of digital literacy in Indonesia, noting that this can lead to serious problems. It is important to ensure that adolescents possess adequate digital literacy so that they can make good and wise use of the opportunities presented by digital technology. Digital literacy is not merely about competencies and skills in using technology; it also emphasizes the ability to evaluate information effectively (Wahono & Effrisanti, 2018). The literacy required today involves the ability to use digital resources effectively, think rationally and creatively, and enhance communication and collaboration skills (Muliani dkk., 2021). (Syafii dkk., 2022) emphasizes the importance of digital literacy education among young people, which serves as a solution that can be implemented by the government and various segments of society.

Digital literacy has become a crucial aspect today, and various research studies and community service initiatives have been conducted to explore its importance in different contexts. (Rahmadi & Hayati, 2020) In their article, the authors identified a need for digital literacy in academic settings. Digital literacy should be implemented as a practical solution to build digital competencies among teachers and students, thereby fostering a workforce capable of advancing education in Indonesia.

Article (Giovanni & Komariah, 2020) shows that there is a significant relationship between digital literacy and student achievement (information literacy, communication literacy, content creation literacy, and safety literacy). Digital literacy has a positive impact on the quality of learning (Indriyani & Kusumaningsih, 2026). Among adolescents, digital literacy is key to ensuring that they can use technology wisely and responsibly. The digital literacy competencies that need to be possessed are: accessing, selecting, understanding, analyzing, verifying, evaluating, distributing, producing, participating, and collaborating (Asari dkk., 2019).

Previous related research includes: Digital literacy of MI (Madrasah Ibtidaiyah) students in self-directed learning during the pandemic (Hanik, 2023). Analysis of prospective elementary school teachers' digital literacy in virtual-based learning (Nahdi & Jatisunda, 2020). Analysis of the influence of teachers' digital literacy and learning management on students' interest in learning (Landa dkk., 2021). Analysis of millennials' digital literacy levels in combating the spread of hoaxes (Raharjo & Winarko, 2021). However, many studies indicate that digital literacy among adolescents still has significant limitations. Awareness of ethical, privacy, and online safety issues is becoming increasingly important. The impact of digital literacy on education has also become a focal point of current research.

Previous research used a quantitative approach, conducting a survey of high school students to assess their level of digital literacy (Nasionalita & Nugroho, 2020). Another study used a quantitative approach to examine the relationship between digital literacy and self-directed learning among undergraduate students writing their theses (Akbar & Anggraeni, 2017). This article aims to explore digital literacy among students in terms of their ability to use technology wisely and adhere to online ethics, privacy, and security. The goal is to provide an understanding of the current state of digital literacy among students. By identifying the factors that influence students' online behavior, this study offers valuable insights for the development of digital literacy in schools.

METHOD

This study employs a quantitative approach using a survey method to measure and identify the relationship between digital literacy and students' online behavior. Through this approach, data were systematically collected to obtain an empirical understanding of students' digital literacy levels and their awareness of ethics, privacy, and security in the use of digital technology. The sampling technique used was non-probability sampling, specifically convenience sampling, which involves selecting respondents based on ease of access. The respondents in this study were students participating in digital literacy activities or training sessions held at several schools in the City and Regency of Bima. The study participants consisted of junior high and high school students aged 13 to 18 years. Participation was voluntary; therefore, only students willing to complete the questionnaire were included in the research sample. A total of 105 students were successfully recruited as respondents from several schools serving as locations for digital literacy activities. Although this technique is efficient, there is a potential for sampling bias because not all members of the population have an equal chance of being selected.

Data collection was conducted using an online questionnaire based on Google Forms, which was distributed to students after the digital literacy training session was completed. The research instrument was designed as a structured questionnaire using a Likert scale to measure respondents' level of agreement with the statements. The questionnaire was used to measure students' digital literacy levels, online behavior, frequency of internet use, types of online activities, perceptions of online risks, understanding of technology, online navigation skills, and critical evaluation of digital information. Figure 1 illustrates the research process.

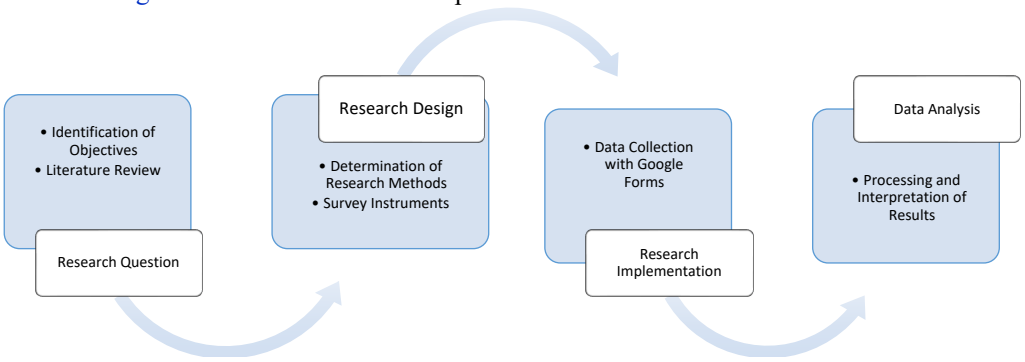

Figure 1. Research Flowchart

The research process consists of a series of main stages, namely Problem Formulation, Research Design, Research Implementation, and Data Analysis.

1) Problem Formulation: The first step is to formulate the research problem; this step aims to understand the relationship between students' digital literacy and their awareness of ethical, privacy, and online safety issues. This step also involves a literature review to identify research gaps and understand relevant literature issues related to the research objectives.
2) Research Design: The research design is developed in accordance with the research objectives that have been formulated. Previous research employed a quantitative approach by conducting a survey among high school students to map digital literacy levels (Nasionalita and Nugroho 2020). This study uses a quantitative approach via an online questionnaire. The questionnaire was developed by considering concepts and variables relevant to the objectives. This was done to collect data on students' digital literacy and online behavior. The "Literacy Score" variable is the sum of the questionnaire scores. This score reflects each respondent's level of digital literacy, with higher scores indicating a higher level of digital literacy. The score is obtained by summing or calculating the scores from each question; each question is weighted 1–5 based on its relevance to digital literacy.

The "literacy score" variable is used to determine and compare digital literacy levels among students, as well as to conduct further statistical analysis. The "literacy level" variable is derived from the literacy score variable. Digital literacy levels are grouped into several categories based on the range of literacy scores. In this study, literacy levels are divided into four categories: "High," "Moderate," "Low," and "Very Low." Respondents with scores of 40–30 can be classified as having a "High" level of digital literacy; scores of 30–20 are categorized as "Moderate"; scores of 20–10 are categorized as 'Low'; and respondents with scores of 10–0 are categorized as having a "Very Low" level of digital literacy. The "literacy level" variable represents students' digital literacy levels. Table 1 presents the indicators and scales used in the questionnaire questions.

Table 1. Dimensions of Digital Literacy.

Indicator	Scale
Frequency of Internet Use	Interval
Types of Activities While Using the Internet	Ordinal
Level of Trust in Information on the Internet	Ordinal
Information Verification Practices	Ordinal
Ability to Identify Valid Content on the Internet	Ordinal
Difficulty in Distinguishing Between True and False Information	Ordinal
Knowledge of Online Safety Practices	Ordinal
Practices in Implementing Online Safety	Ordinal
Literacy Score	Ratio
Literacy Level	Ordinal

3) Research Implementation: This study was conducted using Google Forms, which were utilized for ease of distribution to respondents and for collecting data in a format that is easy to process. Data collection took place in March 2024 over a period of one week.
4) Data Analysis: After data collection, the data was analyzed using R Studio with the R programming language. This was done to obtain valid results and to interpret students' digital literacy and online behavior. The analysis results were used to identify patterns and relationships among variables. Correlation analysis was performed to determine the relationship between adolescents' digital literacy and online behavior. Meanwhile, regression analysis was used to identify the factors influencing digital literacy and online behavior. This study aims to evaluate students' digital literacy; the analysis results will be interpreted to gain valuable insights for developing digital literacy among students.

RESULTS

This study explores students' digital literacy and understanding through data collected from 105 respondents. Analysis of this data provides insights into patterns of Internet use, levels of understanding of online information, safety practices, and trust in online content. The data collection revealed variations in the frequency of students' Internet use, with 44.8% of students using the Internet for more than 5 hours each day. Figure 2 shows students' Internet usage frequency, and Figure 3 presents their literacy levels. Figure 3 indicates that the majority of student respondents have a "Moderate" literacy level (79%), while only 18.1% have a "High" literacy level.

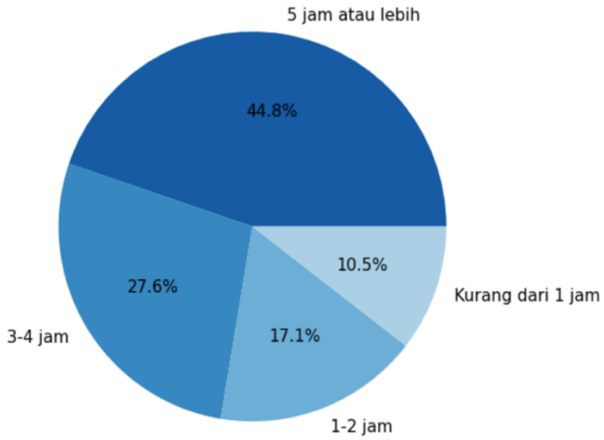

Figure 2. Frequency of Internet Use Among Students

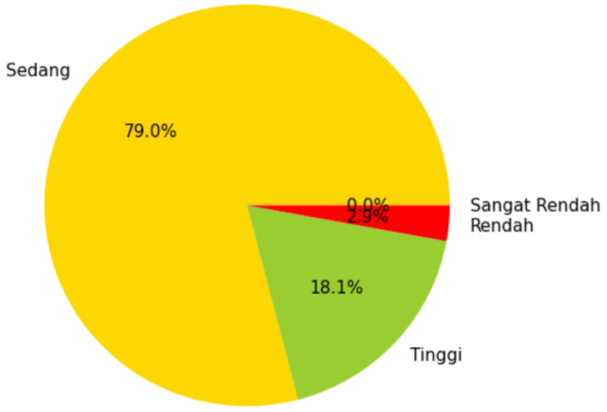

Figure 3. Student Literacy Levels

Figure 4 presents the distribution of students' difficulty levels in distinguishing between true and false information. The diagram shows variation in students' ability to manage online information; the majority of students (44.8%) sometimes and 35.2% rarely experience difficulty in distinguishing information. Although most students rarely experience difficulty in distinguishing information, a significant portion of students sometimes and often experience difficulty. Figure 5 shows the frequency of security practices implemented by students.

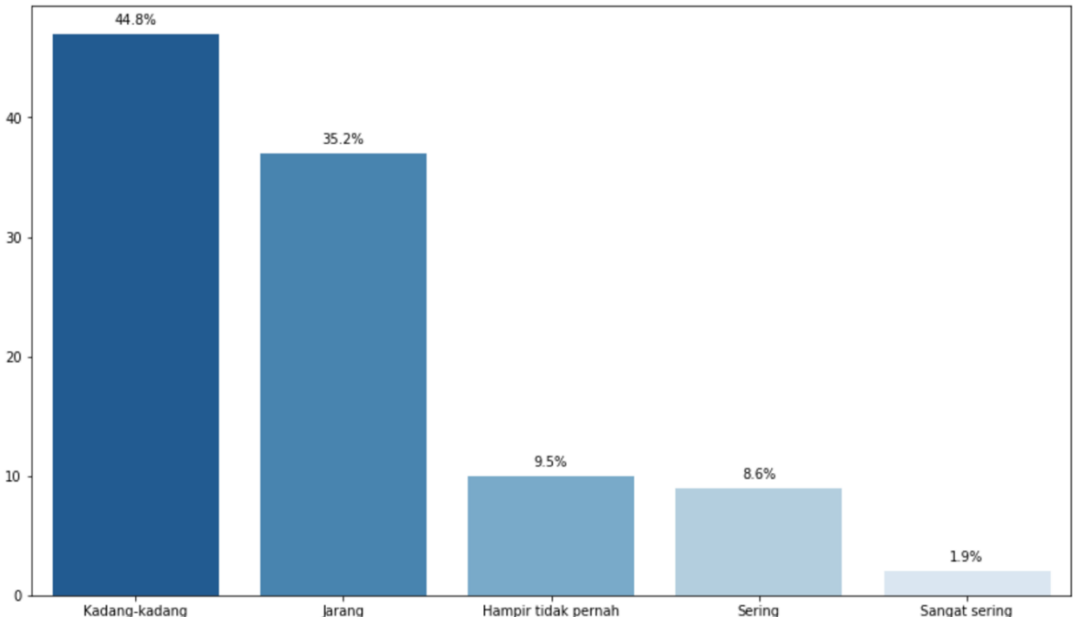

Figure 4. Difficulty Distinguishing Information

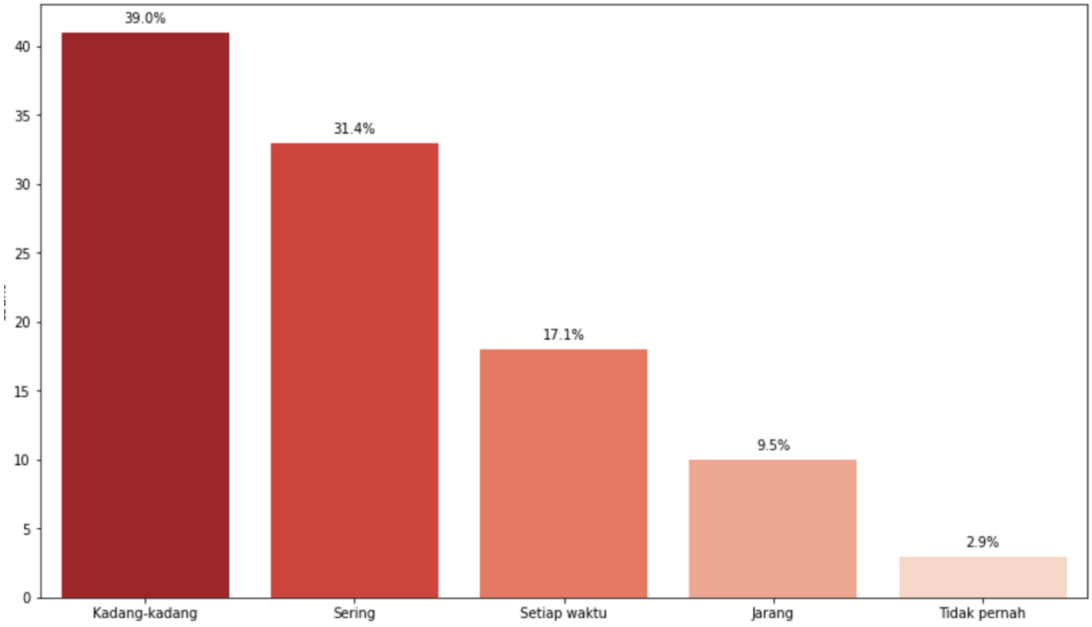

Figure 5. Security Practices

The results of the data analysis provide a deeper understanding of middle school students' digital literacy. Through this analysis, patterns, trends, and relationships among various factors influencing their digital literacy were identified. These findings serve as the basis for developing educational programs aimed at improving students' digital literacy. Table 2 presents the results of the ANOVA test between these variables. The analysis results indicate a significant relationship between the independent variables (digital literacy and difficulty distinguishing between true and false information) and the dependent variable (frequency of internet use). The results of the analysis show that the Literacy Level and Assessment variables each have a degree of freedom (Df) of 1, indicating that each variable was tested individually in the statistical model. The F-values obtained 4.192 for Literacy Level and 4.263 for Assessment indicate that both variables contribute to or influence the dependent variable under study. These F-values represent the comparison between the variation explained by the model and the error variation; thus, the larger the value, the stronger the indication of an influence. Furthermore, the significance value or p-value (Pr(>F)) for Literacy Level is 0.0432 and

for Assessment is 0.0415. Both values are smaller than the commonly used significance threshold of 0.05 ($\alpha = 0.05$). This indicates that, statistically, both variables have a significant influence on the dependent variable, so the null hypothesis (which states there is no influence) can be rejected. It can be concluded that digital literacy levels and assessment results have a significant relationship with the variables under study, such as students' online behavior. This means that changes in digital literacy levels or assessment results will be accompanied by significant changes in online behavior, making these two variables important factors to consider in data-driven analysis and decision-making.

Table 2. ANOVA Test of Frequencies.

	Df	F value	Pr(>F)
Literacy Level	1	4.192	0.0432 *
Assessment	1	4.263	0.0415 *

Table 3 presents the results of a correlation analysis exploring the relationship between the frequency of internet use and digital literacy levels, revealing a moderate positive correlation. These results indicate that the higher the frequency of students' internet use, the higher the likelihood of their digital literacy levels. Additionally, the analysis shows that the frequency of internet use is positively correlated with students' ability to identify valid versus invalid content online and their online safety practices. There is also a moderate positive correlation between the frequency of internet use and difficulty distinguishing between true and false information. This poses a unique challenge in managing online information and underscores the need for in-depth digital literacy among students. A comprehensive digital literacy program can help them develop critical thinking skills to evaluate the veracity of information.

Table 3. Correlation Between Frequency and Other Variables.

	Correlation
Type of Activity	0.05766033
Trust	0.02191398
Fact-Checking	-0.05709946
Identifying Valid Content	0.1381015
Difficulty Distinguishing Between True and False Information	0.199357
Knowledge of Security Practices	0.07056414
Security Practices	0.1649864
Literacy	0.1977472

DISCUSSION

In an increasingly complex digital age, digital literacy can no longer be understood merely as the technical ability to use devices or applications. More than that, digital literacy requires cognitive and critical skills to understand, evaluate, and use information wisely. Students are not only expected to be able to access information but also to evaluate the quality, credibility, and relevance of the information they encounter online, so they are not easily exposed to hoaxes, disinformation, or misleading content. Digital competencies encompass several key interrelated dimensions. First, information management the ability to search for, sort, analyze, and critically evaluate data or information. In this context, students need to understand information sources, compare various references, and assess the accuracy and reliability of information before using it. Second, communication and collaboration, which not only pertain to the ability to interact via digital media but also encompass digital etiquette. Students must be able to communicate politely, respect others, and collaborate in digital environments, such as through online learning platforms or social media. Third, content creation the ability to produce, edit, and share digital content creatively and responsibly. This includes understanding copyright, avoiding plagiarism, and using technology for positive purposes, such as education or the dissemination of useful information. Fourth, digital security, which is a crucial aspect amid rising cyber threats. Students need to understand how to protect personal data, maintain privacy, and recognize risks such as phishing, malware, or misuse of information. Awareness of digital security helps students become safer and more responsible technology users. Finally, participation and action, which refers to the ability to utilize digital media to actively contribute to society. Students are encouraged not only to be consumers of information but also to become agents of change who can use technology to raise social awareness, participate in public discussions, and create collective value.

Overall, digital literacy is a multidimensional competency that integrates technical, cognitive, ethical, and social aspects. Mastery of all these aspects is essential for students to adapt, think critically, and behave responsibly in the face of the ever-evolving challenges of the digital world. These competencies serve as a framework for critical thinking

and a framework for improving digital media literacy and cybersecurity competencies in Indonesia. These competencies need to be developed more specifically, targeting the younger generation, particularly students and university students (Kusumastuti dkk., 2021).

Students must be able to distinguish and evaluate the accuracy of information available online, rather than simply accepting it at face value. It is important to realize that not all online information can be trusted immediately. Therefore, it is important for students to always verify and confirm the accuracy of information before making decisions or drawing conclusions. This enables students to develop critical thinking skills and resist the influence of invalid information or hoaxes (Wahono & Effrisanti, 2018).

In addition, digital literacy emphasizes the importance of choosing options that ensure safety in online activities. It is important for students to understand the potential risks associated with online interactions and to adopt appropriate safety practices. These practices include using strong passwords, maintaining personal privacy, and avoiding actions that could compromise their online security. Digital literacy is not just about mastering technology, but also includes the ability to understand, evaluate, and protect personal data online. These skills are essential for students in the digital age, enabling them to face challenges and take advantage of opportunities in the ever-evolving online world.

CONCLUSION

Overall, the study's findings indicate that the majority of adolescents are at a moderate level of digital literacy (79%), while only a small proportion fall into the low and very low categories (2% each), and 18% have reached a high level of literacy. This distribution indicates that while most adolescents possess basic skills in using digital technology, the depth of students' understanding particularly in critical aspects such as information evaluation, digital ethics, and security remains suboptimal.

The results of the ANOVA test reinforce these findings by showing a moderate positive correlation between the frequency of internet use and the level of digital literacy. This means that the more frequently adolescents use the internet, the more their digital literacy develops, although the improvement is not always significant or consistent across all aspects. On the other hand, the frequency of internet use is also correlated with exposure to both valid and invalid content, as well as various aspects of online safety. This underscores that the intensity of internet use not only increases learning opportunities but also heightens the risk of exposure to misinformation and digital threats.

There is a moderate positive correlation between the frequency of internet use and difficulty in distinguishing between accurate and inaccurate information. These findings reveal a paradox: although internet access and usage are increasing, adolescents' evaluative skills do not always develop at the same rate. In other words, without adequate digital literacy, increased internet use can actually heighten vulnerability to misinformation.

Therefore, this study emphasizes that digital literacy is a crucial competency, particularly in the context of online safety. Digital literacy is not only related to technical skills but also encompasses critical thinking, privacy awareness, and responsible behavior in the digital space. Adolescents with strong digital literacy are more likely to identify risks, filter information, and apply appropriate safety practices. Consequently, efforts to strengthen digital literacy should focus not only on increasing access to and use of technology but also on developing analytical skills and ethical awareness so that adolescents can interact safely, intelligently, and responsibly in the digital world.

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AUTHOR CONTRIBUTION STATEMENT

F was responsible for the research design, data collection and analysis, and manuscript preparation. SM contributed to the development of research instruments, data analysis, and manuscript refinement. TA played a role in the development of the research concept, oversight of the overall research process, and final manuscript refinement.

AI DISCLOSURE STATEMENT

The authors declare that this research was conceived, conducted, written, and revised entirely by the authors without the use of artificial intelligence (AI) tools or techniques.

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