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Improving High School Students Digital Literacy Through Digital Ethics and Skills Education

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ABSTRACT

The rapid advancement of information technology requires students to possess not only technical competencies but also strong digital ethics. This community service program aimed to enhance high school students' digital literacy through digital ethics and skills education. The program involved 50 eleventh-grade students and was implemented using participatory methods, including training, outreach, and mentoring. The materials covered social media ethics, personal data protection, critical evaluation of digital information, and the productive use of technology. Evaluation was conducted using pre-and post-tests and behavioral observations. The results showed a significant improvement in students' digital literacy, with average scores increasing from 56.4% to 89%. Students demonstrated better awareness of digital responsibility, misinformation, and ethical online behavior. This program effectively strengthened students' capacity to navigate the digital environment responsibly and productively.

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INTRODUCTION

Changes in information and communication technology in the current digital are have revolutionized the way people interact, learn, and work. Young people, especially secondary school students, are the group most engaged with digital technology. However, despite frequent use of digital media, strong digital literacy skills, particularly in terms of digital ethics and skills, do not always follow (Kusumaningrum et al., 2021). Digital literacy involves more than just the skills of using technological tools; it also includes critical thinking about information, protecting personal data, and ethical behaviour in the digital world (UNESCO, 2019). Secondary school students growing up amidst today's digital developments are not only consumers of information but also creators of digital content (Meilinda et al., 2020). They have broad access to various knowledge sources, social media, and online learning platforms that can be utilized to support the learning process. Although access to information has become easier, the challenges faced also require solid digital literacy readiness (Pratama et al., 2025). Therefore, this study aims to develop and evaluate a structured digital literacy program integrating ethical and technical competencies among high school students.

The low level of understanding of digital ethics and skill remains a significant challenge among students. Situations such as the spread of misinformation, cyberbullying, plagiarism, and misuse of social media platforms demonstrate that technical skills alone are insufficient to navigate the complexities of cyberspace (Rafid & Nurita, 2025). This highlights the need for action through digital literacy education programs that focus not only on technical aspects but also on the development of ethical values and responsible digital skills (Yuniarto & Yudha, 2021). Moral awareness and responsibility in technology use are crucial for students to behave positively, safely, and productively in the digital environment (Rahman et al., 2023). However, previous studies have primarily focused on digital literacy from a technical perspective, with limited emphasis on integrating digital ethics and practical skills within community service-based interventions.

Digital literacy is not just about operating technological devices; it also encompasses skills in critical thinking, creativity, communication, and an understanding of ethics in the digital world (Handiyani & Abidin, 2023). Therefore, developing digital literacy skills for secondary school students should focus on two main areas: teaching digital ethics and strengthening digital skills. Teaching digital ethics provides students with an understanding of moral and social principles for online interaction, while digital skills equip them with the technical knowledge to access, evaluate, and use information wisely (Nugroho, 2022).

Ethical aspects are crucial in the use of social media because they can reduce the risk of detrimental actions by various parties, potentially leading to legal violations (Rorinca et al., 2024). Ethics in online communication, or netiquette, can be understood as the norms and rules governing the use of the internet as a means of interaction and communication that users must adhere to when using various media available online (Fahrimal, 2018).

Schools, as formal educational institutions, play a crucial role in instilling ethical values of digital literacy. Through interconnected learning, training, and extracurricular activities, students can be guided to understand the importance of maintaining a digital footprint, respecting others' privacy, and utilizing digital media for positive purposes. Improving the quality of education by providing students with the knowledge to use the internet wisely through various constructive and creative activities (Haerani et al., 2022). Therefore, teaching digital ethics and skills is fundamental in preparing a young generation that is intelligent, well-mannered, and able to adapt to the changes of the digital age.

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The community service activity is a contribution from the world of education to strengthen students' abilities to become smart, ethical, and productive technology users. Through educational and participatory methods, it is hoped that students will not only understand the concept of digital literacy but also practice it in their daily lives. This initiative aligns with the government's commitment to creating a National Digital Transformation and supporting the achievement of the Sustainable Development Goals (SDGs), particularly in the areas of quality education (SDG 4) and innovation and infrastructure (SDG 9).

METHOD

This community service activity took place on October 23, 2025, using participatory and educational methods, emphasizing active participation by participants at every stage of the activity. This study employed a quasi-experimental design using a pre-test and post- test approach. The instruments consisted of structured questionnaires measuring digital ethics, cybersecurity awareness, and digital skills. Data were analyzed using descriptive statistics and percentage comparisons to evaluate improvements. The following explains the stages of partner problems and the solutions provided for them.

Program Outreach

This community service activity took place on October 23, 2025, using participatory and educational methods, emphasizing active participation by participants at every stage of the activity. This study employed a quasi-experimental design using a pre-test and post- test approach. The instruments consisted of structured questionnaires measuring digital ethics, cybersecurity awareness, and digital skills. Data were analyzed using descriptive statistics and percentage comparisons to evaluate improvements. The following explains the stages of partner problems and the solutions provided for them.

TABLE 1. Community Service Implementation Method

No	Problem	Impact Solution	Implemented in Activities
1	Students' low understanding of digital ethics (e.g., how to interact politely on social media, maintain privacy, and avoid hate speech)	Unethical behaviour often occurs online, such as cyberbullying, spreading hoaxes, and privacy violations.	Conduct educational sessions and workshops on digital ethics, including case studies and simulations of ethical behaviour in the digital world.
2	Lack of practical digital skills, such as the use of learning applications, data management, and digital security.	Students are not optimally utilising technology for learning and are vulnerable to cybercrime.	Conduct basic and intermediate digital skills training, including the use of educational platforms, password security, and personal data management.
3	Lack of literacy regarding information and digital media (not being able to distinguish between true and false information)	Easily influenced by fake news and negative content.	Providing information literacy education through content analysis activities, discussions, and information verification practices
4	Lack of support within the school	Digital ethics values are not	Mentoring for teachers so that

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	environment for implementing a healthy digital culture	continuously internalised in schools	the material can be continued in teaching and learning activities.
5	Limited availability of engaging digital learning resources and media	Students quickly become bored and less interested in digital educational activities	Creating interactive learning media such as short videos, digital quizzes, and educational infographics about digital ethics and skills
6	Lack of awareness of digital footprints and personal data security	Students share personal data without realising the risks	Holding digital security simulations and a "Being Smart on Digital Media" campaign to build awareness of digital responsibility

The community service activity was implemented using a method that included preparation, implementation, direct practical mentoring, and evaluation of results. The detailed steps in the activity methodology are described as follows:

FIGURE 1. Activity Implementation Stage

Preparation

This stage begins with identifying the needs and challenges experienced by the partner, in this case, SMA Negeri 4 Kota Serang, where the activity will be conducted. The community service team collaborated with the school, conducting observations and conducting direct interviews with relevant parties, including the vice principal for student affairs, to determine the extent of students' digital literacy skills and the challenges they face in utilising information technology. Next, an activity plan, schedule, and training materials were developed that met the participants' needs. The team also prepared evaluation tools in the form of pre- and post-test questionnaires, distributed via a Google Form link to students. This stage is crucial to ensuring the activity runs smoothly and meets its stated objectives.

Implementation

This activity was conducted at State Senior High School (SMA) 4 in Serang City, located at Jalan Raya Banten No. Km. 5, Kasemen, Kasemen District, Serang City, Banten 42111. A total of 50 students from grade XI Science 3 were selected by the school based on their interest and participation in digital activities. This section covered the implementation of this activity, including education and training on digital literacy (Nisa et al., 2026). Students received material through interactive lectures, discussions, and hands-on practice on key aspects of digital literacy, including social media ethics, personal data protection, digital device skills, and critical thinking about information on the internet. The activity concluded with a pre- and post-test to assess students' understanding after the training (Haerani et al., 2022).

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Mentoring

The mentoring phase takes place after the training has been completed. The goal is to ensure that participants' knowledge and skills are truly applied in their daily lives. During this phase, the community service team provides mentoring through the creation of positive digital campaigns and the ethical, safe implementation of technology, through regular consultations both in person and online.

Evaluation Phase

Evaluation is conducted to assess the success of the activity and the effectiveness of the mentoring. The evaluation process includes analysing the results of pre- and post-tests, responses from participants and teachers, and observing changes in student behaviour in the use of digital media. Furthermore, the evaluation serves as a basis for formulating recommendations to improve future activities.

RESULTS AND DISCUSSION

The digital literacy and skills improvement activity held on October 23, 2025, at SMA Negeri 4 Serang City involved 50 students from grade XI Science 3. The participants showed enthusiasm and active participation throughout the activity, including when completing pre- and post-tests, attending material-delivery sessions, participating in discussions, and conducting digital security practice simulations. Community service was carried out through training and workshops for all participants, with the material divided into three sessions. The first session began with an explanation of the importance of digital literacy in today's era. Digital literacy is defined as a person's ability to access, understand, assess, and utilise information wisely and responsibly using digital technology. Participants were introduced to the positive and negative effects of advances in information technology, including the risks that can arise when it is not used ethically and safely.

FIGURE 2. Opening Ceremony

Next, participants were given insight into widely used applications such as WhatsApp, Google, and various social media platforms. They were also introduced to security software, such as antivirus and secure browsers, to enhance their understanding of how to protect their devices. The material then moved on to online ethics, encouraging participants to understand the importance of being polite and responsible when interacting in the digital world. The discussion covered various issues such as hate speech, the spread of unverified information, and cyberbullying. Participants were taught that every action on the internet leaves a digital footprint that can impact reputations in the long term.

In the next session, the discussion focused on aspects of online security. Participants were

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introduced to common dangers such as fake news, phishing, and social engineering. The material was presented through case studies and interactive discussions, allowing participants to better understand common forms of digital manipulation. During the practical session, participants were trained to enable two-factor authentication (2FA) using Google Authenticator. They were also informed about Single Sign-On (SSO), a security system for digital accounts commonly used across online services.

To deepen participants' understanding of the digital issues discussed, real-life examples were included in the form of screenshots of various phenomena, such as hoaxes, cyberbullying, and phishing, which have been hot topics on social media. The goal of this session was to enable participants to connect the material learned to familiar situations in everyday life. Practical activities were conducted using participants' smartphones, particularly when running a Google Authenticator simulation as part of digital security education and when visiting fact-checking websites to identify hoaxes. All of these tools and media were chosen to ensure the learning process felt visual, practical, and engaging, so that participants not only mastered the theory but also applied it directly in the digital world they encountered.

FIGURE 3. Implementation of Activities

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FIGURE 4. Lecturer Team with Participants

After all training materials were presented by the support team, the activity continued with a discussion and question-and-answer session to deepen understanding of the material and evaluate participants' knowledge. This session was designed to provide an interactive opportunity for participants to ask questions, share their views, or share personal experiences regarding the digital literacy issues discussed. Through this discussion, participants not only received information but also actively engaged in critical and reflective thinking about the digital realities they face every day. The questions posed demonstrated students' interest and curiosity in topics such as account security, the distinction between hoaxes and opinions, and ethical use of social media. The team provided direct responses and explanations tailored to the participants' context and age for easy understanding. This discussion also served as a tool to reinforce practical digital literacy values, enabling participants to apply them wisely and responsibly in their digital lives. The following table summarises the questions and answers.

TABLE 2. Summary of the Q&A Discussion

No	Questions	Answers
1	How can you distinguish between false information, personal opinions, and truth in an article or content on a social media platform?	Hoax: News that is untrue, misleading, and not based on reality. Often created to manipulate, arouse emotions, or attract attention. Opinion: An individual's point of view, belief, or interpretation. Not necessarily true or false, as it is subjective. Fact: Data that actually occurred and can be verified.
2	How can you verify the accuracy of information circulating on WhatsApp?	Use fact-checking platforms like turnbackhoax.id or check with trusted news sources.
3	How can you keep your personal data secure online?	Use complex passwords, enable two-step authentication, be vigilant when sharing personal data, avoid suspicious clicks, and adjust app privacy settings.
4	Why is logging out of your account crucial after using a shared computer?	To protect your account from unauthorised access.
5	What are the main obstacles to improving digital	Lack of media knowledge, limitations in

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literacy skills?	available devices, absence of guidance, a culture of copying and pasting, low awareness of digital security, and the impact of the environment and social interactions.

The pretest for 44 students at State Senior High School 4 in Serang City aimed to gain an initial understanding of their digital literacy before undergoing interventions focused on digital ethics and skills. The pretest instrument covered three main components: online ethics, cybersecurity, and technology skills. Data from the initial assessment indicated that students' digital literacy levels were still in the low to moderate range.

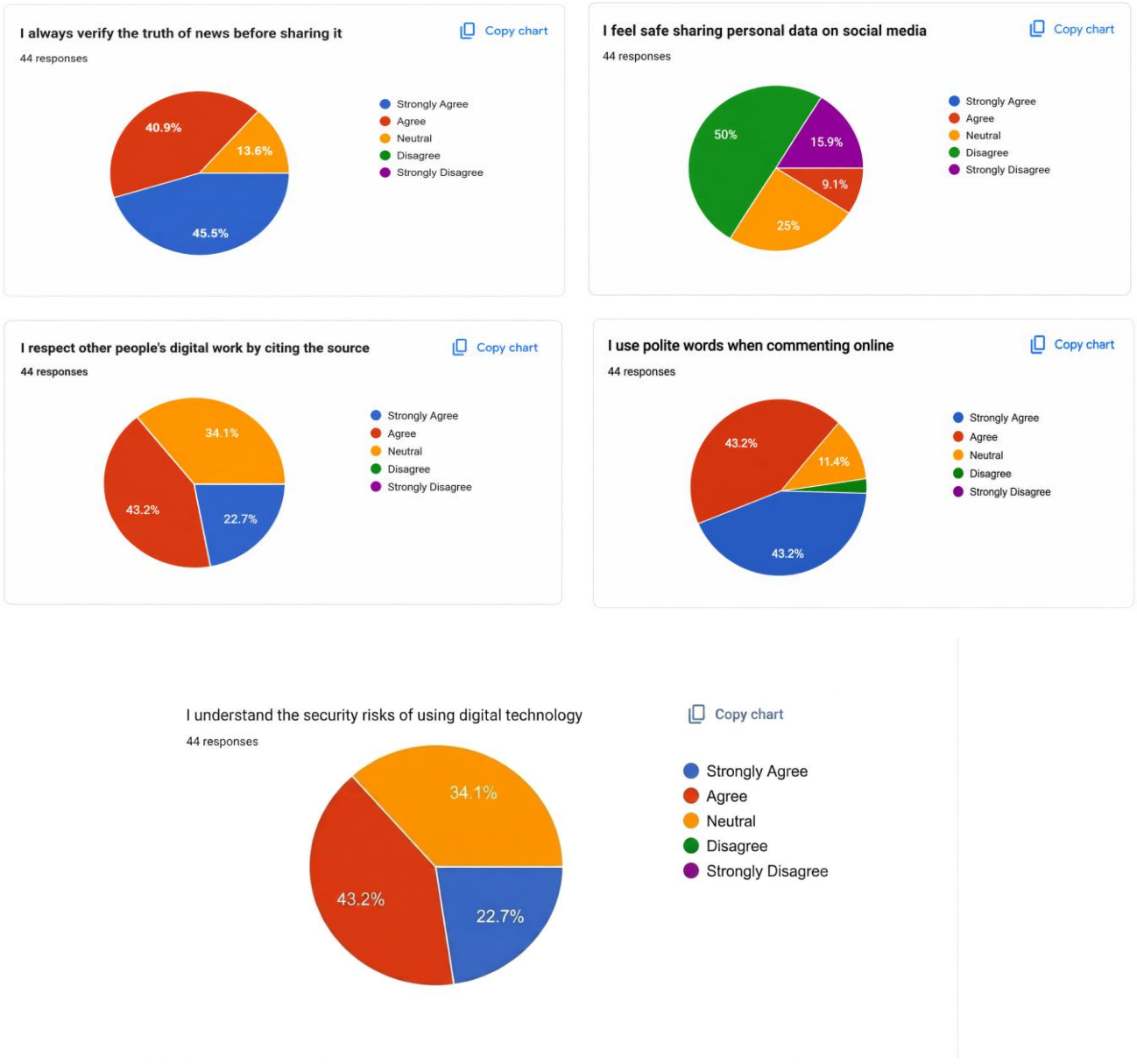

FIGURE 5. Pretest Result

In terms of digital ethics, many students were unable to identify ethically appropriate online communication behaviour. Low scores were observed in understanding ethical commenting and in

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distinguishing between actions that could harm others. The results of this study indicate that understanding of norms and ethics in the digital realm has not yet developed optimally.

Digital security also showed inadequate results. Most students lacked a sufficient understanding of the importance of protecting personal data, using strong passwords, and verifying information to avoid fake news. Low scores in account security and privacy settings indicate that digital risk mitigation skills still need improvement.

Furthermore, in terms of digital skills, students generally only mastered basic use of social media devices and applications. More productive skills, such as utilising technology for learning, collaboration, and information management, remained low. This suggests that technology use is more often directed towards entertainment purposes than for educational activities.

Overall, the average pretest score ranged from 45 to 60 (on a scale of 0 to 100), indicating that digital literacy skills were not yet at a good level. These findings provide an important foundation for implementing the intervention and also serve as a reference for assessing the program's effectiveness through a post test. The pretest results also indicated that students needed to improve their overall competencies to participate safely, responsibly, and productively in the digital world.

The final stage of this activity was a post test and evaluation to assess students' understanding and the program's effectiveness.

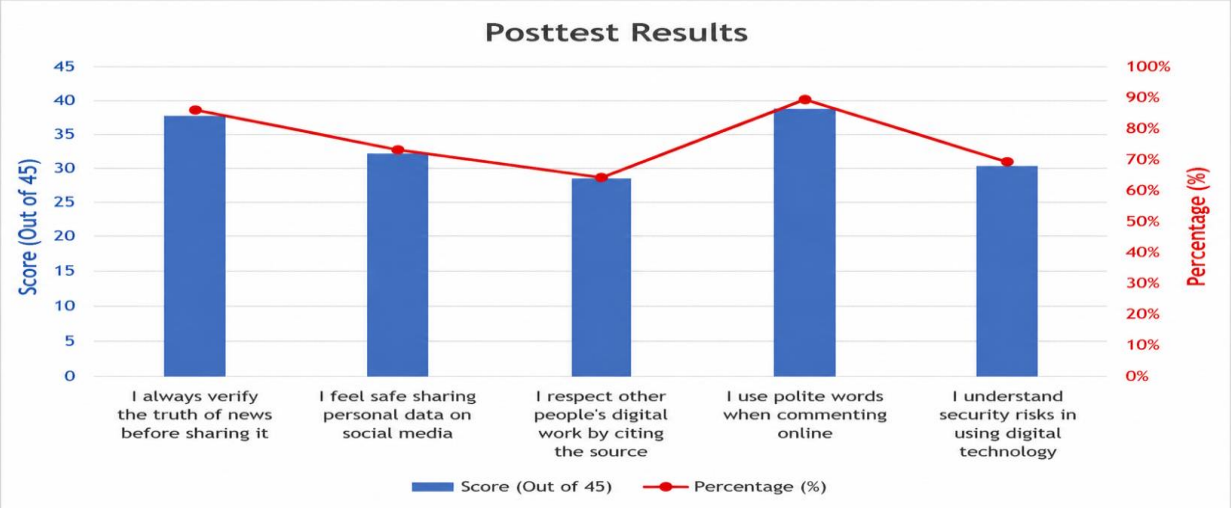

FIGURE 6. Post-test Result

The analysis showed significant improvement in students' understanding after participating in the digital ethics and skills education program. Data analysis revealed that the average pretest score was 56.4 per cent, while the average posttest score increased to 89 per cent. This 32.6-point increase indicates that the students understood the material well.

The distribution of the scores showed that 82 per cent of students were classified as good to excellent on the posttest, up from only 24 per cent on the pretest. Furthermore, only 4 per cent of students were classified as poor, significantly lower than the 31 per cent on the pretest. These data indicate that the majority of students experienced a consistent improvement in their digital competencies.

. Through the final evaluation, students demonstrated significant improvement in their ability to recognise misinformation, distinguish between factual data and opinions, and apply digital ethics principles when using social platforms. Furthermore, students gained a greater understanding of the

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importance of account security, privacy, and digital responsibility in their daily lives.

Overall, the final evaluation results indicated that this community service program successfully strengthened students' digital literacy across various aspects, including knowledge, attitudes, and practical skills. These results confirm that digital education initiatives are highly relevant and require ongoing implementation to create a generation that is intelligent, critical, and ethical in the digital. The significant increase in post-test scores indicates that participatory and practice-based learning effectively enhances digital literacy. This finding aligns with previous studies ((UNESCO, 2019), which emphasize the importance of integrating ethical awareness with technical skills.

CONCLUSION

This study demonstrates that digital ethics and skills-based education significantly improve students' digital literacy. The program effectively enhanced students' understanding of cybersecurity, ethical behaviour, and responsible technology use. The findings highlight the importance of integrating ethical and technical competencies in digital literacy education. Future programs should incorporate more advanced topics and ensure sustainability through continuous collaboration between educational institutions and schools.

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We hope this program will make a significant contribution to improving the quality of education and community empowerment, and serve as foundation for the continuation of similar programs in the future.

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