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Digital Literacy based on Islamic Values to Improve Risk Perception and Critical Thinking among Muslim Adolescents

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ABSTRACT

Risk perception and critical thinking have become the two important cognitive skills for adolescents to possess in order to prevent risky online behavior such as spreading fake news. These skills are related to digital literacy and can be improved through training. However, most of the existing literature is in digital literacy training, online risk perception, and critical thinking by using correlational approach and conventional digital literacy training. For this reason, this research aimed to integrate Islamic values into digital training to improve risk perception and critical thinking skills among Muslim adolescents. This study hypothesized that digital literacy based on Islamic values can improve adolescents risk perception and critical thinking skills. To test this hypothesis, a pre-test post-test within experimental research design involving 112 Muslim adolescents in Surabaya was conducted. The participants were provided with digital literacy training which was embedded with Islamic values in four training sessions. The risk perception and critical thinking scale were used to measure each dependent variable. The results of data analysis using the paired sample t-test showed that there were significant differences in the scores of risk perception and critical thinking skills before and after training. Thus, the hypotheses in this study were accepted. The practical implications of the results of this study are also discussed.

INTRODUCTION

The number of internet users in developing countries has grown very rapidly in recent years. According to the recent World Bank's report, the percentage of individuals using the internet in developing countries had increased from 7% in 2005 to 45% in 2020 (World Bank, 2020). Likewise, internet users in Indonesia as a developing country, have also increased very rapidly, and have become one of the fastest growing in the world. A report from the Association of Indonesian Internet Service Providers (APJII, 2023) stated that there has been an increase in the trend of internet access in Indonesia from year to year. In 2018, internet access in the country reached 64.8% and its level rose to 73.7% in 2019-2020 of the total population or around 196.7 million people. This number then increased again to reach 77.02% in 2021-2022 and finally in 2023 internet access in Indonesia reached 78.19 percent in 2023 (APJII, 2023). More recently, in 2024, the total internet users in Indonesia has reached 79.5 percent, with a total of 221,563,479 (APJII, 2024).

Amongst such a large number of internet users, adolescent internet users should be a major concern, as this group represents the highest population of internet users. The majority of internet users in Indonesia is generation Z, with roughly 34% of the total internet users (APJII, 2024). Despite

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some opportunities for adolescents, such as increasing knowledge and skills in computers, mathematics, and reading skills (Livingstone, Mascheroni, & Stoilova, 2023), internet could also provide risks for adolscents. A descriptive study conducted by Luthfia et al., (2019) demonstrated that there are some risks encountered by adolescent internet users in Indonesia including exposure to violent content, hate speech, and pornography, false identity, and harsh comment. Furthermore, cyberbullying also becomes a threat among adolescents. According to a report by UNICEF (2020), 45% of adolescents reported that they have ever experienced cyberbullying such as harassment through chatting applications and illegal spread of photo/video. In addition, adolescents are also vulnerable to be exposed with fake news. A study among junior high school indicated that the majority of respondents believe in misinformation that once spread in the social media (Ariska et al, 2023). The risks of fake news are also global phenomena. In a study, Howard et al., (2021) found that 76 percent of 14–24-year olds reported seeing online mis/disinformation at least once a week. At the same time, A survey in 10 countries showed the weakness of adolescents in evaluating online information where up to three-quarters of children reported feeling unable to judge the veracity of the information they encountered online (Livingstone, 2019)

Digital Literacy

To deal with the aforementioned risks, adolescents must be equipped with adequate digital skill capacity. Individuals must have the ability to adopt technology or known as digital literacy skills (Phuapan et al., 2016). Digital literacy is the ability to access, manage, understand, integrate, communicate, evaluate and create information safely and appropriately. With high digital literacy, it will be beneficial for students to face online risks (Helsper and Smahel, 2020). Phuapan et al. (2016) noted that digital literacy is the most important skill in utilizing technology, a communication tool to access, organize, coordinate, estimate, and provide information in society.

Unfortunately, research has found that only 2 percent of children and adolescents have the critical literacy skills they need to judge whether a story is true or false. Carefully navigating the complex online landscape requires a certain level of literacy, critical thinking skills and maturity that children and youth may not acquire. The existence of digital skill training provides positive benefits and protection for adolescents from the dangers of the internet (Reder, 2015). A large-scale, nationally representative survey in the US showed that young people who received media literacy learning opportunities were more likely to rate the accuracy of information correctly and that those who received media literacy education in schools were 26 percent more likely to rate evidence-based posts as 'accurate' rather than rating an inaccurate post as 'accurate'. In contrast, this study found that adolescents who did not receive media literacy education tend to rate both accurate and inaccurate posts as 'accurate' (Reder, 2015).

In line with the previous study conducted in the US, a study among adolescents in a Public school in Surabaya found that a significant number of students have insufficient literacy skills, preventing them from recognizing fake news. Moreover, they also contribute to share such misinformation (Hari et al., 2022). Another study conducted in a junior high school in Bandung by Ariska et al, (2023) demonstrated that the vast majority of students have low ability in distinguishing fake information and valid information. They tend to believe misinformation spread over the internet and found it difficult to trace the information from the reliable sources.

Hague & Payton (2010) described several important components in digital literacy, namely functional skills and beyond, creativity, collaboration, communication, the ability to find and select information, critical thinking and evaluation, cultural and social understanding, and e-safety. In particular, critical thinking skills need attention. The rise of news on social media makes people believe that social media is a legitimate source of news. This makes people even more lazy to test the credibility of the information they receive and share (Jackson, 2019). Critical thinking skills are not only for passively receiving and interpreting information, but also for contributing, analyzing and thinking critically when dealing with information. In a digital context, critical thinking means internet users do not take something for granted and check and verify anything before declaring it true. Critical

thinking helps Internet users go beyond the first impressions of any subject to form rational and impartial judgements. Amidst the flood of fake news, critical thinking becomes important. A literature review conducted by Machete & Turpin (2020) shows that critical thinking is an important skill for identifying fake news.

Digital Literacy and Critical Thinking Skills

Although the concepts of literacy and critical thinking are almost similar, the relationship between literacy skills and critical thinking remains debatable. According to Breivik (2005) literacy involves applying critical thinking skills in order to effectively select rich information. In contrast, Ward (2006) states that information literacy is not just critical thinking, but a broader skill that involves not only analytical engagement with information but also the creative and meaningful management of information. Meanwhile, Albtiz (2007), emphasized the difference between literacy and critical thinking. Furthermore, it is stated that literacy is a collection of concrete and skill-based abilities while critical thinking is a series of high-level cognitive processes in metacognitive capacities. In the context of cognitive development, Weiler (2005) considers the role of cognitive maturity in the acquisition of information literacy skills. Weiler (2005) says that individuals at the dualistic stage of intellectual development, such as students entering college, may face challenges in critically evaluating information, often relying on external authorities such as professors, librarians, or the Internet to provide answers. This dependence on authority stems from an inability to engage in critical thinking about the information they encounter.

Although there are various debates on the definition and interpretation of critical thinking skills, the relationship between the two concepts remains the dominant theme. Information literacy and critical thinking share a fundamental synergy that emphasizes the importance of facilitating effective engagement with information and knowledge in a rapidly evolving information landscape. Several correlational studies show that literacy skills are related to critical thinking skills. Wertz et al. (2013) found that among engineering students in America, information literacy is positively correlated with thinking skills. The results of research on students in Indonesia conducted by Amin, Adiansyah & Hujjatusnaini (2023) showed that communication skills and digital literacy simultaneously affect critical thinking skills significantly. Similar research on students conducted by Susanti & Krisdiana (2021) also showed the same results, where literacy skills were significantly correlated with critical thinking skills. Meanwhile, research on high school students conducted by , Supriyanti Permanasari, & Khoerunnisa (2020) also found a significant positive correlation between information literacy and critical thinking skills.

Digital Literacy and Risk Perception

In addition to critical thinking skills, risk perception also plays an important role in safe internet behavior. Risk in the digital context can be interpreted as various intentional or unintentional situations experienced by Internet users which lead to unexpected, negative and detrimental consequences, and which can be physically and mentally harmful (Staksrud & Livingstone, 2009). Meanwhile, risk perception refers to how individuals perceive and assess risk online, greatly influencing their online activities, protective behavior towards personal information and digital engagement as a whole (Nyblom et al., 2020). High online risks are more likely to take protective measures and safe internet practices. This awareness-driven behavior not only enhances personal cybersecurity but also contributes to the resilience of the wider digital ecosystem against cybercrimes and threats (Sun et al., 2022).

High risk perception among internet users requires good digital literacy skills. A higher level of digital literacy is significantly related to the more adequate online coping strategies aimed at solving problems and protecting children from online risks and further harm (Van Schaik et al., 2017). According to Vissenberg, d'Haenens, & Livingstone (2022) individuals with higher digital literacy tend to show a better and more accurate understanding of potential online risks, enabling them to make informed decisions about their online activities. Conversely, those with limited digital literacy may find it difficult to effectively recognize and assess various online risks. The results of this study

were confirmed by subsequent studies, for example, a recent study conducted by Purnama et al. (2021) among elementary school students in Yogyakarta showed that digital literacy is related to the ability to recognize the risks of online behavior. Another research among young individuals aged 17-24 showed that digital literacy is significantly correlated with perceptions of online risk (Luthfia et al., 2021). This means that the higher a person's digital literacy level, the higher their risk perception in online behavior. Digital literacy not only empowers individuals to take advantage of the benefits of the digital world but also equips them with the tools to measure and respond to potential risks in a more informed way.

The reality on the field shows that digital literacy, risk perception, and critical thinking skills regarding online information are still not encouraging. Raharjo & Winarko (2021) found that the digital literacy level of the millennial generation in the city of Surabaya is generally in the low category index. The highest component is shown by the Ability to Understand with a digital literacy index score of 46.8%. Likewise, with the condition of youth digital literacy in Gunung Anyar District, early research in the field points to an urgent need to equip youth with effective digital literacy skills, given their increasing exposure to digital information and online platforms. Preliminary surveys show that adolescents often have difficulty evaluating the credibility of online content, leading to potential consumption of misinformation and vulnerability to online risks. The majority of adolescents still use a lot of online activities to watch videos or play games. They also lack knowledge about internet security (cybersecurity) such as the need to change passwords and not disclose personal information on the internet. This is understandable considering that adolescents in the Gunung Anyar sub-district have never received digital literacy training, while most of them are active internet users.

To our knowledge, previous literature has not discussed the integration of religious teachings in the realm of digital literacy for adolescents. This research begins the efforts to fill this critical gap by examining the potential of Islamic value-based digital literacy training in improving online behavior risk perception and critical thinking skills among adolescents. Thus, the main objective of this research is to investigate how Islamic values can be strategically incorporated into digital literacy education, equipping youth with adequate skills in critically appraising digitally available information.

Incorporating beliefs and culture such as religion into digital literacy training is crucial. Firstly, religion can shape individuals' perceptions, attitudes, and behaviors towards the use of technology (Abiddin et al., 2022). Furthermore, religion can influence ethical considerations and decision-making processes in the digital world. Religion provides guideline on what to do and not to do, including in social interaction with people in social media (Alnuaimi & Azzi, 2022). This help adolescents in dealing with complex moral dilemmas with religious values and norms. Moreover, incorporating religious values can promote inclusivity and foster a more respectful learning environment that make individuals feel respected. Consequently, individuals can be more engaging during the program (Douglass et al., 2022).

Specifically, for Muslim adolescents, insertion of Islamic values teaches people about using the internet wisely. One of the values relevant for digital literacy training is thoughtfulness before sharing information or *tabayyun* (Mohamad & Mat Isa, 2022), which is implied by the Qur'an (QS 49:6). "*O believers, if an evildoer brings you any news, verify ʿitʾ so you do not harm people unknowingly, becoming regretful for what you have done*". The other values include honesty and integrity as well as preventing hate as stated in the Qur'an "*O you who have believed, be persistently standing firm for Allah, witnesses in justice, and do not let the hatred of a people prevent you from being just. Be just; that is nearer to righteousness. And fear Allah; indeed, Allah is acquainted with what you do*" (QS 5:8). In the context of digital behaviour, this value encourages users to be inclusive, caring, and to treat everyone with respect (Kango et al., 2023). This makes the internet a friendlier place where everyone's rights are respected. Learning about Islamic values alongside digital skills helps adolescents healthier in using the internet.

In relation to this objective, some of the research questions in this research are how can Islamic-based digital literacy training improve risk perception and critical thinking skills in

adolescents in Gunung Anyar. Researchers hypothesize that religion-based digital literacy interventions can positively influence adolescents' perceived risk of online behavior (H_1) and critical thinking skills (H_2) towards digital information. By answering these research questions and hypotheses, this study seeks to offer new insights into the field of communication psychology and cyberpsychology and make a substantial contribution to the theoretical and practical dimensions of digital literacy education for youth.

METHODS

This study used a quasi-experimental design with pretest and posttest within subject. In this design, the dependent variables, namely risk perception (Y1) and critical thinking skills (Y2) were measured once before the intervention and once after the intervention then the results were compared. A quasi-experimental design with pretest and posttest measures was selected for some technical reasons. First, random assignment of participants to experimental conditions is not feasible due to pre-existing groupings. The participants already came from different group of learning community based on the sub district where they lived. Assigning them to a new different group of either control or experimental group can lead to confusion and inconvenience. Secondly, using pretest and posttest measures is sufficient to assess changes within the same group over time and enables the effectiveness of the intervention while controlling for potential confounding variables.

The intervention provided in this study was in the form of digital literacy training integrated with Islamic values which was carried out in 4 sessions, conducted in four different days within two consecutive weeks. Each session lasted for 75 minutes and contains three different sub sessions. The first sub session was introduction session and group orientation which took about 15 minutes. After the introduction part, the tutor presented the materials for about 45 minutes. The materials covered four different topics, namely internet security in session 1, utilization of internet technology in session 2, critical thinking on information in session 3, and Islamic-based digital information in session 4. Although session 4 is particularly allocated for Islamic value topics, it does not mean other sessions do not discuss about them. Islamic values were also inserted in previous sessions. After discussing the material comes the case study, which reflected the topics. Questions and answers were also accommodated in the last 15 minutes of the session. The more detailed training modules and training materials and their implementation can be seen on the following page: https://s.id/digilittraining.

There were 112 participants consisting of Muslim adolescents in Gunung Anyar District. They were junior high school students living in four sub-districts including Gunung Anyar Sub-District, Gunung Anyar Tambak Sub-District, Rungkut Tengah Sub-District, and Rungkut Menanggal Sub-District who participated in community service program entitled '*FPK Mengaji"* organized by the Faculty of Psychology and Health. The program aimed to provide additional courses in basic Islamic studies and the Qur'an. Sample selection was determined using purposive sampling technique with the criteria of junior high school students and ability to use the internet. Participants were asked to voluntarily take part in digital literacy training activities. They were explained about the training procedure and given informed consent before the study started. They can withdraw whenever they want from training. After participating in the session, participants were provided with snacks as compensation.

To measure risk perception and critical thinking, two previously validated scales were adapted and translated into Bahasa Indonesia using Brisling's back-translation method. One of the authors (MSM) and an independent English-Bahasa Indonesia translator performed the translation process, ensuring accuracy and consistency. Comparison between the English and Bahasa Indonesia versions revealed no significant errors or differences in the translation results, indicating compatibility between the two versions of the scales.

The risk perception scale consists of 9 items adapted from the Harmful behavior dimension of the Internet Risk Perception Scale developed by Torres-Hernández, García-Martínez, & Gallego-Arrufat (2022). The reliability test in this study shows that this scale has a very good reliability value

(Cronbach's alpha = 0.94). This scale measures participants' perceptions of how risky online behaviors are. An example of an item on this scale is “How risky is accessing pornographic sites?” Responses are in a Likert 1-5 format, with details 1 (Very Safe), 2 (Less Risk), 3 (Moderate), 4 (Moderately Risky), and 5 (Very Risky). Meanwhile the scale of critical thinking skills is adapted from the critical thinking aspect in Wang et al., (2022). An example of an item is "How often do you ask friends/parents/teachers about the truth of information from the internet". This scale consists of 9 items, with a Likert response type of 1-5, with details of a score of 1 (Never), 2 (Rarely), 3 (Sometimes), 4 (Often), 5 (Always). The reliability test in this study shows that this scale has sufficient reliability value (Cronbach's alpha = 0.77). The data that has been collected is then analyzed. Hypothesis testing was carried out using the Paired-sample t-test technique which was carried out with the help of SPSS Version 22 Software.

RESULTS AND DISCUSSION

Out of a total of 140 Muslim adolescents who took part in the community service program conducted by the Faculty of Psychology and Health, 120 adolscents were willing to participate in this Islamic-based digital literacy training. 8 Participants were unable to complete the training, so the total sample obtained for analysis was 112 adolescents. The demographic description of the participants can be seen in Table 1. Demographic distribution data showed that most of the participants were female and aged 13-14 years. In terms of gadget ownership, some of the participants had smartphones and some of them had more than one gadget. In terms of parents' occupations, most of the participants had parents who worked as entrepreneurs and private employees.

A Paired-sample t-test was subsequently conducted to test the hypothesis. The first hypothesis (H1) is that Islamic-based digital literacy training has a significant effect on increasing adolescents' perceived risk of online behavior. Based on the results of the paired samples t-test showed that there was a significant difference between the value of risk perception before training (M=23.20; SD=8.34) and after training (M=32.21; SD=10.17); [t (111) = -21.91, p = .000]. Thus, H_1 was accepted, where Islamic-based digital literacy training increased adolescents' perceived risk of online behavior. Figure 2 illustrates the test results.

Tabel 1. Demographic Description of Participants

Demographic Variables		Total	Percentage
Gender			
	Male	40	35.7
	Female	72	64.3
Age			
	10	1	0.9
	11	1	0.9
	12	24	21.4
	13	44	39.3
	14	32	28.6
	15	6	5.4
	16	4	3.6
Gadget Ownership			
	Computer	8	7.1
	Notebook	18	16.1
	Notebook, Computer	1	0.9
	Notebook, Smartphone	23	20.5
	Notebook, Smartphone, Tablet	2	1.8
	Smartphone	59	52.7
	Tablet	1	0.9
Occupation of Parent			
	ASN/TNI	5	4.5
	Housewives	10	8.9
	Private Employee	39	34.8

	Builder	4	3.6
	Self-Employed	54	48.2

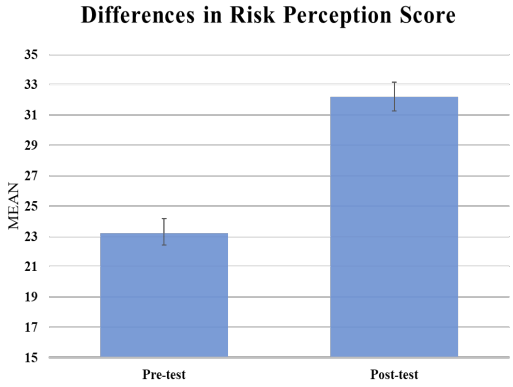

Figure 1. Comparison of risk perception score between pre-test and post-test

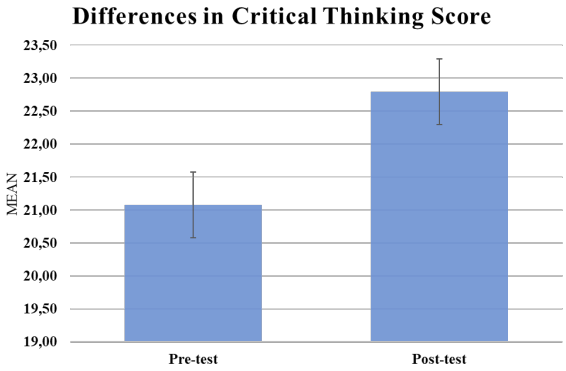

Figure 2. Comparison of critical thinking score between pre-test and post-test

Departing from concerns about the low digital literacy of adolescents in Gunung Anyar District, as well as the lack of risk knowledge and critical thinking skills and the absence of systematic digital literacy training, this study aims to examine the effect of Islamic value-based digital literacy training on risk perception and critical thinking skills of adolescents in Gunung Anyar sub-district, Surabaya. Islamic values integrated in this training are *tabayyun*, trust, and honesty as well as other values such as God's threats for online despicable actions such as fake news and dangerous online behavior such as pornography and its bad effects. Integration of Islamic values is a novelty offered in research that is different from previous studies with similar topics. These values are highly encourage in Islamic teachings and become fundamental principles to guide behavior in various aspects of life, including the digital interactions (Mohamad & Mat Isa, 2022). Incorporation of these values can also address a gap in the existing literature, where previous studies often focus on technical aspects of digital literacy without adequately considering the religious and ethical dimensions. Furthermore, digital literacy improvement program that target Muslims adolescent living in an urban area is also relatively scarce. The results of the study showed that digital literacy training conducted in four sessions can significantly improve risk perception and critical thinking skills among adolescents.

The results of this study confirmed the importance of digital literacy in increasing risk perception among adolescents. This finding is in line with and reinforces the results of various previous studies showing the significance of the role of digital literacy on risk perception, such as research conducted by Purnama et al. (2021) and Luthfia et al., (2021). In addition, this experimental research also strengthened the results of correlational studies between digital literacy and critical thinking skills such as research conducted by Amin, Adiansyah & Hujjatusnaini (2023), Susanti & Krisdiana (2021), and research by Supriyanti Permanasari, & Khoerunnisa (2020). In a digital world

with an abundance of digital information and interactions, digital literacy is the most important skill to encourage strong critical thinking and good risk perception among internet users, especially among adolescents. A solid understanding of digital literacy equips individuals with the ability to assess vast online information, helping them to intelligently analyze and interpret digital content (Wertz et al., 2013). Proficiency in digital literacy enables youth to discriminate between credible and dubious sources, encourages evaluation of multiple perspectives, and facilitates the synthesis of more complex information. In addition, as digital literacy advances, individuals develop better intelligence in measuring the potential risks inherent in the digital world. This increased awareness includes recognizing online threats, assessing the reliability of digital platforms, and understanding the intricacies of data security and privacy (Sun et al., 2022).

The research findings showed that Islamic-based digital literacy training can increase risk perception in online behavior and critical thinking skills regarding digital information among adolescents. The research findings have practical implications that are important to note. These findings can be used by educational institutions and community organizations to design targeted digital literacy programs with an emphasis on Islamic values which are still rare (Susilawati et al., 2021). By integrating Islamic values and principles into digital literacy curricula, educators can help youth develop a stronger understanding of evaluating digital information and recognizing the potential risks of harmful online behavior. These programs can be adapted to Islamic values, fostering a sense of relevance so as to motivate adolescents to be more actively involved. In addition, policy makers and stakeholders involved in youth education can use these insights to realize Islamic-based digital literacy inclusion as a complementary approach within broader digital literacy initiatives.

Apart from having practical implications, the research findings also have significant theoretical implications for the fields of communication psychology, education, and Islamic psychology. The integration of Islamic values into digital literacy training shows potential synergies between cognitive processes and belief systems. This study adds insight into how Islamic values can function as a means to enhance critical thinking and risk perception. These findings also extend theories of socio-cognitive development by demonstrating that Islamic narratives and ethical frameworks can play a role in shaping adolescents' abilities to critically assess and respond to online information. This research provides an overview of the mechanisms by which faith-based interventions influence cognitive processes and decision-making, contributing to a nuanced understanding of the interactions between culture, belief systems, and digital literacy. In addition, this research emphasizes diverse cultural and Islamic contexts in designing interventions to promote digital literacy. These insights enrich the theoretical discourse around the interrelationships between education, technology, and belief systems, and offer a foundation for future interdisciplinary research and pedagogical approaches.

Although this experimental research provides valuable insight into the potential benefits of Islamic-based digital literacy training for youth, it has several drawbacks that need to be considered. First, the scope of the study is limited to certain age groups and certain Islamic contexts, which may limit the generalizability of the results to the wider population. In addition, the majority of participants were in the middle to lower socioeconomic class category. For this reason, further research needs to involve participants from middle to upper socioeconomic backgrounds. Another limitation is that the benefits of these interventions may be short-term and thus do not fully capture the sustainability and long-term impact of the observed increases in risk perception and critical thinking skills. The third limitation is that the measurement of critical thinking skills in this study relies on self-report questionnaires, which can lead to bias and inaccurate responses. Future research can develop a more objective assessment of critical thinking skills, for example with quizzes and case studies.

CONCLUSION

Based on the results of the research and discussion above, it can be concluded that this experimental research has shown the benefits of digital literacy training among adolescents through the integration of Islamic values. These findings underscore the potential for digital literacy training

based on Islamic values in strengthening risk perception in online behavior and fostering critical thinking skills.

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