



## Beyond Access: Digital Literacy and Collaborative Capacity among Santriwati to Prevent Online Radicalization

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### ABSTRACT

The internet and social media have become open spaces highly vulnerable to the spread of radical group propaganda, hoaxes, and hate speech. This condition has driven the emergence of digital literacy movements as a societal response to the various negative impacts of digital media. Digital literacy among religious groups is considered one of the effective approaches to countering misleading and divisive information. This study aims to measure the level of digital literacy among female students at the Diniyah Putri Islamic Higher Education Institution in Padang Panjang, using ten digital literacy competency indicators developed by Japelidi (Jaringan Pegiat Literasi Digital / Digital Literacy Activist Network). The research employs a mixed method sequential explanatory model, beginning with a quantitative approach to obtain a general overview, followed by qualitative methods to deepen the understanding of the quantitative data. The findings reveal that the students possess a moderate level of digital literacy, with a total index score of 76.9%. The highest component is the ability to access digital information, with an index score of 87.2%, indicating their technical proficiency in locating



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and retrieving information online. In contrast, the lowest score is found in the ability to collaborate digitally, at 66.3%, reflecting limited use of digital media for cooperative work and productive interaction. These findings highlight the need for a more holistic enhancement of digital literacy, particularly in the collaborative dimension, within religious educational environments.

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## INTRODUCTION

The development of digital technology has fundamentally transformed how people access, produce, and distribute information. On the one hand, this transformation creates broad opportunities for learning, communication, social participation, and individual empowerment. On the other hand, digital spaces also present serious challenges, including the proliferation of disinformation, misinformation, hate speech, radicalism, and various other forms of harmful content. In the Indonesian context, these challenges have become increasingly relevant along with the growing penetration of internet access and the intensity of social media use across different layers of society. This situation indicates that advances in digital infrastructure have not always been accompanied by adequate public readiness to engage with information critically, ethically, and responsibly.

In an increasingly pervasive digital era, Indonesia faces serious challenges related to the spread of false information (hoaxes) and hate speech.

Based on data presented by the Ministry of Communication and Informatics (Kemkominfo), approximately 800,000 websites in Indonesia have been indicated as disseminators of hoaxes and hate speech (Siregar, 2022). Kemkominfo blocked around 773,000 websites classified into ten categories of harmful content, including pornography, issues related to ethnicity, religion, race, and intergroup relations (SARA), fraud or illegal trade, narcotics, gambling, radicalism, violence, child exploitation, internet security violations, and infringements of Intellectual Property Rights (IPR). Among these categories, pornographic content was the most dominant (Alfi et al., 2021).

This problem becomes even more complex when confronted with a weak literacy culture within society. Low reading interest is often positioned as one indicator of limited public capacity to select, understand, and evaluate information in depth. The “Most Literate Nation in the World” study conducted by Central Connecticut State University ranked Indonesia 60th



out of 61 countries in terms of reading interest (Sumarti, E et al., 2020). This constitutes an alarming warning, especially when juxtaposed with Indonesia's position as the country with the highest social media activity in Asia.

The combination of low literacy culture and high digital exposure makes Indonesian society highly vulnerable to receiving and disseminating information whose validity has not been verified. This condition creates fertile ground for the spread of hoaxes, hate speech, and radical propaganda that may threaten social cohesion and national stability (Nurdina, 2024). Therefore, strengthening digital literacy is an urgent need that must be instilled from an early stage across various social groups, particularly within the education sector and religious communities.

In the national context, Indonesia is a country with a very large internet user base. The 2024 Indonesian Internet Profile Survey (Association, 2024) compiled by the Indonesian Internet Service Providers Association (APJII) notes that the number of internet users has reached 221.56 million people, or around 79.5% of the total population. This figure shows that in terms of infrastructure and basic access, the digital space has reached the majority of Indonesians. However, when APJII included a special module on AI utilization in the 2025 Internet User Profile (Association, 2025) the following year, a contrasting picture emerged. Only about 27% of

respondents said they had used AI technology, while about 73% had not. This disparity indicates a significant gap between the availability of digital infrastructure and the actual behavior of the public in accessing AI-based content (Djuuna, 2026)

This data shows that more than half of Indonesians were connected to the internet, meaning that access to digital media has become increasingly widespread and evenly distributed. This increase in connectivity signifies broader public access to digital media as a space for social interaction, a source of information, and a learning medium.

The internet enables information exchange in various formats such as text, audio, images, symbols, and video, which can be produced, shared, modified, and commented on quickly by other users. The interactive, real-time, and borderless character of digital media makes the internet a highly strategic medium, yet also one that is laden with risks if not accompanied by adequate digital literacy skills. As digital media, the internet has multifunctional capabilities to deliver information in the form of sound, text, symbols, images, and video, all of which can easily be uploaded, shared, commented on, and even modified by other users. Digital media not only accelerates the flow of information but also transcends geographical, temporal, and spatial boundaries. This makes the internet both a highly effective and a complex communication tool.



Currently, technology has become an integral part of human life, including the learning process. The presence of online learning platforms, educational applications, and increasingly widespread internet access provides new opportunities to create more creative and inclusive teaching methods. In addition, social media has also influenced the way society accesses and disseminates educational information (Rizqiyah, 2025)

The internet is akin to a double-edged sword: on the one hand, it provides significant benefits such as easy access to information, online learning, and broad social connectivity; on the other hand, it opens opportunities for the spread of false information (hoaxes), hate speech, radicalism, and other negative content (Subakir, 2021). The rapid flow of information, when not balanced with critical thinking skills and digital ethics, can trap users—especially young people—within disinformation and misinformation (Diepeveen, 2022).

Figure 1. The growth of Indonesia's internet penetration rate from 2024 to 2026



Source: APJII.or.id, 2026

Adolescence is the most vulnerable period in individual development. In general, adolescents are characterized as exploratory individuals who are always curious, easily influenced, and tend to accept media content at face value. At the same time, they are familiar with technology, unafraid of new things, critical, and often idealistic. These characteristics inevitably shape their behavior in using the internet. These results indicate that adolescents who use social media frequently and engage with predominantly image-based content may be more likely to experience heightened body image concerns and encounter difficulties in psychological adjustment. (Hoffmann et al., 2021). University students, categorized as late adolescents and early adults, typically experience a transitional period and are active users of digital media.

While university students represent the largest demographic of internet users, little is known about how female Islamic boarding school students who navigate between strict institutional norms and open digital environments develop critical digital competencies (Pratama, 2025). University students represented the most active demographic of internet users, ranked first as the most active internet users. It cannot be denied that digital media is more closely associated with adolescents than with their parents and teachers (Maulida & Sari, 2017). Currently, society is experiencing an information tsunami,

leaving many confused about distinguishing between valid information and hoaxes.

Given that young people are the most active group in using the internet and social media, they also become the most vulnerable group to exposure to negative content (Monggilo, 2016). Therefore, systematic, structured, and collaborative efforts are required from various social elements government, educational institutions, communities, media, and the private sector—to build awareness and improve digital literacy capabilities within society. Amid the increasingly uncontrollable flow of global information, digital literacy becomes an essential foundation for shaping an intelligent, critical, and wise society. Digitally literate communities will be more resilient in facing the onslaught of hoaxes, hate speech, and destructive content (Pada et al., 2022). They are able to use technology as a tool to build positive networks, strengthen social solidarity, and broaden insights and participation in democratic life. Thus, strengthening digital literacy is not merely a technical necessity but a strategic step in shaping a civilized and competitive future nation in the era of digital transformation.

One important group to examine in this context is *Santriwati* (female Islamic boarding school students). As part of the young Muslim generation living amid accelerated digitalization, *Santriwati* are no longer outside the flow of technological transformation. They

interact with the internet, social media, and various digital platforms for academic, social, and personal purposes. However, their position is also unique because they are situated within the pesantren educational environment, which normatively emphasizes moral formation, discipline, and religious values. Pesantren, as traditional Islamic educational institutions in Indonesia, have played an important role in shaping the character and moral conduct of the Muslim community. However, in facing the era of modernity marked by social change, technological advancement, and globalization pesantren are confronted with significant challenges (Ramadhani, 2025). This makes *Santriwati* an interesting subject of study, particularly in examining how digital literacy competence develops at the intersection of religious educational traditions and the demands of contemporary digital life.

Digital media, closely intertwined with everyday life, has become an inseparable companion within society (Lindgren, 2021), including for *Santriwati* studying at Perguruan Diniyah Putri Padang Panjang. *Santriwati* in modern Islamic boarding schools also fall into the category of active adolescent internet users, even though their internet access time may still be restricted by the rules enforced in their boarding schools. Perguruan Diniyah Putri Padang Panjang is among the pesantren institutions that provide internet access for their students.



These *Santriwati*, as part of the digital native generation, are vulnerable to being influenced by digital hoaxes that may lead them toward radical and intolerant attitudes.

While previous studies have examined digital literacy among general university students and public-school pupils, none have applied the Japelidi competency framework to measure literacy levels within the context of female Islamic boarding schools, where institutional regulation of technology intersects with heightened exposure to extremist narratives. Most previous studies have focused on students in public schools, university students, or society in general, and thus have not provided a specific depiction of digital literacy characteristics within pesantren educational communities, particularly among *Santriwati*. In fact, mapping this competence level is important to determine the extent to which *Santriwati* are capable of accessing, understanding, evaluating, and utilizing digital information appropriately. Such studies are also needed to identify competency areas that remain weak, so they can serve as a basis for designing educational interventions, institutional policies, and more contextualized digital literacy strengthening programs.

Digital literacy can no longer be considered an additional skill; rather, it has become a fundamental necessity in social life in the digital era (Mujiono, 2024). One strategic response relevant to this challenge is the mass, sustainable,

and multi-layered movement to strengthen digital literacy across society. This digital literacy movement has broad scope. It not only aims to enhance individuals' technical abilities to access, search for, and use information through digital devices, but also emphasizes the importance of developing a critical attitude toward received information. Digital literacy teaches individuals to distinguish between valid and misleading information, encourages ethical communication practices in digital spaces, and prioritizes social responsibility in disseminating information (Anisti et al., 2024). In other words, digital literacy is not only about skills but also about character and virtuous values in media engagement.

The emergence of digital literacy movements reflects public concern regarding the negative impacts of internet media (Saputra, 2020). The orientation of such movements is to improve quality of life, and the application of digital literacy is believed to be effective and appropriate only when embedded within a permanent, regular, and continuous process. Meanwhile, according to Gilster (2007), digital literacy is the ability to understand and use information from various digital sources—namely the ability to read, write, and engage with information by using the technology and formats available in a given era.

Specifically, this study measures santriwati's competency across ten Japelidi indicators and identifies which



dimensions require pedagogical intervention to strengthen resilience against online radicalism. More specifically, this research is directed at measuring the level of *Santriwati* digital literacy competence across several key dimensions, and describing the tendencies of their abilities in facing information challenges in the digital era. The results are expected to contribute theoretically to the development of digital literacy studies in the context of Islamic education, while also providing practical contributions for pesantren institutions in designing strategies to strengthen digital capacity in alignment with the values of religious education.

## **METHODOLOGY**

This design was selected because the quantitative phase provides a generalizable profile of literacy levels, while the qualitative phase explains why certain competencies remain weak despite high access to skills. According to Sugiyono, in his book on mixed research strategies, this design integrates quantitative methods in the initial stage and is then followed by qualitative methods in the subsequent stage. This approach was selected because it is able to provide a more comprehensive and in-depth understanding of the phenomenon under investigation. In the first stage, quantitative methods were used to obtain measurable numerical data, which may be descriptive, comparative, associative, or a combination of both (comparative–

associative), as well as structural analysis.

The quantitative data obtained enabled the researcher to identify general patterns, measure relationships among variables, and map the tendency levels of the object being studied. Subsequently, the qualitative stage was conducted to enrich and deepen the understanding of the quantitative findings. Qualitative data were collected through techniques such as in-depth interviews, participatory observation, or documentation studies in order to capture participants' subjective perspectives and to understand the social and cultural context surrounding their behavior or responses. Thus, qualitative data functioned not only as complementary information but also as explanatory data that provide interpretation and meaning for the quantitative results (Mezmir, 2020).

The population in this study consisted of female students (*Santriwati*) of Diniyah Putri Padang Panjang. Sampling was conducted using simple random sampling, and the questionnaire was completed by 100 respondents. The subjects of this study were the *Santriwati* of Diniyah Putri Padang Panjang, while the object of the study was the level of digital literacy competence in countering online radicalism. Data were collected through the distribution of questionnaires and in-depth interviews. Data were collected using a questionnaire with a 5-point Likert scale and analyzed. Furthermore, the



researcher classified the digital literacy assessment criteria based on the mean score expressed as a percentage and categorized it into three levels: (1) Low Digital Literacy Index, with a mean score of 17%–45%; (2) Moderate Digital Literacy Index, with a mean score of 45.1%–73%; and (3) High Digital Literacy Index, with a mean score of 73%–100%.

For qualitative data, analysis followed the Miles and Huberman model, which includes the stages of data reduction, data display, and conclusion drawing/verification. Source triangulation refers to the use of more than one data source in a study to check the consistency or accuracy of information. By comparing data obtained from different parties or informants, researchers can obtain a more objective, comprehensive, and in-depth description of the phenomenon being studied. This is intended to enhance data validity and avoid bias from any single source (Handoko, 2024). To ensure data trustworthiness, this study applied source and theory triangulation.

## RESULTS AND DISCUSSIONS

### Analysis of the Competency Level of Santriwati at Diniyah Putri Padang Panjang in Countering Online Radicalism

Based on the questionnaire responses from 100 respondents in this study, all participants were female, as the research was conducted at the female-

only Islamic boarding school (*Pondok Pesantren Khusus Puteri*) Diniyyah Putri Padang Panjang, West Sumatra, which focuses on female students (*santriwati*) at the university level. The findings indicate that digital literacy levels, based on class-interval values, were grouped into three categories: low, moderate, and high. These results were determined using the class-interval formula (figure).

The low digital literacy category had a class interval of 36–84. The moderate digital literacy category had a class interval of 85–132. Meanwhile, the high Digital Literacy Index category had a class interval of 133–180. This can be seen in Table 1.

**Table 1. Class Intervals**

Class Interval	Category	Number of Respondents	Percentage
133–180	High	60	60%
85–132	Moderate	40	40%
36–84	Low	0	–

Source: Processed by the researcher, 2023

The score distribution shows that 60 respondents (60%) fell into the high category, while 40 respondents (40%) were in the moderate category. No respondent was classified in the low category. This finding indicates that, overall, the digital literacy competence of *santriwati* at Diniyyah Putri Padang Panjang tends to be at a moderate to high



level, with a dominant tendency toward the high category. This distribution suggests that most respondents possess relatively adequate abilities to access, understand, and use digital information. Within the context of this study, such achievement can be interpreted as a positive initial resource for *santriwati* in navigating digital spaces, including in responding to exposure to content that may contain radical narratives.

The absence of respondents in the low category constitutes an important finding. Descriptively, it demonstrates that all respondents had at least a minimum level of competence that prevented them from being entirely passive or highly vulnerable in interacting with digital media. In other words, the lack of low-category scores indicates that the *santriwati* in this sample already have a sufficient foundation of digital literacy to carry out basic functional activities in digital media use. From the perspective of preventing online radicalism, this condition is relevant because digital literacy competence is an essential prerequisite for individuals to recognize, filter, and evaluate information circulating on the internet.

Meanwhile, the proportion of respondents in the moderate category (40%) also warrants particular attention. Although this group is not classified as low, their position indicates that a substantial segment of respondents has not yet reached an optimal level of digital literacy competence. In an

increasingly complex digital environment, individuals with moderate competence may be viewed as a transitional group: they possess basic skills but still require reinforcement in more critical aspects, such as assessing information credibility, identifying hidden ideological agendas, and developing reflective capacity when responding to provocative content. Without appropriate educational interventions, this group may remain vulnerable when facing increasingly adaptive and persuasive strategies of radical dissemination in digital media.

Indicator scores were calculated using the average of all respondents who were university-level *santriwati* at Perguruan Diniyah Putri Padang Panjang. Subsequently, each sub-index score represented the average of all indicators within that sub-index. Finally, the average of all sub-indices constituted the final Digital Literacy Status score. Measuring digital literacy was the primary focus of this study. The questionnaire was designed based on a literature review, theoretical examination, and discussions with digital literacy researchers in the Japelidi community, using Japelidi's ten digital literacy competency indicators.

**Table 2. Digital Literacy Index per Dimension**

No	Competency Dimension	Index Score (%)	Category
1	Accessing	87.2%	High

2	Selecting	83.8%	High
3	Understanding	79.0%	High
4	Analyzing	78.1%	High
5	Verifying	78.8%	High
6	Evaluating	76.8%	High
7	Distributing	75.2%	Moderate
8	Producing	74.8%	Moderate
9	Participating	69.4%	Moderate
10	Collaborating	66.3%	Moderate
	<b>Overall Digital Literacy</b>	<b>76.9%</b>	<b>High</b>

Source: Processed by the researcher, 2023

The findings show that the “access” dimension achieved the highest score (87.2%). This indicates that university-level *Santriwati* demonstrate a high degree of familiarity in using digital devices.

The selection competence obtained an index of 83.8%. This indicates that *Santriwati* do not accept all information passively; they show a tendency to choose information aligned with their academic or personal needs, acting as an initial layer of digital resilience against radical narratives.

The findings also show that the digital literacy index for the “understanding” (79%), “analyzing” (78.1%), and “verifying” (78.8%) components were all in the high category. This indicates that *Santriwati* attempted to conduct initial checks of the source or content of the information they received. This verification process often draws on social and academic authority, such as asking dormitory supervisors or

lecturers, reflecting a culture of *Tabayyun* (verification) in the *pesantren* context.

In contrast to the previous dimensions, the index for the “distributing” component was 75.2%, which fell into the moderate category. This indicates that the ability to share information responsibly remains a relatively weaker area. Awareness that every digital action leaves a trace implies that distributing information is not neutral. “When we forward messages on WhatsApp, there is an arrow indicating it is a forwarded message. This reminds us to be careful and not to share unverified news, as it leaves a digital footprint” (Informant Tasya, 2021). This gap between knowing and doing represents a main challenge in contemporary digital literacy.

Furthermore, the “producing” (74.8%), “participating” (69.4%), and “collaborating” (66.3%) components fell into the moderate category. This suggests that while *Santriwati* are strong as digital users who can receive and evaluate information individually, they have not yet fully developed as active digital subjects who produce discourse, engage in public conversations, and build collaboration in digital spaces. Efforts to prevent extremist narratives require collective work and the strengthening of moderation networks, making this weakness a critical area for intervention.

The findings also show that the “access” dimension achieved the highest

score (87.2%) compared to other digital literacy competency indicators. This result indicates that university-level *Santriwati* at Diniyyah Putri demonstrate a high degree of availability and familiarity in using digital devices and the internet in daily life. Within the digital literacy framework, access competence can be understood as the most fundamental layer of competence, as it is a prerequisite for the development of more complex abilities such as selecting, evaluating, producing, and distributing information critically. In other words, without adequate access capacity, mastery of higher-level digital literacy dimensions is unlikely to develop optimally.

The high score in this dimension can be explained by the specific characteristics of the respondents. The *Santriwati* included in the sample were university-level students, a group that is institutionally permitted to bring and use smartphones, unlike *Santriwati* at the MTs and MA levels whose access to digital devices is more restricted. This policy directly creates a more open access environment for university-level *Santriwati*. With permission to use devices, respondents not only have opportunities to connect to the internet but also repeatedly interact with various applications, communication platforms, digital learning resources, and social media. Such high intensity of use likely contributes to the formation of strong access competence.

In addition to being influenced by institutional policy, the high level of access competence is also related to the respondents' socio-academic position as university students. As part of the higher-education cohort, *Santriwati* at the university level face academic demands that necessitate the use of digital technology, such as searching for references, maintaining course-related communication, accessing learning materials, using online learning platforms, and networking with lecturers and fellow students. This indicates that their digital activities are not merely recreational but also functional and instrumental. In this context, digital access is no longer an additional activity; rather, it has become part of their academic and social routines. This condition strengthens the argument that the high access score reflects a relatively well-established process of digital adaptation among university-level *Santriwati* at Diniyyah Putri.

Furthermore, the score of 87.2% also indicates that university-level *Santriwati* are not digitally marginalized. They already possess basic abilities to operate devices, connect to the internet, use communication applications, and enter various digital information spaces. From an empowerment perspective, this finding is important because it shows that *Santriwati* in a female Islamic boarding school environment can no longer be viewed as a group isolated from digital transformation. On the



contrary, they are part of a young Muslim generation that actively participates in the digital ecosystem for personal, academic, social, and religious purposes. This is also supported by a statement from an informant who noted:

“We are very fortunate because, besides being able to pursue knowledge at Diniyyah, we are also still allowed to use electronic devices specifically for students at the university level, although the hours and rules are still regulated by the boarding school. Accessing the internet from our mobile devices is generally something we are used to doing because we are allowed, so simply accessing, browsing, observing, and searching for data on the internet is still safe and we can use it.” (Interview with Informant ZK, 2021)

The research findings show that the selection competence obtained an index of 83.8%, placing it in the good category. This indicates that university-level *Santriwati* at Perguruan Diniyyah Putri Padang Panjang generally have a sufficiently adequate ability to filter information from various digital sources according to their needs and the purposes of use. Within the digital literacy framework, selection competence is an important dimension because it serves as an initial mechanism to reduce exposure to irrelevant, misleading, or potentially harmful information. Thus, this competence reflects not only technical skill in choosing information but also

functional awareness in managing information flows in digital spaces.

The high score in this dimension indicates that respondents do not accept all information passively; rather, they show a tendency to choose information considered aligned with their academic, social, or personal needs. This selective attitude is evident in the tendency of *Santriwati* to independently determine what kinds of information they want to search for, use, or ignore. In everyday digital media use, such competence is crucial because digital spaces are characterized by information abundance, where users continuously encounter competing messages, news, opinions, and content vying for attention. Therefore, selection competence becomes an initial strategy that determines the quality of an individual's interaction with digital media.

When linked to the respondents' characteristics as university-level *Santriwati*, this achievement can be understood as a logical consequence of their need to engage with digital information in a more direct manner. As university students, respondents are required to seek learning materials, academic references, course information, and various other knowledge resources relevant to their studies. At the same time, as *Santriwati*, they are situated within an educational environment that emphasizes discipline, adherence to norms, and caution in accepting information. The combination of academic demands and institutional



culture likely shapes habits of selecting information in a more purposeful and careful manner.

In the context of preventing online radicalism, selection competence has highly important significance. This competence indicates that *Santriwati* are not merely passive consumers of digital media; instead, they begin to exercise control over what types of information enter their cognitive space. Individuals with strong selection competence tend to be better able to avoid inappropriate, provocative, or potentially misleading content. At this point, selection competence can be viewed as an initial layer of digital resilience, because users begin to limit exposure to information that is unnecessary or considered inappropriate. In confronting radical narratives online, such skills are important to prevent early engagement with content containing propaganda, intolerance, or extreme ideological appeals.

Nevertheless, the index score of 83.8% also needs to be interpreted critically. Selection competence is not always identical to the ability to evaluate the truth or credibility of information in depth. A user may be able to choose information deemed relevant to their needs, but may not necessarily be able to assess whether that information is valid, objective, or contains certain biases. In other words, information selection is more closely related to relevance and preference, whereas information evaluation concerns accuracy,

reliability, and source integrity. Therefore, although *Santriwati* demonstrates good ability in choosing and ignoring information, this does not automatically indicate that they are fully able to critically distinguish between true information and information that is manipulative or contains hidden ideological content.

The findings also show that the digital literacy index for the “understanding” component was 79% and fell within the high category. This indicates that university-level *Santriwati* at Diniyah Putri Padang Panjang have a relatively good ability to understand the content, intent, and purpose of information circulating through online media and social media. Within the digital literacy framework, understanding competence signifies that users are no longer merely accessing and selecting information but have begun interpreting the meaning of the messages they receive.

This achievement may be linked to the respondents’ characteristics as university-level *Santriwati* who simultaneously exist within academic and religious environments, thereby becoming accustomed to materials requiring conceptual understanding and interpretive meaning-making. In the context of countering online radicalism, understanding competence is important because it enables individuals to recognize that digital content is not always neutral, but may carry particular intentions and orientations. However,



understanding competence is not entirely identical to the ability to critically assess the validity and truth of information. This is reinforced by an informant's statement:

“We understand digital tools well enough—what they are used for and their functions—so we know and understand very well if there is news or forwarded information that is not valid, such as Islamic extremism, coup movements, or many coup videos that do not match between the words being said and the lip movements shown in the video images.” (Interview with Informant ZK, 2021)

Meanwhile, the index for the “analyzing” component was 78.1%, also in the high category. This result indicates that university-level *Santriwati* have begun developing the ability to examine information more critically, including reading message structures, considering perspectives, and recognizing potential bias in content. In digital literacy, analyzing competence represents a higher stage than understanding because it requires more reflective deconstruction of information. This achievement may be interpreted as an indication of growing critical thinking capacity among respondents, most of whom are in late adolescence to early adulthood and are required to be adaptive to developments in information technology. In the context of preventing online radicalism, analytical competence is essential because radical narratives are

often packaged persuasively and do not always appear explicitly. Therefore, the relatively high levels of understanding and analysis among *Santriwati* at Diniyah Putri suggest a strong cognitive foundation, although this still needs to be strengthened through learning that emphasizes source verification, contextual reading, and critique of ideological bias in digital media.

The findings show that the digital literacy index for the “verifying” component reached 78.8% and was in the high category. This indicates that university-level *Santriwati* at Diniyah Putri Padang Panjang tend not to accept digital information at face value; instead, they attempt to conduct initial checks of the source or content of the information they receive. Within the digital literacy framework, verifying competence is an important marker of a behavioral shift from a passive position toward a more conscious and cautious stance. At this stage, users begin to understand that digital information is not necessarily trustworthy merely because it appears convincing, goes viral, or is shared widely.

The high score in verifying can be understood in relation to respondents' close engagement with digital technology in daily activities. As university-level *Santriwati*, they have relatively broader access to digital devices and the internet, and are therefore accustomed to encountering diverse information from social media, messaging platforms, news sites, and



other online sources. This high exposure appears to encourage the development of habits of double-checking information, whether by examining the origin of the source, comparing it with other sources, or seeking clarification from figures considered authoritative, such as dormitory supervisors, teachers, or lecturers. This pattern indicates that respondents' verification processes do not rely solely on digital tools, but also draw on social and academic authority available in their environment.

Within the *pesantren* context, the tendency to ask dormitory supervisors, teachers, or lecturers also carries important meaning. It suggests that information verification among *Santriwati* is not entirely individual, but also takes place within a framework of pedagogical and moral relations. In other words, verification is not only a technical fact-checking activity, but also part of a culture of caution in receiving knowledge. In the context of countering online radicalism, this is highly relevant because one of the main strategies of radical propaganda is to exploit pseudo-authority, out-of-context quotations, or the presentation of religious information that appears authentic. The habit of verifying through more trustworthy sources can function as an initial protective mechanism against the penetration of such narratives.

Next, the index for the "evaluating" component was 76.8%, also in the high category. This indicates that university-level *Santriwati* have

developed a fairly good ability to assess information more reflectively after processes of understanding, analyzing, and verifying have been carried out. In digital literacy, evaluation is among the most important stages because at this level users do not only check whether information appears true, but also assess the extent to which it is credible, relevant, useful, and safe to trust or use. Thus, evaluating competence involves both cognitive and ethical considerations.

The score of 76.8% suggests that respondents have begun developing more mature judgments regarding information quality. They do not stop at the question "is this true?", but also move toward questions such as "is this worth trusting?", "what are the consequences if it is accepted or shared?", and "is there a particular bias behind this message?". In the context of online radicalism, evaluative competence is crucial because much extremist content does not always appear as easily recognizable falsehoods. Instead, such content is often constructed through a mixture of partial facts, emotion, religious symbols, and moral framing, making it appear plausible to certain audiences. In such situations, evaluation becomes key for assessing not only the surface truth of information, but also the quality of its arguments and its potential impacts.

From the perspective of *pesantren* education, these results indicate a strong opportunity to reinforce



evaluative competence through learning that is not only normative but also dialogical and analytical. If evaluative competence continues to be developed, *Santriwati* will not only be able to reject clearly false information, but also identify narratives that subtly contain intolerance, ideological simplification, or the legitimization of violence. In this way, evaluative competence functions as an essential intellectual barrier in building resilience against radicalism in digital spaces.

In contrast to the previous dimensions, the index for the “distributing” component was 75.2%, which fell into the moderate category. This finding is particularly interesting because it indicates that the ability to share information responsibly remains a relatively weaker area compared to the abilities to receive, check, and assess information. Within the digital literacy framework, distributing information is not merely a technical action, but a social and ethical decision with broad consequences. When someone forwards messages, shares links, reposts content, or re-uploads information, they act not only as users but also as agents who disseminate meaning and influence in digital spaces.

The moderate category for this dimension can be interpreted to mean that university-level *Santriwati* have a preliminary awareness of the importance of caution in sharing information, but this awareness has not fully developed into consistent and critical distribution

practices. This is understandable, because decisions to distribute information are often influenced by factors more complex than understanding or verifying alone, such as social pressure, emotional impulses, the desire to share quickly, group solidarity, or the perception that certain information is urgent for others to know. In social media contexts, sharing decisions also frequently occur spontaneously, leaving limited room for reflection.

The issue of digital footprints is highly relevant for deepening the analysis of this dimension. Awareness that every digital action leaves a trace implies that distributing information is not a neutral activity free from consequences. Forwarding on WhatsApp, reposting on Instagram, retweeting on X/Twitter, and other forms of distribution carry implications for digital reputation, social responsibility, and the potential reproduction of negative impacts from certain content. In the context of online radicalism, this dimension becomes even more critical because the dissemination of extremist narratives often occurs through seemingly simple sharing actions that are not always recognized as participation in reproducing ideology. In other words, a person may not fully agree with certain content, yet still contribute to expanding its reach by sharing, commenting on, or forwarding it.

Therefore, the score of 75.2% for distributing competence should be read as a signal that the ethics of information



distribution still require special attention. *Santriwati* may already be capable of receiving and assessing information but may not fully have equally strong control when deciding whether certain content is appropriate to share. Put differently, there may be a gap between knowing and doing: knowing that information should be scrutinized does not automatically lead to fully responsible distribution practices. This gap represents one of the main challenges in contemporary digital literacy.

Overall, these findings reveal an important pattern. Verifying competence (78.8%) and evaluating competence (76.8%) show that university-level *Santriwati* at Diniyah Putri have relatively strong capacities to check and assess digital information before accepting it. Meanwhile, distributing competence (75.2%), which remains in the moderate category, indicates that the greatest challenge emerges at the stage of ethical implementation in digital spaces—namely, when individuals must decide whether information is appropriate to share. Thus, these results underscore that digital literacy strengthening in *pesantren* settings should be directed not only toward developing verification and evaluation skills, but also toward shaping moral responsibility in information distribution practices, particularly to prevent the reproduction of hoaxes, hate speech, and online radicalism narratives.

The findings further show that the digital literacy index for the “producing” component was 74.8%, which also fell into the moderate category. This indicates that the ability of university-level *Santriwati* at Perguruan Diniyyah Putri Padang Panjang to generate digital content has not developed as strongly as their abilities to access, understand, or verify information. Within the digital literacy framework, producing competence is not only related to technical skills in creating content but also to the ability to formulate ideas, package messages, and convey information clearly and responsibly. In the context of countering online radicalism, this competence is important because it enables *Santriwati* not only to filter information, but also to produce alternative narratives that are moderate and educational. Therefore, the moderate category in this dimension suggests that such potential exists but still requires strengthening.

For the “participating” component, an index of 69.4% indicates a low category. This suggests that the active engagement of university-level *Santriwati* in digital spaces remains limited. Digital participation includes engagement in discussions, expressing opinions, sharing ideas, and contributing to public conversations in digital media. The low score in this dimension indicates that *Santriwati* tend to remain in the position of information recipients or observers, rather than fully becoming active actors who shape discourse. In the



context of preventing online radicalism, this limited participation becomes a challenge because moderate voices may be less present in digital spaces if users with good literacy do not actively engage.

Meanwhile, for the “collaborating” component, an index of 66.3% indicates that the ability to collaborate in digital spaces is also relatively weak. In digital literacy, collaboration includes the ability to build networks, share roles, discuss, and collectively produce ideas. This finding shows that although *Santriwati* demonstrates high competence in understanding information, it has not been fully accompanied by the ability to manage information collectively. Thus, the main challenge lies not in a lack of individual understanding, but in the limited strength of a digital collaboration culture. In the context of countering online radicalism, this weakness is important because efforts to prevent extremist narratives require collective work, joint discourse production, and the strengthening of moderation networks in digital spaces.

This study is limited by its single-institution sample and cross-sectional design, which constrain generalizability. Future research should employ multi-site sampling and longitudinal methods to track literacy development over time. Theoretically, these findings extend the Japelidi framework by demonstrating that access and selection skills do not automatically

translate into participatory and collaborative competencies in regulated educational environments. Practically, pesantren administrators should design structured programs that move beyond access training toward content production and digital collaboration.

## Discussion

### Critical Literacy, Collaborative Agency, and Digital Resilience Against Radicalization

The empirical findings of this study reveal a distinct competency gradient among *santriwati*: high proficiency in cognitive and evaluative dimensions (accessing, selecting, verifying, and evaluating) contrasted with moderate-to-low performance in participatory and collaborative dimensions. Interpreting this pattern through contemporary digital literacy scholarship reveals both protective strengths and structural vulnerabilities in countering online radicalization. Foundational frameworks position digital literacy as the capacity to locate, interpret, and ethically engage with information across networked environments (Hobbs, 2017; Livingstone, 2004; Van Dijk, 2020). The *santriwati*’s strong performance in verifying (78.8%) and evaluating (76.8%) aligns with this baseline, reflecting a habit of cautious information consumption often reinforced by the Islamic concept of *tabayyun*.

However, contemporary scholarship warns that functional



literacy alone is insufficient in algorithmically mediated ecosystems. Critical digital literacy requires users to deconstruct the ideological framing, commercial logics, and algorithmic biases embedded in digital content (Kellner & Share, 2007; Pangrazio, 2016). While respondents demonstrate reflective evaluation, the moderate scores in distributing (75.2%) and producing (74.8%) suggest that critical deconstruction has not yet fully translated into conscious content curation or counter-narrative creation. Without this critical-production link, users remain vulnerable to subtle radicalization pathways that exploit emotional resonance and pseudo-authoritative religious framing.

This competency gap becomes theoretically salient when examined through participatory culture and networked learning frameworks. Jenkins et al. (2009) and Ito et al. (2013) argue that effective digital citizenship requires transitioning from passive consumption to active collaboration, peer-to-peer knowledge sharing, and collective discourse shaping. The relatively low scores in participating (69.4%) and collaborating (66.3%) indicate that institutional regulations and normative pesantren cultures may prioritize individual moral vigilance over public digital engagement. Yet, preventing online radicalization is inherently a networked challenge.

Extremist actors strategically exploit algorithmic echo chambers,

micro-targeting, and participatory virality to normalize intolerant ideologies and recruit vulnerable youth (Conway, 2017; Scrivens et al., 2021; Aly et al., 2017). In this context, digital literacy must evolve from individual cognitive defense to collective digital resilience. Resilience frameworks emphasize the capacity to anticipate, adapt to, and recover from harmful digital exposures through critical appraisal, emotional regulation, and supportive peer networks (Livingstone et al., 2017; Vandoninck et al., 2013). The santriwati's verification habits and institutional authority-seeking function as initial resilience buffers. However, their limited collaborative agency restricts the development of peer-moderated counter-narratives that could algorithmically displace extremist content.

Theoretically, these findings challenge the assumption that digital literacy develops uniformly across cognitive, ethical, and participatory domains. In regulated religious educational settings, institutional norms may inadvertently reinforce consumption-based literacy while constraining collaborative production. Practically, this underscores the need for pedagogical interventions that explicitly bridge critical evaluation with networked content creation. By fostering participatory digital cultures that reward ethical collaboration, moderate narrative production, and algorithmic awareness, pesantren can transform santriwati from



cautious information consumers into proactive digital resilience agents capable of disrupting radicalization pathways at both individual and network levels.

## CONCLUSION

Based on the findings of this study, it can be concluded that the digital literacy competency level of university-level *santriwati* at Perguruan Diniyyah Putri Padang Panjang generally falls within the fairly good to high categories, particularly in the basic and cognitive dimensions: accessing (87.2%), selecting (83.8%), understanding (79%), analyzing (78.1%), verifying (78.8%), and evaluating (76.8%). These findings indicate that most respondents have a relatively strong foundation of digital literacy in accessing information, choosing content according to their needs, understanding message meanings, and conducting initial assessments of the sources and content of information circulating in digital media. In the context of countering online radicalism, these achievements constitute an important asset because they show that *santriwati* are no longer positioned as wholly passive recipients of information; rather, they have begun to develop the cognitive capacity to filter, interpret, and assess information in a more conscious and cautious manner.

Nevertheless, the study also shows that *santriwati*' digital literacy competencies are not evenly developed across all dimensions. Competencies related to expression, social engagement,

and collective work in digital spaces remain relatively weaker, namely in distributing (75.2%), producing (74.8%), participating (69.4%), and especially collaborating (66.3%). This pattern suggests that *santriwati* tend to be stronger as digital users who can receive, understand, and evaluate information individually, but have not yet fully developed as active digital subjects who produce discourse, engage in public conversations, and build collaboration in digital spaces. Thus, the primary challenge of *santriwati*' digital literacy no longer lies in access or basic comprehension, but in transforming individual capacities into digital practices that are more productive, participatory, and collaborative.

Substantively, these results affirm that strengthening digital literacy within the *pesantren* environment cannot be limited to improving technical and cognitive abilities alone; it must also focus on developing ethical, participatory, and social dimensions. To enhance *santriwati*' capacity to counter online radicalism, *pesantren* institutions need to promote learning that not only habituates verification and evaluation of information, but also trains the ability to produce positive content, build moderate Islamic narratives, participate actively in digital spaces, and collaborate in disseminating peaceful and tolerant values. In this way, *santriwati*' digital literacy does not stop at the ability to protect themselves from problematic content exposure, but develops into the



capacity to contribute actively to building a healthier, more critical, and more civilized digital ecosystem.

#### CREDIT AUTHORSHIP

#### CONTRIBUTION STATEMENT

**Rahmah and Yanti:** Conceptualization, Methodology, Investigation, Data Curation, Writing

**Erika dan Aisyah:** Review, supervision, validation and Editing.

#### DECLARATION OF COMPETING INTEREST

The authors declare no competing financial, professional, or personal interests that could have influenced the research reported in this manuscript.

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