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Digital Ecology of Islamic Boarding Schools: A Systematic Literature Review on Multicultural Education and Resilience Against Religious Extremism

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Abstract

Digital transformation has transformed the landscape of Islamic education, presenting new opportunities and challenges in the formation of religious identity among Islamic boarding school students (*pesantren*). On the one hand, digital spaces can strengthen multicultural values and religious moderation, but on the other hand, they can also serve as a medium for the spread of extremist narratives. This study aims to synthesize the literature on the digital ecology of Islamic boarding schools (*pesantren*) and its role in building multicultural values and resilience against religious extremism. The study used a Systematic Literature Review (SLR) method, adhering to the PRISMA 2020 guidelines. Literature was obtained from Scopus, Web of Science, ERIC, Dimensions, and Google Scholar databases through a process of identification, screening, eligibility assessment, and inclusion. A total of 54 articles meeting the inclusion criteria were analyzed using a thematic analysis approach. The study identified five main themes: the digital transformation of Islamic education, changes in religious authority in the digital space, technology-based multicultural education, the expansion of digital extremism, and strengthening religious moderation and digital literacy. The findings indicate that resilience against extremism is determined not only by individual capacity but also by the existence of a healthy digital ecology characterized by critical digital literacy, an inclusive communication culture, access to credible religious sources, moderate leadership, and constructive digital governance. Furthermore, the relationship between digital transformation, multicultural education, and religious moderation is interdependent in shaping the resilience of Islamic boarding school students to extremist propaganda in the digital space. As a theoretical contribution, this study proposes the Digital Resilience Ecology Multicultural Model (DREM-Model), which explains that resilience against extremism is the result of the dynamic interaction between technology, education, culture, and religious values within the Islamic boarding school ecosystem. This model expands the study of digital Islamic education by shifting the focus from a counter-radicalization approach to ecological resilience as a strategy for strengthening sustainable resilience.

Keywords: digital ecology; Islamic boarding schools; multicultural education; moderation; digital literacy; religious extremism

INTRODUCTION

The development of digital technology has fundamentally changed the way individuals obtain information, communicate, construct identities, and interpret religious experiences. The internet, social media, video-sharing platforms, instant messaging applications, and artificial intelligence-based technologies have become integral parts of modern society (El-Hajj, 2025; Tyagi et al., 2024). Digital transformation not only changes learning methods but also influences social interaction patterns, knowledge construction, and the process of internalising values that previously took place predominantly in physical educational spaces (Bygstad et al., 2022; Timotheou et al., 2023). This phenomenon is increasingly relevant in Islamic education, especially in Islamic boarding schools, which have long served as centres for the transmission of Islamic knowledge, character formation, and the reproduction of socio-religious values.

Islamic boarding schools are Islamic educational institutions that have significantly contributed to shaping the religious character of Indonesian society. In addition to their function as educational institutions, they also serve as centres for developing the values of moderation, tolerance, and harmonious social life in a pluralistic society (Burga & Damopolii, 2022). The long history of Islamic boarding schools demonstrates their ability to integrate Islamic teachings with local socio-cultural contexts, thus giving rise to inclusive and accommodating religious traditions that foster diversity (Muhajir et al., 2025). In Indonesia's multicultural society, the role of Islamic boarding schools in instilling values of tolerance, respect for differences, and commitment to national life is becoming increasingly important. However, the development of digital technology presents new challenges for the educational process in Islamic boarding schools.

Students no longer acquire religious knowledge exclusively from *kiai* (Islamic scholars), *ustadz* (Islamic teachers), religious texts, and the *pesantren* environment, but also from various digital sources that are available without time or space constraints. The diverse religious content circulating on social media, websites, video channels, podcasts, and online forums offers a wide range of perspectives, from moderate to exclusive and extreme (Ramadhani, 2025). As a result, the traditional religious authority that has been the hallmark of Islamic boarding schools faces new dynamics in guiding the learning process and shaping students' religious identity.

Studies show that digital space has become an important arena in the spread of religious ideology (Gao et al., 2024), including narratives of intolerance (Verkuyten & Kollar, 2021), radicalism (Burhanuddin et al., 2020), and extremism (Karpova et al., 2022). Extremist groups utilise digital technology to spread propaganda, build ideological networks, and influence the perceptions and behaviour of the younger generation. (Montasari, 2024). The speed, scale, and algorithmic nature of digital media enable the dissemination of ideological messages more widely than through conventional channels (Nuralina et al., 2024). This situation places the younger generation as a vulnerable group to exposure to unverified religious information that could potentially lead to exclusive or intolerant views.

Currency also offers significant opportunities for strengthening multicultural education and religious moderation. Digital technology enables cross-cultural interactions, knowledge exchange, and dialogue between groups that were previously

difficult to achieve (Lee, 2023). Through the appropriate use of technology, Islamic boarding schools can expand access to diverse learning resources, strengthen students' digital literacy, and develop religious content that emphasises tolerance, inclusivity, and respect for diversity (Mahmudah & Ridwan, 2025). Thus, digital space can function not only as a source of risk but also as a strategic medium for building a culture of diversity and strengthening resilience against extremism.

There is a need to explain the relationship between technology, individuals, educational institutions, and the social values that develop in the digital environment. One relevant perspective is the concept of digital ecology. This concept views the digital environment as a system comprising various interacting elements, including technological infrastructure, social actors, communication practices, digital culture, and institutional policies (Zoppelletto & Bullini Orlandi, 2022). Digital ecology in the educational context refers not only to the use of technology but also encompasses how technology shapes the learning process, social relations, and the construction of student identity (Dabbagh, 2023).

Digital ecology in the context of Islamic boarding schools refers to the entire digital environment that influences students' educational, social, and religious lives (Pratama et al., 2026). This ecology encompasses access to digital technology, media usage patterns, online communication culture, the roles of *kiai* and *ustadz* in the digital space, institutional policies related to technology use, and the production and consumption of religious content in Islamic boarding schools (Muhtadi et al., 2025). The interaction of these components has the potential to shape multicultural values and influence students' resilience to various forms of extremism that develop in the digital space.

Although research on the digitalisation of Islamic education has progressed rapidly, most studies still focus on digital literacy, online learning, the transformation of educational technology, or the use of social media in Islamic preaching. Research on multicultural education in Islamic boarding schools also generally highlights the curriculum, *pesantren* culture, and social practices within the physical educational space. Meanwhile, studies on religious extremism have focused more on deradicalisation strategies, religious moderation, or the prevention of radicalism among the younger generation. Thus, research systematically linking the digital ecology of Islamic boarding schools, multicultural education, and resilience to religious extremism remains relatively limited.

These limitations indicate a research gap in the existing literature. To date, there has been little research that comprehensively maps how developments in digital ecology studies in Islamic education contribute to the formation of multicultural values and resilience against extremism. Furthermore, no conceptual framework can integrate research findings on the digitalisation of Islamic boarding schools, multicultural education, digital literacy, religious moderation, and extremism prevention into a single, coherent analytical model.

Based on these gaps, this article aims to systematically review the development of research on digital ecology, multicultural education, and resilience to religious extremism in the context of Islamic education. Specifically, this study seeks to answer the following questions: (1) what are the trends in the development of research on digital ecology in Islamic education; (2) what are the

main themes that emerge in studies on multicultural education and resilience to extremism in the digital era; (3) what is the relationship between the digital ecology of Islamic boarding schools, multicultural values, and resilience to religious extremism; and (4) what conceptual model can explain the relationship between these three aspects.

Through a Systematic Literature Review (SLR) approach, this article is expected to make three main contributions. First, it maps the development of research related to the digitalisation of Islamic education, multiculturalism, and religious extremism. Second, it identifies dominant themes and research gaps that remain open for future development. Third, it proposes a conceptual model of Digital Multicultural *Pesantren* Ecology as a theoretical framework for understanding the role of *pesantren* digital ecology in building multicultural values and strengthening resilience against religious extremism in the digital era.

MATERIALS AND METHODS

This study uses a Systematic Literature Review (SLR) approach to identify, select, evaluate, and synthesise scientific literature on digital ecology, multicultural education, Islamic education, religious moderation, and resilience against religious extremism (Azarian et al., 2023). The SLR method was chosen because it allows for transparent, structured, and replicable analysis in mapping research developments and identifying existing research gaps.

This systematic review protocol follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines, which include four main stages: identification, screening, eligibility, and inclusion.

A. Data Sources and Search Strategy

Literature was obtained from internationally reputable scientific databases, namely Scopus, Web of Science (WoS), ERIC, Dimensions, and Google Scholar, with Google Scholar used as a supplementary source. The search was conducted using a combination of keywords and Boolean operators to ensure comprehensive and relevant coverage of the literature.

The main keywords used are as follows: ("Islamic boarding school" OR *pesantren* OR "Islamic education") AND ("digital ecology" OR "digital environment" OR "digital transformation" OR "digital literacy") AND (multicultural OR diversity OR tolerance OR inclusiveness) AND (extremism OR radicalism OR "religious extremism"). Keyword variations were used to broaden the search scope, including those focusing on digital literacy, religious moderation, and Islamic education in a digital context.

The literature search was limited to publications from 2015 to 2025 to capture research developments in the last decade relevant to digital transformation in Islamic education.

B. Inclusion and Exclusion Criteria

The articles analysed in this study were selected based on the following inclusion and exclusion criteria. Inclusion criteria include:

1. Reputable scientific journal articles (peer-reviewed journal).
2. Published between 2015 and 2025.
3. Available in English.

4. Discussing Islamic education, Islamic boarding schools, digital ecology, digital literacy, multicultural education, religious moderation, or religious extremism.
5. Available in full-text form (full-text available).

Exclusion criteria include:

1. Articles can be editorials, opinions, or comments.
2. Conference proceedings and book reviews.
3. Articles that are not relevant to the research focus.
4. Duplication from different databases.
5. Articles without full text access.

C. Study Selection Procedure (PRISMA)

The study selection process was conducted in four stages in accordance with the PRISMA 2020 framework. Initially, all articles obtained from the database were collected, and duplicates were removed. Next, articles were screened based on their titles, abstracts, and keywords to assess their relevance to the research topic. Articles that passed the screening stage were then subjected to a full-text assessment to ensure compliance with the inclusion criteria. Only articles that met all requirements were included in the final analysis. The entire selection process was documented in a PRISMA flowchart to ensure transparency and replicability of the research.

D. Study Quality Assessment

Each selected article was evaluated for methodological quality, considering several aspects: clarity of research objectives, appropriateness of research design, clarity of data collection methods, consistency of data analysis, clarity of research results, and relevance to the study's focus. Articles of low quality or those that did not meet minimum standards were excluded from the final synthesis stage.

E. Data Extraction

Data from each article that met the criteria were extracted using a structured format. Information collected included article identification (author, year, and country), research characteristics, study context, focus, key findings, and theoretical and practical implications.

F. Data Analysis Techniques

The data was analysed using thematic analysis to identify key patterns and themes emerging from the reviewed literature. The analysis process involved several stages: data familiarisation, initial coding, grouping codes into themes, reviewing themes, and final interpretation. The resulting themes were then used to develop a conceptual synthesis regarding the relationship between digital ecology, multicultural education, and resilience to religious extremism in the context of Islamic education.

G. Conceptual Model Development

Based on the results of a literature synthesis, this study develops a conceptual model of Digital Multicultural *Pesantren* Ecology. This model illustrates how digital infrastructure, institutional governance, digital literacy, multicultural education, and religious moderation interact in shape students' resilience to extremism in the digital space. This conceptual model serves as the main theoretical contribution of the research as well as a basis for further empirical research in the context of Islamic boarding school education in the digital era.

RESULTS AND DISCUSSION

A. Result

The literature identification process yielded numerous articles from various academic databases (Scopus, Web of Science, ERIC, Dimensions, and Google Scholar). After removing duplicates and initial screening based on title and abstract, a full-text assessment was conducted.

Based on the literature search, 612 articles were retrieved from various databases. After removing duplicate articles, 487 articles remained for the initial selection stage. The screening process, which involved reviewing titles and abstracts, yielded 213 articles relevant to the research topic. Next, a feasibility assessment was conducted through a full-text review of these articles, resulting in 96 articles meeting the methodological and substantive requirements. In the final stage, 54 articles met all inclusion criteria and were used as the primary data sources in the thematic synthesis process. This process ensured that the articles analysed were sufficiently relevant and of high quality to support the research findings.

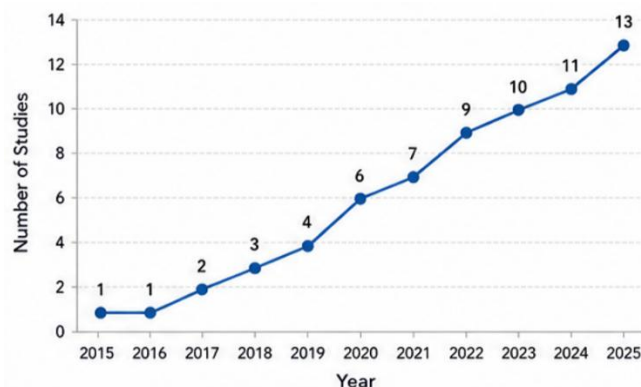
In summary, the study selection flow can be seen in the following diagram:

Table 1. PRISMA-Based Article Selection Process

No.	PRISMA Phase	Selection Process	Number of Records
1	Identification	Articles retrieved from all selected databases	612
2	Duplicate Screening	Articles remaining after duplicate removal	487
3	Title and Abstract Screening	Articles considered relevant to the research topic	213
4	Full-Text Eligibility Assessment	Articles meeting the eligibility criteria after full-text review	96
5	Final Inclusion	Articles included in the systematic review and thematic synthesis	54

This process showed that only literature truly relevant to the focus areas of digital ecology, Islamic education, multiculturalism, and religious extremism was included in the final analysis.

An analysis of 54 articles meeting the inclusion criteria shows that studies on digital ecology, Islamic education, multiculturalism, and religious extremism have experienced significant growth in recent years. In terms of temporal distribution, publications show a fairly consistent upward trend.



The trend indicates growing academic attention to digitalization in Islamic education and digital-based extremism.

Figure 1. Distribution of Studies by Year

This increase indicates that issues in digital transformation in Islamic education, religious digital literacy, and digital-based extremism are increasingly attracting academic attention. This also demonstrates that the development of digital technology has spurred a range of studies seeking to understand its impact on the formation of religious identity, educational practices, and the social life of Muslim communities.

Geographically, most research originates from Asia, particularly Indonesia and Malaysia. The dominance of these two countries indicates that the digitalisation of Islamic education has received significant attention in countries with large Muslim populations and strong Islamic educational traditions. Furthermore, a number of studies have emerged from the Middle East, particularly Saudi Arabia and Qatar, that have extensively examined the relationship among digital media, religious authority, and the spread of Islamic discourse in virtual spaces. Studies from Europe, particularly the United Kingdom and the Netherlands, generally focus on the integration of multicultural education, digital citizenship, and efforts to prevent extremism among minority Muslim communities. Meanwhile, research in the United States has focused more on online radicalisation, media literacy, and the development of resilience strategies against extremist propaganda in digital spaces.

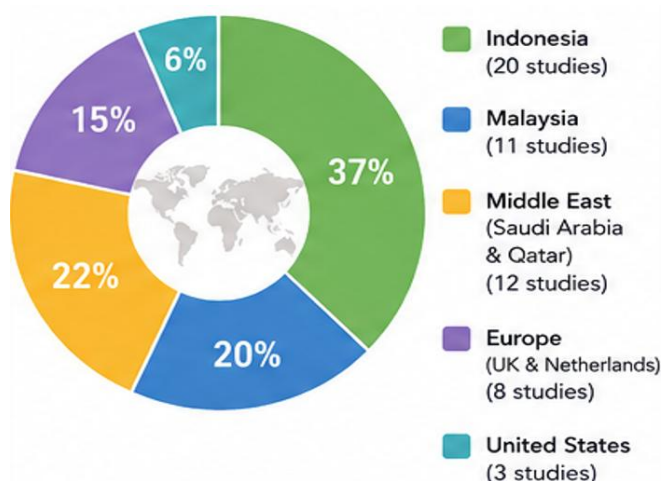


Figure 2. Geographical Distribution

In terms of methodological approach, the majority of studies used qualitative methods (52%). The dominance of qualitative approaches indicates that researchers are primarily seeking to understand the digitalisation of Islamic education, the experiences

of digital media users, and the construction of meaning within religious communities. Twenty-eight per cent of studies used quantitative approaches to measure the influence of digital literacy, religious attitudes, and tendencies toward tolerance or extremism. Furthermore, 15% of studies used mixed methods, combining the strengths of qualitative and quantitative approaches, while the remaining 5% were conceptual and theoretical articles focused on developing analytical models or frameworks.

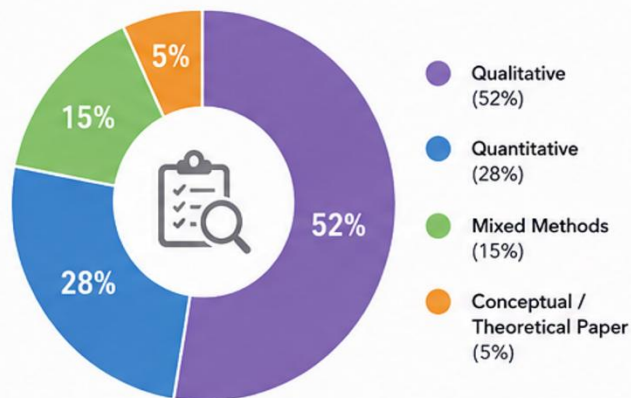


Figure 3. Research Methods

The most common research focuses found in the literature can be grouped into five main themes. First, the digitalisation of Islamic education, which discusses the integration of digital technology and online learning platforms, as well as the transformation of the educational systems of Islamic boarding schools and other Islamic educational institutions. Second, religious digital literacy, which highlights students' ability to access, evaluate, and critically utilise religious information in the digital space. Third, multicultural education emphasises the importance of developing values of tolerance, respect for diversity, and cross-cultural dialogue through digital media. Fourth, religious moderation, which focuses on strategies for strengthening inclusive, balanced, and non-violent religious attitudes. Fifth, digital radicalism and extremism, which examines patterns of extreme propaganda dissemination, the process of online radicalisation, and various prevention strategies.

Overall, the characteristics of the reviewed studies indicate that research on Islamic education in the digital era has evolved beyond simply addressing technology utilisation to more complex studies of value formation, identity, and socio-religious resilience. These findings provide an important foundation for understanding how the digital ecology of Islamic boarding schools can be developed as a means of strengthening multicultural values and as an instrument for preventing religious extremism in the digital age.

The results of the literature synthesis produced five main themes that are interconnected in forming the digital ecology of Islamic boarding schools.

1. Digital Transformation in Islamic Education

Literature shows that Islamic boarding schools and Islamic educational institutions are increasingly integrating digital technology into their learning processes. This includes the use of e-learning platforms, social media for Islamic outreach, and the digitisation of Islamic books. However, this transformation has not always been accompanied by strengthening critical digital literacy.

2. Digital Literacy and Religious Authority

Digitalisation is shifting the pattern of religious authority from a centralised model (kiai/ustaz) to a more open, distributed one. This presents challenges in including religious disinformation and increased exposure to unreliable sources.

3. Multicultural Education in the Digital Space

Digital spaces offer opportunities to broaden understanding of diversity through cross-cultural and interfaith interactions. Digital media can be an effective tool for building tolerance, dialogue, and understanding across identities.

4. Expansion of Extremism in Digital Space

The literature consistently shows that digital media is used by extremist groups to spread propaganda, construct exclusive identities, and radicalise young people. Algorithmic platforms amplify the spread of this content.

5. Religious Resilience and Moderation Strategy

The strategies most frequently found in the literature include strengthening digital literacy, religious moderation education, involvement of religious leaders, and the formation of inclusive and supportive digital communities.

Analysis of the literature shows that there are research gaps, as shown in the following table:

Table 2. Research Gap Matrix

No	Dimensions	Literature Findings	The gap
1	Digitalization of Islamic Education	Focus on technology implementation	Not yet examined the digital ecosystem holistically
2	Digital Literacy	Emphasize technical skills	Minimal integration with multicultural values
3	Multicultural Education	Dominant in physical space	Lack of studies in the digital space of Islamic boarding schools
4	Digital Extremism	Focus on prevention	Not yet linked to educational ecology
5	Religious Moderation	Normative approach	Not yet based on a digital ecology system

This gap indicates the need for a more integrative approach through the perspective of the digital ecology of Islamic boarding schools.

Based on the integration of literature findings, this study develops a conceptual model of Digital Multicultural *Pesantren* Ecology, which consists of five main layers:

1. Digital Infrastructure Layer

Covering internet networks, digital devices, learning platforms, and Islamic boarding school communication systems.

2. Institutional Governance Layer

Covering Islamic boarding school policies, the leadership role of kiai, and regulations on the use of digital technology.

3. Digital Culture Layer

Covers norms, ethics, and practices of digital communication in Islamic boarding school communities.

4. Multicultural Learning Layer

Contains the process of internalising the values of tolerance, diversity, justice, and intercultural dialogue through digital media.

5. Resilience Layer Against Extremism

Describes the ability of Islamic boarding school students to reject extreme narratives through critical digital literacy, religious moderation, and reflective thinking skills.

B. Discussion

The results of this SLR show that the digital ecology of Islamic boarding schools cannot be understood solely as the use of technology in learning, but as a complex system encompassing interactions among technology, culture, institutions, and religious values.

1. Digital Transformation without Critical Literacy Increases Vulnerability to Religious Extremism

One of the key findings of this SLR is that digital transformation in Islamic education does not automatically result in improved religious understanding or strengthened religious moderation. Instead, the study indicates that expanded access to digital technology can increase individuals' vulnerability to extremist narratives if not balanced with critical digital literacy skills (Huang, 2024; Rea, 2022). These findings demonstrate that the relationship between digitalisation and the formation of religious attitudes is non-linear; technology can function as an instrument of empowerment while also facilitating the spread of extreme ideologies.

From the perspective of the Digital Literacy theory developed by Gilster (1997), digital literacy is not only related to the technical ability to operate digital devices but also to the ability to critically evaluate, interpret, and verify information. This concept was later expanded by Buckingham (2015) who emphasised that digital literacy should be understood as the capacity to understand how information is produced, distributed, and constructed in a media environment saturated with ideological interests. This ability is becoming increasingly important because the current digital space is filled with various religious authorities who do not always have academic legitimacy or clear scientific chains (Smith & Storrs, 2023).

The findings of this study corroborate those of previous studies, which showed that young Muslims are both the most active internet user segment and the most vulnerable to exposure to extreme content in digital media (Conway et al., 2019; Gaudette et al., 2022). However, the literature synthesis also reveals a more complex pattern than these previous findings. Most previous studies tended to explain digital radicalisation as a consequence of exposure to extreme content alone (Mølmen & Ravndal, 2023; Wolfowicz et al., 2022). Meanwhile, the results of this study indicate that the more determining factor is not simply the presence of extreme content, but rather an individual's weak capacity to critically evaluate the information received.

This finding has important theoretical implications because it shifts the focus of analysis from a content-centred approach to a capability-centred approach. Vulnerability to extremism is not

primarily caused by the technology or digital content itself, but by users' unpreparedness to manage the complexity of information available in the digital space (LaCroix & Berkovits, 2026). In other words, digital extremism thrives not because of an abundance of information, but rather because of a lack of ability to filter and interpret that information reflectively.

This finding can be explained through Castells' Network Society theory. According to Castells. Menurut Castells (2011), digital society is characterised by the formation of information networks that enable ideas, values, and identities to spread rapidly across geographical and institutional boundaries. In the context of Islamic boarding schools, this condition causes students to no longer rely exclusively on traditional religious authorities such as kiai and ustaz, but also obtain religious information from various, often unverified, digital actors. As a result, religious authority has become increasingly fragmented and competitive. This situation opens up opportunities for the emergence of exclusive, simplistic, and even extreme religious narratives to gain greater influence among the younger generation of Muslims.

Interestingly, the SLR results also found that the literature on the digitalisation of Islamic boarding schools is still dominated by discussions about the use of technology for learning, administration, and digital da'wah. Conversely, studies specifically exploring critical digital literacy as a protective mechanism against extremism are relatively limited. This finding highlights a conceptual gap in previous research, which tends to assume that increased access to technology will automatically lead to improved educational quality (Guess et al., 2020). However, as recent studies have shown, digitalisation without strengthening critical thinking skills can increase the risk of exposure to misinformation, disinformation, and ideological propaganda (Leha, 2025).

These findings indicate that resilience against extremism cannot be built solely through the provision of technological infrastructure. Resilience is the result of the interaction among the digital environment, institutional culture, learning practices, and user literacy capacity (Zhou et al., 2025). Therefore, in the Digital Multicultural *Pesantren* Ecology model proposed in this study, critical digital literacy is positioned as a mediating mechanism linking digital transformation to the formation of an inclusive religious identity (Ben Ghrbeia & Alzubi, 2024). Without such a mechanism, digital transformation has the potential to produce effects that contradict the goals of moderate and multicultural Islamic education.

Thus, these findings broaden our understanding of the relationship between digitalisation and religious extremism. While most previous research has positioned technology as an external factor influencing religious behaviour, the results of this study suggest that a more important factor lies in the quality of the digital ecology built by educational institutions. In the context of Islamic boarding schools, this means that the success of digital transformation is measured not only by the level of technology adoption but also by the ability of Islamic boarding schools to build a culture of critical literacy that enables students to become reflective, selective media users and resilient to various forms of extreme propaganda in the digital space.

2. Multicultural Education Plays a Strategic Role in Shaping Inclusive Religious Identity, but It Must Be Extended into Digital Spaces

The second finding from the SLR results indicates that multicultural education plays a very strategic role in shaping an inclusive religious identity among Islamic boarding school students. However, most multicultural education practices in the literature remain oriented towards social interactions in physical spaces, such as dormitory life, classical learning, cross-cultural activities, and familiarisation with living together in diverse environments (Tamimi et al., 2026). Meanwhile, the development of digital technology has created new social spaces that also play a significant role in shaping the identity, values, and perspectives of the younger generation of Muslims (Beverungen et al., 2022). Therefore, multicultural education is no longer adequately understood as a pedagogical practice confined in physical spaces, but rather needs to be expanded into the digital ecosystem where Islamic boarding school students interact and construct their socio-religious meanings.

This finding aligns with Banks's theory of multicultural education. According to Banks (2021), the primary goal of multicultural education is to develop students' social competence and critical awareness, enabling them to live democratically in a pluralistic society. Multicultural education not only aims to increase knowledge about diversity but also to shape attitudes, values, and skills that enable individuals to interact constructively with diverse groups (Sri Ilham Nasution & Ahmad Fauzan, 2025). In the context of Islamic boarding schools, values such as *tasamuh* (tolerance), *ta'aruf* (getting to know each other), *musawa* (equality), and *i'tidal* (justice) are important foundations for the formation of an inclusive religious identity.

The results of the literature synthesis indicate that multicultural education has been shown to strengthen tolerance, respect for differences, and the ability to engage in cross-identity dialogue. This finding aligns with various studies suggesting that educational experiences emphasising diversity can reduce social prejudice and strengthen social cohesion in multicultural societies (Banks, 2021; Nieto, 2001). However, this study found a pattern different from that of most previous studies. While previous research primarily viewed multicultural education as a process that occurs through face-to-face interactions within the educational community, the results of this SLR demonstrate that religious identity formation among students is also currently heavily influenced by digital experiences outside the direct control of educational institutions.

This change indicates a shift in the socialisation arena from physical spaces to hybrid spaces that combine offline and online interactions. From the perspective of the Networked Publics theory developed by Varona et al. (2022), digital media has created a new public space in which individuals construct identities, form communities, and interact with diverse social groups. For students, the digital space allows for encounters with a much broader range of religious, cultural, and ideological views than the *pesantren* environment itself (Suradji & Faridi, 2025). digital media has created a new public space in which individuals construct identities, form communities, and interact with diverse social groups. For students, the digital space allows for encounters with a much broader range of religious, cultural, and ideological views than the *pesantren* environment itself

These findings indicate that the concept of multicultural education that has developed so far tends to be oriented towards conventional educational contexts. Most multicultural education models are built on the assumption that social interactions occur within the classroom, the school community, or a relatively controlled

community environment. However, in the digital era, the process of identity formation is increasingly influenced by social media algorithms, virtual networks, and personalised digital information consumption. Consequently, the success of multicultural education is no longer solely determined by the curriculum and school culture, but also by the quality of the digital environment surrounding students.

These findings extend the argument put forward by Jenkins & Jie (2024) regarding the importance of participatory culture in the digital environment. According to them, digital participation enables individuals to engage in the exchange of ideas and social learning that transcends geographic and institutional boundaries. However, the results of this study indicate that digital participation does not always result in openness to diversity. In some cases, social media algorithms actually reinforce the echo chamber and filter bubble phenomena, namely conditions in which individuals are more frequently exposed to views that align with their own beliefs, thereby reducing opportunities for cross-perspective dialogue (Erickson, 2024). This finding explains why some studies have found that high digital access does not always correlate positively with increased tolerance.

The uniqueness of this research lies in its identification of the relationship between multicultural education and the digital ecology of Islamic boarding schools. Unlike previous research that tends to separate issues of diversity and digital technology (Aghdam et al., 2022), the results of this SLR show that the two are interrelated. Multicultural education becomes less effective when implemented solely in physical spaces, whereas the social lives of Islamic boarding school students increasingly take place in digital spaces (Aghdam et al., 2022). In other words, digital transformation demands a paradigm shift in multicultural education from a physical-centric approach to one that encompasses the entire digital ecosystem.

The implication of these findings is the need to expand the concept of multicultural education toward what can be called digital multicultural education. This concept emphasises not only mastery of knowledge about diversity but also the ability to interact ethically, dialogically, and reflectively in pluralistic digital spaces. Digital literacy and multicultural education are no longer positioned as separate domains, but rather as complementary competencies in building an inclusive religious identity.

In the Digital Multicultural *Pesantren* Ecology model proposed in this study, multicultural education serves as a mechanism for forming a moderate socio-religious identity that is open to differences. However, its effectiveness is greatly influenced by the quality of the digital culture developing within the *pesantren* environment. The stronger the integration between multicultural values and inclusive digital practices, the greater the *pesantren*'s ability to build students' resilience against narratives of intolerance and extremism that develop in the digital space.

Thus, the results of this study indicate that the primary challenge for Islamic education in the digital era is not simply how to integrate technology into learning, but how to ensure that digital spaces become multicultural learning arenas that strengthen inclusive religious identities. These findings also expand the study of multicultural education by positioning digital ecology as a crucial factor influencing the process of value and identity formation in contemporary Muslim societies.

3. Religious Moderation as a Key Element in Building Ideological Resilience in the Digital Era

The third finding from the SLR results indicates that religious moderation is a central element in building ideological resilience against various forms of extremism that develop in the digital space. Unlike the security approach, which positions extremism as a threat that must be controlled through surveillance and restrictions on access to information, the literature reviewed in this study shows that religious moderation works through the internalisation of values, the development of critical thinking, and the cultivation of balanced religious attitudes. Resilience against extremism is built not only through control of digital content but also through the formation of a religious orientation capable of filtering and evaluating various information proportionally.

This finding can be explained through the concept of *wasatiyyah*, which is the primary foundation of religious moderation in Islamic tradition. According to Syamsuni (2026), *wasatiyyah* embodies the principles of balance, justice, tolerance, and the rejection of all forms of extremism in thought and action. Religious moderation is not merely a compromising attitude toward differences, but rather the ability to understand religious teachings comprehensively and contextually without falling into exclusive or radical tendencies. (Akmal et al., 2025). This perspective becomes increasingly important in the digital age, when various religious interpretations can be accessed instantly without adequate academic verification.

The results of the literature synthesis indicate that religious moderation serves as a cognitive filter, helping individuals evaluate various religious narratives circulating in digital spaces. This finding expands on previous research, which generally positions religious moderation as an instrument for social harmony and diversity management (Muis, 2026). Meanwhile, the results of this study indicate that religious moderation serves a broader function: an epistemological resilience mechanism against various forms of ideological manipulation that emerge through digital media.

These findings are interesting because they demonstrate a shift in the function of religious moderation in digital society. In conventional social contexts, religious moderation is often understood as a means of maintaining relationships between groups of different religions or cultures. However, in the digital environment, religious moderation also helps manage information overload and prevent individuals from becoming trapped in narrow, exclusive religious interpretations. In other words, religious moderation has not only a social dimension but also a cognitive one that plays a role in shaping individuals' ability to understand the complexity of religious information available online.

This phenomenon can be explained through the theory of Religious Authority in the Digital Age, developed by Campbell, (2013). This theory explains that digitalisation has changed the structure of religious authority from a hierarchical model to a networked model. In traditional systems, religious legitimacy is obtained through formal education, scientific chains of transmission, and community recognition (Hasan, 2025). In contrast, in the digital space, authority is often built on popularity, follower counts, and algorithmic visibility (Duffy & Meisner, 2023). As a result, individuals can easily access a variety of religious sources that have widely varying qualities and ideological orientations.

In situations like this, religious moderation becomes a crucial tool for developing selective capacity in receiving religious

information. SLR results indicate that individuals with a moderate religious orientation tend to be better able to distinguish between substantive religious teachings and political or exclusionary ideological narratives. Conversely, weak religious moderation is often correlated with increased acceptance of discourses that emphasise an "us versus them" dichotomy, claims of a single truth, and the delegitimisation of different groups.

These findings also differ significantly from some previous research, which tends to link radicalisation to socioeconomic factors, political marginalisation, or social dissatisfaction (Kruglanski et al., 2019). While these factors remain relevant, the literature synthesis indicates that in the digital context, vulnerability to extremism is not always rooted solely in structural conditions. Even individuals from well-educated backgrounds can be exposed to extreme ideologies if they lack a strong foundation of religious moderation. These findings shift the focus of analysis from external factors to internal factors, such as religious orientation and individual reflective capacity.

The results of this study contribute by expanding the concept of religious moderation from a normative to a digital-ecological approach. In many previous studies, religious moderation was primarily understood as a set of values or principles taught through religious education curricula (Rohmat, 2026). However, the results of this study indicate that the effectiveness of religious moderation is strongly influenced by the digital environment in which individuals interact and obtain information (Yulawati & Asri, 2024). Therefore, religious moderation needs to be understood as a social practice that is continually shaped by interactions among individuals, educational institutions, digital culture, and online communication networks.

An important implication of these findings is the need to integrate religious moderation education and digital literacy within the Islamic boarding school education system. To date, these two aspects have often been developed separately. However, research shows that they have a mutually reinforcing relationship. Digital literacy without religious moderation risks producing technically proficient individuals who are vulnerable to ideological manipulation. Conversely, religious moderation without digital literacy may be less effective in dealing with the rapidly evolving dynamics of information in the digital space.

In the Digital Multicultural *Pesantren* Ecology model, religious moderation is placed at the core of the process of building ideological resilience. Religious moderation serves as a mechanism connecting digital literacy, multicultural education, and an inclusive digital culture. Through this mechanism, students not only gain the ability to use technology effectively but also develop the capacity to assess, critique, and respond to various religious narratives proportionally and responsibly.

Thus, the results of this study confirm that the primary challenge of Islamic education in the digital era is not only providing access to technology but also ensuring that digitalisation goes hand in hand with strengthening religious moderation. In this context, religious moderation serves as an ideological foundation, enabling students to develop a religious identity that is inclusive, critical, and resilient against various forms of extremism that thrive in the contemporary digital space.

4. A Healthy Digital Ecology Functions as a Protective System Against Online Radicalisation

The fourth finding from the SLR results suggests that resilience to online radicalisation cannot be explained solely by individual factors, such as religiosity or digital literacy, but must be understood as the result of interactions among the various elements that make up the digital ecology. The reviewed literature consistently shows that individuals do not interact with information in a neutral space. Instead, they exist in a digital environment comprised of technological infrastructure, communication culture, social networks, religious authorities, and value systems that collectively influence how they receive, interpret, and respond to information. Therefore, both digital radicalisation and resilience to it are multidimensional ecological phenomena.

These findings reinforce the Ecological Systems Theory perspective developed by Bronfenbrenner (1994), which holds that individual development is shaped by multiple interacting environmental layers. In the digital context, this environment includes not only family, school, and social communities but also social media networks, digital platforms, information algorithms, and virtual communities that are part of young people's daily lives. Thus, resilience to extremism cannot be understood as a purely personal ability, but rather as a product of the quality of the social and digital environment surrounding an individual.

The literature synthesis shows that most previous studies have viewed digital radicalisation through a risk-based approach. Their primary focus is on identifying factors that increase the likelihood of exposure to extremist ideologies, such as consuming radical content, social isolation, or involvement in exclusive online communities (Karpova et al., 2022). While this approach makes important contributions to understanding the radicalisation process, this study found that it tends to under-emphasise protective factors that can build resilience against the influence of extremism.

The SLR results indicate that a healthy digital ecology has a protective function that is as important as security-based prevention efforts. A healthy digital environment is characterised by strong digital literacy (Bejaković & Mrnjavac, 2024), an inclusive communication culture (Kim, 2026), access to credible religious sources (Battista, 2024), moderate religious leadership (Schlag et al., 2025), and digital governance that supports constructive participation (Ni, 2022). These factors form protective mechanisms that reduce the likelihood of individuals accepting and internalising extreme narratives.

These findings differ from most research on digital radicalisation, which tends to focus on extreme content and counter-narrative strategies. The results of this study show that the success of preventing extremism is determined not only by the ability to counter radical propaganda but also by the ability to create a digital environment that provides alternative identities, communities, and positive sources of meaning (Duarte et al., 2025). In other words, individuals do not become resistant to extremism simply because they know the ideology is false, but because they already have a strong social and religious identity in a digital environment that supports inclusive values.

This phenomenon aligns with Resilience Theory, which emphasises that resilience is a system's ability to adapt and continue functioning in the face of threats or disruptions (Kuhlicke et al., 2023). Resilience to extremism does not mean an absence of exposure to radical ideologies, but rather the ability of students to recognise, evaluate, and reject these narratives without losing their religious identity. Therefore, the primary focus is no longer simply

eliminating risk but rather building adaptive capacity that enables individuals to remain resilient in complex digital environments.

These findings also reveal an interesting pattern in the context of Islamic boarding schools. Most studies on Islamic boarding schools have emphasised the roles of the curriculum, scholarly traditions, and the *kiai* (Islamic teacher) in fostering religious moderation. However, the SLR results show that in the digital era, these influences no longer operate in a linear fashion. The quality of interaction between the physical and digital environments strongly influences the effectiveness of Islamic boarding school education. Islamic boarding schools with an inclusive digital culture, clear media policies, and active involvement of *kiai* and *ustaz* (Islamic teachers) in the digital space tend to be better at building students' resilience against various forms of extreme propaganda than those that rely solely on conventional learning approaches.

These findings broaden the study of extremism prevention by shifting the focus from an individual approach to an ecological one. Most deradicalisation models developed to date treat the individual as the primary unit of analysis (Pokrajčić & Marinić-Kuliš, 2025). Instead, this study demonstrates that resilience to extremism is a characteristic that emerges from the interaction of various elements within a social and digital system. Therefore, efforts to prevent extremism require more than just individual interventions; they also require the development of a healthy and supportive digital environment.

The main contribution of this research lies in the development of the Digital Multicultural *Pesantren* Ecology concept, which views resilience against extremism as the result of integrating digital transformation, multicultural education, digital literacy, and religious moderation. In this model, digital ecology functions as a protective system that dynamically connects all these components. Digital infrastructure provides access to information, multicultural education shapes an inclusive orientation, digital literacy develops critical thinking, and religious moderation provides a normative foundation for assessing various religious information. The interaction of these elements produces ideological resilience that enables students to face the challenges posed by extremism in the digital space.

These findings indicate that strategies for preventing radicalisation in Islamic boarding schools need to shift from a reactive approach to a more preventative and ecological one. Strengthening digital literacy, developing a healthy digital culture, increasing educators' capacity to utilise digital media, and producing moderate religious content should be viewed as part of an integrated protection system. Thus, Islamic boarding schools function not only as religious educational institutions but also as digital ecosystems that develop inclusive, critical, and resilient Muslim digital citizens to counter various forms of extremism.

The relationship among digital transformation, multicultural education, religious moderation, and resilience against extremism is not linear but unfolds through complex, interconnected ecological processes. The study's findings indicate that digital transformation is fundamentally a structural condition that Islamic educational institutions cannot avoid. However, its impact on the formation of religious identity is largely determined by the quality of the digital ecology that develops within Islamic boarding schools.

Unlike most previous research that treats digitalisation, multicultural education, and religious moderation as standalone variables, these results demonstrate that these three elements operate interdependently in shape resilience against extremism. Digital transformation provides space for interaction and the production of new knowledge; multicultural education shapes an inclusive social orientation; and religious moderation provides a normative framework for interpreting diversity and difference. When these three elements are supported by critical digital literacy and effective institutional governance, a resilient capacity will be formed that enables Islamic boarding school students to confront various forms of extreme propaganda in the digital space.

These findings yield a new conceptual model known as the Digital Resilience Ecology Multicultural Model (DREM Model). Unlike previous models, which tended to emphasise the direct link between digital literacy and the prevention of radicalism, this model explains that resilience to extremism is a product of the interaction among five interconnected ecological layers.

These results indicate that resilience against extremism is not the result of a single factor but rather a product of an educational ecosystem that integrates technology, culture, learning, and religious values. Therefore, this study proposes a paradigm shift from a counter-radicalisation approach to an ecological resilience approach. While the former focuses on countering extremist ideologies after they emerge, the ecological approach emphasises building a digital environment that fosters sustainable resilience.

The main theoretical contribution of this research lies in the development of the Digital Resilience Ecology Multicultural Model (DREM Model), which extends educational ecology theory to the context of digital Islamic education. This model explains that multicultural education, digital literacy, and religious moderation do not operate in isolation but form an adaptive system that collectively strengthens resilience against extremism.

Thus, this model offers a new research agenda in contemporary Islamic education studies. Future research could examine the relationships between the model's layers through quantitative, mixed-methods approaches, and comparative case studies of various Islamic boarding schools in Indonesia, Malaysia, the Middle East, and other Muslim countries. Such empirical testing is crucial to verify the extent to which each ecological dimension contributes to the formation of students' multicultural identities and digital resilience.

CONCLUSION

The study's findings indicate that digital transformation, multicultural education, religious moderation, and digital literacy are interrelated dimensions in shaping the resilience of Islamic boarding school students in the digital space. While digital spaces offer opportunities to strengthen values of diversity and inclusivity, they also serve as a medium for the spread of extremist narratives. The research findings confirm that resilience against extremism is determined not only by individual capacity but also by the presence of a healthy digital ecology, characterised by critical digital literacy, an inclusive communication culture, credible religious sources, moderate leadership, and constructive digital governance. Based on this synthesis, the study proposes the Digital Resilience Ecology Multicultural Model (DREM Model), which posits that resilience against extremism results from dynamic interactions among technology, education, culture, and religious values within the Islamic boarding school ecosystem. Theoretically, this research

shifts the focus of research from a counter-radicalisation approach to an ecological resilience approach. In practical terms, these findings emphasise the importance of developing an integrated digital ecosystem for Islamic boarding schools to foster an inclusive religious identity and strengthen resilience against extremism in the digital space. Future research should empirically test the DREM Model in various Islamic educational contexts to validate the inter-dimensional relationships proposed in this model.

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