

Information Ecology and Islamic Education: Communication Resilience Strategies in the Era of Digital Disruption

Abd. Muhaimin* abdmuhaimin016@gmail.com

Affiliation (Independent researcher, Indonesia)

ABSTRACT

Information ecology is understood as the application of ecological concepts to model the information society, in which the flow of data, social interactions, and technology are conceived as an ecosystem that mutually influences one another. In the era of digital disruption, this ecosystem presents both opportunities and challenges for Islamic education. On the one hand, the abundance of information can enrich learning resources; on the other hand, it has the potential to weaken values, reduce the quality of communication, and generate disinformation. This article examines communication resilience strategies in Islamic education through the lens of information ecology. Namely how educational institutions are able to adapt while maintaining balance within the information society. The study highlights three key strategies: first, strengthening digital literacy grounded in Islamic values; second, integrating the principles of tabayyun (verification) and communication ethics into educational practice; and third, utilizing digital technology in a critical, creative, and sustainable manner. Thus, Islamic education is not only able to withstand the currents of digital disruption but also play an active role in shaping an information society that is healthy, inclusive, and oriented toward islamic values.

Keywords: Information ecology; Islamic education; communication resilience; digital disruption.

Introduction

The advancement of digital technology has significantly transformed conventional communication patterns. On one hand, the ease of accessing information presents broad opportunities for the equitable distribution of knowledge. On the other hand, the wave of digital disruption carries serious consequences for values, authority, and the quality of communication, particularly within the educational context.(Ardina Rasiani et al., 2025, p. 385) Educators, teachers, scholars, and educational institutions, who once served as central authorities of knowledge, are gradually sharing this role with digital figures. Dynamic, complex, and diverse interactions now occur in digital spaces, where knowledge is obtained not only from teachers in classrooms but also from religious influencers on social media and algorithms that filter and display

* Corresponding author: Abd. Muhaimin

content.(Nyai Raodotul Janah et al., 2025, p. 748) Ultimately, this complexity reshapes communication patterns amid the clash of information with traditional structures.(Asran & Amaluddin, 2025)

To understand the dynamics of the information society, a new perspective is needed, one of which is information ecology. This concept emphasizes that information functions not merely as consumable data but also shapes social ecosystems that influence human thinking, behavior, and interaction.(Susanti, 2018) Students are no longer treated merely as information users but as part of a complex communication network where the flow of information guides educational directions. Amid information flows that create phenomena such as information overload and destructive disinformation, eroding manners, spreading religious hate speech, and weakening sensitivity to values, serious attention is required. Such conditions demand careful reflection on how Islamic education can adapt without losing its identity as a system rooted in Qur'anic principles and Islamic intellectual traditions.(Lathyva Nur Wahyuni et al., 2025, p. 669)

Research on Islamic education and digital technology has been conducted extensively. Based on the author's review, studies on this theme using the information ecology paradigm have not yet been identified. Broadly, existing studies can be categorized into three tendencies. First, general discussions on the opportunities and challenges of the digital era, as seen in Hernawati and Dewi Mulyani(Hernawati & Mulyani, 2023) or Khotimah Suryani.(Khotimah Suryani, 2022) Second, studies focusing on specific aspects, such as mental health, spirituality, digital literacy, or disinformation, exemplified by Ardina Rasiani et al.,(Ardina Rasiani et al., 2025) Asran and Amaluddin,(Asran & Amaluddin, 2025) or Dimas Maulana Rahman and Miftahurrahmat.(Dimas Maulana Rahman & Miftahurrahmat, 2025) Third, research emphasizing educational management aspects, such as Yudhy Widya Kusumo and Mariana,(Yudhy Widya Kusumo & Mariana, 2025) or Ali Mustopa Yakub Simbolon and Iswantir.(Mustopa & Iswantir, 2023) Among these tendencies, information ecology has not yet been employed as a paradigm to understand how the information ecosystem functions in Islamic education. Using this paradigm, the author assumes that communication resilience in Islamic education can be built on Islamic values.

Here, communication resilience is understood not only as the ability to withstand the flow of disinformation but also as the capacity to develop civilized, critical, and truth-oriented communication patterns. Islamic values should serve as the foundation for addressing the challenges of the digital era. Based on this premise, this study aims to explain the dynamics of Islamic education in the era of digital disruption through the lens of information ecology. This perspective allows for the identification of the disruptions that most affect communication patterns. Subsequently, strategies to build communication resilience are formulated in such a way that Islamic education is not merely trapped in information disruption but rather seizes opportunities to cultivate an ethical and civilized communication civilization.

Method

Research Design

This study employs a qualitative and conceptual approach to explore the perspective of information ecology in Islamic education. It relies on document analysis and literature review to understand how knowledge, technology, values,

and communication interact within educational contexts influenced by digital disruption. This design allows for an in-depth exploration of both theoretical and practical aspects of information ecology in education.

Data Sources

The main data sources include scholarly articles and other relevant literature. These sources were purposively selected to ensure direct relevance to the study's focus on Islamic education and information ecology. By examining these materials, the study can capture a comprehensive picture of existing practices, challenges, and strategies.

Data Collection

Data were collected through systematic document analysis and literature review. Key information was extracted regarding knowledge management, technology use, communication practices, and the integration of Islamic values in education. The collected data were then organized thematically and adjusted to suit the study's focus.

Data Analysis

Data were analyzed using thematic and content analysis. Codes were generated based on patterns and findings related to communication resilience, ethical technology use, and value-based education. The results were then interpreted through the lens of Islamic principles, highlighting strategies that enable Islamic educational institutions to navigate digital disruption effectively and sustainably.

Results

Information Ecology Paradigm in Islamic Education

From the perspective of information ecology, as explained by Bonnie Nardi and Vicki O'Day (1999), an information system is understood as "a system of people, practices, values, and technologies in a particular local environment," (Nardi & O'Day, 1999) a system consisting of humans, values, practices, and technologies that interact with one another. This paradigm views the flow of information as never existing in isolation but always connected to the social and cultural environment that contains it. The metaphor of "ecology" is used to emphasize that information does not exist separately from humans and technology. Nardi and O'Day compare several metaphors of technology: technology as a tool, technology as a text, and technology as a system. From these three metaphors, they developed a new one, technology as an ecology (Selfe & Hayden, 2000, pp. 93–94). Just like in biological ecosystems, each element is interdependent and mutually influential. In this context, Islamic education can be understood as part of the information ecosystem with its distinctive character, functioning to transmit divine values, preserve the authority of knowledge, and instill spiritual ethics amid the ever-changing digital landscape.

As a sub-ecosystem of information, Islamic education plays a role in regulating the circulation of knowledge and spiritual values among diverse actors and media. As a sub-system of information, Islamic education can also be described as a subculture, as once expressed by Gus Dur (K.H. Abdurrahman Wahid). This means that the understanding of Islamic education, such as that

found in pesantren institutions, plays a significant role both in socio-cultural contexts and in virtual environments (Alnashr, 2019). Pesantren, madrasahs, and Islamic higher education institutions can be seen as “habitats” where adaptation occurs between religious texts and the digital world. Within this framework, Islamic education functions as a system that seeks to maintain a balance between freedom of access to information and ethical responsibility in its use. Furthermore, as suggested by Nardi and O’Day regarding participatory technology approaches that should be developed by involving users as active participants in designing and modifying their information ecology, the role of Islamic education appears significant. (Selfe & Hayden, 2000, pp. 94–95) It is not merely a venue for teaching knowledge but an ecological mechanism that protects the integrity of knowledge and ethics amid the rapid flow of global information.

The interaction between humans (teachers and students), technology, and spiritual values forms the core of the information ecology paradigm in Islamic education. In digital spaces, the teacher–student relationship shifts from a vertical pattern to a networked relationship, where learning is no longer constrained by time and space. Technology becomes a new mediator in the transmission of knowledge but simultaneously introduces challenges related to *adab al-‘ilm* (ethics of learning) and intention in seeking knowledge. Islamic spiritual principles should serve as guidance to ensure that digital interactions remain within ethical boundaries. In this way, learning is not reduced to mere data exchange but continues to be a spiritual experience that nurtures the connection between the heart and knowledge. The concept of “using technology with heart,” the title of Nardi and O’Day’s book, signifies balancing technical efficiency with human moral-spiritual values. The primary aim of information ecology is to enhance human life quality through a healthy relationship with technology itself. (Selfe & Hayden, 2000, pp. 100–102)

Within the framework of information ecology, technology is not regarded as a neutral entity or a threat but as part of the web of life that operates according to the principle of interconnection. Changes in one part (e.g., the emergence of AI in education) will impact learning patterns, values, and even social relationships. Therefore, Nardi and O’Day emphasize the importance of locality, understanding how technology functions within specific social and cultural contexts. (Nardi & O’Day, 1999, p. 55) Not all technologies fit all contexts. The health of the information ecology depends on humans’ ability to maintain a balance between innovation and human values. Hence, Islamic education needs to cultivate ecological awareness of information, meaning awareness to manage technology proportionally, fairly, and oriented toward *maṣlaḥah* (common good).

The information ecology paradigm offers a new perspective for Islamic education in navigating the digital landscape. Through this paradigm, Islamic education is encouraged not merely to adapt to technological dimensions but also to renew its epistemological and spiritual dimensions. Its main goal is not only to produce students who are technologically literate and skilled but also to cultivate spiritually grounded individuals capable of maintaining life balance. Attila Márton emphasizes that the digital ecosystem is essentially part of the life network, with ecological boundaries that require collective responsibility. He reminds us that every system has limitations and cannot grow without control, necessitating systemic wisdom to preserve harmony. (Márton, 2022, p. 14) With this awareness, Islamic education can be understood as a living ecosystem where spiritual values,

technology, and humanity dynamically interact to foster hikmah (wisdom) amid the complexities of the times.

Information Ecology and the Position of Islamic Education in the Digital Era

As a continuation of the discussion in the previous subchapter, it is important to examine how Islamic education positions itself amid the increasingly complex global information ecosystem. In this context, the information ecology approach can serve as a framework to reassess the relationship between knowledge, technology, and communication ethics in Islamic education. Information ecology views an information system as a living network consisting of humans, values, practices, and technologies that dynamically interact with one another. When this framework is applied within the Islamic context, Islamic education can be understood as part of this ecosystem with its distinct ethical principles and orientations: knowledge as a path to meaning, technology as a tool to be humanized, and communication as a means of upholding ethical conduct. Through this perspective, Islamic education does not merely react to the flow of digital information but also actively participates in reorganizing the relationship between knowledge, technology, and morality.

1. Knowledge

In Islam, 'ilm (knowledge) is not merely a collection of information but a path to ma'rifah, the recognition that leads humans closer to God. Syed Muhammad Naquib al-Attas (1995) describes Islamic education as a process of ta'dib, the cultivation of ethical refinement in relation to knowledge, not just its transmission. (Ahmad, 2021, p. 41) Therefore, knowledge constitutes the primary element in the Islamic information ecology as it directs the entire system. In the data-saturated digital era, Islamic education must reaffirm the principle that knowledge should embody meaning and ethical orientation, not simply accumulate information. Knowledge becomes the intellectual energy that drives the entire ecosystem toward truth rather than mere technical efficiency.

2. Technology

In Islamic information ecology, technology functions as a means (wasilah), not an end (ghayah). (Cahyarani Triayu Hanifah & Tenny Sudjatnika, 2025) As in Nardi and O'Day's information ecology, technology is merely a "species" within the ecosystem, to be understood through its relationship with humans and values rather than as a neutral entity. (Nardi & O'Day, 1999, p. 53) Islam regards technology as a trust (amanah) that must be managed with moral and spiritual awareness. Through technology, humans can expand access to knowledge and accelerate the learning process, but its use must always remain within the corridor of wisdom (hikmah). Hence, in this ecology, technology does not dominate humans; rather, it is humanized and serves as a tool to approach values of collective welfare, justice, and sustainability.

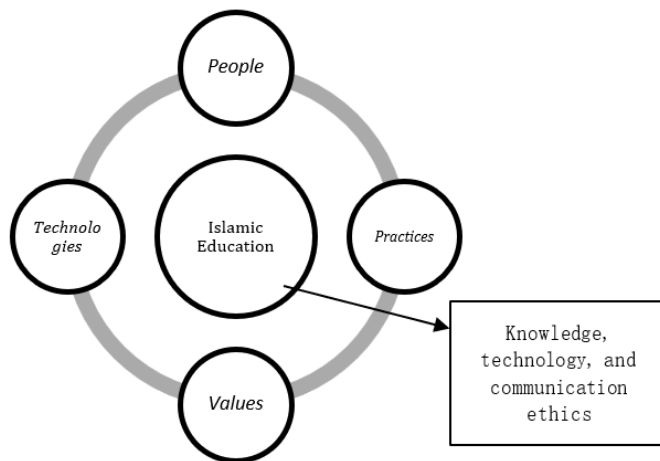
3. Communication Ethics

Communication ethics serve as the guardian of social balance within the information ecosystem. Ethical principles such as honesty (shidq), avoiding prejudice and slander, verifying facts, refraining from sowing discord (namimah), and others are crucial. (Juminem, 2019) In the era of digital media rife with hoaxes, hate speech, and disinformation, communication ethics become a moral fortress that ensures the flow of information does not disrupt

social and spiritual order. They also serve as a space for the internalization of values, where learners learn not only “what is said” but also “how and for what purpose one speaks.” Information ecology emphasizes the importance of participation, diversity, and locality, values that can only thrive through ethical and participatory communication. Islam also upholds principles of tabayyun (verification) and qaulan ma’rūfan as the basis for communication ethics.(Asran & Amaluddin, 2025)

This balance is a key principle in Islamic information ecology. It prevents knowledge from becoming value-less, technology from turning into a hedonistic instrument, and communication from losing its spiritual ethics. Ultimately, Islamic information ecology seeks to restore the spiritual essence within the modern world of knowledge. It views the entire information system, from curriculum, media, to teacher–student relations, as a living system under the principle of divinity. In this way, Islamic education can fulfill its ecological role: maintaining a balance between technological advancement and the preservation of humanistic and divine values.

Figure 1. Islamic information ecology



Communication Resilience Strategies

In the context of Islam-based information ecology, communication resilience becomes a crucial capability for Islamic education to endure, adapt, and maintain value balance amid the rapid flow of digital information. Resilience here is not merely a technical skill in using technology, but also a moral and spiritual capacity to filter, assess, and transmit information wisely. Based on this perspective, at least three main strategies can serve as the foundation for strengthening communication resilience in contemporary Islamic education.

Strengthening Digital Literacy

The first strategy is to strengthen digital literacy grounded in Islamic values. In the modern information ecosystem, digital literacy is not only about technical proficiency in accessing and processing data but must also be supported by ethical and spiritual frameworks. Islamic digital literacy means understanding technology as a trust (amanah), not merely a tool, and cultivating awareness that every digital interaction carries moral responsibility before Allah. Islamic education faces significant challenges in the post-truth era, where information is

often subjective and manipulative. Educators are required not only to deliver religious content textually but also to instill critical, analytical, and contextual thinking in learners. Islamic education should equip young generations with sufficient media literacy—the ability to access, analyze, evaluate, and produce media content wisely. Additionally, strengthening religious literacy is important so that learners are not easily influenced by misleading information about Islam or other religions in general.(Ardina Rasiani et al., 2025, p. 384)

Integrating Tabayyun and Communication Ethics

The second strategy is integrating the principle of tabayyun and communication ethics into Islamic pedagogical practice. The principle of tabayyun emphasizes verification and clarification of information before dissemination. This principle is a direct teaching from the Qur'an (Q.S. al-Ḥujurat [49]: 6) and is highly relevant to the challenges of disinformation and viral culture today. Incorporating tabayyun into curricula and learning activities trains students to think critically, exercise caution in drawing conclusions, and resist provocation. Communication ethics should be taught not only normatively but also through teacher role models and collaborative digital practices.(Ardina Rasiani et al., 2025) Islamic communication ethics emphasizes principles such as qaulan sadidan (truthful and proper speech), qaulan ma'rufan (good speech), qaulan layyinan (gentle speech), qaulan kariman (noble speech), and qaulan maysuran (easily understood speech). When educators apply these principles, the learning environment becomes more conducive, supportive, and trust-building, while strengthening learners' character and personality. Thus, Islamic learning spaces become places where freedom of expression is balanced with moral responsibility, and digital interaction becomes a medium for character development rather than merely message exchange.(Fajri Chairawati et al., 2025)

Critical, Creative, and Sustainable Technology Engagement

The third strategy is fostering critical, creative, and sustainable engagement with technology.(Hernawati & Mulyani, 2023, p. 9) Within the framework of Islamic information ecology, technology use should be guided by wisdom, linking knowledge and action to Islamic values. Being critical means recognizing the ideological and economic dimensions of each technology; being creative means using technology for learning and da'wah innovation; and sustainability means employing it proportionally without disrupting social and spiritual balance. This principle aligns with Attila Márton's notion of systemic wisdom, which emphasizes the importance of maintaining sustainability in the digital ecosystem. Consequently, learners do not merely become technology consumers but active users who manage and organize technology to support a more just, ethical, and ecological life.(Márton, 2022) One of the innovative approaches proven to be effective is the implementation of the flipped classroom, in which learning takes place interactively and collaboratively. This strategy can significantly improve students' learning outcomes. In addition, blended learning, which combines face-to-face instruction with online activities, has also demonstrated its effectiveness. Blended learning can enhance students' conceptual understanding and lead to better academic achievement (Muh. Thoriq Aziz Kusuma & Fauzi Muharom, 2024, p. 85).

These three strategies essentially form an integrated framework within Islam-based information ecology resilience. Value-driven digital literacy

reinforces tabayyun and communication ethics, while critical and creative technology engagement ensures the sustainability of values within the educational system. Through these strategies, Islamic education not only survives in the digital era but also positions itself as a center and source of wisdom, guiding society toward balanced living.

Discussion

The digital era has created a highly complex and dynamic information ecosystem. The flow of information is no longer like in the conventional media era; it is multidirectional and occurs in real time. This means that each individual is not only a receiver of information but also a producer and distributor of content. Messages and information can now cross countries and cultures at incredible speed, creating a global exchange of information. Although conventional media such as television, radio, and newspapers still play a role, digital media—including the internet, social media platforms, podcasts, and mobile applications—have become far more dominant in delivering news and entertainment to the public (Kamaruddin Hasan et al., 2023, p. 43). In the context of education, this transformation has generated a more open, collaborative, and interactive learning space. Students and teachers are no longer confined to classrooms or mosques; they have shifted to virtual spaces through various digital platforms such as YouTube, Instagram, TikTok, and Islamic learning applications. (Lathyva Nur Wahyuni et al., 2025, p. 671) This innovation provides broader and faster access to learning. Furthermore, advances in information and communication technology offer significant opportunities for cross-cultural and interdisciplinary learning. Through the global connectivity enabled by the digital world, learners can interact, discuss, and exchange ideas with individuals from diverse cultural and academic backgrounds. (Nyai Raodotul Janah et al., 2025, p. 744)

The conveniences created by the transformation of the information ecosystem bring fundamental changes to teaching and learning patterns in Islamic education. One example is that teachers are no longer the sole source of knowledge but act as facilitators who guide students in sorting, interpreting, and making sense of information. Artificial intelligence (AI), for instance, plays a role in personalizing learning by analyzing student data to recommend relevant materials, assist in performance evaluation, and create adaptive learning experiences for teachers. (Dedi Lazwardi et al., 2024, p. 4) Learning processes have shifted from mere knowledge transfer to a dialogical space for building understanding and critical awareness. However, the challenge lies in the habits of many students shaped by the speed and instant nature of digital information, often lacking patience for the gradual learning process emphasized in Islamic scholarly traditions. (Lathyva Nur Wahyuni et al., 2025, p. 671)

The stages of learning in Islamic education traditions often contrast with the flow of digital information, which produces “data floods” that are difficult to control. In virtual spaces, truth and falsehood, knowledge and opinion, intermingle without clear boundaries. (Ardina Rasiani et al., 2025, p. 384) This has the potential to create epistemological confusion among Muslim learners. Moreover, the high rate of internet use in Indonesia is not matched by sufficient information literacy skills. Society still faces challenges that indicate low competence in sorting and managing information. This condition shows that inadequate foundational information literacy among internet users can result in various negative

impacts.(Chantica Az Zahra, n.d.) Without digital literacy and strong academic foundations, individuals can easily fall prey to misleading information or ideologies deviating from Islamic values.

Value challenges constitute one of the main issues in the digital ecosystem. Cyberspace often promotes individualism, moral relativism, and hedonism, which conflict with the principle of balance (*wasatiyyah*) in Islam.(Muhamad Basyrul Muvid & Nelud Darajaatul Aliyah, 2020) Learners in the digital era are exposed to consumerist cultures, instant lifestyles, and material-oriented views of happiness. These influences can shift spiritual and moral values if not balanced with strong faith and spiritual awareness. Therefore, Islamic education must instill digital ethics grounded in Qur'anic values, enabling learners to use technology wisely, interact morally, and position digital advancements as a means to strengthen faith and promote collective well-being.(Lathyva Nur Wahyuni et al., 2025)

Digital interactions, which often diminish dimensions of *adab* (etiquette), courtesy, and empathy that characterize Islamic communication, require serious attention.(Yudhy Widya Kusumo & Mariana, 2025) The phenomena of hate speech, unethical debates, and spreading slander on social media pose challenges for education. Educators have a role in instilling the understanding that communication is not merely the exchange of information but also a reflection of moral conduct and responsibility. Principles such as *qaulan ma'rufan*, *qaulan layyinan*, and *qaulan sadidan* must be revitalized in digital spaces.(Maghfira Septi Arindita et al., 2022) In other words, a systemic strategy is needed to integrate digital literacy, *adab*, and Islamic values into the curriculum. Educational programs should focus not only on technological mastery but also on shaping morally responsible technology users.(Kapsan Usman Utomo Nasution, 2023, p. 65) Teaching about social media ethics, academic honesty in digital spaces, and responsible information dissemination should become part of modern Islamic education. Teachers, as role models, are expected to provide a balance between tradition and digital realities.

Conclusion

In the era of digital disruption, Islamic education faces both opportunities and challenges within a complex information ecosystem. Applying an Islam-based information ecology framework, this study highlights that knowledge, technology, and communication ethics are interdependent elements that must be balanced to ensure resilient education. Three main strategies emerge as essential for fostering communication resilience: strengthening digital literacy grounded in Islamic values, integrating the principle of *tabayyun* and communication ethics into pedagogy, and engaging with technology in a critical, creative, and sustainable manner.

These strategies work synergistically: value-driven digital literacy reinforces ethical communication, while critical and creative technology use ensures the sustainability of moral and spiritual principles. By implementing this approach, Islamic education does not merely adapt to digital information flows but actively shapes a healthy, ethical, and spiritually grounded information society. Ultimately, the integration of knowledge, technology, and ethics enables Islamic education to fulfill its ecological role, preserving divine values, nurturing spiritual growth, and promoting wisdom in the midst of complex digital realities.

References

- Ahmad, A. (2021). Konsep Ta'dib Syed Muhammad Naquib Al-Attas dan Implikasinya dalam Pendidikan Islam. *AN NUR: Jurnal Studi Islam*. <https://doi.org/10.37252/an-nur.v13i1.98>
- Alnashr, M. S. (2019). Pendidikan Karakter ala Gus Dur: Representasi Pesantren dalam Mendidik Bangsa. *SHAHIH: Journal of Islamicate Multidisciplinary*. <https://doi.org/10.22515/shahih.v4i1.1597>
- Ardina Rasioni, Herlini Puspika Sari, Erna Wilis, & Urai Setiawarni. (2025). Pendidikan Islam di Era Post-Truth: Tantangan Dan Strategi Literasi Media Bagi Generasi Muda. *IHSAN : Jurnal Pendidikan Islam*, 3(2).
- Asran, & Amaluddin. (2025). Pendidikan Agama Islam dalam Menangkal Hoaks dan Disinformasi. *Journal of Humanities, Social Sciences, And Education (JHUSE)*, 1(3).
- Cahyarani Triayu Hanifah, & Tenny Sudjatnika. (2025). The Role of Youth and Technology in Modern Islam. *Madani : Jurnal Ilmiah Multidisiplin*, 3(5).
- Chantica Az Zahra. (n.d.). Etika dan Literasi Informasi di Media Digital untuk Menciptakan Ekosistem Informasi yang Sehat. 2022. https://www.researchgate.net/profile/Chantica-Az-Zahra/publication/372941074_Etika_dan_Literasi_Informasi_di_Media_Digital_untuk_Menciptakan_Ekosistem_Informasi_yang_Sehat/links/67b35f1d207c0c20fa8c5f2b/Etika-dan-Literasi-Informasi-di-Media-Digital-untuk-
- Dedi Lazwardi, Rachmat Panca Putera, & Sucipto. (2024). EKOSISTEM TEKNOLOGI PENDIDIKAN MASA DEPAN. *EDUNESIS: Jurnal Kajian Dan Dinamika Pendidikan*, 1(1). <https://journal.jkrisetmetrolampung.web.id/index.php/dinamika/article/view/9/9>
- Dimas Maulana Rahman, & Miftahurrahmat. (2025). Pendidikan Islam sebagai Modal Resiliensi Mental di Era Digital. *An-Nur: Jurnal Pendidikan Dan Pembelajaran*, 1(1).
- Fajri Chairawati, Asyraf Andari Harisma, & Wildia Ulfita Ladayani. (2025). URGENSI ETIKA KOMUNIKASI ISLAM BAGI PENDIDIK DALAM DUNIA PENDIDIKAN. *Iltishal : Jurnal Komunikasi Dan Media*, 2(1).
- Hernawati, H., & Mulyani, D. (2023). Tantangan dan Peluang Pendidikan Islam dalam menyiapkan Generasi Tangguh di Era 5.0. *Al-Fikri: Jurnal Studi Dan Penelitian Pendidikan Islam*. <https://doi.org/10.30659/jspi.6.1.1-17>
- Juminem, J. (2019). ADAB BERMEDIA SOSIAL DALAM PANDANGAN ISLAM. *Geneologi PAI: Jurnal Pendidikan Agama Islam*. <https://doi.org/10.32678/geneologipai.v6i1.1799>
- Kamaruddin Hasan, Asmaul Husna, Muchlis, Dwi Fitri, & Zulfadli. (2023). Transformasi Komunikasi Massa Era Digital Antara Peluang Dan Tantangan. *Jurnal Politik Dan Pemerintahan*, 8(1).
- Kapsan Usman Utomo Nasution. (2023). TRANSFORMASI POLA KOMUNIKASI PENDIDIKAN ISLAM DI ERA SOCIETY 5.0: PELUANG DAN TANTANGAN BAGI LEMBAGA PENDIDIKAN ISLAM. *Du Global: Jurnal Pendidikan Islam*, 4(1).
- Khotimah Suryani. (2022). TANTANGAN DAN PELUANG PENDIDIKAN ISLAM DI PESANTREN PADA ERA DISRUPSI. *MULTICULTURAL of Islamic Education*, 6(1).
- Lathyva Nur Wahyuni, Malika Indira Ainia, & Moh. Halifa Ramadhani. (2025). Pendidikan Agama Di Era Digital: Menjaga Spiritualitas di Tengah Derasnya Arus Informasi. *JURNAL LENTERA: Kajian Keagamaan, Keilmuan Dan Teknologi*, 24(2).
- Maghfira Septi Arindita, Meila Asfi Raykhani, Naufal Ra'uf, Rulyn Ardianoor, & Yayat Suharyat. (2022). PRINSIP DASAR ILMU KOMUNIKASI ISLAM. *Religion : Jurnal Agama*,

Sosial, Dan Budaya. <https://doi.org/10.55606/religion.v1i5.17>

Márton, A. (2022). Steps toward a digital ecology: ecological principles for the study of digital ecosystems. *Journal of Information Technology*. <https://doi.org/10.1177/02683962211043222>

Muh. Thoriq Aziz Kusuma, & Fauzi Muharom. (2024). Transformasi Peran Pendidik dan Tren Pembelajaran Digital di Era Teknologi. *IJCE (Indonesian Journal of Community Engagement)*, 1(2).

Muhamad Basyrul Muvid, & Nelud Darajaatul Aliyah. (2020). Konsep Tasawuf Wasathiyah Di Tengah Arus Modernitas Revolusi Industri 4.0; Telaah Atas Pemikiran Tasawuf Modern Hamka dan Nasaruddin Umar. *Tribakti: Jurnal Pemikiran Keislaman*, 31(1).

Mustopa, A. M. Y. S., & Iswantir, I. (2023). Pengembangan Manajemen Lembaga Pendidikan Islam di Era Disrupsi. *Jurnal Al-Qalam Jurnal Kajian Islam & Pendidikan*. <https://doi.org/10.47435/al-qalam.v15i1.1565>

Nardi, B. A., & O'Day, V. L. (1999). Information ecologies: Using technology with heart. *First Monday*. <https://doi.org/10.1080/01972240050133706>

Nyai Raodotul Janah, Imam Mudin, Hafilah Alfinnas, Asep Mulyana, & Tamsik Udin. (2025). Interrelasi Pendidikan Islam, Budaya, dan Identitas di Era Digital: Studi Fenomenologis dalam Konteks Multikultural Indonesia. *Al-Manar: Jurnal Komunikasi Dan Pendidikan Islam*, 14(1).

Selfe, D., & Hayden, D. (2000). A review and applications of information ecologies. *ACM Journal of Computer Documentation*. <https://doi.org/10.1145/337271.337291>

Susanti, D. A. (2018). EKOLOGI INFORMASI DALAM IMPLEMENTASI PERPUSTAKAAN DIGITAL DI INDONESIA: ANTARA HARAPAN DAN KENYATAAN. *EduLib*. <https://doi.org/10.17509/edulib.v2i2.10043>

Yudhy Widya Kusumo, & Mariana. (2025). Manajemen Komunikasi Islam: Prinsip, Konsep, dan Relevansi di Era Modern. *Journal Of Islamic Management*, 5(1).