

Digital citizenship in the AI Era: Ethical and pedagogical challenges from Muhammadiyah values perspective

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ABSTRACT

Purpose – The rapid advancement of Artificial Intelligence (AI) has significantly reshaped digital citizenship by influencing information dissemination, civic engagement, and democratic participation in digital environments. While previous studies have explored digital citizenship, AI in education, and digital ethics separately, limited research has integrated AI-mediated citizenship challenges with a religious-ethical framework grounded in Muhammadiyah values. This study aims to examine how AI transforms digital citizenship, identify the ethical and pedagogical challenges arising from this transformation, and develop a Muhammadiyah-based ethical framework for responsible digital citizenship in the AI era.

Method – This study employed a qualitative library research design using a scoping-oriented and conceptual-normative approach. Relevant literature was collected from Scopus, Google Scholar, academic books, policy documents, and official Muhammadiyah publications using keywords related to AI, digital citizenship, civic education, digital ethics, Islam *Berkemajuan*, and Muhammadiyah values. Following systematic inclusion and exclusion procedures, 86 sources were selected based on relevance, credibility, recency, and conceptual contribution. Data was analyzed through content analysis and conceptual-normative analysis.

Findings – The findings indicate that AI creates new opportunities for civic participation, access to information, and digital engagement, while simultaneously intensifying challenges such as misinformation, algorithmic bias, social polarization, privacy concerns, and diminished reflective agency. Muhammadiyah values—including *aqidah, akhlak, ibadah, muamalah duniawiyah, amar ma'ruf nahi munkar*, and *Islam Berkemajuan*—provide a comprehensive ethical foundation for fostering critical, responsible, just, and civilized digital citizens. This study contributes an integrative framework that connects AI, digital citizenship, civic education, and Muhammadiyah ethical values to support values-based digital citizenship education in the contemporary digital era.

Keywords: Digital Citizenship; Artificial Intelligence; Muhammadiyah Values; Digital Ethics; Citizenship Education.

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INTRODUCTION

Artificial Intelligence (AI) has become one of the most decisive forces reshaping contemporary civic life. In digital public spheres, AI is no longer merely a technical instrument that supports communication or information retrieval; it increasingly functions

as an algorithmic infrastructure that organizes visibility, filters information, recommends content, predicts preferences, and influences how citizens participate in public discourse (Amalia et al., 2025; Permana & Fadillah, 2026; Sieber et al., 2025). This transformation affects the formation of opinions, political attitudes, social interaction, and democratic participation. Consequently, digital citizenship in the AI era must be understood not only as the ability to use digital technology, but also as the capacity to act critically, ethically, and responsibly in spaces mediated by intelligent systems (Lahdili et al., 2024; Nurfajri et al., 2025).

The expansion of AI-supported platforms has created new opportunities for civic participation. Citizens can access information more quickly, engage in online campaigns, participate in digital deliberation, and contribute to public problem-solving through technology-based media (Lase et al., 2025; Sieber et al., 2025). However, the same technologies also produce serious ethical risks. Algorithmic curation may intensify ideological polarization, filter bubbles, and echo chambers; automated systems may reproduce social bias; and generative AI may accelerate disinformation and weaken public trust (Fazrina et al., 2025; Katili et al., 2025; Masrukhi et al., 2024). These dynamics show that AI-mediated citizenship is characterized by an ambivalent condition: it broadens civic access while simultaneously exposing citizens to new forms of manipulation, exclusion, and moral uncertainty.

In the educational context, these developments require a stronger orientation for digital citizenship education. Civic education cannot limit itself to technical digital literacy or the instrumental use of AI tools. Learners need to understand data privacy, algorithmic bias, information verification, responsible communication, human dignity, and the ethical consequences of digital participation (Al Fatih et al., 2024; Ecker, 2025; Naufal, 2025). Without this ethical foundation, education risks producing digitally skilled learners who are weak in reflective judgment, social responsibility, and democratic sensitivity. Therefore, digital citizenship education in the AI era requires an integrated framework that combines technological competence, critical literacy, moral reasoning, and values-based orientation (Asimakopoulos et al., 2025; Jati, 2024).

The first body of literature discusses digital citizenship as a framework for preparing citizens to participate ethically and responsibly in digital environments. Studies on digital citizenship emphasize privacy awareness, digital ethics, online responsibility, and appropriate participation in networked societies (Amalia et al., 2025; Iskandar et al., 2025; Karo, 2025). These studies have made important contributions by expanding citizenship education beyond conventional civic knowledge toward digital behavior, online participation, and democratic engagement in virtual spaces. However, much of this scholarship still treats the digital environment as a platform used by citizens, rather than as an algorithmically mediated space that actively shapes citizens' choices, emotions, and public reasoning (Putri et al., 2025; Wati & Mardiana, 2025).

The second body of literature focuses on AI in education. Recent studies highlight the potential of AI for personalized learning, adaptive feedback, and learning efficiency, while also warning about risks related to academic integrity, democratic imagination,

critical literacy, data bias, and ethical governance (Prasetio et al., 2023; Saputra & Hadad, 2024). This literature demonstrates that AI is not a neutral pedagogical instrument; rather, it has normative consequences for how learners understand knowledge, autonomy, authority, and responsibility. Nevertheless, the discussion of AI in education is often separated from the broader discourse of digital citizenship and civic morality (Goswami, 2025; Mbukut, 2025; Tjasmadi & Christianto, 2025).

The third body of literature examines religious, Islamic, and values-based approaches to education and citizenship. Studies on Islamic ethics and Muhammadiyah thought emphasize tawhid, morality, social responsibility, justice, humanity, tajdid, ijtihad, and Islam Berkemajuan as ethical resources for responding to modernity and technological transformation (Dita et al., 2025; Gonzalez-Argote et al., 2025). Muhammadiyah, as a modern Islamic movement, has a long educational tradition that combines religious commitment, rational inquiry, social service, and progressive engagement with social change. Yet, the explicit application of Muhammadiyah values to AI-mediated digital citizenship education remains underdeveloped in existing scholarship (Astuti et al., 2025; Katz, 2024; Rapanta, 2025; Valenzuela, 2025).

These challenges underscore that digital transformation in education cannot be addressed solely through a technological approach. Digital citizenship education requires a learning framework that integrates technological competence with the cultivation of ethical awareness, critical reasoning, and moral responsibility. Without a strong value-based foundation, the use of AI risks shifting the orientation of education from the holistic development of human beings toward a narrow emphasis on efficiency and instrumental skills (Amalia et al., 2025; Fajrillah et al., 2024; H. S. Nugraha, 2023). Therefore, a values- and ethics-based educational approach becomes an urgent necessity to ensure that AI serves as a means of empowering citizens, rather than as an instrument that undermines humanity, justice, and public virtue in digital life.

The need for a values- and ethics-based educational approach calls for a normative framework that is not only universal in nature, but also deeply rooted in the religious and social traditions that live within society. In the Indonesian context, Islamic perspectives constitute a relevant source of ethics for responding to the dynamics of digital citizenship in the era of AI. Muhammadiyah, as a modern Islamic movement that places education as a central pillar of its mission, has a long tradition of responding to social change through a rational, contextual, and progress-oriented religious approach (Al Farabi & Ibad, 2025; Trisno, 2024; Zaini et al., 2025). Through the perspective of *Islam Berkemajuan* (Progressive Islam), Muhammadiyah views technological development as a sphere of social ijtihad that must be directed toward strengthening human values, justice, and public welfare (Agung et al., 2025; Arifin et al., 2022; Budiman et al., 2025; Haq, 2024). Therefore, the Muhammadiyah perspective is adopted in this article as a relevant religious-ethical framework for addressing the challenges of digital citizenship education amid the rapid development of AI.

Normatively and operationally, the Muhammadiyah ethical framework in responding to the challenges of digital citizenship is grounded in four core values: *aqidah* (faith),

akhlak (morality), *ibadah* (religious practice), and *muamalah duniawiyah* (worldly social relations) (Mohadib & Tajudin, 2024; Muslimah & Azani, 2023). *Aqidah* serves as the foundation of transcendental consciousness that positions AI as an instrument rather than an end in itself, ensuring that its use remains oriented toward divine values and public benefit. *Akhlak* guides the behavior of digital citizens to uphold honesty, responsibility, and critical awareness in confronting disinformation, algorithmic manipulation, and polarization in digital spaces. *Ibadah* fosters moral discipline and sustained ethical awareness, reflected in wise, reflective, and proportional attitudes toward the use of technology. Meanwhile, *muamalah duniawiyah* emphasizes that the utilization of AI must be directed toward the public interest, social justice, and the empowerment of citizens. These four values are further reinforced by the paradigm of *Islam Berkemajuan* (Progressive Islam), which promotes a critical, adaptive, and progressive engagement with technology without losing its orientation toward humanity and moral responsibility (Mutalib et al., 2025; Realisti et al., 2025; Sholikhiddin et al., 2026).

Based on the state of the art, three gaps can be identified. First, theoretical discussions on digital citizenship have not sufficiently addressed how AI transforms the digital public sphere through algorithmic mediation, personalization, and automated decision-making. Second, studies on AI in education tend to focus on pedagogical innovation and ethical risks, but they do not always link these issues to the formation of citizens' moral agency and democratic responsibility. Third, studies on Muhammadiyah values and Islamic education have not yet been systematically connected to the challenges of AI-based digital citizenship. These gaps indicate the need for a conceptual-normative study that bridges AI-mediated citizenship, digital citizenship education, and Muhammadiyah values.

The novelty of this study lies in its effort to develop Muhammadiyah values as a religious-ethical framework for digital citizenship education in the AI era. Rather than viewing AI only as an educational tool or technological challenge, this article positions AI as a civic phenomenon that reshapes participation, public reasoning, and moral responsibility. The study contributes an integrative framework that connects *aqidah*, *akhlak*, *ibadah*, *muamalah duniawiyah*, *amar ma'ruf nahi munkar*, and *Islam Berkemajuan* with the ethical demands of digital citizenship, including critical awareness, information responsibility, algorithmic justice, privacy protection, and public civility.

Accordingly, this study is guided by four research questions: (1) How does AI transform the meaning and practice of digital citizenship? (2) What ethical and pedagogical challenges emerge in digital citizenship education in the AI era? (3) How can Muhammadiyah values function as a religious-ethical framework for responding to these challenges? (4) What integrative conceptual framework can be proposed for values-based digital citizenship education grounded in Muhammadiyah values?

METHOD

This study used qualitative library research with a scoping-oriented and conceptual-normative design. Library research was selected because the problem examined in this

article is primarily conceptual, theoretical, and normative: it concerns how AI reshapes digital citizenship and how Muhammadiyah values may provide an ethical foundation for citizenship education. Unlike a full systematic literature review that aims to exhaustively map all available empirical studies through a highly standardized protocol, this study uses a focused and interpretive literature-based design to synthesize key scholarly debates, identify conceptual gaps, and construct a normative framework. It also differs from a purely conceptual paper because the argument is grounded in a documented literature search, explicit inclusion and exclusion criteria, and systematic thematic analysis.

Data Sources, Search Strategy, and Final Corpus

The data consisted of secondary sources, including peer-reviewed journal articles, academic books and book chapters, policy documents, and official publications relevant to AI, digital citizenship, civic education, digital ethics, Islamic ethics, Islam Berkemajuan, and Muhammadiyah values. Literature was searched through Scopus, Google Scholar, academic books, policy documents, and official Muhammadiyah publications. The search was guided by combinations of keywords such as "digital citizenship", "artificial intelligence", "AI in education", "digital ethics", "citizenship education", "Islamic ethics", "Muhammadiyah values", "Islam Berkemajuan", "aqidah", "akhlak", "ibadah", and "muamalah duniawiyah". Priority was given to publications from the last ten years, while older foundational sources were retained when they provided essential conceptual grounding. The final corpus reviewed in this article consisted of 86 sources.

The method is visualized in Figure 1 to clarify the relationship between literature identification, screening, eligibility assessment, final corpus formation, and the two stages of analysis used in this study. This study followed a PRISMA-inspired literature search, selection, and analysis process. A total of 214 records were identified from Scopus, Google Scholar, academic books and book chapters, policy documents, and official Muhammadiyah publications using keywords related to artificial intelligence, digital citizenship, civic education, digital ethics, Islamic ethics, and Muhammadiyah values. After removing duplicates, 186 records remained for title, abstract, and source screening. Subsequently, 114 full-text sources were assessed for eligibility, while records with limited relevance, insufficient ethical discussion, weak methodological contribution, or incomplete bibliographic information were excluded. The final review corpus consisted of 86 sources, including peer-reviewed journal articles, academic books and chapters, policy documents, and official Muhammadiyah publications. The analysis was conducted in two stages: thematic analysis to identify key issues and the development of an integrative framework linking AI, digital citizenship, civic education, Islamic ethics, Muhammadiyah values, and the dimensions of *aqidah*, *akhlaq*, *ibadah*, and *muamalah duniawiyah*.

Analytical Procedures

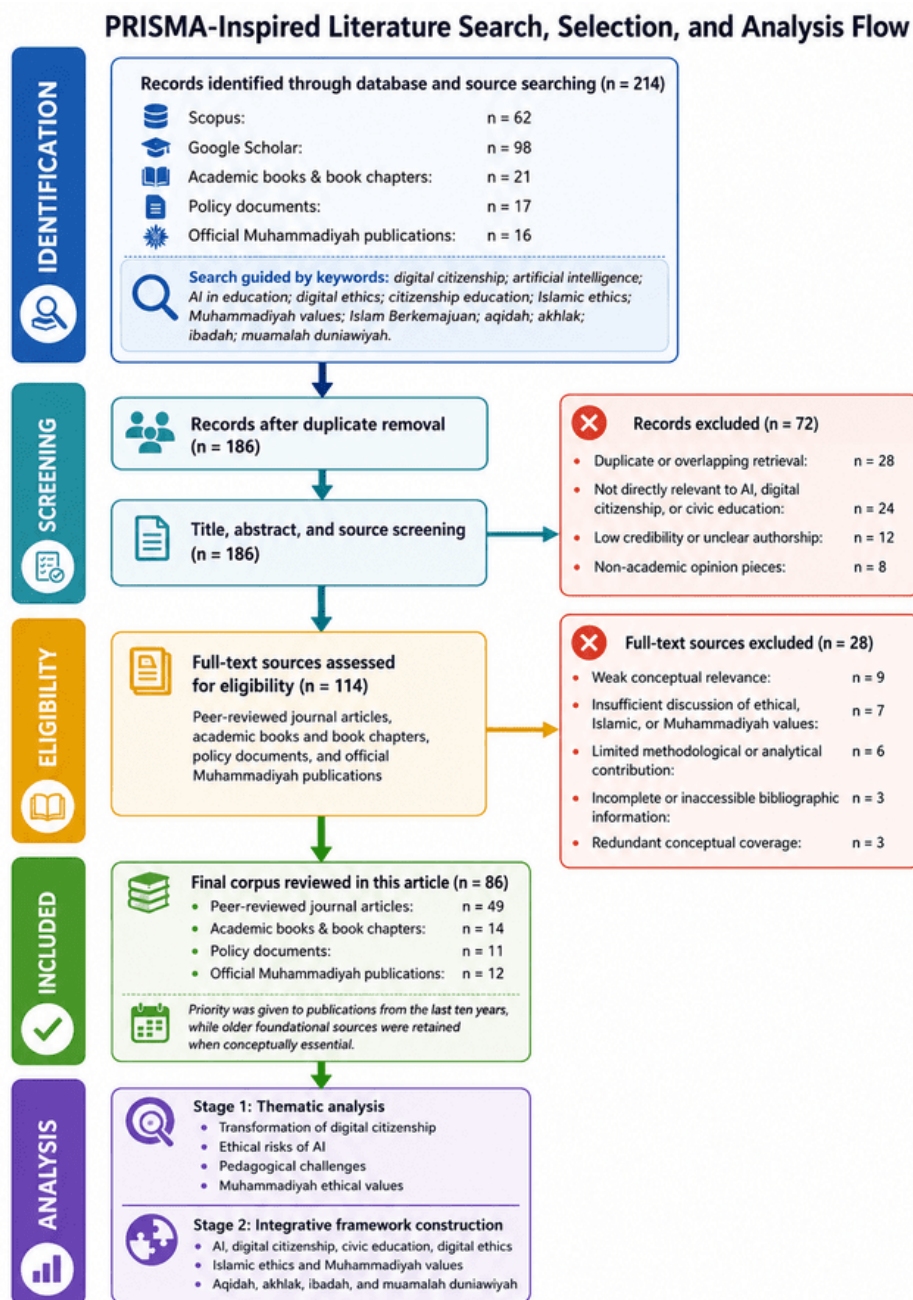
Data analysis was conducted in two interconnected stages. The first stage used content analysis to identify, code, and categorize recurring themes in the literature. The coding process focused on four thematic clusters: (1) AI-mediated transformation of digital citizenship; (2) ethical risks, including disinformation, algorithmic bias, polarization, privacy violations, and data injustice; (3) pedagogical challenges in civic education, including

critical literacy, reflective agency, academic integrity, and civic responsibility; and (4) Muhammadiyah values as ethical resources for digital citizenship education.

The second stage used conceptual-normative analysis. At this stage, the themes identified through content analysis were interpreted through the ethical framework of Muhammadiyah values: *aqidah*, *akhlak*, *ibadah*, *muamalah duniawiyah*, *amar ma'ruf nahi munkar*, and *Islam Berkemajuan*. This analysis aimed to construct a normative argument about how Muhammadiyah values can guide ethical digital citizenship education in the AI era. The analytical process therefore moved from descriptive synthesis to normative interpretation and finally to the formulation of an integrative conceptual framework.

Figure 1.

Methodological flow of literature search, selection, and analysis.



RESULT AND DISCUSSION

Digital Citizenship in the Era of Artificial Intelligence

The first research question concerns how AI transforms the meaning and practice of digital citizenship. The literature indicates that AI has shifted digital citizenship from a model centered on technology use toward a model shaped by algorithmic mediation. Citizens no longer merely access digital spaces; they interact with systems that curate information, predict preferences, recommend content, rank visibility, and influence public discourse (Alvarez Cazares, 2024; Sajja et al., 2024). This means that civic participation in the AI era is mediated by non-human systems whose operations are often opaque to users (Alexsius Pardosi et al., 2024; Susi et al., 2025).

This transformation creates both expansion and vulnerability. On the one hand, AI-supported platforms enable broader access to civic information, rapid mobilization, and new forms of public participation (Hagedorn et al., 2026; Sajja et al., 2024). On the other hand, algorithmic systems may narrow citizens' exposure to diverse perspectives, intensify filter bubbles, and shape opinion formation through personalized information environments (Goswami, 2025; Naufal, 2025). Therefore, digital citizenship in the AI era requires more than digital participation; it requires algorithmic awareness, critical interpretation, and the capacity to recognize how technological systems shape civic perception and democratic interaction (Agus Triono & Candra Sangaji, 2023; Briliyanda et al., 2025).

According to Habbal et al., (2024), AI in civic education should not be understood merely as an instructional aid, but rather as a pedagogical medium that shapes how learners understand democracy, participation, and power relations in the digital sphere. They emphasize that AI-based learning has the potential to expand experiences of digital citizenship through simulations of public deliberation and collective decision-making, provided that it is designed reflectively and oriented toward democratic values. In line with this view, Mulaudzi & Hamilton (2025) argue that AI-based personalized learning can enhance students' engagement with issues of digital citizenship, yet at the same time poses the risk of narrowing perspectives if it is not balanced with exposure to diverse viewpoints. They contend that civic education must ensure that the use of AI not only accommodates individual preferences but also fosters dialogue, tolerance, and openness to difference as core elements of democratic practice. From a critical perspective, Goswami (2025) argues that the use of AI without a clear ethical framework risk deepening social polarization through echo chamber and filter bubble mechanisms. Recommendation algorithms, according to this view, tend to reinforce users' existing perspectives and preferences, thereby limiting exposure to diverse viewpoints. This condition has implications for the weakening of citizens' capacity to engage in rational, dialogical, and inclusive public deliberation as the foundation of digital democracy. These arguments are reinforced by González-Sancho & Vincent-Lancrin, (2016); and Nasoha et al., (2025), who highlight the risk of reproducing structural inequalities through data bias and the design of AI systems. When algorithmic decision-making is applied in contexts such as education, media, and public services, certain social groups may experience systemic marginalization.

Therefore, the use of AI in the digital public sphere requires adequate mechanisms of transparency, accountability, and ethical oversight to ensure that technology does not instead exacerbate social and political inequalities.

Ethical and Pedagogical Challenges in Digital Citizenship Education

The second research question asks what ethical and pedagogical challenges emerge in digital citizenship education in the AI era. The findings show five major challenges. The first is disinformation and misinformation. Generative AI and algorithmic recommendation systems can accelerate the circulation of misleading content, making it difficult for learners to distinguish between credible information and manipulated narratives (Jati, 2024; Zulmawati, 2025). The second challenge is algorithmic bias. AI systems trained on biased data may reproduce discrimination and unequal treatment, thereby contradicting the civic principles of justice and equality (Díaz-Rodríguez et al., 2023; Gonzalez-Argote et al., 2025).

The third challenge is polarization. Recommendation algorithms may reinforce existing beliefs by continuously exposing users to similar content, limiting encounters with different perspectives, and weakening deliberative habits (Ecker, 2025; Goswami, 2025). The fourth challenge is privacy and data exploitation. AI-based learning systems and digital platforms collect, process, and predict user behavior, raising concerns about autonomy, consent, and the protection of personal data. The fifth challenge is the weakening of reflective agency. When learners become dependent on AI outputs, their critical thinking, moral judgment, academic integrity, and independent reasoning may decline (Astuti et al., 2025; Katz, 2024; Rapanta, 2025; Valenzuela, 2025).

Pedagogically, these challenges reveal a gap between digital literacy and ethical literacy. Schools and higher education institutions often emphasize the ability to use digital tools, but insufficiently cultivate the moral capacities needed to evaluate the social consequences of AI. Civic education must therefore move beyond technical competence toward ethical reasoning, critical literacy, reflective dialogue, and responsible participation. Educators need to function not only as facilitators of AI-supported learning, but also as moral guides who help learners understand the civic consequences of technological choices.

Civic education faces serious challenges in shaping ethical digital citizens amid the disruption of AI. The development of AI-based technologies not only transforms how citizens interact in digital spaces, but also shifts the standards of values and social norms that underpin civic practices. In this context, education is confronted with a dual demand: preparing learners to be adaptive to technological change while simultaneously enabling them to uphold ethical principles, responsibility, and justice in the use of AI (Fatimah Az-zahra et al., 2025a; Zulmawati, 2025). One of the main challenges identified is the gap between digital literacy and ethical literacy. Education tends to emphasize the mastery of technical skills, such as accessing information, using digital applications, and utilizing AI technologies, while the dimension of digital ethics has not been adequately integrated into the civic education curriculum. Values such as responsibility, honesty, justice, and awareness of the social impacts of technology are often positioned as supplementary aspects rather than as the core of learning (D. Nugraha, 2020; M. H. R. Nugraha, 2017).

This gap results in the formation of digital citizens who are technologically competent but weak in reflective and moral capacities. Learners are able to use technology effectively, yet they do not fully possess critical awareness to assess the ethical implications of AI use, such as issues of data privacy, algorithmic bias, and social responsibility for disseminated information. This condition indicates that digital literacy without an ethical foundation has the potential to give rise to instrumental and pragmatic forms of citizenship practice (Aslam et al., 2022; Damanik et al., 2025). Beyond the literacy gap, AI-mediated digital spaces also present serious challenges to character formation and citizens' social responsibility. Digital culture, which is fast-paced, anonymous, and driven by algorithmic logic, tends to facilitate reactive and individualistic behavior with limited social empathy. Interactions occurring in digital spaces often neglect moral and relational dimensions, thereby weakening values of solidarity, tolerance, and social concern (Adinata et al., 2025; Irawan et al., 2021; Irawan & Masyitoh, 2023; Ruyadi et al., 2023; Suhardiyanto et al., 2025; Wijayanti, Masrukhi, & Irawan, 2025; Wijayanti, Masrukhi, Irawan, et al., 2025).

In this situation, civic education occupies a dilemmatic position between adapting to technological dynamics and maintaining its normative function as a vehicle for shaping citizens' character. If education becomes overly oriented toward technological adaptation, there is a risk that civic education will be reduced to mere digital skills training. Conversely, if education neglects the reality of technological disruption, civic learning may lose its contextual relevance for learners in the era of AI. Therefore, the role of educators and educational institutions becomes crucial in responding to technological disruption in a critical and ethical manner. Educators function not only as facilitators of technology-based learning, but also as moral agents who guide learners in understanding, reflecting upon, and internalizing ethical values in the use of AI (Fatimah Az-zahra et al., 2025b; Rejeki et al., 2025). Meanwhile, educational institutions are required to formulate policies, curricula, and learning ecosystems that place democratic values, justice, and social responsibility as the foundation of digital transformation, so that civic education remains oriented toward the formation of critical, civilized, and responsible digital citizens (Anggraeni, Nurbayani, et al., 2025; Anggraeni, Saepudin, et al., 2025; Irawan et al., 2026).

Muhammadiyah Values as a Religious-Ethical Framework

Muhammadiyah values offer a relevant and contextual religious-ethical framework for responding to the complexity of digital citizenship challenges in the era of AI (PWMU, 2024; Rohani, 2021). AI-based technological disruption not only presents technical issues, but also gives rise to moral dilemmas that touch upon the dimensions of justice, humanity, social responsibility, and public civility. In this context, an ethical approach rooted in the Islamic tradition becomes important to balance technological advancement with human responsibility and the goal of forming ethical citizens. Conceptually, Muhammadiyah education is built upon the integration of *aqidah*, *akhlak*, *ibadah*, and *muamalah duniawiyah* as an inseparable unity of values in shaping both transcendental awareness and individual social piety (Tobroni, T., & Isyraqi, A. 2014; Elmahjub, 2023; Yanto, 2020). This value framework positions human beings as moral subjects who are responsible for every use of knowledge and technology, including AI. From this perspective, technology is

viewed as a *wasilah* (means) for civilizational progress, not as an end in itself. Therefore, the use of AI must always be directed toward realizing public benefit, social justice, and collective well-being, rather than merely pursuing efficiency and technological productivity.

The principles of justice and humanity constitute the primary ethical foundations within Muhammadiyah values that have direct relevance to digital citizenship practices. Justice demands that AI systems do not reproduce bias, discrimination, or social inequality through the algorithms and data they employ. In the context of digital citizenship, this principle affirms that every citizen has equal rights to access information, protection of personal data, and fair treatment in technology-based decision-making processes. Meanwhile, the value of humanity places human dignity at the center of every technological innovation, ensuring that AI does not replace or diminish the role of human beings as moral and social subjects.

The critical dimension of Muhammadiyah ethics is reinforced by the principle of *amar ma'ruf nahi munkar*, which encourages an active and responsible stance in responding to digital citizenship practices. Within digital spaces that are increasingly saturated with disinformation, algorithmic manipulation, hate speech, and data exploitation, *amar ma'ruf nahi munkar* calls on citizens not to remain passive. This principle is not only interpreted as a rejection of technological practices that damage the social order, but also as a constructive impetus to promote digital literacy, ethical communication, and the wise and civil use of AI, so that the digital public sphere remains preserved as an arena for the common good. Furthermore, the paradigm of Progressive Islam, which characterizes Muhammadiyah thought, offers a rational, adaptive, and progressive approach to responding to developments in AI. Progressive Islam views technology as a space for social *ijtihad* that requires critical thinking, openness to innovation, and the courage to formulate ethical solutions to emerging challenges (Abdullah Masmuh, 2020; Ainusyamsi & Husni, 2021; Mawardi, 2011). Within this framework, AI is not rejected as a threat, but is instead addressed constructively while upholding the values of *tawhid*, justice, and humanity as its primary orientation. In the context of civic education, Muhammadiyah values function as an ethical and normative foundation that strengthens the direction of educational transformation amid technological disruption. Civic education occupies a dilemmatic position between the demand for technological adaptation and the obligation to maintain its fundamental role as a means of character formation for citizens. If education becomes overly oriented toward technological adjustment, there is a risk that civic education will be reduced to mere digital skills training. Conversely, if education ignores the realities of technological disruption, civic learning may lose its contextual relevance for learners in the era of AI (Nasoha et al., 2025; Rifaldi & Saguni, 2025).

In this context, Muhammadiyah values, as emphasized by Syifa, (2021) provide a relevant and contextual ethical framework. Muhammadiyah, as an Islamic movement grounded in the Qur'an and the Sunnah, positions education not merely as a process of knowledge transfer, but also as an effort to cultivate moral character, social responsibility, and humanitarian awareness. The principles of *da'wah amar ma'ruf nahi munkar*, a culture

of *ijtihad* and *tajdid*, and the spirit of Progressive Islam serve as normative foundations that can guide the use of AI so that it remains aligned with the values of justice, honesty, and the promotion of public welfare (Islamy, 2021; Rafsanjani & Razaq, 2019).

The culture of *ijtihad* and *tajdid* within Muhammadiyah emphasizes that responses to technological developments must be rational, critical, and progressive without losing their ethical orientation. In digital citizenship education, these values encourage educators and educational institutions not to react impulsively to technology, but rather to reflectively examine the social, moral, and political implications of the use of AI (Akbar & Azani, 2024; Almu'tasim, 2019). In this way, technology is not positioned as an end in itself, but as an instrument to strengthen the quality of citizenship and digital democracy. Moreover, the spirit of *al-Ma'un*, which emphasizes social concern and advocacy for vulnerable groups, reinforces the dimension of social justice in digital citizenship. When AI has the potential to reproduce inequality and marginalization through data bias and system design, the value of *al-Ma'un* provides an ethical foundation to ensure that digital transformation in education and the public sphere remains oriented toward the protection of human dignity and social inclusivity. The integration of Muhammadiyah values into digital citizenship education enables the development of an educational framework that is not only technologically adaptive but also morally and normatively robust. Citizenship education grounded in Muhammadiyah values has the potential to cultivate digital citizens who are critical, civilized, and socially responsible, and who are capable of directing the ethical use of AI in social, national, and civic life (PWMU, 2024; Suara Muhammadiyah, 2025; Syifa, 2021).

Muhammadiyah values offer a religious ethical framework that is relevant for responding to the complexity of digital citizenship challenges in the era of AI. In the context of technological disruption, which often gives rise to moral dilemmas, an ethical approach grounded in Islamic tradition becomes essential to balance technological advancement with human responsibility. Conceptually, Muhammadiyah education is built upon the integration of *aqidah* (faith), *akhlak* (morality), *ibadah* (worship), and *muamalah duniawiyah* (worldly social relations) as an inseparable set of values in shaping both transcendental awareness and individual social piety (Muhammad, 2014; Muhammadiyah.or.id, 2026). This value framework positions human beings as moral subjects who are responsible for every use of science and technology, including AI. From the Muhammadiyah perspective, technology is viewed as a *wasilah* (means) for civilizational progress rather than an end in itself. The use of technology must always be directed toward realizing public benefit, social justice, and collective well-being. This principle serves as an ethical foundation for evaluating the application of AI across various sectors of life, including education, governance, and the digital public sphere. Accordingly, technological mastery is not measured solely in terms of efficiency and productivity, but also by the extent to which technology contributes to enhancing the moral quality and human dignity of citizens (Ahmad et al., 2025; Rifaldi & Saguni, 2025).

The values of justice and humanity constitute fundamental principles in Muhammadiyah ethics that are directly relevant to issues surrounding AI. Justice requires

that AI systems do not reproduce bias, discrimination, or social inequality through the algorithms and data on which they rely. In the context of digital citizenship, this principle affirms that every citizen has equal rights to access information, to the protection of personal data, and to fair treatment within technology-based decision-making processes. Meanwhile, the value of humanity places human dignity at the center of all technological innovation, asserting that AI must not replace or diminish the role of human beings as moral and social subjects.

The principle of *amar ma'ruf nahi munkar* strengthens the critical dimension of Muhammadiyah ethics in relation to digital citizenship practices. In digital spaces saturated with disinformation, opinion manipulation, hate speech, and data exploitation, *amar ma'ruf nahi munkar* encourages citizens to adopt an active, critical, and responsible stance. This attitude is manifested not only through resistance to technological practices that undermine the social order, but also through constructive efforts to promote digital literacy, ethical communication, and the wise and civil use of AI. In this sense, the principle functions as a moral mechanism for safeguarding the digital public sphere so that it remains healthy and oriented toward the common good. Furthermore, the paradigm of Progressive Islam, which characterizes Muhammadiyah thought, offers a rational, adaptive, and progressive approach to responding to developments in AI. Progressive Islam views technology as a space of social *ijtihad* that demands critical thinking, openness to innovation, and the courage to formulate ethical solutions to emerging challenges (Elmahjub, 2023; Fatimah Az-zahra et al., 2025a; Muhammadiyah.or.id, 2026; Nasoha et al., 2025). Within this framework, AI is not rejected as a threat but is engaged constructively while upholding the values of *tawhid*, justice, and humanity as its primary orientation. Consequently, Muhammadiyah values do not remain at a normative–theological level but demonstrate practical relevance in addressing ethical issues of AI within digital citizenship practices. The integration of *aqidah*, *akhlaq*, and social values in Muhammadiyah education enriches the discourse on digital citizenship with a contextual moral foundation rooted in Indonesia's Islamic tradition. This perspective has the potential to serve as an alternative ethical framework capable of bridging technological advancement with the goal of forming digital citizens who are just, civil, and socially responsible.

Conceptual Framework for Integrating Muhammadiyah Values and Digital Citizenship

The conceptual framework for integrating Muhammadiyah values and digital citizenship is grounded in the view that ethical challenges in digital spaces cannot be addressed solely through technological approaches or secular normative frameworks, but rather require a value foundation that is transcendental, humanistic, and contextual. In this regard, Muhammadiyah values provide an Islamic ethical foundation that can be systematically integrated into digital citizenship education, particularly in responding to the disruptions of AI that affect patterns of participation, social relations, and citizens' decision-making processes in the digital public sphere. Conceptually, Muhammadiyah education is based on the integration of *aqidah*, *akhlaq*, *ibadah*, and *muamalah duniawiyah* as an inseparable unity of values that shape the personality of Muslims who

are faithful, knowledgeable, and committed to good deeds (Agus Triono & Candra Sangaji, 2023; Ahas et al., 2025; Iqbal Baihaqi et al., 2024). This framework positions human beings as *khalifah fil ardh* who bear moral responsibility in managing and utilizing knowledge and technology. In the context of digital citizenship, such integration implies that mastery of technology, including AI, must be accompanied by ethical awareness and an orientation toward social well-being, so that digital citizens are not only technically competent but also morally mature (Bangsawan, 2023; Briliyanda et al., 2025; Hagedorn et al., 2026).

The values of justice and humanity constitute the main pillars of this integrative framework. In digital citizenship, the principle of justice demands that the use of AI does not generate inequalities in access to information, algorithmic discrimination, or the marginalization of vulnerable groups. Meanwhile, the value of humanity affirms that technology must continue to place human dignity at the center of decision-making processes. The integration of these values into digital citizenship education encourages learners to understand that algorithmic systems are not neutral entities, but social products that must be critically examined and directed to align with the principles of social justice and respect for human rights. The principle of *amar ma'ruf nahi munkar* provides a practical dimension within the conceptual framework for integrating Muhammadiyah values and digital citizenship. In digital spaces characterized by disinformation, opinion manipulation, hate speech, and the exploitation of personal data, *amar ma'ruf nahi munkar* functions as an ethical foundation for fostering critical, participatory, and responsible citizenship. This value encourages digital citizens not to remain passive in the face of ethical deviations in the use of AI, but to actively engage in information verification, promote ethical communication, and reject technological practices that undermine social order and democracy (Alexsius Pardosi et al., 2024; Alvarez Cazares, 2024).

Integrative conceptual framework can be proposed for values-based digital citizenship education grounded in Muhammadiyah values. Based on the analysis, the framework consists of four interrelated dimensions: ethical foundation, civic risk awareness, pedagogical orientation, and expected digital citizenship outcomes. Muhammadiyah values function as the ethical foundation; AI-related problems constitute the civic risk context; citizenship education provides the pedagogical space; and the expected outcome is the formation of digital citizens who are critical, civilized, just, and socially responsible.

Furthermore, the paradigm of Progressive Islam strengthens this integrative conceptual framework by providing a progressive and adaptive orientation toward technological developments. Progressive Islam views AI as a space for social *ijtihad* that requires rational thinking, openness to innovation, and the courage to formulate new values without abandoning the principles of *tawhid*, justice, and humanity (Arbelaez Ossa et al., 2023; Díaz-Rodríguez et al., 2023; Habbal et al., 2024). In the context of digital citizenship, this paradigm encourages education not to adopt a reactive or defensive stance toward technology, but rather to proactively direct the use of AI toward strengthening democracy, civic participation, and social welfare. Accordingly, the conceptual framework integrating Muhammadiyah values and digital citizenship positions

Islamic values as an ethical foundation for cultivating digital citizens who are faithful, critical, and socially responsible. This integration expands the meaning of digital citizenship beyond mere participatory competence in cyberspace, framing it instead as a moral practice oriented toward the realization of public benefit (*maslahah*), justice, and humanity. In educational contexts, this framework serves as a basis for the development of curricula, learning strategies, and institutional policies capable of bridging advances in AI with the goal of character formation for a civilized and progressive citizenry.

Table 2.

Analytical matrix linking AI-era challenges, civic risks, Muhammadiyah values, and pedagogical implications.

AI-Era Challenge	Civic Risk	Muhammadiyah Ethical Response	Pedagogical Implication
Disinformation and misinformation	Weakening of truth, trust, and public reasoning	<i>Akhlak</i> and <i>amar ma'ruf nunkar</i> : honesty, verification, and responsibility	Teach information verification, source criticism, and ethical communication.
Algorithmic bias	Discrimination and unequal civic treatment	<i>Muamalah duniawiyah</i> and justice: public benefit, fairness, and social inclusion	Discuss data justice, algorithmic accountability, and equality in civic education.
Polarization and echo chambers	Decline of dialogue, tolerance, and democratic deliberation	<i>Akhlak</i> and humanity: respect, empathy, and openness to difference	Use deliberative learning, dialogue, and exposure to diverse viewpoints
Privacy and data exploitation	Threats to autonomy, dignity, and digital rights	<i>Aqidah</i> and human dignity: technology as means for <i>maslahah</i> , not domination	Integrate digital rights, privacy literacy, and responsible AI use.
Dependence on AI outputs	Weak reflective agency, critical thinking, and academic integrity	Ibadah and Islam <i>Berkemajuan</i> : discipline, reflection, <i>ijtihad</i> , and responsible innovation	Promote reflective tasks, ethical AI guidelines, and human-centered learning

CONCLUSION

This study concludes that AI has transformed digital citizenship by mediating information flows, public participation, opinion formation, and civic decision-making. In response to the first research question, the study shows that digital citizenship in the AI era is no longer limited to the use of digital platforms but increasingly involves interaction with algorithmic systems that shape visibility, preferences, and public reasoning. This transformation expands opportunities for civic engagement while also creating new forms of vulnerability. In response to the second research question, the study identifies five major ethical and pedagogical challenges: disinformation, algorithmic bias, polarization, privacy and data exploitation, and the weakening of learners' reflective agency. These challenges indicate that digital citizenship education must move beyond technical digital literacy toward ethical literacy, critical reasoning, democratic dialogue, and responsible AI use. Civic education has a strategic role in ensuring that learners are not only competent users of technology, but also reflective citizens capable of evaluating the moral and social consequences of AI. In response to the third and fourth research questions, the study argues that Muhammadiyah values offer a relevant religious-ethical framework for digital citizenship education in the AI era. *Aqidah, akhlak, ibadah, muamalah duniawiyah, amar ma'ruf nahi munkar, and Islam Berkemajuan* provide ethical foundations for truthfulness, responsibility, justice, human dignity, public benefit, and progressive engagement with technology. The novelty of this article lies in the proposed integrative framework that connects AI-era civic challenges with Muhammadiyah values and pedagogical implications for values-based citizenship education.

The implications of this study are threefold. Theoretically, it enriches the discourse on digital citizenship by introducing a Muhammadiyah-based ethical perspective. Pedagogically, it offers a framework for integrating AI literacy, digital ethics, and values-based citizenship learning. Practically, it recommends that educational institutions develop responsible AI guidelines, curriculum materials, and learning strategies that are grounded in critical awareness, social responsibility, and public civility. Future research may empirically test this framework in Muhammadiyah educational institutions or compare it with other religious and cultural ethical frameworks in digital citizenship education.

DECLARATIONS

Author Contribution

Wijayanti, T., Conceptualization, Investigation, Writing – Review & Editing, and Supervision; **Maulana, D.F.** Conceptualization, Methodology, Formal Analysis, Writing – Original Draft, Visualization, and Corresponding Author; **Irawan, H.**, Validation, Resources, Writing – Review & Editing, and Supervision.

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Conflict of Interest

The authors declare no conflict of interest.

Declaration of AI Use

ChatGPT by OpenAI was used under the authors' supervision to assist in improving language clarity, grammar, and academic writing style during the preparation of this manuscript. All content was reviewed and validated by the authors, who take full responsibility for the final version of the manuscript.

Additional Information

Not applicable.

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