

Integrating Muhammadiyah Values into Teacher Professional Digital Competence: A Systematic Literature Review

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Abstract

Digital transformation has reshaped teachers' professional responsibilities by requiring not only technological proficiency but also pedagogical, ethical, and institutional responsiveness. In Muhammadiyah education, teacher digital competence needs to be understood as a value-based construct shaped by religious, moral, and organizational principles. This systematic literature review examines the digital competencies discussed in studies on Muhammadiyah teachers, analyzes their alignment with Muhammadiyah principles, and identifies challenges and opportunities in developing value-based digital competence. Using the PRISMA framework, seven eligible articles published between 2021 and 2026 were selected from Scopus, ERIC, DOAJ, and Garuda. The findings indicate that Muhammadiyah teachers' digital competence comprises four interrelated dimensions: technical competence, pedagogical digital competence, ethical digital competence, and value-based digital competence. Besides, the integration of Progressive Islam, Tajdid, and Manhaj Tarjih is evident both explicitly in some studies and interpretively through the thematic synthesis of the reviewed literature. In addition, the most frequently reported challenges involve teacher readiness, pedagogical integration, and infrastructure limitations. In contrast, opportunities emerge through continuous professional development, institutional collaboration, and the use of digital technologies to strengthen Islamic education and da'wah. Based on these findings, this review proposes a preliminary conceptual framework for Muhammadiyah Teacher Professional Digital Competence (TPDC) comprising pedagogical competence, technological competence, Muhammadiyah principles, and development strategies. The framework extends existing TPDC conceptualizations by incorporating ethical-spiritual and value-based dimensions and by positioning Muhammadiyah principles as a normative and organizational foundation for teachers' digital practices. Future research should empirically validate the proposed framework and develop instruments for measuring Muhammadiyah value-based digital competence.

Keywords: Digital Competence, Muhammadiyah Education, Muhammadiyah Principles, Teacher Professional Digital Competence, Technology in Education

Abstrak

Transformasi digital telah membentuk kembali tanggung jawab profesional guru dengan menuntut tidak hanya kemahiran teknologi tetapi juga responsivitas pedagogis, etis, dan institusional. Dalam pendidikan Muhammadiyah, kompetensi digital guru perlu dipahami sebagai konstruksi berbasis nilai yang dibentuk oleh prinsip-prinsip agama, moral, dan organisasi. Tinjauan literatur sistematis ini meneliti kompetensi digital yang dibahas dalam studi tentang guru Muhammadiyah, menganalisis keselarasan kompetensi tersebut dengan prinsip-prinsip Muhammadiyah, dan mengidentifikasi tantangan dan peluang dalam mengembangkan kompetensi digital berbasis nilai. Dengan menggunakan kerangka kerja PRISMA, tujuh artikel yang memenuhi syarat yang diterbitkan antara tahun 2021 dan 2026 dipilih dari Scopus, ERIC, DOAJ, dan Garuda. Temuan menunjukkan bahwa kompetensi digital guru Muhammadiyah terdiri dari empat dimensi yang saling terkait: kompetensi teknis, kompetensi digital pedagogis, kompetensi digital etis, dan kompetensi digital berbasis nilai. Selain itu, integrasi Islam Progresif, Tajdid, dan Manhaj Tarjih terlihat jelas baik secara eksplisit dalam beberapa studi maupun secara interpretatif melalui sintesis tematik dari literatur yang ditinjau. Selanjutnya, tantangan yang paling sering dilaporkan meliputi kesiapan guru, integrasi pedagogis, dan keterbatasan infrastruktur. Sebaliknya, peluang muncul melalui pengembangan profesional berkelanjutan, kolaborasi kelembagaan, dan penggunaan teknologi digital

untuk memperkuat pendidikan Islam dan dakwah. Berdasarkan temuan ini, tinjauan ini mengusulkan kerangka kerja konseptual awal untuk Kompetensi Digital Profesional Guru Muhammadiyah (TPDC) yang terdiri dari kompetensi pedagogis, kompetensi teknologi, prinsip-prinsip Muhammadiyah, dan strategi pengembangan. Kerangka kerja ini memperluas konseptualisasi TPDC yang ada dengan memasukkan dimensi etika-spiritual dan berbasis nilai serta dengan memposisikan prinsip-prinsip Muhammadiyah sebagai landasan normatif dan organisasional untuk praktik digital guru. Penelitian selanjutnya harus memvalidasi secara empiris kerangka kerja yang diusulkan dan mengembangkan instrumen untuk mengukur kompetensi digital berbasis nilai Muhammadiyah.

Kata kunci: Kompetensi Digital, Pendidikan Muhammadiyah, Prinsip-prinsip Muhammadiyah, Kompetensi Digital Profesional Guru, Teknologi dalam Pendidikan

BACKGROUND

Digital transformation has become one of the most influential forces reshaping contemporary education. It has changed not only how teachers deliver instruction, but also how knowledge is accessed, mediated, evaluated, and institutionalized in learning environments (Mateo-Guillen & Ocaña, 2025; Pereira-Villa, 2025; Zhang et al., 2024). The acceleration of educational digitalization during and after the COVID-19 pandemic has further increased the demand for teachers to develop digital competence as an essential part of their professional identity (UNESCO, 2023). Teachers are now expected to move beyond the operational use of digital tools and demonstrate the ability to integrate technology into meaningful, ethical, and pedagogically sound learning practices (Nurfazri et al., 2026). Therefore, digital competence should not be understood merely as technical proficiency, but as a professional capacity that includes pedagogical decision making, critical awareness, ethical judgment, and contextual responsiveness.

In Islamic education, digital transformation raises a more complex challenge because technology integration cannot be separated from religious, moral, and epistemological considerations. Islamic educational institutions are not only required to improve learning effectiveness through digital tools, but also to ensure that digital practices remain consistent with Islamic values and educational purposes (Arim et al., 2024; Darmawan et al., 2026; Nurbayan & Sanusi, 2025; Widodo, 2025). In this setting, teachers are responsible for selecting digital content, designing learning activities, guiding students' digital behavior, and maintaining the ethical orientation of learning. Thus, teacher digital competence in Islamic education involves the ability to use technology critically, ethically, pedagogically, and in accordance with the normative foundations of Islamic pedagogy (Bin Zakaria et al., 2025; Rapi et al., 2024).

This issue is particularly relevant in Muhammadiyah education. Muhammadiyah is one of the largest Islamic educational organizations in Indonesia and has played an important role in developing modern Islamic education through schools, universities, and other educational institutions. The organization manages approximately 163 universities and thousands of schools across Indonesia, making its educational network highly significant in shaping the direction of Islamic education in the digital era (Persyarikatan Muhammadiyah, 2025). Muhammadiyah education is rooted in the integration of Islamic teachings, scientific reasoning, social responsibility, and reform oriented thought (Hamami, 2021; Khoirudin et al., 2020). This educational orientation reflects the legacy of K. H. Ahmad Dahlan, who emphasized the importance of producing learners with noble character, intellectual capacity, and social awareness (Prayitno et al., 2020; Qodir et al., 2020; Yasuko, 2026).

On the other hand, the digital transformation of Muhammadiyah education therefore requires a teacher competence framework that is not limited to the mastery of digital platforms. Muhammadiyah teachers are expected to embody *Al Islam* and *Kemuhammadiyahan* values in their professional practices, including in digital learning environments (Chotijah & Kusumaningtyas, 2025). In this regard, digital

technology is not a neutral instrument. It can become a medium for strengthening Islamic learning, expanding da'wah, supporting character formation, and cultivating students' responsible participation in digital society. However, the same transformation also creates challenges related to teacher readiness, pedagogical adaptation, infrastructure, digital resources, and the availability of Islamic values based learning materials. These challenges indicate the need for a more context specific understanding of teacher professional digital competence within Muhammadiyah education.

Several studies have examined technology integration in Islamic education. For example, Nurfazri et al. (2026) reviewed studies on digitalized Islamic learning materials in English language teaching and found that digital media such as learning management systems, Powtoon, e books, and YouTube can support language skills, motivation, engagement, Islamic identity, and character development. Besides, Efe & Akcan (2024) reviewed studies on Islam, science, and technology and found that research in this field has largely focused on practical implementation and survey based studies, while deeper theoretical and pedagogical foundations of Islamic sciences remain underexplored. Other studies also show that educational technology can improve accessibility, quality, and inclusiveness in Islamic education, although teacher digital competence and institutional policy support remain crucial factors in ensuring successful technology integration (Murhayati et al., 2025; Siregar et al., 2025; Zakiyyah, 2024). However, most of these studies discuss Islamic education in general and do not specifically address Muhammadiyah educational institutions.

On the other hand, several reviews and conceptual studies have discussed the principles of Muhammadiyah, including *tajdid*, *manhaj tarjih*, and progressive Islam, as the ideological foundation of Muhammadiyah movements and educational practices. For example, Ardhana & Ali (2024) employed a qualitative approach, with descriptive analysis and a literature review, to examine the Muhammadiyah *tajdid* and *tajrid* movements. The study found that Muhammadiyah is manifested through three movement models, namely as an Islamic movement, a movement of *amar ma'ruf nahi munkar*, and a movement of *tajdid*, with *tajdid* serving as an open, concrete, and productive effort that supports Muhammadiyah's vision of *Islam Berkemajuan* in addressing educational, health, and socio-economic issues. Moreover, Hasanah & Habibi (2024) conducted a systematic literature review (SLR) using the PRISMA framework to examine learning methods used in teaching *tajwid* within Al-Qur'an Hadith subjects among Islamic boarding school students in Indonesia from 2014 to 2024. The study found three learning methods frequently used in *tajwid* instruction: Index Card Match, Peer Tutor, and Contextual Teaching and Learning (CTL). Besides, Pohan et al. (2025) analyzed the concept of *Islam Berkemajuan* in Muhammadiyah's MKCH and found that it consists of theological, methodological, and practical dimensions. The study also highlights Muhammadiyah's transformation from a *tajdid*-oriented movement to a more inclusive, contextual *tanwir* movement. Also, Jannah (2023) examined the history and philosophy of Muhammadiyah education through a literature review and found that it is grounded in a rational Islamic understanding, the integration of science and Islamic teachings, and a progressive educational orientation aimed at developing holistic, comprehensive human beings (*insan kamil*). However, they provide limited discussion regarding the integration of digital technology and digital pedagogy within Muhammadiyah educational contexts. Therefore, there is still a lack of review studies that systematically synthesize the relationship between technology integration and Muhammadiyah principles in developing teachers' digital competence.

The existing literature shows a clear separation between two bodies of scholarship. Studies on educational technology tend to focus on digital competence, technology adoption, platform use, digital literacy, and pedagogical innovation. Meanwhile, studies on Muhammadiyah tend to focus on ideological,

theological, philosophical, and organizational foundations. Consequently, limited attention has been given to how Muhammadiyah values shape teachers' professional digital competence. This gap is theoretically important because it limits current understanding of teacher digital competence in value based Islamic educational contexts. It is also practically important because Muhammadiyah educational institutions need a teacher development framework that can integrate digital transformation with their religious, ethical, and organizational mission. To address this gap, this study uses Teacher Professional Digital Competence (TPDC) as the main conceptual lens. TPDC is relevant because it understands digital competence as part of teachers' broader professional capacity, including technological competence, pedagogical competence, attitudes toward technology, critical awareness, and contextual decision making (Skantz-Åberg et al., 2022). This framework is broader than TPACK, which mainly explains the interaction among technological, pedagogical, and content knowledge (Mishra & Koehler, 2006). In this review, TPACK is positioned as a related pedagogical technology framework found in some of the reviewed studies, while TPDC functions as the broader analytical framework for interpreting teacher digital competence as a professional construct. Digital literacy is also treated as a supporting concept because it explains teachers' ability to access, evaluate, create, communicate, and use digital resources responsibly.

Furthermore, Muhammadiyah principles are positioned as the value foundation that shapes how TPDC is interpreted and practiced in Muhammadiyah education. In addition, Progressive Islam reflects openness to modern knowledge, scientific development, and digital innovation without abandoning Islamic ethical foundations. Besides, Tajdid reflects the renewal of teaching methods, educational media, and learning strategies in response to contemporary needs. Also, Manhaj Tarjih reflects ethical reasoning, methodological carefulness, and responsible selection of digital content. Operationally, these principles may appear in digital teaching practice through the development of Islamic values-based digital media, careful selection of online learning resources, ethical guidance for students' digital behavior, renewal of instructional strategies, and integration of technology with character formation. Based on this positioning, this SLR does not merely map studies on digital competence among Muhammadiyah teachers. It aims to synthesize existing literature and propose a context-specific Muhammadiyah TPDC framework that integrates technological competence, pedagogical competence, Muhammadiyah principles, and development strategies. Hence, this study contributes to the literature on teacher digital competence by showing that digital competence in Muhammadiyah education is not only a technical or pedagogical construct, but also a value-oriented professional construct shaped by religious and organizational foundations.

RESEARCH METHOD

This study employed an SLR design using the Preferred Reporting Items for Systematic Reviews and Meta Analyses (PRISMA) 2020 framework to ensure a transparent, rigorous, and replicable review process (Page et al., 2021). An SLR was considered appropriate because studies directly examining the relationship between teacher professional digital competence and Muhammadiyah educational values remain limited and scattered across different areas of scholarship. Hence, this review was designed not only to identify relevant studies, but also to synthesize conceptual and empirical patterns concerning digital competence, teacher professionalism, and Muhammadiyah principles in educational practice.

The review focused on the intersection of three domains: teacher digital competence, Muhammadiyah education, and value based Islamic educational principles. In this study, teacher digital competence refers to teachers' ability to use digital technologies critically, ethically, pedagogically, and effectively in educational settings. This concept includes digital competence, TPDC digital pedagogy,

technology integration, digital literacy, TPACK, artificial intelligence related competence, and online instructional practices. Meanwhile, Muhammadiyah principles refer to the reform oriented educational values associated with Progressive Islam or Islam Berkemajuan, Tajdid, Manhaj Tarjih, and the integration of Islamic values with scientific and social development. These conceptual boundaries were used to guide the formulation of review questions, search strategy, eligibility criteria, study selection, and thematic synthesis.

Formulating the review questions (RQs)

This review was guided by three research questions:

1. What digital competencies are discussed in studies on Muhammadiyah teachers in the digital era?
2. How are digital competencies integrated with Muhammadiyah principles, particularly Progressive Islam, tajdid, and Manhaj Tarjih?
3. What challenges and opportunities are reported in developing value based digital competence within Muhammadiyah education?

These questions were formulated to ensure that the review did not only describe the use of digital tools among Muhammadiyah teachers, but also examined how digital competence is connected to pedagogical, ethical, and organizational values within Muhammadiyah education.

Data Sources and Search Strategy

To explore the practices of digital competence in Muhammadiyah educations, we gained the data from four databases: Scopus, ERIC, DOAJ, and Garuda. Scopus was selected for its comprehensive indexing and extensive coverage of high-quality international journals. ERIC was included for its specialization in educational research. Besides, DOAJ was used to expand coverage of high-quality open-access journals that frequently publish empirical studies from diverse national contexts that may not always be adequately indexed in larger databases. Moreover, Garuda was incorporated to capture the national (Indonesian) databases. Hence, combining these four databases was considered more effective for ensuring broader coverage and minimizing database bias than relying on only one or two sources.

To identify potentially eligible studies, we developed two search strategies: a manual search and a systematic search utilizing more comprehensive keywords combined with Boolean operations. Manual searching was conducted to identify potentially relevant studies using initial keyword combinations related to Muhammadiyah, digital competence, technology integration, TPDC, TPACK, tajdid, and Manhaj Tarjih (such as 'Muhammadiyah AND digital OR technology OR TPACK OR TPDC', 'Muhammadiyah AND tajdid OR manhaj tarjih OR 'Progressive Islam'). After that, we used the second strategy to search related articles using Boolean operations or specific characters, such as ("Muhammadiyah" OR "Muhammadiyah School" OR "Muhammadiyah Education") AND ("digital competence" OR "TPDC" OR "TPACK" OR "digital pedagogy" OR "educational technology" OR "technology integration" OR "artificial intelligence" OR "online learning") AND ("Progressive Islam" OR "Islam Berkemajuan" OR "tajdid" OR "renewal" OR "manhaj tarjih" OR "Islamic values") AND ("teacher" OR "lecturer" OR "Muhammadiyah Teacher").

Inclusion and Exclusion Criteria

The publication period was limited to studies published between 2021 and 2026. This range was selected to capture recent studies produced during and after the acceleration of educational digitalization. The same time range was applied consistently in the abstract, method, results, and conclusion. The inclusion and exclusion criteria were as follows:

Table 1. Inclusion and Exclusion Criteria

No	Inclusion	Exclusion
1	Studies published between 2021 and 2026	Studies published outside the 2021 to 2026 period
2	Papers situated within Muhammadiyah education	Studies unrelated to Muhammadiyah education
3	Studies discussing digital competence, digital pedagogy, educational technology, technology integration, TPACK, TPDC, artificial intelligence, or online learning	Studies outside educational settings
4	Studies involving Muhammadiyah teachers or educators as participants or primary subjects of analysis	Studies that do not involve teachers or educators
5	Empirical studies published in peer reviewed journals	Proceedings, opinion papers, editorials, inaccessible articles, duplicate contents, or incomplete full text articles
6	Studies written in English or Indonesian	Studies written in languages other than English or Indonesian
7	Studies that provide evidence relevant to at least one review question	Studies that do not contribute to answering the review questions

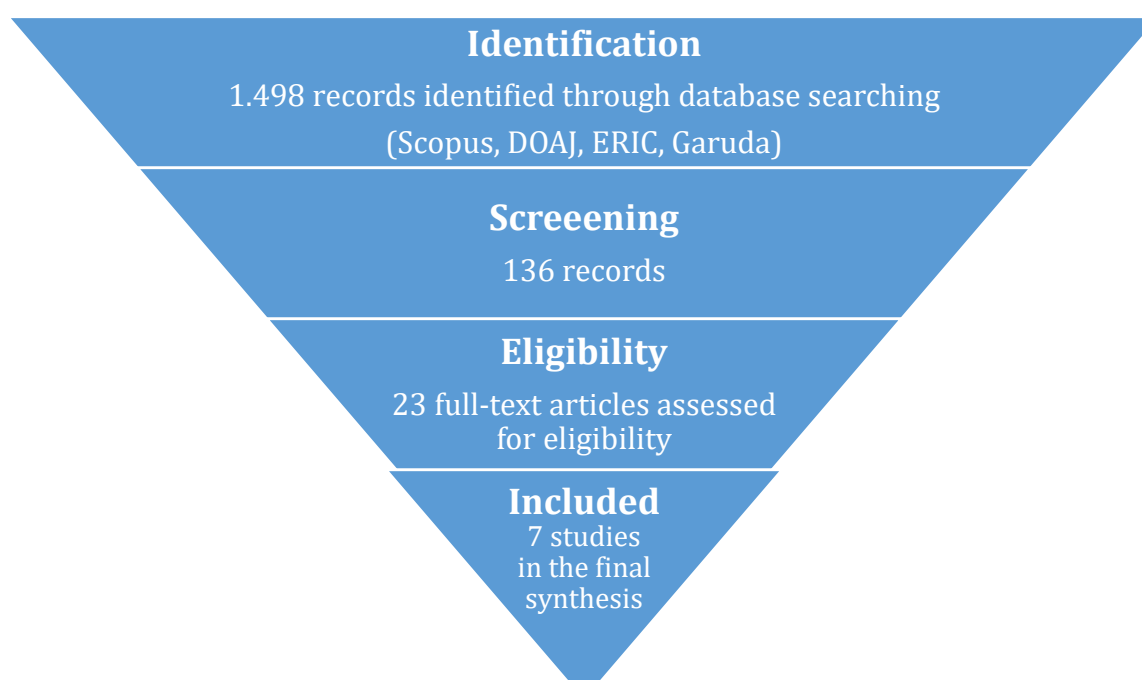


Figure 1. The selection of studies

In this phase, we conducted a two-stage process: screening titles and abstracts, and then reviewing full-text articles. This method aimed to identify studies relevant to the topic of this SLR. There were 1,498 studies in the initial search using two keyword approaches. After direct selection from each database, the screening yielded 136 articles suitable for the metadata analysis stage. Next, we read the titles and

abstracts to ensure the selected manuscripts met the criteria. Of the 136 articles, only 23 relevant studies containing the keywords technology, Muhammadiyah school, and Muhammadiyah principle remained. Next, full-text screening was conducted using exclusion and eligibility criteria. Of the 23 studies previously reviewed, two were inaccessible (missing PDF files), one contained duplicate content, one was published in proceedings, and 12 articles did not focus on Muhammadiyah teachers, did not discuss technology, and did not align with Muhammadiyah principles. Therefore, seven studies were eligible for critical review. The stepwise selection procedure is presented in Figure 1.

Quality Consideration and Data Analysis

The number of studies included in the final synthesis was relatively small, with only seven articles meeting the inclusion criteria. This was primarily due to the review's specific focus, which required studies to simultaneously address three interrelated dimensions: Muhammadiyah educational institutions, teachers' digital competence or technology integration, and Muhammadiyah principles such as Progressive Islam, *tajdid*, and *Manhaj Tarjih*. While there is a substantial literature on digital competence in education and technology integration in Islamic education, most studies do not specifically focus on the Muhammadiyah context. Similarly, many studies that address Muhammadiyah principles primarily examine their theological, philosophical, organizational, or socio-religious dimensions without connecting them to teachers' digital competence or educational technology practices. Consequently, the application of strict inclusion and exclusion criteria substantially reduced the number of eligible studies. This selection process was intentionally designed to ensure conceptual alignment with the research questions. It included only studies that directly contribute to understanding the relationship between digital competence and Muhammadiyah principles. Although the number of final studies was limited, the focused scope enabled a more in-depth and coherent synthesis of the existing evidence, thereby allowing the review to identify emerging patterns, gaps, and conceptual relationships that might not have been apparent in a broader but less focused review. Moreover, the review employed a matrix analysis approach adapted from (Miles & Huberman, 1994). Key findings from the selected studies were extracted and organized into comparative matrices to facilitate cross-study analysis. Rather than analyzing each study individually, the findings were compared across studies and synthesized according to the three review questions. Recurring patterns and categories emerging from the comparison were used to develop the themes presented in the Results section.

RESULT AND DISCUSSION

This section presents findings from seven empirical studies retrieved through systematic screening. The studies are organized according to the three RQs that structure this research: (1) the digital competencies discussed in relation to Muhammadiyah teachers; (2) how those competencies align with the Muhammadiyah principles: progressive Islam, *tajdid*, or *manhaj tarjih*; and (3) the challenges and opportunities encountered in developing value-based digital competence within the Muhammadiyah educational context. Where relevant, patterns across studies are identified and synthesized rather than described in isolation.

Digital Competencies Discussed in Studies on Muhammadiyah Teachers

Across the seven reviewed studies, teacher digital competence in Muhammadiyah education appears in four interconnected categories: technical competence, pedagogical digital competence, ethical digital competence, and value based digital competence. These categories indicate that digital competence

is not limited to the ability to operate digital platforms. Instead, it is expressed through teachers' capacity to select, design, manage, evaluate, and ethically integrate digital technology into learning practices (see Table 2).

Table 2. Digital Competencies Discussed in Studies on Muhammadiyah Teachers

No	Category of Competence	Main Indicators Identified Across Studies	Examples of Practices	Representative Studies
1	Technical competence	Ability to operate digital tools, create digital media, and use online learning platforms	PowToon media creation, digital video production, Wordwall based learning, Zoom, Quizizz, YouTube, Google Forms, and Google Classroom	Wijayati & Khafidhoh (2022); Widati et al. (2023); Winarti et al. (2022); Suhartono et al. (2022)
2	Pedagogical digital competence	Ability to integrate technology into instructional design, learning management, assessment, and student engagement	Blended learning, digital assessment, online learning management, instructional media development, and TPACK based teaching	Winarti et al. (2022); Nugraeni & Suyatno (2023); Erviana et al. (2025); Afnan et al. (2025)
3	Ethical digital competence	Ability to use digital technology responsibly and guide students' digital behavior	Digital literacy involving moral awareness, social responsibility, discipline, and ethical communication	Afnan et al. (2025); Nugraeni & Suyatno (2023)
4	Value based digital competence	Ability to align digital practices with Islamic and Muhammadiyah educational values	Da'wah integrated digital media, Islamic content development, value oriented digital resources, and technology use for character formation	Wijayati & Khafidhoh (2022); Afnan et al. (2025)

As presented in table 2, the analysis of the seven selected studies identified four interrelated dimensions of digital competence among Muhammadiyah teachers: technical competence, pedagogical digital competence, ethical digital competence, and value-based digital competence. These dimensions emerged through cross-study comparison and reflect different ways in which teachers engage with digital technologies in Muhammadiyah educational settings. The first dimension is technical competence. It refers to teachers' ability to operate digital technologies, create digital content, and utilize online learning platforms. Several studies reported practices such as developing learning media with PowToon (Wijayati & Khafidhoh, 2022), producing educational videos (Widati et al., 2023), using Wordwall for interactive learning activities (Suhartono et al., 2022), and managing learning through Zoom, Quizizz, YouTube, Google Forms, and Google Classroom (Winarti et al., 2022). However, these platforms should not be interpreted as digital competencies themselves. Rather, they represent examples of how broader technical competencies are enacted in practice. The competence lies in teachers' ability to select, adapt, and effectively use digital technologies to support learning objectives across different contexts.

The second dimension is pedagogical digital competence. It concerns the integration of technology into instructional design, learning management, assessment, and student engagement. This dimension is

evident in studies emphasizing blended learning, digital assessment, instructional media development, and technology-supported teaching practices (Nugraeni & Suyatno, 2023; Winarti et al., 2022). Similarly, Afnan et al. (2025) highlighted the relevance of the TPACK framework, suggesting that effective technology integration requires the interaction of technological, pedagogical, and content knowledge. Supporting this view, Erviana et al. (2025) found that pedagogical competence and professional competence significantly predicted digital technology integration among Muhammadiyah elementary school teachers. These findings indicate that digital competence extends beyond operating technologies and includes the ability to employ them meaningfully for teaching and learning. Also, the third dimension is ethical digital competence. It reflects teachers' ability to use technology responsibly and guide students' behavior in digital environments. Nugraeni and Suyatno (2023) identified aspects such as digital communication, attitudinal readiness, and the promotion of students' digital literacy, while Afnan et al. (2025) emphasized moral awareness, social responsibility, and ethical engagement in digital contexts. These findings suggest that digital competence within Muhammadiyah education includes ethical considerations that shape how technology is used and how students are prepared to participate in digital society. Besides, the fourth dimension is value-based digital competence. It represents the distinctive contribution of Muhammadiyah educational contexts. This competence involves aligning digital practices with Islamic values and Muhammadiyah educational principles. Studies reported the use of digital media for da'wah, the development of Islamic digital content, value-oriented learning resources, and technology-supported character education (Afnan et al., 2025; Wijayati & Khafidhoh, 2022). In this perspective, technology functions not merely as an instructional tool but also as a medium for promoting religious, moral, and educational values. Therefore, these findings indicate that digital competence among Muhammadiyah teachers is a multidimensional construct encompassing technical, pedagogical, ethical, and value-based dimensions. Also, the reviewed studies consistently demonstrate that digital technologies such as PowToon, Wordwall, Zoom, and Google Classroom serve as vehicles through which competence is expressed rather than as competence itself. The evidence further suggests that effective digital competence in Muhammadiyah education requires not only technological proficiency but also pedagogical expertise, ethical responsibility, and alignment with institutional values.

Integration of Digital Competence with Muhammadiyah Principles

The second review question examines how digital competence is integrated with Muhammadiyah principles, particularly Progressive Islam, Tajdid, and Manhaj Tarjih. The synthesis shows that this integration appears in two different forms: explicit integration and interpretive integration. Explicit integration refers to studies that directly connect digital practices with Islamic values, da'wah, tajdid, or Muhammadiyah educational purposes. Besides, interpretive integration refers to studies in which the connection with Muhammadiyah principles is not directly stated, but can be inferred based on the context of Muhammadiyah education, the nature of the digital practice, and the orientation of the learning activity.

Based on the findings from the seven reviewed studies, five studies addressed the relationship between digital competence and Muhammadiyah principles. The strongest example of explicit integration is found in Wijayati and Khafidhoh (2022), where the development of PowToon-based digital media is directly framed as a form of contemporary da'wah. Also, Islamic greetings, prayers, and religious messages are intentionally embedded into the digital learning materials. In this context, digital media are not presented merely as technological tools but as instruments for communicating and disseminating Islamic values. This explicit framing reflects the principle of Tajdid through the adaptation of religious messages to contemporary digital media. The study also suggests elements of Manhaj Tarjih by emphasizing careful

content selection and the alignment of digital materials with Islamic educational objectives. In addition, Afnan et al. (2025) provide another example of explicit integration through their application of TPACK in PAI. Their findings suggest that digital literacy should contribute not only to technological and pedagogical effectiveness but also to the development of communication skills, discipline, ethical awareness, social responsibility, and Islamic character. This perspective aligns closely with Muhammadiyah's understanding of education as a process that integrates intellectual, moral, and spiritual development. It also demonstrates how digital competence can function as a vehicle for achieving broader educational and religious goals rather than as a purely technical capability.

Table 3. Forms of Integration between Digital Competence and Muhammadiyah Principles

Muhammadiyah Principle	Operationalization in Digital Teaching Practice	Form of Integration	Representative Studies
Progressive Islam	Openness to modern knowledge, educational innovation, and digital transformation while maintaining Islamic values	Mostly interpretive, with some explicit alignment in Islamic education and TPACK based studies	Erviana et al. (2025); Afnan et al. (2025)
Tajdid	Renewal of teaching methods, learning media, and da'wah practices through digital technology	Explicit in media based da'wah studies; interpretive in technology training and digital learning studies	Wijayati & Khafidhoh (2022); Suhartono et al. (2022); Nugraeni & Suyatno (2023)
Manhaj Tarjih	Ethical reasoning, careful content selection, and responsible use of digital media in Islamic learning	Mostly interpretive, but explicit where digital content selection is connected to Islamic values	Wijayati & Khafidhoh (2022); Afnan et al. (2025)

According to the table 3, other studies demonstrate a more interpretive form of integration. For example, Suhartono et al. (2022) and Nugraeni and Suyatno (2023) explicitly referred to Tajdid in the context of digital skills development and educational innovation, yet they provided limited discussion of the theological foundations underlying this connection. Similarly, Erviana et al. (2025) did not explicitly discuss Progressive Islam, Tajdid, or Manhaj Tarjih. However, their findings showed that pedagogical and professional competencies significantly support teachers' ability to integrate digital technologies effectively. However, these findings were interpreted as reflecting the spirit of Progressive Islam, particularly its emphasis on openness to knowledge, educational advancement, and adaptation to contemporary challenges while maintaining Islamic values. Furthermore, the integration between digital competence and Muhammadiyah principles operates at different levels of evidence and articulation. Tajdid demonstrates the strongest explicit relationship, particularly in studies emphasizing educational innovation, media development, and digital da'wah. By contrast, the connections with Progressive Islam and Manhaj Tarjih are more frequently identified through thematic interpretation of value-oriented educational practices, ethical technology use, and responsible content development. Therefore, the review suggests that digital competence in Muhammadiyah education is not understood solely as technical proficiency. Rather, it is embedded within broader educational, ethical, and religious objectives that seek to align technological innovation with Muhammadiyah's commitment to educational renewal, ethical reasoning, and Islamic values.

Challenges and Opportunities in Developing Value-Based Digital Competence

The third review question identifies challenges and opportunities in developing value based digital competence within Muhammadiyah education. The synthesis shows that the challenges are

multidimensional and operate at individual, pedagogical, institutional, infrastructural, and value related levels. Some challenges appear across several studies and can be interpreted as dominant patterns, while others appear only in one or two studies and should be treated as emerging or context specific findings.

Table 4. Challenges and Opportunities in Developing Value Based Digital Competence

Category	Challenges	Opportunities	Evidential Pattern	Representative Studies
Infrastructure and Access	Unequal internet access, limited devices, and limited technology access	Blended learning can expand access and reduce learning disruption	Moderate	Winarti et al. (2022); Afnan et al. (2025)
Teacher Readiness	Limited prior experience, perception that technology is difficult, technical complexity, and resistance to change	Training, mentoring, hands on practice, and professional development can improve readiness	Dominant	Wijayati & Khafidhoh (2022); Widati et al. (2023); Nugraeni & Suyatno (2023); Suhartono et al. (2022)
Pedagogical Integration	Gap between availability of platforms and meaningful classroom use	TPACK and TPDC based development can strengthen pedagogical technology integration	Dominant	Nugraeni & Suyatno (2023); Erviana et al. (2025); Afnan & Maksum (2025)
Institutional Support	Limited technical support and uneven institutional facilitation	School university collaboration and institutional training can support sustainable development	Moderate	Nugraeni & Suyatno (2023); Suhartono et al. (2022)
Islamic Value-Based Resources	Limited availability of digital resources that explicitly integrate Islamic and Muhammadiyah values	Digital media can expand da'wah, Islamic learning, and character education	Emerging but important pattern	Wijayati & Khafidhoh (2022)
Student Development	Unequal student participation in digital learning	Digital literacy can strengthen soft skills, communication, discipline, and learning engagement	Moderate	Winarti et al. (2022); Afnan & Maksum (2025)
Digital Transformation	Uneven adoption of educational technology across schools and learning contexts	Digitalization after the pandemic can become a basis for long term educational innovation	Moderate	Wijayati & Khafidhoh (2022); Winarti et al. (2022)

Table 4 shows that teacher readiness and pedagogical integration emerged as the most frequently reported challenges, appearing in three to four studies each. Besides, infrastructure limitations were reported in two studies, while institutional support, Islamic value integration, digital transformation, and student participation were discussed in a smaller number of studies. These patterns suggest that the primary barriers to values-based digital competence development are related to human capacity and the effective pedagogical use of technology rather than technology availability alone. Teacher readiness is a crucial factor in determining the success of digital competency development. Various studies show that some teachers still view digital technology as complex and difficult to use (Widati et al., 2023). Lack of prior experience in using educational technology leads to a lack of confidence in integrating technology into learning. Furthermore, resistance to change has been identified as a major barrier (Nugraeni & Suyatno, 2023; Suhartono et al., 2022). These findings demonstrate that the challenges of digitalization are not

solely technical but also psychological and cultural. The shift to digital learning requires teachers to change their habits, teaching methods, and even their perspectives on the learning process itself. Interestingly, the literature also shows that these barriers can be overcome through appropriate interventions. Training programs, expert mentoring, and hands-on practice have consistently been reported to improve teachers' digital competency (Widati et al., 2023). These findings indicate that digital competency is not a fixed ability but can be developed through continuous learning experiences. In other words, investing in TPDC is one of the most effective strategies to accelerate digital transformation in Muhammadiyah's educational environment.

In addition to individual readiness, previous papers have highlighted the importance of pedagogical integration in the use of technology. Meanwhile, several studies have found a gap between the availability of digital platforms and their optimal utilization in learning practices (Nugraeni & Suyatno, 2023; Suhartono et al., 2022). These findings suggest that the presence of technology does not automatically result in higher-quality learning. Many teachers have access to various digital applications and platforms, but are unable to utilize them to create meaningful learning experiences. Consequently, digital competence should be understood as the pedagogical ability to use technology to achieve learning objectives, rather than merely the operational ability to use specific devices or applications. In this context, the TPDC framework emerges as one of the most promising opportunities. Moreover, Afnan et al. (2025) demonstrated that integrating technological, pedagogical, and content knowledge can improve teacher professionalism and the quality of learning. This finding is supported by Erviana et al. (2025), who emphasized that a strong pedagogical foundation is a crucial prerequisite for successful technology integration. Consequently, developing effective digital competencies requires a balance between technological mastery and pedagogical skills. Teachers who master technology but lack an understanding of appropriate learning strategies are likely to produce less effective learning. In contrast, teachers with strong pedagogical competencies are better able to utilize technology meaningfully.

Apart from that, Winarti et al. (2022) and Afnan et al. (2025) show that disparities in internet access and limited digital devices remain significant barriers to the implementation of technology-based learning. These findings indicate that digital transformation has not occurred evenly across Muhammadiyah educational institutions. Schools located in areas with limited infrastructure face greater difficulties in implementing digital innovations than schools with more adequate technological resources. As a result, developing digital competency is not only related to increasing individual capacity but is also influenced by structural factors beyond the control of teachers and students. In addition, various studies show that these conditions create new opportunities for educational transformation. For example, the COVID-19 pandemic was a significant turning point that accelerated the adoption of digital technology in the learning process (Wijayati & Khafidhoh, 2022; Winarti et al., 2022). The crisis forced schools and teachers to adapt to various digital platforms in a relatively short time. This process has led to increased awareness of the importance of digital competency as an integral part of teacher professionalism. The reviewed literature shows that digitalization, which initially responded to the pandemic, has since become a permanent necessity in education.

On the other hand, the institutional dimension also plays a crucial role in the development of values-based digital competencies. Studies by Nugraeni and Suyatno (2023) and Suhartono et al. (2022) show that collaboration between universities and schools significantly improves teachers' digital competencies. Through these partnerships, schools gain access to resources, training, and expertise previously unavailable. These findings demonstrate that developing digital competencies is a collective responsibility that requires support from various stakeholders. Consequently, sustainable digital transformation is

difficult to achieve if it relies solely on individual teacher initiatives without adequate institutional support. Furthermore, an aspect that distinguishes Muhammadiyah education from many other educational contexts is the importance of integrating Islamic values into the digitalization process. Wijayati and Khafidhoh (2022) identified the limited availability of digital learning resources that explicitly integrate Islamic values as a key challenge. They pointed to a gap between the development of educational technology and the need for learning content aligned with Muhammadiyah principles. Moreover, digital technology offers enormous opportunities to expand Islamic da'wah and education. Digital media enables the dissemination of Islamic values beyond conventional classroom boundaries and reaches students across various learning contexts (Wijayati & Khafidhoh, 2022). They demonstrate that digitalization should not be viewed as a threat to Islamic identity. Instead, technology can be a strategic instrument for strengthening the internalization of Islamic values when used critically and purposefully (Nurfazri et al., 2026). From this perspective, values-based digital competencies encompass not only the ability to use technology but also the ability to select, develop, and utilize digital resources in line with Islamic principles. Furthermore, at the student level, the benefits of developing digital competencies extend beyond academic achievement. Afnan et al. (2025) report that digital literacy contributes to the development of a range of soft skills, including communication, collaboration, adaptability, and problem-solving. These competencies are increasingly important in facing the demands of the digital society and the 21st-century workplace. However, Winarti et al. (2022) found a gap in student participation in digital learning, indicating that the benefits of digitalization have not been felt equally by all students. They emphasized the importance of an inclusive approach to prevent digital transformation from widening existing educational gaps.

Therefore, this literature synthesis demonstrates that developing values-based digital competencies in Muhammadiyah education is a transformational process that involves the interplay of infrastructure, teacher readiness, pedagogical integration, institutional support, and Islamic values. The primary challenge lies not solely in technology adoption but in integrating technology with pedagogical goals and Islamic missions. The greatest opportunities arise from strengthening teacher competencies based on TPDC, continuous professional development, collaboration between schools and universities, and the production of digital learning resources that integrate Islamic values. These findings indicate that the future of Muhammadiyah education does not depend solely on the level of technology adoption, but rather on the institution's ability to build a digital ecosystem that harmonizes technological innovation with character building and Islamic values.

DISCUSSION

Muhammadiyah teacher competence in the digital era cannot be understood solely as the ability to use technology. A synthesis of the seven reviewed studies indicates that digital competence extends beyond the operational use of digital tools and encompasses pedagogical, ethical, and value-oriented dimensions. The findings reveal that digital competence in Muhammadiyah educational settings is shaped not only by teachers' ability to integrate technology into learning but also by their capacity to align digital practices with Islamic values and educational goals. Based on these patterns, this study proposes a conceptual model of Muhammadiyah TPDC that positions pedagogical competence as the core dimension connecting technological and ethical-spiritual competences with Muhammadiyah principles rooted in Progressive Islam, Tajdid, and Manhaj Tarjih.

The competency profiles identified in the reviewed studies are broadly consistent with the TPDC framework proposed by Skantz-Åberg et al. (2022), which conceptualizes teacher professional digital competence as a multidimensional construct consisting of technological competence, content knowledge, attitudes toward technology use, pedagogical competence, cultural awareness, critical approach, and professional engagement. Similar to Skantz-Åberg et al. (2022), the present review highlights the central role of pedagogical and technological competence in effective technology integration. However, the findings also suggest that the Muhammadiyah educational context requires an expanded conceptualization of TPDC. In particular, ethical-spiritual competence and value-based orientations emerged as recurring themes across the reviewed studies. This finding is noteworthy because Skantz-Åberg et al. (2022) acknowledged that ethical dimensions remain underrepresented in existing TPDC conceptualizations. Hence, we extend the TPDC framework by incorporating Muhammadiyah principles as an explicit normative dimension that guides the selection, adaptation, and utilization of technology in educational practice. The proposed model conceptualizes teacher digital competence not merely as a professional capability but as a value-oriented educational competence. Technology integration is understood as a process shaped by pedagogical judgment, ethical responsibility, religious values, and continuous professional development. Each review question contributes to this conceptualization by identifying the competencies discussed in the literature, examining their relationships with Muhammadiyah principles, and analyzing the challenges and opportunities of developing values-based digital competence in Muhammadiyah educational institutions.

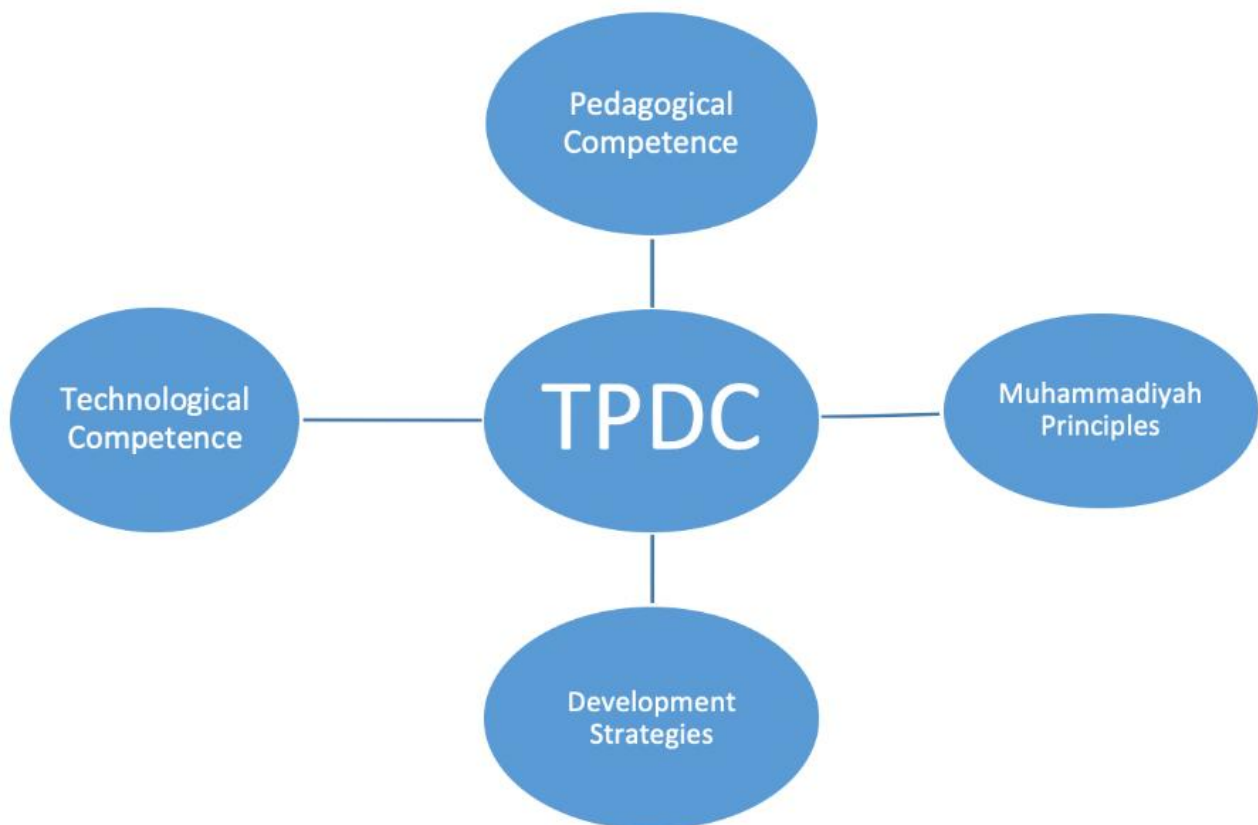


Figure 2. Conceptual Model of Muhammadiyah Teacher Competence in the Digital Era

This study proposes a Muhammadiyah TPDC model in which digital competence emerges through the interaction of four interrelated dimensions: pedagogical competence, technological competence, Muhammadiyah principles, and development strategies. Unlike approaches that view digital competence primarily as a set of technical skills, the proposed model conceptualizes teacher digital competence as a multidimensional and value-oriented construct. The model suggests that effective technology integration depends not only on teachers' ability to use digital tools but also on their pedagogical decision-making, institutional values, and continuous professional development.

Pedagogical competence occupies a central position in this model because the reviewed studies consistently demonstrate that technology integration becomes meaningful only when supported by effective pedagogical practices (see Table 2). This finding supports the TPDC framework proposed by Skantz-Aberg et al. (2022), which emphasizes the inextricable relationship between pedagogy and technology. Similarly, Erviana et al. (2025) found that pedagogical competence significantly predicted the success of technology integration among Muhammadiyah teachers. Furthermore, the dominance of the pedagogical dimension in the literature can be explained by the character of Muhammadiyah education, which, from the outset, positions education as a means of social transformation. Moreover, Ahmad Dahlan views education as an instrument for liberating the community from backwardness by integrating religious knowledge with modern science (Dwi Hatmanto, 2018). Consequently, technology in Muhammadiyah education is not adopted for its own sake but is expected to contribute to meaningful learning, character formation, and social progress. In addition, technological competence constitutes the second dimension of the model. The reviewed studies reported teachers' use of digital platforms such as PowToon, Wordwall, Zoom, Google Classroom, Quizizz, and digital video production tools. However, these platforms should not be understood as digital competence itself. Rather, they represent contexts through which broader technological competencies are enacted. The findings suggest that technological competence encompasses transferable capabilities such as digital content creation, online communication, digital assessment, technology-supported collaboration, and digital learning management. It aligns with previous studies highlighting the importance of teachers' digital skills in 21st-century education (Cinganotto & Montanucci, 2025; Galeboe et al., 2025; Gündüzalp & Yaraş, 2022; Korenova et al., 2024; Pagliara & Sanchez Utge, 2023; Rahimi & Tafazoli, 2022). Therefore, pedagogy and technology are inseparable, as technology functions effectively only when integrated with pedagogical objectives (Mishra & Koehler, 2006).

On the other hand, as mentioned in Table 3, the most distinctive contribution of this model lies in its incorporation of Muhammadiyah principles, particularly Progressive Islam, Tajdid, and Manhaj Tarjih. These findings suggest that technology integration is not merely a technical or pedagogical endeavor, but rather part of a broader mission to advance Islamic education while remaining true to Muhammadiyah values. Besides, conventional TPDC frameworks generally emphasize technology, pedagogy, professional attitude, and critical awareness; this review shows that religious and organizational values also shape digital competence in Muhammadiyah education. Progressive Islam supports openness to modern knowledge, scientific development, and digital innovation while maintaining Islamic ethical orientation. Tajdid is reflected in the renewal of teaching methods, learning media, and da'wah practices through digital technology. Manhaj Tarjih provides a basis for ethical reasoning, careful content selection, and responsible decision-making in digital learning. Therefore, the principles of Muhammadiyah do not function merely as abstract theological concepts. They can be operationalized in digital teaching through Islamic value-based digital media, responsible use of online resources, ethical guidance for students' digital behavior, and the integration of technology with character formation. For example, Wijayati and

Khafidhoh (2022) found that digital learning media were intentionally designed to incorporate Islamic greetings, prayers, and religious content, transforming digital technology into a medium for learning and da'wah. This aligns with Hadisaputra et al. (2024), who argue that progressive Islam encourages openness to modernization while maintaining Islamic values. Similarly, Fanani et al. (2021) explain that Manhaj Tarjih integrates textuality, rationality, and spirituality as a framework for responding to contemporary challenges. Therefore, this model demonstrates that digital competence in Muhammadiyah schools is not merely a technical or pedagogical construct but also an ideological one.

Furthermore, development strategies are a crucial dimension for sustaining TPDC as shown in Table 4. This finding is consistent with the literature emphasizing professional learning communities and ongoing teacher development as crucial mechanisms for digital transformation (Liu et al., 2024). In the Muhammadiyah context, development strategies are crucial because they bridge the gap between technological innovation and values-based educational goals. Furthermore, this model demonstrates a conceptual shift from a technology-centered understanding of digital competence to a values-based TPDC framework. While conventional TPDC models emphasize the interaction between technology and pedagogy, the proposed model suggests that teachers' digital competence in Muhammadiyah education emerges through the interaction of pedagogical competence, technological competence, organizational values, and ongoing development strategies. This theme contributes to the growing literature on digital competence by suggesting that educational institutions with strong ideological foundations may require a context-specific TPDC framework that integrates technological adaptation with organizational and religious values.

CONCLUSION

This systematic literature review examined how digital competence is conceptualized within Muhammadiyah educational settings and synthesized evidence from seven selected studies. The findings indicate that Muhammadiyah teachers' digital competence extends beyond technological proficiency and encompasses pedagogical, ethical, and value-based dimensions. The reviewed studies further suggest that digital competence is shaped by Muhammadiyah principles, particularly Progressive Islam, Tajdid, and Manhaj Tarjih, which influence how digital technologies are selected, adapted, and integrated into educational practice. A key contribution of this study is the proposed Muhammadiyah TPDC model. Building on existing TPDC frameworks, the model highlights the interaction of pedagogical competence, technological competence, Muhammadiyah principles, and development strategies in shaping teachers' digital competence. The model further suggests that digital competence in Muhammadiyah education should be understood not only as a professional capability but also as a value-oriented educational construct. In this regard, the study contributes to the growing literature on teacher digital competence by incorporating ethical-spiritual and organizational dimensions that have received limited attention in previous TPDC conceptualizations. Several limitations should be acknowledged. The review was based on only seven eligible studies, reflecting the limited body of literature on Muhammadiyah teachers' digital competence. In addition, the proposed TPDC model represents a conceptual synthesis derived from the reviewed literature rather than an empirically validated framework. Therefore, future research should empirically test the model across different Muhammadiyah educational contexts, develop valid instruments to measure value-based digital competence, and conduct longitudinal studies to examine how teachers' digital competence develops over time. Such efforts will strengthen the empirical foundation of the proposed framework and contribute to a more comprehensive understanding of teacher digital competence in Islamic educational settings.

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