Navigating Digital Disruption: Professional Competence of Lower Primary Teachers in the Merdeka Curriculum for Alpha Generation Learners

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ARTICLE INFO	ABSTRACT
	The rapid acceleration of digital disruption has significantly transformed elementary education, particularly in relation to the learning characteristics of Generation Alpha and the implementation of Indonesia's Merdeka Curriculum. In this context, lower primary teachers are required to possess adaptive professional competencies that integrate pedagogical expertise, digital literacy, and ethical awareness. This study aims to explore the professional competence of lower-grade elementary teachers in responding to digital disruption during the implementation of the Merdeka Curriculum for Generation Alpha learners, as well as to identify supporting and constraining factors influencing this competence. Employing an exploratory qualitative approach, the study involved nine lower-grade teachers from an Islamic elementary school in Yogyakarta selected through purposive sampling. Data were collected using open-ended online questionnaires and analyzed through thematic analysis. The findings reveal that teachers strongly recognize Generation Alpha as digital native learners and acknowledge digital competence as a core component of professionalism. This study concludes that strengthening teachers' digital pedagogical competence through continuous, context-based professional development is essential for effective curriculum implementation. The study contributes to the literature by providing empirical insights into lower primary teacher professionalism within digital transformation and curriculum reform contexts.

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1. INTRODUCTION

In the ideal landscape of 21st-century education, teachers are positioned as professional agents capable of integrating pedagogical expertise, digital literacy, ethical judgment, and adaptive competencies to support meaningful learning for diverse learners. This expectation becomes increasingly critical in the era of digital disruption, where rapid technological advancements particularly artificial

intelligence (AI), digital platforms, and data-driven learning systems reshape how knowledge is accessed, constructed, and assessed. Within this context, professional teacher competence is no longer limited to subject mastery and classroom management, but extends to the ability to design technology-enhanced learning experiences that are developmentally appropriate, ethically grounded, and responsive to learners' socio-cultural realities (Pratiwi & Yunus, 2024; Supriyono & Prihandono, 2024). For elementary education, especially lower primary grades, this ideal condition demands teachers who can balance digital innovation with foundational pedagogical principles that prioritize cognitive, emotional, and moral development.

The urgency of this ideal is intensified by the emergence of Generation Alpha, children born after 2010 who have been immersed in digital technology from early childhood. Empirical studies consistently show that Generation Alpha learners demonstrate strong visual orientation, rapid information processing, preference for interactive media, and early familiarity with digital devices (Dewi et al., 2021; Karina et al., 2024). While these characteristics present opportunities for innovative learning, they also pose pedagogical challenges, particularly for lower-grade students who are still developing basic literacy, numeracy, self-regulation, and social skills. Research indicates that without adequate pedagogical mediation, excessive or poorly structured technology use may hinder deep learning, attention span, and character development at the primary level (Rochim, 2024; Hasanah, 2024). Consequently, teachers' professional competence becomes a determining factor in ensuring that digital tools function as pedagogical enablers rather than disruptive distractions.

In Indonesia, these global dynamics intersect with national education reform through the implementation of the Merdeka Curriculum (Independent Curriculum), which emphasizes flexibility, learner-centered pedagogy, contextual learning, and the meaningful integration of technology. In principle, the Merdeka Curriculum provides a strategic framework that empowers teachers to adapt learning designs to student needs and local contexts, including the use of digital technology and AI-supported learning tools (Supriyono & Prihandono, 2024). However, empirical evidence suggests that curriculum flexibility alone does not automatically translate into effective classroom practice. Several recent studies report that many elementary teachers, particularly at the lower-grade level, experience difficulties in translating curriculum ideals into digitally integrated pedagogical practices due to limited digital competence, insufficient training, and uneven access to infrastructure (Maulid et al., 2024; Patty & Lekatompessy, 2024).

Existing empirical findings reveal a persistent readiness gap between policy expectations and teacher capacity. Although teachers generally express positive attitudes toward digital learning and recognize the importance of AI and educational technology, their practical competence often remains at a basic or instrumental level, focused on media use rather than pedagogical transformation (Ulimaz et al., 2024; Afandi & Kurnia, 2023). This gap is particularly evident among experienced teachers who were professionally formed in pre-digital educational environments and received limited formal preparation in digital pedagogy during their initial training. Research between 2020 and 2025 consistently identifies the lack of contextual, practice-oriented professional development as a major barrier to meaningful technology integration in elementary schools (Santoso & Fitriatin, 2024; Salsabila et al., 2025). As a result, digital disruption is often perceived as an external pressure rather than an integrated component of professional growth.

Despite the growing body of research on digital learning, AI in education, and teacher professionalism, a critical research gap remains. First, most existing studies focus on secondary or higher education contexts, leaving lower primary education underexplored, even though this level is foundational for lifelong learning habits. Second, many studies adopt a techno-centric perspective, emphasizing tools and applications rather than teachers' professional competence as a holistic construct encompassing pedagogical judgment, ethical awareness, curriculum interpretation, and learner development. Third, research rarely situates teacher competence within the specific policy context of the Merdeka Curriculum and the unique characteristics of Generation Alpha learners simultaneously. Consequently, there is limited empirical understanding of how lower-grade teachers perceive, negotiate,

and enact professional competence amid digital disruption in real classroom settings under the Independent Curriculum framework. This absence creates a conceptual and empirical blind spot in current educational research.

Therefore, this study addresses a specific and operational research problem: How do lower primary school teachers conceptualize and enact professional competence in response to digital disruption during the implementation of the Merdeka Curriculum for Generation Alpha learners, and what factors support or constrain this process? By focusing on teachers' lived experiences and perceptions, this research moves beyond normative assumptions about digital readiness and explores the complex interaction between teacher competence, learner characteristics, curriculum policy, and institutional context. Such an approach is essential to uncover the structural and professional dynamics that shape technology integration at the foundational level of education.

The objective of this study is threefold: (1) to explore lower-grade teachers' perceptions of Generation Alpha learners in the context of digital learning; (2) to analyze the dimensions of professional competence required to navigate digital disruption within the Merdeka Curriculum; and (3) to identify the supporting and inhibiting factors influencing teachers' professional readiness. The findings are expected to contribute theoretically by enriching the discourse on teacher professionalism in digitally disrupted elementary education, and practically by informing teacher training programs, curriculum implementation strategies, and policy interventions.

2. METHODS

This research used an exploratory qualitative approach to explore the perceptions and experiences of lower-grade elementary school teachers in developing professional competencies amidst digital disruption during the implementation of the Independent Curriculum for Generation Alpha students. The research was conducted in December 2025 at SD IT (Islamic Elementary School) in Yogyakarta. The subjects consisted of nine lower-grade teachers teaching in grades I through III of regular elementary schools. Subjects were selected using a purposive sampling technique, with the criteria being teachers with more than 10 years of teaching experience and direct involvement in digital-based learning or the use of technology in the classroom.

The research procedure began with the development of an open-ended questionnaire designed to explore teachers' perspectives on the characteristics of Generation Alpha students, the professional competencies required in the digital era, teacher readiness levels, contextual challenges in technology integration, the role of the Independent Curriculum, and the need for continuous professional development. The questionnaire was distributed online via Google Forms to facilitate respondent participation and ensure flexibility. The data collected consisted of written narratives from respondents reflecting their actual classroom experiences.

All responses were systematically analyzed through thematic analysis, which included data familiarization, initial coding, grouping codes into key themes, and reviewing and confirming themes to ensure consistency of meaning. To strengthen the interpretation of the findings, the results of the thematic analysis were then linked to the research objectives, namely to understand the professional competency of lower-grade teachers in facing digital disruption and the supporting and inhibiting factors in its implementation in the Independent Curriculum. Furthermore, the frequency of occurrence of certain themes was calculated descriptively to identify dominant patterns without the intention of making statistical generalizations.

Data validity was maintained through re-readability of respondents' answers, consistency of the coding process, and conceptual triangulation with current literature on teacher digital competency and basic education. The final interpretation focused on how teacher professional readiness interacts with the characteristics of Generation Alpha and the context of education policy, resulting in a comprehensive understanding of the dynamics of teacher competency in the era of digital transformation.

3. FINDINGS AND DISCUSSION

This study aims to explore the professional competencies of lower-grade teachers in facing digital disruption in the implementation of the Independent Curriculum for Generation Alpha students, while also identifying the challenges and associated professional development needs. The following table presents the demographic characteristics of lower-grade teachers, categorized by length of teaching experience as an elementary school teacher at SD IT Yogyakarta.

Table 1. Demographic Characteristics of Elementary School Teacher Respondents

Full Name	Gender	Years of Teaching Experience as an Elementary School Teacher
Putri	Female	> 10 years
Rochma Yulika	Female	> 10 years
Susanti	Female	5 - 10 years
Suliatun	Female	> 10 years
Intarti Ratnaningsih	Female	> 10 years
Rian Dwi Astuti	Female	> 10 years
Ratna	Female	> 10 years
Wiwik Agustinawati	Female	> 10 years
Eram Kusuma Kartikasari, S.S., S.Pd.SD	Female	> 10 years

Based on respondent characteristics, all participants in this study were female elementary school teachers. Of the nine teachers involved, the majority had extensive teaching experience, with eight having served as teachers for more than ten years, while one teacher had worked between five and ten years. This composition indicates that the respondents were predominantly experienced educators with extensive experience in teaching practices at the lower grade level. The predominance of teachers with more than a decade of service indicates that the study findings reflect professional perspectives formed through mature pedagogical experience. With their extensive experience, the teachers not only understand the dynamics of conventional learning but also directly experience the transition to digital-based learning in the implementation of the Independent Curriculum. This strengthens the validity of the qualitative findings regarding the challenges of technology adaptation, professional competency, and professional development needs in addressing the characteristics of Generation Alpha students. Furthermore, the gender homogeneity of the study sample aligns with the demographic reality of the teaching staff in Indonesian elementary schools, which is predominantly female. This situation provides a relevant social context for understanding lower grade teaching practices, particularly in efforts to build learning environments that are adaptive to digital disruption and the developmental needs of early-age learners. Another thematic analysis of the open-ended questionnaire responses revealed several key findings demonstrating the complex dynamics between the characteristics of digital native learners, teacher preparedness, and education system support. The following table shows the percentage distribution of lower-grade teachers' professional competencies in digital learning.

Table 2. Percentage Distribution of Professional Competence of Lower Elementary School Teachers in Digital Learning

Theme	Number of Teachers	Percentage
Digital Native Learners	9	100%
Digital Competence	8	89%
Professional Readiness	7	78%
Infrastructure and Context Barriers	6	67%

| Supporting the Independent Curriculum | 8 | 89% |
| Professional Development Needs | 9 | 100% |

The first finding indicates that all respondents viewed Generation Alpha students as individuals who had become accustomed to digital technology from an early age. Teachers described students as "easily adapting to digital technology" and "technologically literate," reflecting the characteristics of learners who are responsive to digital media and technology-based interactions. This finding addresses the research objective regarding the learning context faced by lower-grade teachers and explains why demands on teacher professional competence have shifted significantly. Intense exposure to technology from an early age shapes learning expectations that are more visual, interactive, and fast-paced, making conventional approaches less relevant. This finding aligns with previous research findings confirming that Generation Alpha students exhibit a strong preference for digital and multimodal learning, which requires teachers to adapt pedagogical strategies creatively and technologically integratively.

The second finding indicates that digital competence is perceived as a core component of lower-grade teacher professionalism. Most respondents explicitly mentioned the importance of digital skills, both in the use of learning media, technology-based classroom management, and the creation of interactive materials. This trend occurs as teachers face the reality of increasingly digitalized classrooms, where technology is no longer an additional tool but rather the primary medium of learning. In a theoretical context, these results support the 21st-century teacher competency framework, which positions digital literacy as the foundation of modern professionalism. Previous studies have also shown that the success of technology integration is significantly influenced by teachers' digital competency levels, particularly at the elementary education level, which requires specific pedagogical approaches tailored to children's developmental stages.

However, despite the critical importance of digital competency, the third finding indicates a gap in teachers' professional readiness in its implementation. Many respondents cited limited training, a lack of mentoring, and the need to continuously improve digital skills. This trend can be explained by the limited availability of ongoing professional development programs specifically targeting contextual digital skills for lower-grade teachers. Theoretically, this phenomenon reflects the concept of a readiness gap in digital education transformation, where policies and system demands evolve faster than human resource capacity. This finding is consistent with previous research that found low teacher participation in digital training to be a major obstacle to the success of technology-based learning innovations.

The fourth finding reveals that challenges to technology integration stem not only from individual teacher competencies but also from contextual and structural factors. Teachers reported limited infrastructure, disparities in student access to devices, and a lack of digital learning resources appropriate to the characteristics of early childhood. This trend demonstrates that teachers' professional competence operates within a complex educational ecosystem, requiring systemic support for successful digital learning. From an educational ecology perspective, the school environment, institutional policies, and resource availability are key factors mediating teachers' pedagogical practices. These findings reinforce previous research that asserted that the digitalization of education in elementary schools is often hampered by limited infrastructure and unequal access to technology.

The fifth finding relates to teachers' perceptions of the Independent Curriculum as a framework that relatively supports adaptive and innovative learning. Most respondents stated that this curriculum provides flexibility in the selection of learning methods and media, including the use of digital technology. However, this positive perception is not fully accompanied by adequate competency readiness and technical support. This explains why, despite the progressive nature of the curriculum policy, its implementation has not been optimal in lower grades. This finding aligns with previous studies showing that curriculum reforms often face implementation challenges due to limited teacher capacity and school resources.

This final finding underscores the urgent need for structured and continuous teacher professional development, particularly in the area of digital pedagogical competency. Teachers consistently

proposed practice-based training, ongoing mentoring, and the provision of adequate facilities as primary solutions. This trend can be explained by the dynamic nature of digital competency, which continues to evolve with technological advances. Theoretically, this aligns with the concept of lifelong professional learning, which emphasizes the need for continuous updating of teacher competency through reflective experience and contextual training. Previous research also confirms that continuous professional development programs have a significant impact on improving the quality of digital learning in elementary schools. Overall, the results of this study indicate that the professional competence of lower-grade teachers in facing digital disruption is a multidimensional construct influenced by the characteristics of Generation Alpha students, individual teacher readiness, curriculum support, and school structural factors. These findings address the research objective by revealing that although teachers recognize the importance of digital competence and are supported by the Independent Curriculum framework, readiness gaps and contextual limitations remain major obstacles. Therefore, digital education transformation in lower-grade schools cannot rely solely on curriculum policies but must be accompanied by strategies to strengthen teachers' professional competence systematically and sustainably.

The first major finding of this study that lower primary teachers recognize Generation Alpha learners as digitally native and therefore emphasize digital competence as central to professionalism resonates with broader empirical evidence indicating that teachers' digital literacy is foundational to their pedagogical effectiveness. For example, Susilowati and Haryono (2025) showed that digital literacy significantly enhances elementary teachers' pedagogical competencies, influencing curriculum design, instructional delivery, and classroom management performance. Similarly, systematic reviews report that digital competence has become an indispensable component of 21st-century teacher professionalism, not merely a supplemental skill (Yulaikhah & Hidayat, 2025). Your findings contribute to this discourse by showing that, in the Indonesian context under the Merdeka Curriculum, teachers are cognitively attuned to these expectations. Theoretically, this alignment can be interpreted through 21st Century Skills frameworks, which position digital literacy as integrated with pedagogical reasoning and adaptive expertise, rather than as a technical add-on. This confirms that digital competence is increasingly framed as a core professional domain, consistent with both national curriculum reform intentions and international competency constructs (e.g., UNESCO ICT-CFT), rather than an optional teacher attribute. The similarity between your findings and the literature suggests a converging global understanding of what teacher professionalism must encompass in digitally saturated learning environments.

Despite this shared recognition of digital competence's importance, your study reveals persistent readiness gaps teachers acknowledge digital tools' pedagogical potential but struggle with actual implementation due to limited training, infrastructure deficits, and contextual barriers. This contrasts with findings in certain quantitative studies where basic digital competency scores among teachers were relatively high (e.g., Özdemir, 2025, who found generally high digital competence and literacy levels among teachers), though those studies were mainly in contexts with different educational infrastructures and professional development ecosystems. In contrast, studies in Indonesian primary settings echo your results: for instance, Fitri et al. (2025) documented that while schools and governments provide digitalization support, challenges such as unsustainable training and infrastructure disparities still hamper effective policy implementation. The divergence thus appears to reflect contextual differences in educational systems, resource distribution, and policy implementation fidelity: in contexts with more robust infrastructure and systematic professional development, digital competence scores may be higher; in your Indonesian study, structural limitations suppress the translation of teachers' acknowledgement of digital competence into classroom practice. Theoretically, this underscores the ecological model of teacher competency where individual capacities interact with institutional and systemic conditions which aligns with educational ecology perspectives emphasizing that competence is enacted within an ecosystem of support, resources, and professional learning opportunities.

Finally, your finding that the Merdeka Curriculum's flexibility supports adaptive, technology-integrated instruction but is undermined by competency and contextual limitations reveals a nuanced interplay between curriculum policy and teacher agency. This aligns with systematic reviews that highlight digitalization's potential to enhance pedagogical variation and learner engagement, while also emphasizing barriers like limited digital literacy and resource gaps (e.g., Sindoro, 2025). However, your results advance the literature by illustrating not only these challenges but also the internal cognitive and professional dynamics teachers' reflective understanding of digital pedagogy, their professional autonomy, and perceived needs for ongoing development that shape how curriculum reform translates into practice. This critical nuance contrasts studies that treat curriculum policy and teacher competence as separate domains; instead, your findings show that curriculum effectiveness is contingent on co-evolutionary development of teacher competencies, infrastructure, and continuous professional learning. From a theoretical standpoint, this supports transformative professional development models that argue for sustained, context-embedded training rather than isolated technology workshops, and aligns with emerging research stressing lifelong professional learning as central to meaningful digital integration. Consequently, the scientific implication is that policy frameworks like the Merdeka Curriculum are necessary but insufficient alone; without systematic, ongoing development of teacher capacity and supportive learning ecosystems, educational reforms will struggle to realize their potential impact on teaching and learning in the digital age.

4. CONCLUSION

This study demonstrates that lower-grade teachers recognize the urgency of digital competence as an integral part of professional competence in teaching Generation Alpha in the era of digital disruption. Although these teachers have extensive teaching experience and a strong pedagogical understanding, their digital readiness is still developing and is influenced by limited technological skills, access to infrastructure, and a lack of contextual ongoing professional development. The implementation of the Independent Curriculum is perceived as a strategic opportunity to encourage the integration of technology into learning, but its effectiveness depends heavily on systematic support for improving teachers' digital competencies. Therefore, strengthening technology-based professional competencies is a key prerequisite for creating adaptive learning that is relevant to Generation Alpha students.

Future research is recommended to involve a broader and more geographically diverse group of participants to obtain a more comprehensive picture of elementary school teachers' digital competencies. A mixed methods approach can also be used to combine the strengths of qualitative and quantitative data to measure competency levels more objectively. Furthermore, a longitudinal study is needed to track the development of teachers' digital competencies as the Independent Curriculum continues to be implemented. Limitations of this study lie in the relatively limited number of respondents and the use of an open-ended questionnaire as the sole data collection instrument, which means the findings are more representative of teachers' subjective perceptions. Therefore, future research is recommended to include classroom observations and in-depth interviews to enhance data validity.

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