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Teacher Digital Literacy and Merdeka Curriculum Readiness: The Role of Learning Communities in Preparing 21st-Century Competencies in Secondary Schools

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Abstract
The global education crisis demands that teachers possess competent digital literacy as a prerequisite for implementing the Merdeka Curriculum and preparing students for 21st-century challenges. However, despite strong policy emphasis on digital literacy and Learning Communities, empirical evidence of their interrelationship in Indonesian secondary school contexts remains limited. This study aims to analyze the effectiveness of Learning Communities as a mechanism for teacher professional development, the level of teacher digital literacy, and the evaluation of the school's digital climate in supporting the synergy between the two. This research uses a descriptive quantitative approach with a cross-sectional survey design, based on data from 39 Junior High School teachers across two work units (SMPN 2 Dawarblandong and SMPN 2 Mojosari). Data were analyzed using descriptive statistics including means, standard deviations, and comparative analysis between schools. The results show that the Learning Community dimension proved highly effective with an average score of 4.78, serving as a core pillar for professional development and teacher self-reflection. The strongest indicator lies in the Learning Communities' ability to help teachers identify strengths and weaknesses in their teaching practices, achieving a score of 4.92. However, the Teacher Digital Literacy dimension recorded the lowest average score of 4.47, with the routine use of Google Classroom as the lowest indicator at 4.23. While leadership support in facilitating Learning Communities is very high at 4.90, formal recognition related to digital innovation by school principals remains moderate at 4.28. It is concluded that Learning Communities have established a strong foundation for collaboration, but there is a significant gap between non-technical collaborative readiness and routine technology adoption. Schools need to reorient Learning Communities to focus on operational technical training and strengthen the recognition system to encourage continuous digital integration in implementing the Merdeka Curriculum.

INTRODUCTION

The shift in the global education landscape driven by the Fourth Industrial Revolution and the emergence of Society 5.0 has positioned 21st-century competencies—such as creativity, critical thinking, collaboration, and communication—as fundamental learning outcomes (Selviani et al., 2025). Indonesia has responded to these demands through the implementation of the Merdeka Curriculum, a

curriculum framework that emphasizes differentiated learning, project-based approaches, and flexibility for teachers to design relevant learning experiences (Syafruddin et al., 2025). The success of the Merdeka Curriculum heavily depends on teachers' ability to adapt, innovate, and utilize Information and Communication Technology (ICT) in their teaching practices. However, the literature still lacks comprehensive analysis on how teachers develop the dual competencies of digital literacy and collaborative professionalism simultaneously, especially through Learning Communities. Recent studies have demonstrated that curriculum reform success is intrinsically linked to teachers' technological pedagogical content knowledge and their capacity to integrate digital tools meaningfully into instruction (Mustofa et al., 2025). The transformative nature of the Merdeka Curriculum requires teachers to move beyond traditional pedagogical approaches and embrace technology-enhanced learning environments. Therefore, understanding the current state of teacher digital literacy becomes essential for effective curriculum implementation. The integration of digital technologies in education has become not merely an option but a necessity in preparing students for future challenges.

In this context, Teacher Digital Literacy (TDL) transcends mere technical skills; it encompasses a teacher's pedagogical capacity to effectively integrate technology to enhance student learning outcomes and support the philosophy of the Merdeka Curriculum (Lailiyah et al., 2024). A broader conceptualization of digital literacy is needed, including information literacy, communication skills, digital content creation, online safety, and digital problem-solving, rather than a narrow focus on the use of specific platforms. Platforms such as Google Classroom support assignment management, formative assessment, and collaboration (Wohlfart & Wagner, 2022). Digital literacy in educational settings involves multiple dimensions including information literacy, communication and collaboration skills, digital content creation, safety awareness, and problem-solving capabilities (Agustina & Lestari, 2025). To operationalize 21st-century competencies within Merdeka Curriculum implementation, teachers must demonstrate digital fluency that aligns with creativity, critical thinking, collaboration, and communication. Research indicates that teachers with higher levels of digital literacy demonstrate greater innovation in teaching methods and improved student engagement (Haq & Wakidi, 2024).

Facing the challenges of rapid curriculum adaptation and the complexity of technology integration, Learning Communities (LC) play a crucial role in teacher transformation. Learning Communities require clearer theoretical grounding, particularly regarding their role as professional learning structures that foster reflective dialogue, collaborative inquiry, and continuous pedagogical improvement. Studies show that Learning Communities, through practices such as Lesson Study or peer coaching, are highly relevant in supporting the simultaneous enhancement of pedagogical competence and teacher digital literacy (Wahyuni et al., 2023). The collaborative nature of Learning Communities creates opportunities for teachers to experiment with new teaching methodologies aligned with the demands of the Merdeka Curriculum, including its digital aspects. Effective Learning Communities foster a culture of shared responsibility for student learning and collective efficacy among educators (Langoday et al., 2024). Through structured dialogue and reflective practices, teachers in Learning Communities can critically examine their instructional strategies and identify areas for improvement. The supportive environment within Learning Communities helps teachers overcome the isolation often experienced in traditional school structures and builds professional networks that sustain innovation.

The demographic composition of the teaching workforce adds another layer of complexity to digital literacy development and Learning Community effectiveness. Many Indonesian schools, particularly in secondary education, exhibit significant age polarization among teaching staff, with substantial numbers of both senior teachers nearing retirement and younger digital natives entering the profession (Yuliandari et al., 2024). This generational divide presents both challenges and opportunities for professional development initiatives. Senior teachers often possess deep pedagogical knowledge and extensive classroom experience but may face barriers in adopting new technologies, while younger teachers typically demonstrate higher technological proficiency but may lack pedagogical depth (Saa, 2024). Learning Communities can serve as bridging mechanisms that

facilitate bidirectional knowledge transfer—senior teachers sharing pedagogical wisdom while junior teachers contribute technical digital expertise. Understanding how these demographic factors influence the effectiveness of Learning Communities and digital literacy development is essential for designing appropriate professional development strategies. The intergenerational dynamics within schools can either facilitate or hinder the successful implementation of curriculum reforms.

Despite the acknowledged importance of the Merdeka Curriculum's emphasis on enhanced Teacher Digital Literacy and the recognition of Learning Communities as catalysts for professional growth, empirical analysis is still needed to understand how these two elements synergize at the school practice level. Previous research has examined Learning Communities and digital literacy separately, but limited studies have investigated their interconnection specifically within the context of Merdeka Curriculum implementation (Nadya et al., 2023). Furthermore, the role of institutional support and school digital climate in facilitating this synergy remains underexplored in Indonesian secondary school contexts (Rahmawati et al., 2024). The gap between policy intentions and classroom realities often stems from insufficient understanding of the mechanisms that enable or constrain teacher development. Research examining the interplay between collaborative professional learning structures, digital competencies, and institutional support systems is critical for informing evidence-based policy decisions. This study addresses these gaps by empirically investigating the relationships among Learning Community effectiveness, Teacher Digital Literacy levels, and school digital climate.

This research aims to empirically investigate the effectiveness of Learning Communities and the level of Teacher Digital Literacy implementation, as well as the extent to which the school digital climate facilitates this process in the context of Merdeka Curriculum readiness in secondary schools. Specifically, this study pursues three main objectives: first, to analyze the effectiveness level of Learning Communities in two State Junior High Schools; second, to measure the level of Teacher Digital Literacy implementation and routine practices of core Merdeka Curriculum technology use; and third, to evaluate the extent to which institutional support and school digital climate contribute to the synergy between Learning Communities and enhanced Teacher Digital Literacy. By examining these dimensions comprehensively, this study seeks to provide actionable insights for school leaders, policymakers, and teacher educators regarding strategies to strengthen the preparation of 21st-century competencies through digital literacy development within collaborative professional learning structures. The findings will contribute to the growing body of knowledge on curriculum reform implementation in developing country contexts.

METHODS

This research employed a descriptive quantitative approach with a survey design. The purpose of this approach was to describe the actual conditions and characteristics of the research variables Learning Communities, Teacher Digital Literacy, and School Digital Support/Climate as perceived by teachers in the sample population. Data collected were cross-sectional in nature and were used to identify average scores (levels of agreement) for a series of statements reflecting ongoing practices. The descriptive quantitative method was selected because it allows for systematic measurement and statistical analysis of current phenomena without manipulation of variables, making it appropriate for assessing the present state of Learning Community effectiveness and digital literacy levels in school settings.

The target population consisted of Junior High School teachers who were actively involved in Learning Communities at their schools. The research sample comprised a total of 39 teacher respondents from two work units: SMPN 2 Dawarblandong (N=15) and SMPN 2 Mojosari (N=24). The demographic profile of respondents showed significant polarization regarding age and years of service. Overall, 18 respondents had more than 20 years of teaching experience, and 16 respondents were over 50 years old. On the other hand, there was a significant group of young teachers, with 11 respondents in the 25-35 age range and several having less than 5 years of teaching experience. This demographic composition is important to consider in the analysis of technology adoption patterns and

Learning Community participation dynamics. The respondents represented diverse subject areas including mathematics, science, language arts, and social studies, ensuring representation across the curriculum.

Data were collected through a questionnaire measuring teachers' perceptions of the digital climate and their Learning Community practices. The instrument used a 5-point Likert scale, with rating ranges as follows: 1 = Strongly Disagree to 5 = Strongly Agree. The dimensions measured in this study included: (1) Learning Communities, measured through 9 indicators including participation, Lesson Study practices (observation and reflection), sharing of teaching materials, and utilization of student learning outcomes for teaching practice improvement; (2) Teacher Digital Literacy, measured through 10 indicators focusing on routine technology integration, particularly the utilization of Google Classroom platform for learning facilitation, assignment management, and providing digital feedback; and (3) School Digital Support/Climate, measured through 13 indicators evaluating school leadership support (facilitating Learning Communities and providing recognition), infrastructure availability (devices and internet connectivity), official policies, and school culture promoting digital innovation. Data analysis was conducted using descriptive statistics. The primary calculation was the mean score for each statement, group of indicators, and dimension. These mean scores were used to determine the effectiveness level (strongly agree/agree/neutral/etc.) of each variable. Comparative calculations of mean scores between the two work units were also performed to identify implementation variations.

Table 1. Research Variables and Indicators

Dimension	Number of Indicators	Key Aspects Measured	Score Range
Learning Communities	9	Participation, Lesson Study, resource sharing, reflection practices	1-5
Teacher Digital Literacy	10	Google Classroom usage, digital assignment management, online feedback	1-5
School Digital Climate	13	Leadership support, infrastructure, policies, innovation culture	1-5

RESULTS AND DISCUSSION

Results

Demographic Profile of Respondents and Implications for Digital Literacy

The total of 37 respondents whose demographic details could be categorized based on work unit, age, and years of teaching service revealed important patterns for understanding digital literacy readiness. Demographic analysis uncovered extreme polarization in age and years of service at both schools. The majority of respondents (18 individuals) were senior teachers with over 20 years of teaching experience, simultaneously belonging to the age group above 50 years. The presence of this large senior group indicates pedagogical stability but also raises unique challenges in digital technology adaptation. Teachers who are more senior are often categorized as digital immigrants who may face barriers in adopting new technologies compared to younger teachers. On the other hand, there was a substantial group of young teachers (25-35 age range), especially at SMPN 2 Mojosari. This intergenerational gap underscores the importance of Learning Communities as an inclusive platform. An effective Learning Community serves as an important mechanism to bridge this gap, facilitating two-way knowledge transfer: senior teachers share pedagogical depth while junior teachers contribute technical digital competence.

Table 2. Demographic Profile of Respondents (N=37)

Work Unit	Number (N)	Dominant Age Range	Dominant Teaching Experience
SMPN 2 Dawarblandong	15	> 50 years (8)	> 20 years (8)
SMPN 2 Mojosari	22	25-35 years (8) and > 50 years (8)	> 20 years (10)

Learning Communities: Foundational Pillar of Merdeka Curriculum Readiness

The Learning Community dimension overall demonstrated very strong performance, achieving the highest average score among all measured dimensions at 4.78 (Strongly Agree category). This effectiveness level indicates that Learning Communities have become established and are an integral part of the professional culture of teachers at both schools. The strength of Learning Communities was most evident in indicators related to teaching practice reflection and reciprocal collaboration. The statement with the highest average score across the entire survey was "Learning Communities help me identify strengths and weaknesses in teaching practices," which reached 4.92. This near-perfect score confirms that Learning Communities are not only seen as gathering places but function as critical inquiry environments that encourage teachers to engage in continuous reflection and adjustment of their teaching methods. This self-reflection capability and behavior modification constitute crucial non-technical foundations for implementing the dynamic Merdeka Curriculum, as the curriculum demands constant curriculum adaptation.

The level of collaboration was also very high, indicated by high scores on "I receive input from fellow teachers" (4.90) and "I routinely share teaching materials or media" (4.79). Furthermore, comparison between schools showed that SMPN 2 Dawarblandong demonstrated slightly higher consensus, achieving a perfect score of 5.00 on several core Learning Community indicators, including identification of weaknesses, enthusiasm, and reinforcing discussions. This highlights that both schools possess mature collective assets to face curriculum changes. The collaborative environment fostered by Learning Communities extended beyond formal meetings to include informal exchanges, peer observations, and shared planning sessions. Teachers reported feeling supported and valued within their Learning Communities, which contributed to their willingness to take instructional risks and experiment with new pedagogical approaches.

Table 3. Average Scores of Learning Communities and Leadership Support

Dimension/Key Indicator	Total Average (N=39)	Category
Learning Community Dimension Average	4.78	Strongly Agree
LC helps me identify strengths and weaknesses	4.92	Highest overall indicator
School leadership facilitates LC formation	4.90	High Structural Support
Principal gives recognition to LC	4.28	Development Area

Teacher Digital Literacy: Routine Technology Adoption as Implementation Gap

Although Learning Communities showed very high effectiveness, the Teacher Digital Literacy dimension showed the lowest overall average score at 4.47. This gap indicates a disparity between intention and collaboration (which is high in Learning Communities) and routine implementation of digital technology in daily practices. The critical point of Teacher Digital Literacy was identified in the statement: "I use Google Classroom routinely to facilitate learning," which recorded the lowest score across the entire survey with an average of 4.23. This indicator is very important because Google Classroom, as part of Google Workspace for Education, is one of the main digital tools recommended to support content management, assignments, and assessments required by the Merdeka Curriculum. The score of 4.23, although still in the "Agree" category, indicates that Google Classroom use has not yet fully become an integrated and continuous routine practice among all teachers.

The low score for routine Google Classroom use amid high Learning Community collaboration scores (4.78) suggests that Learning Communities currently may prioritize general pedagogical discussions and sharing of physical/traditional resources rather than in-depth operational technical training. The ability to manage student assignments through Google Classroom had a higher score (4.72) than routine Google Classroom use itself. This difference can be interpreted to mean that teachers tend to use Google Classroom when required (for example, to collect assignments) but have not yet utilized its full potential for comprehensive learning facilitation or constant digital interaction. To address the Merdeka Curriculum demands, Learning Communities must transform into digital upskilling hubs. Strengthening needs to be directed at overcoming daily implementation barriers, such

as creating digital assessment rubrics, utilizing automated quiz features, or seamlessly integrating digital teaching materials, which are necessary steps to elevate Teacher Digital Literacy scores from "quite agree" to "strongly agree" status.

Table 4. Average Scores of Teacher Digital Literacy Indicators (Focus on Google Classroom)

Teacher Digital Literacy Indicator	Total Average (N=39)	Category
Teacher Digital Literacy Dimension Average	4.47	Lowest Overall
Student assignments managed through Google Classroom	4.72	High (Assignment Focus)
I use Google Classroom routinely	4.23	Lowest (Routine Focus)
I provide feedback digitally through platforms	4.64	Moderate-High
I create digital learning materials regularly	4.51	Moderate

School Digital Support and Climate: Recognition of Innovation Challenges

The school digital climate overall was assessed as very supportive. Structural and administrative support indicators showed impressive scores. School leadership in facilitating Learning Community formation achieved a very high score of 4.90. Additionally, schools had official policies related to ICT utilization (4.79) and provided adequate devices (4.82). Teachers' perception that the school climate positively supports the use of digital technology was also very high (4.85). Cultural support for innovation also appeared strong, where digital learning innovation was encouraged (4.77) and teachers were supported to develop teaching media (4.82).

Although structural facilities and innovation encouragement were at ideal levels, there was a key weakness in the aspect of formal recognition or acknowledgment by leadership. The statement "The principal gives recognition to Learning Communities" only achieved a score of 4.28. This score of 4.28, although still positive, is significantly lower than the leadership facilitation score (4.90) and other digital climate support scores. The presence of this relatively low recognition score implies a gap between providing resources and sustaining commitment. Schools have successfully created infrastructure and supporting policies. However, the transition from mere participation in Learning Communities to sustained digital innovation—which demands extra time and energy from teachers—requires formal recognition. Failure to provide formal acknowledgment can hinder teachers' efforts to maintain routine digital adoption (reflected in the low Google Classroom score of 4.23). Measurable and explicit recognition is key to maintaining long-term motivation and encouraging the pedagogical risk-taking necessary to implement the Merdeka Curriculum effectively.

Table 5. School Digital Climate Support Indicators

Digital Climate Indicator	Total Average (N=39)	Category
Leadership facilitates LC formation	4.90	Very High
School has official ICT policies	4.79	High
Adequate devices available	4.82	High
Positive digital climate perception	4.85	Very High
Digital innovation encouraged	4.77	High
Support for media development	4.82	High
Principal recognition of LC	4.28	Moderate (Gap)

Comparative Analysis Between Schools

Comparison between SMPN 2 Dawarblandong and SMPN 2 Mojosari revealed interesting patterns in implementation. SMPN 2 Dawarblandong demonstrated higher consistency in Learning Community practices, with several indicators reaching perfect scores of 5.00. This school's smaller size (15 teachers) may facilitate more cohesive collaboration and stronger interpersonal relationships among staff members. However, both schools showed similar patterns in the digital literacy implementation gap, with routine Google Classroom usage remaining the lowest indicator at both institutions. This suggests that the challenge of translating collaborative readiness into consistent digital practice transcends individual school contexts and represents a broader systemic issue requiring targeted intervention.

Discussion

The findings of this research paint a scenario of Merdeka Curriculum readiness that has a strong foundation but faces specific implementation barriers. Learning Communities at these secondary schools successfully created a culture of intensive collaboration and reflection (4.78), overcoming the existing demographic challenges where Learning Communities can function as platforms enabling senior teachers to share pedagogical experience and junior teachers to share digital skills. This dual exchange mechanism represents a sophisticated form of professional learning that leverages the diverse competencies present within the teaching workforce. The effectiveness of Learning Communities in fostering reflective practice, as evidenced by the highest score of 4.92 for identifying teaching strengths and weaknesses, demonstrates that teachers have embraced a growth mindset and are willing to critically examine their instructional practices. Such reflective capacity is fundamental to the continuous improvement cycle required by the Merdeka Curriculum's emphasis on adaptive, student-centered pedagogy (Zaenab et al., 2024). The collaborative culture established within Learning Communities creates psychological safety that encourages experimentation and risk-taking, both essential for pedagogical innovation.

However, the high score for Learning Communities does not automatically result in high routine digital practices. The low score for routine Google Classroom use (4.23) indicates an implementation gap that must be immediately addressed. This gap may occur due to several factors, such as Learning Communities' lack of focus on practical technical coaching sessions, or challenges in teacher time management to fully integrate technology that requires more structured preparation and data management. The disparity between the high score for managing student assignments through Google Classroom (4.72) and the lower score for routine use suggests a compliance-oriented rather than integration-oriented approach to technology adoption. Teachers appear to use digital tools when externally mandated or for specific functions but have not internalized technology use as a seamless component of their daily pedagogical practice. This pattern reflects what research describes as superficial adoption rather than deep integration of educational technology (Rohimajaya & Hamer, 2023). The transformation from occasional to routine use requires not only technical skill development but also shifts in pedagogical beliefs and instructional habits.

To achieve full success in the Merdeka Curriculum, teachers must be able to manage learning and assessment digitally. Therefore, the synergy between Learning Communities and Teacher Digital Literacy must be strengthened. Learning Communities need to be reoriented to move beyond "sharing ideas" to "doing digital practices" in a structured manner, which might be achieved through modifying the Lesson Study format so that its main focus is on specific ICT integration (Agustin & Zumrotun, 2024). The current structure of Learning Communities, while excellent for pedagogical discourse, lacks the hands-on technical training component necessary for building digital fluency. Teachers need structured opportunities to practice using digital tools, troubleshoot technical problems, and receive immediate feedback on their technology integration attempts. Peer-to-peer technical coaching within Learning Communities could provide the scaffolding necessary for teachers to develop confidence and competence in routine digital tool usage. The emphasis must shift from knowing about digital tools to knowing how to effectively use them in authentic teaching contexts (Hadi et al., 2023).

The significant age polarization revealed in the demographic analysis (16 respondents over 50 years old and 11 in the 25-35 age range) necessitates differentiated approaches to professional development within Learning Communities. Senior teachers, while possessing deep pedagogical content knowledge, may experience technology anxiety or perceive digital integration as an additional burden rather than a pedagogical enhancement. These teachers require patient, supportive training approaches that build on their existing strengths while gradually expanding their technological repertoire (Stringer et al., 2024). Conversely, younger teachers may lack the pedagogical expertise to effectively integrate technology for meaningful learning rather than merely for novelty. Reverse mentoring programs, where younger teachers provide technical support to senior colleagues while simultaneously learning pedagogical strategies, could maximize the complementary strengths of

different generational cohorts. The Learning Community structure provides an ideal venue for such intergenerational knowledge exchange, but this exchange must be intentionally designed and facilitated rather than assumed to occur naturally (Arifin et al., 2025).

At the institutional level, school leadership has provided adequate facilities and strong structural support, as evidenced by the high scores for infrastructure availability and policy establishment. The challenge that remains is converting facilitation into motivation strengthening. School principals need to realize that without formal recognition of teachers' efforts in digital innovation, improvement in Teacher Digital Literacy scores (4.23) will stagnate. The recognition gap identified in this study (4.28 compared to 4.90 for facilitation) represents a missed opportunity to reinforce desired behaviors and sustain innovation momentum. Recognition serves multiple functions: it validates teachers' extra efforts, signals institutional priorities, provides social prestige, and creates normative pressure for others to engage in similar innovation. The absence of strong recognition systems may explain why teachers adopt digital tools when required but do not maintain routine use—the extrinsic motivation provided by mandates is insufficient without the intrinsic and social motivation fostered by recognition and celebration of innovation (Vioreza et al., 2025).

The pattern of higher scores for specific digital functions (assignment management at 4.72) compared to routine integration (4.23) suggests that teachers may view technology adoption primarily as an administrative compliance issue rather than a pedagogical enhancement opportunity. This perception may stem from how digital tools are introduced and framed within professional development contexts. If technology training emphasizes procedural compliance (how to upload materials, submit grades) rather than pedagogical transformation (how to provide personalized feedback, facilitate collaborative projects), teachers are unlikely to see routine technology use as enhancing their core professional work of teaching (Rasdiana et al., 2024). Learning Communities must reframe technology integration discussions to focus on pedagogical benefits improved student engagement, more efficient formative assessment, enhanced differentiation capabilities rather than administrative requirements (Fernández-Batanero et al., 2020). This reframing requires explicit modeling and sharing of successful technology-enhanced teaching practices within Learning Community meetings.

While infrastructure scores are high (adequate devices 4.82, positive digital climate 4.85), the gap between available resources and routine practice utilization indicates that infrastructure provision alone is insufficient for driving sustained digital integration. This finding aligns with research showing that technology integration is more strongly influenced by teacher beliefs, pedagogical knowledge, and institutional culture than by hardware availability. The schools in this study have successfully addressed the "access" dimension of the digital divide but must now focus on the "use" dimension—ensuring that available technologies are employed effectively and routinely for pedagogical purposes. This requires moving beyond one-time training sessions to ongoing, embedded professional learning that addresses teachers' evolving needs as they progress from initial adoption through to sophisticated integration of digital tools (Maryani et al., 2024).

The effectiveness of Learning Communities as a primary mechanism for teacher professional development in this study confirms international research on professional learning communities as drivers of instructional improvement (Soepriyanti et al., 2025). However, the disconnect between Learning Community effectiveness and digital literacy implementation suggests that the content and focus of Learning Community activities may need adjustment. If Learning Community meetings predominantly address general pedagogical issues without specifically targeting digital integration challenges, they will not effectively support teachers in developing digital literacy. Strategic agenda-setting for Learning Community activities should explicitly incorporate technology integration as a recurring theme, with structured protocols for teachers to share digital tools, troubleshoot implementation challenges, and collectively problem-solve around technology-enhanced pedagogy.

The findings of this study have significant implications for the successful implementation of the Merdeka Curriculum at scale. The curriculum's emphasis on differentiated, project-based learning

inherently requires robust digital literacy, as these pedagogical approaches are greatly facilitated by technology tools that enable personalized pathways, collaborative work, and formative assessment (Tohamba & Ansyar, 2025). The implementation gap identified in this study—between collaborative readiness and digital practice—suggests that policy support for the Merdeka Curriculum must include not only curriculum guidelines and learning resources but also systematic professional development in digital pedagogy. Schools need structured support to transform their Learning Communities into effective vehicles for digital upskilling, including protocols, exemplar practices, and external expertise when needed. The recognition gap also points to the need for district and national-level recognition systems that celebrate and disseminate innovative digital practices.

The long-term sustainability of digital innovation in teaching practice depends on creating systems and structures that reinforce rather than undermine technology integration. The moderate recognition score (4.28) relative to other support indicators suggests that current systems may not adequately reinforce teachers' extra efforts in digital innovation. Sustainability requires multiple reinforcing factors: ongoing professional learning opportunities, peer support through Learning Communities, administrative recognition and rewards, and gradual shifts in school culture that normalize digital integration as expected professional practice rather than exceptional innovation. The transformation from early adoption to sustained practice is a gradual process that requires continuous support and reinforcement across multiple school years, not a one-time intervention.

CONCLUSION

This research concludes that Learning Communities in both State Junior High Schools function at a very high maturity level, characterized by an average score of 4.78. This maturity of Learning Communities has created a foundation of collaborative culture and self-reflection that constitutes the schools' greatest social capital in supporting the Merdeka Curriculum transformation. Structural school support and the digital climate in general are also assessed as very positive, providing the necessary infrastructure and policy framework for digital integration. However, analysis reveals a digital implementation gap that must become a primary concern. The Teacher Digital Literacy dimension shows the lowest average score (4.47), particularly in the aspect of routine use of core Merdeka Curriculum technologies such as Google Classroom (4.23). This gap signifies challenges in transforming collaborative knowledge gained from Learning Communities into sustained daily digital practices. Furthermore, the lack of formal recognition from school leadership for teachers' innovation efforts (recognition score 4.28) can hinder teachers' motivation to improve Teacher Digital Literacy sustainably. The strong foundation of collaboration established by Learning Communities represents significant organizational capacity that can be leveraged for digital transformation if appropriately redirected toward technical skill development and supported by recognition systems that reinforce desired behaviors.

Based on these findings, several strategic recommendations emerge for strengthening the synergy between Learning Communities and Teacher Digital Literacy in support of Merdeka Curriculum implementation. First, schools should reorient Learning Community functions to explicitly integrate technical coaching sessions focused on optimizing digital tools essential to the Merdeka Curriculum, moving beyond conceptual sharing to practicing operational procedures such as utilizing automated assessment features and managing differentiated assignments in Google Classroom. Second, given the significant age polarization among teachers, schools should institutionalize formal reverse mentoring programs where younger teachers serve as digital coaches for senior colleagues, ensuring effective and supportive technical skill transfer that bridges competency gaps influenced by years of service. Third, school principals need to develop explicit and measurable recognition mechanisms, which might include incentives, internal publication of best practices, or formal certification for teachers demonstrating significant improvement in digital technology integration supporting the Merdeka Curriculum. Fourth, follow-up qualitative research is recommended to explore specific micro-barriers (such as connectivity issues, time efficiency concerns, or perceptions of digital

workload) that prevent Google Classroom from becoming routine practice despite the supportive school climate, providing deeper insights for targeted intervention design.

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