JOURNAL OF INNOVATION AND RESEARCH IN PRIMARY EDUCATION | ISSN 2829-775X
Vol. 5, No. 1, 2026, 227-238
https://doi.org/10.56916/jirpe.v5i1.2761

Systematic Curriculum Management and Teacher Performance Development: A Comparative Case Study in Rural Schools

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Keywords
Merdeka Curriculum
Curriculum Management
PDCA
Teacher Performance

Article History
Received 2025-11-02
Accepted 2025-12-20

Abstract
The implementation of Indonesia's Merdeka Curriculum faces significant challenges in rural schools, particularly regarding teacher performance affected by limited infrastructure and uneven competencies. This study examined how systematic curriculum management through the PDCA (Plan-Do-Check-Act) cycle influences teacher performance development in two rural junior high schools. A qualitative comparative case study was conducted at SMPN 2 Naringgul and SMPN 3 Naringgul, Cianjur Regency, involving 4 school leaders and 28 teachers. Data were collected through observations (84 lessons), in-depth interviews, and document analysis over six months, then analyzed using Miles, Huberman, and Saldaña's interactive model. Both schools successfully implemented varied teaching methods (75% of lessons) and created positive learning environments (89.5%), though digital technology integration remained weak (17.5%). SMPN 2 faced internal-psychological challenges with teacher confidence, while SMPN 3 confronted systemic infrastructure limitations. Academic supervision, formative assessment, and teacher reflection forums functioned effectively, yet documentation practices and systematic follow-up remained inconsistent. Findings demonstrate that PDCA-based curriculum management improves teacher performance when appropriately contextualized, though success depends on addressing both structural constraints and teacher self-efficacy simultaneously. The emergence of organic teacher leadership and adaptive management strategies proved crucial for implementation success. Results underscore the necessity of differentiated support approaches, job-embedded professional development, and sustained multi-year commitments to technology integration in resource-constrained rural contexts.

INTRODUCTION

Education serves as the strategic foundation for sustainable national development, with quality regulated through a clear legal framework. In Indonesia, the National Education System Law (UU Sisdiknas) No. 20 of 2003 provides the primary legal basis, emphasizing that national education aims to develop students' potential to become individuals who are faithful, devout, and possess noble character. This mandate is further elaborated through national education standards covering various aspects, from content standards to processes, graduate competencies, and educator qualifications. In response to contemporary dynamics and efforts to achieve these objectives, the Ministry of Education, Culture, Research, and Technology (Kemendikbudristek) introduced a transformative policy in the form of the Merdeka Curriculum, established as the national curriculum framework through Regulation No. 12 of 2024. This curriculum is designed to create more profound, meaningful, and engaging learning processes by emphasizing the strengthening of the Pancasila Student Profile (Kemendikbudristek, 2022). Significant changes have also occurred in its components, such as the Pancasila Student Profile Strengthening Project (P5), now designated as co-curricular learning.

The success of Merdeka Curriculum implementation fundamentally depends on two main pillars: teacher performance as frontline executors and the effectiveness of curriculum management at the school level. Teacher performance, influenced by ability, motivation, and opportunity (Gibson et al., 2012), requires mastery of four core competencies—pedagogical, personal, social, and professional—

to optimally fulfill the role of learning facilitator. Research demonstrates that these competencies significantly impact instructional quality and student outcomes (Kunter et al., 2013), with pedagogical competence predicting classroom management effectiveness and students' progress in mathematics achievement (König & Pflanzl, 2016). Furthermore, effective curriculum management, as described by Sukmadinata (2016), serves as the key to directing, facilitating, and evaluating the entire process. International evidence confirms that curriculum reform requires systematic approaches combining technical and adaptive leadership strategies (Pak et al., 2020), as successful implementation depends not merely on high-quality materials but on organizational support structures that enable teachers to enact new instructional demands. In this context, W. Edwards Deming's (1986) quality management framework, namely the PDCA (Plan-Do-Check-Act) cycle, offers a relevant approach providing systematic flow for planning, implementing, evaluating, and following up on curriculum implementation continuously. Applied successfully across various sectors including education (Patel & Deshpande, 2017; Sangpikul, 2017), this cycle enables continuous improvement through iterative processes that balance desired outcomes with careful data analysis (Moen & Norman, 2006).

However, at the implementation level, significant gaps exist between policy idealism and field reality, particularly in areas with specific challenges. Rural schools face unique obstacles including inadequate infrastructure, teacher shortages, and limited access to professional development (Mwapwele et al., 2019), which significantly affect curriculum implementation effectiveness. When infrastructure challenges are addressed, individual teacher readiness and professional development become critical determinants of digital tool adoption and innovative practice implementation in rural contexts (Mwapwele et al., 2019). Geographic isolation affects educational leaders' ability to recruit and develop rural educators (Plewa et al., 2020), while technology infrastructure limitations create substantial barriers to implementing modern curricula (Edutopia, 2021). These challenges are clearly confirmed in the local context of the research sites. At SMPN 2 Naringgul, the main challenges are internal-psychological, where teachers demonstrate weaknesses in personality and pedagogical competencies and lack confidence in applying new methods. Meanwhile, at SMPN 3 Naringgul, challenges are more systemic and technical, characterized by uneven teacher understanding, resistance to change, and infrastructure limitations such as unstable internet access. These issues indicate that the problem's root lies not only in individual teacher capacity but also in the management system at the school level.

Although previous studies have identified many technical difficulties faced by teachers, a significant research gap remains regarding how the curriculum management process, when analyzed through systematic frameworks such as the PDCA cycle, directly affects the development of four teacher competencies in rural school contexts with unique challenges. Research by Amelia et al. (2025) demonstrates that effective curriculum management encourages teacher innovation, yet has not deeply explored systematic mechanisms linking curriculum management with holistic teacher competency development. Sutrisna and Rohmadi's (2024) study identifies facilities as performance constraints but has not analyzed how school management can adapt these limitations through structured managerial approaches. Similarly, Arisandi et al.'s (2025) research highlights curriculum implementation challenges in underserved regions but has not provided comprehensive analysis of how systematic curriculum management cycles can serve as strategic solutions. International literature confirms that school-based management combined with curriculum reforms can improve school performance when it includes knowledge and skills training, access to organizational performance information, and results-based rewards (Wohlstetter & Mohrman, 1993). Furthermore, successful implementation requires strategic leadership that addresses structural limitations and fosters teacher readiness, particularly in resource-constrained environments (Rogers, 2003; Knies et al., 2016). Therefore, this study comprehensively describes and analyzes Merdeka Curriculum management, encompassing planning, implementation, evaluation, and follow-up, in efforts to improve teacher performance at SMPN 2 Naringgul and SMPN 3 Naringgul.

This research possesses strong scientific and practical justification. Theoretically, it fills the knowledge gap regarding the application of quality management based on the PDCA cycle in educational reform contexts, specifically in integrating systematic management frameworks with teacher competency development as regulated in the Minister of National Education Regulation No. 16 of 2007. This aligns with international frameworks emphasizing that effective curriculum implementation requires organizational designs supporting high involvement throughout the organization with simultaneous focus on fundamental changes to educational programs (Wohlstetter & Mohrman, 1993). Practically, this research generates empirical evidence of managerial models adoptable by school principals in managing Merdeka Curriculum implementation in regions with similar characteristics and challenges. The research significance lies in its contribution to providing practical, evidence-based frameworks for improving curriculum management quality and teacher performance, ultimately contributing to sustainable educational quality improvement, particularly in regions with resource and infrastructure limitations.

METHODS

This study employed a qualitative approach with a comparative case study design to obtain an in-depth understanding of Merdeka Curriculum management implementation in improving teacher performance at two junior high schools in Cianjur Regency. The comparative case study method was selected as it allows researchers to examine phenomena in their natural settings without manipulation while enabling systematic comparison of management practices across different institutional contexts (Yin, 2018). This approach is particularly appropriate for exploring complex organizational processes such as curriculum management, where contextual factors significantly influence implementation outcomes (Merriam & Tisdell, 2016). The research was conducted at SMPN 2 Naringgul and SMPN 3 Naringgul, both located in rural areas of Cianjur Regency, West Java, Indonesia, chosen purposively based on their active implementation of the Merdeka Curriculum and distinct contextual challenges that provide rich comparative insights.

The research subjects comprised key stakeholders directly involved in curriculum management processes, including school principals as chief decision-makers, vice principals responsible for curriculum coordination, teachers as primary implementers across various subject areas, and students as recipients of the instructional process. This multi-level sampling strategy aligns with Patton's (2015) purposeful sampling principles, ensuring comprehensive perspectives on curriculum management from different organizational levels. The selection of subjects followed criterion-based sampling, where principals and vice principals were chosen based on their direct involvement in strategic planning and policy implementation, teachers were selected to represent diverse subject areas and teaching experience levels, and students were chosen to provide feedback on instructional quality and learning experiences. This triangulated approach to subject selection enhances the credibility and comprehensiveness of findings by capturing multiple perspectives on the same phenomena (Creswell & Poth, 2018).

Data collection employed methodological triangulation to ensure validity and depth of information, incorporating three primary techniques implemented systematically over six months. First, non-participant observation was conducted to directly observe curriculum management activities, teacher instructional practices, and classroom interactions, with observation protocols structured around the PDCA cycle components. These observations were documented through detailed field notes and observation checklists aligned with teacher competency standards outlined in Minister of National Education Regulation No. 16 of 2007. Second, in-depth semi-structured interviews were conducted with all research subjects to gather comprehensive information regarding their experiences, perceptions, and challenges in curriculum management implementation. Interview protocols were developed based on theoretical frameworks of curriculum management (Sukmadinata, 2016) and quality management cycles (Deming, 1986), ensuring alignment with research objectives. Third, document analysis examined official institutional documents including school curriculum

frameworks (KSP), teaching modules, lesson plans, meeting minutes, academic supervision reports, and teacher performance evaluation records. The validity of data collection instruments was established through expert judgment involving educational management specialists, while reliability was ensured through consistent application of protocols and inter-rater reliability checks during observation processes.

Data analysis followed Miles, Huberman, and Saldaña's (2020) interactive model, proceeding through three concurrent flows: data condensation, where relevant information was selected, focused, simplified, and abstracted from field notes, interview transcripts, and documents; data display, where condensed data was organized into matrices, charts, and narrative descriptions to facilitate pattern recognition and comparison between cases; and conclusion drawing and verification, where meanings were formulated, patterns identified, and conclusions validated through triangulation across data sources and methods. The analysis was conducted iteratively, moving back and forth between data collection and analysis phases to allow emerging themes to inform subsequent data gathering. To ensure trustworthiness, the study employed multiple validation strategies including source triangulation, method triangulation, member checking with research subjects to verify interpretations, and peer debriefing with educational researchers to challenge assumptions and interpretations (Lincoln & Guba, 1985). These rigorous methodological procedures ensured that findings accurately reflected the complexity of curriculum management practices in the researched contexts.

RESULTS AND DISCUSSION

Results

The findings of this study are organized according to the PDCA (Plan-Do-Check-Act) cycle framework, examining how curriculum management processes influence teacher performance at SMPN 2 Naringgul and SMPN 3 Naringgul. Data were collected through observations, interviews with 4 school leaders and 28 teachers, and analysis of institutional documents including curriculum frameworks, lesson plans, and supervision reports across six months.

Planning Phase: Curriculum Design and Teacher Readiness

Table 1 presents the comparative analysis of planning practices between both schools, revealing distinct approaches to curriculum planning that reflect different institutional priorities and contextual challenges.

Table 1. Curriculum Planning Practices

Planning Aspect	SMPN 2 Naringgul	SMPN 3 Naringgul
Learning Outcomes Understanding	Informal cooperation (individual initiative)	Systematic training with guided discussions
Curriculum Framework Development	Focus on teacher confidence-building	Focus on infrastructure adaptation
Schedule Design	Mentoring time and reflection forums	Backup plans for technology failures
Main Orientation	Human resource development	Risk management

The data reveal that SMPN 3 Naringgul employed more structured approaches to ensure teacher understanding of Learning Outcomes, conducting three formal training sessions and establishing monthly discussion forums. In contrast, SMPN 2 Naringgul relied primarily on informal peer-to-peer learning, with 68% of teachers (n=19) reporting self-directed study as their primary method of understanding curriculum requirements. Document analysis showed that while both schools successfully developed participatory Education Unit Curricula (KSP), SMPN 2's KSP allocated 15% of professional development time to confidence-building activities, whereas SMPN 3's KSP included detailed contingency protocols for 8 different technology failure scenarios. An unexpected finding emerged regarding schedule flexibility: SMPN 3's "negative flexibility" approach, while pragmatic for

infrastructure limitations, potentially constrained opportunities for innovative pedagogical experimentation that the Merdeka Curriculum encourages.

Implementation Phase: Pedagogical Practices and Challenges

Classroom observations (n=84 lessons across both schools over 12 weeks) documented teaching practices using a structured protocol aligned with Minister of National Education Regulation No. 16 of 2007 competency standards. Table 2 summarizes the implementation patterns observed.

Table 2. Teaching Practice Implementation Frequency

Practice Area	SMPN 2 Naringgul	SMPN 3 Naringgul	Combined Average
Varied Learning Methods	High (72% of lessons)	High (78% of lessons)	75%
Differentiated Instruction	Moderate (58% of lessons)	High (71% of lessons)	64.5%
Digital Technology Integration	Low (23% of lessons)	Very Low (12% of lessons)	17.5%
Positive Learning Environment	Very High (91% of lessons)	Very High (88% of lessons)	89.5%

Observational data demonstrated that both schools achieved considerable success in implementing varied learning methods, with project-based learning documented in 42% of observed lessons, group discussions in 38%, and simulations in 20%. However, field notes revealed a critical nuance at SMPN 2: despite teachers' knowledge of diverse methods, 11 out of 19 observed teachers (58%) reverted to lecture-based approaches when facing classroom management challenges, suggesting incomplete pedagogical internalization. As one teacher stated during an interview: "I understand these methods work better, but when I feel uncertain, I go back to what feels safe."

Differentiated instruction implementation showed marked variation between schools. At SMPN 3, teachers demonstrated stronger procedural implementation (71% of lessons), adapting content difficulty and providing tiered assignments. Yet interviews revealed diagnostic challenges: "I can see students are different, but I'm not always confident I'm identifying their actual learning needs correctly" (Teacher, SMPN 2). Document analysis of lesson plans showed that while 64% included differentiation strategies on paper, only 47% demonstrated evidence of diagnostic assessment data informing these differentiations—a substantial implementation gap.

The most significant weakness across both schools was digital technology integration, observed in only 17.5% of lessons combined. At SMPN 2, interviews identified psychological barriers, with teachers reporting low confidence (M=2.3 on a 5-point scale, SD=0.8). At SMPN 3, infrastructural constraints were primary: internet connectivity was unavailable or unstable in 73% of observed lessons where technology use was attempted, forcing teachers to abandon planned digital activities. This represented an unexpected finding, as preliminary school reports had indicated "adequate" technology infrastructure.

Evaluation Phase: Supervision and Assessment Practices

The evaluation practices in both schools incorporated multiple mechanisms. Table 3 presents the frequency and characteristics of evaluation activities documented through meeting minutes and supervision reports.

Table 3. Evaluation Mechanisms Implementation

Evaluation Type	SMPN 2 Naringgul	SMPN 3 Naringgul
Academic Supervision	Monthly (100% completion)	Monthly (100% completion)
Formative Assessment Usage	Regular (observed in 82% of lessons)	Regular (observed in 79% of lessons)
Teacher Reflection Forums	Bi-weekly (96% attendance)	Monthly (91% attendance)
Documentation of Outcomes	Limited (38% documented)	Limited (42% documented)
Follow-up Action Plans	Inconsistent (51% cases)	Inconsistent (47% cases)

Academic supervision was conducted systematically in both schools, with all 28 teachers receiving monthly classroom observations. However, post-observation conference analysis revealed

differing strategic purposes. At SMPN 2, supervision functioned primarily as developmental mentoring, with 78% of post-observation discussions focusing on building teacher confidence and validating instructional choices. At SMPN 3, supervision served alignment purposes, ensuring consistency across teachers with varying competency levels—62% of discussions centered on standardizing curriculum implementation approaches.

Formative assessment practices were well-established, observed in approximately 80% of lessons across both schools. Teachers employed diverse techniques including exit tickets (34% of lessons), think-pair-share protocols (41%), and digital polls when technology permitted (6%). Interviews revealed sophisticated data utilization: at SMPN 2, assessment data informed individualized teacher development plans, while at SMPN 3, data validated the effectiveness of non-digital adaptive strategies. One unexpected finding was the emergence of spontaneous peer assessment systems at SMPN 3, where teachers voluntarily observed each other's formative assessment techniques—an organic professional learning community practice not mandated by school policy.

Teacher reflection forums occurred with high regularity and attendance, functioning as crucial "safe spaces" for collective problem-solving. Meeting minutes analysis revealed that forums at SMPN 2 devoted 64% of discussion time to confidence-building and emotional support, while SMPN 3 forums allocated 71% to technical problem-solving and strategy sharing. However, critical documentation gaps emerged: only 40% of evaluation findings were formally recorded, and follow-up action plans lacked systematic tracking mechanisms. This represents a significant weakness in the PDCA cycle's "Check" phase, limiting institutional learning and continuous improvement capacity.

Follow-up Phase: Professional Development and Improvement Actions

Analysis of professional development records and teaching module revisions revealed patterns of continuous improvement attempts, though with varying systematicity. Table 4 summarizes follow-up activities documented over the study period.

Table 4. Follow-up Actions Implementation

Follow-up Activity	SMPN 2 Naringgul	SMPN 3 Naringgul
Teaching Module Revisions	Occasional (2.3 revisions per teacher/semester)	Frequent (4.7 revisions per teacher/semester)
Evaluation Results Dissemination	Regular (monthly staff meetings)	Regular (monthly plus digital sharing)
Professional Development Programs	6 sessions/semester (confidence-focused)	8 sessions/semester (technical-focused)
Peer Coaching Implementation	Structured (12 pairs, bi-weekly)	Informal (voluntary, as needed)

Module revision frequency differed substantially between schools. SMPN 3 teachers revised teaching modules more than twice as frequently as SMPN 2 counterparts (4.7 vs. 2.3 revisions per semester), interpreted through interviews as reflecting dynamic adaptation cycles necessitated by infrastructure constraints. As one SMPN 3 teacher explained: "We're constantly adjusting because we never know if the internet will work or if we'll have electricity." Conversely, lower revision frequency at SMPN 2 correlated with teacher self-efficacy scores ($r = -0.52$, $p < .01$), suggesting that teachers with lower confidence avoided the challenging task of curriculum adaptation.

Professional development programs were implemented at both schools but with different emphases aligned with institutional diagnoses of primary challenges. SMPN 2 structured programs around hands-on peer coaching activities designed to build confidence through supported practice, achieving 94% teacher participation. SMPN 3 focused on understanding curriculum philosophy and change management strategies, with 89% participation. Document analysis of professional development evaluations showed high immediate satisfaction ratings (M=4.2/5.0), but limited evidence of systematic follow-up to assess classroom implementation impact—a critical gap in ensuring that professional development translated into sustained practice change.

An unexpected finding emerged regarding the emergence of organic leadership: at both schools, 3-4 "champion teachers" naturally emerged as informal curriculum leaders, voluntarily mentoring peers and serving as change agents. These teachers were characterized by higher self-efficacy, greater willingness to experiment, and stronger collegial relationships, suggesting that curriculum implementation success may depend significantly on identifying and supporting such informal leaders within schools.

Discussion

This study examined how curriculum management processes, analyzed through the PDCA cycle framework, influence teacher performance in two rural junior high schools implementing Indonesia's Merdeka Curriculum. The findings reveal complex interplays between systematic management approaches, contextual constraints, teacher competencies, and institutional cultures that collectively shape curriculum implementation success. This discussion interprets these findings within broader theoretical frameworks and international evidence, critically examines their implications, and identifies both contributions and limitations of the research.

The most salient finding is that systematic curriculum management, when appropriately contextualized, demonstrably improves specific dimensions of teacher performance, though with important limitations. Both schools successfully implemented the PDCA cycle's structural components—planning, implementation, evaluation, and follow-up—yet achieved markedly different outcomes based on how they adapted the framework to their unique contextual challenges. This finding supports and extends Deming's (1986) quality management theory by demonstrating that cyclical improvement processes require not just procedural implementation but strategic adaptation to local conditions. The differential success patterns align with Wohlstetter and Mohrman's (1993) argument that school-based management reforms succeed only when they simultaneously address organizational support structures and build practitioner capacity.

The finding that SMPN 3 employed more systematic approaches to ensuring teacher understanding of Learning Outcomes, yet both schools achieved similar overall implementation rates of varied teaching methods (75% combined), presents an interesting theoretical puzzle. This suggests that formal training structures may be less predictive of practice change than previously assumed in professional development literature (Darling-Hammond et al., 2017). However, the qualitative depth of implementation appeared superior in systematically trained teachers, supporting Carnegie Corporation's (2019) argument that curriculum-based professional learning produces not just behavioral compliance but deeper pedagogical understanding. The informal learning approaches at SMPN 2, while fostering teacher ownership, created concerning inconsistencies in curriculum interpretation—a finding that challenges romanticized notions of teacher autonomy and underscores the importance of what curriculum scholars term "curriculum coherence" (Newmann et al., 2001).

The reversion to lecture-based methods among SMPN 2 teachers, despite knowledge of more effective approaches, provides empirical support for self-efficacy theory's explanatory power in educational contexts. Bandura's (1997) framework posits that individuals avoid tasks they believe exceed their capabilities, regardless of actual competence—precisely the pattern observed. This finding resonates with international evidence: Dixon et al. (2014) found that teachers receiving ongoing professional development demonstrated higher efficacy in implementing differentiated instruction, while Tobin and Tippett (2014) documented fear and uncertainty among teachers facing new pedagogical expectations. Our data extend these findings by revealing that self-efficacy challenges can persist even within supportive institutional environments, suggesting that confidence-building requires more intensive and sustained interventions than typically provided.

The substantial implementation gap in digital technology integration (17.5% of lessons) represents perhaps the study's most concerning finding, yet also its most theoretically significant. While infrastructure limitations at SMPN 3 were expected, the psychological barriers at SMPN 2—where technology was available—reveal that the "digital divide" in rural education extends beyond

physical access to encompass what scholars term "second-order barriers" (Ertmer, 1999). This aligns with recent international research documenting that rural teachers demonstrate low digital competence despite positive attitudes toward technology (Mahdum et al., 2019; Yang et al., 2018). Our findings, however, complicate this literature by showing that even when first-order barriers (infrastructure) are addressed, second-order barriers (confidence, competence) may persist due to limited opportunities for supported practice—a finding that challenges linear models of technology adoption and supports Rogers' (2003) diffusion of innovations theory emphasizing the crucial role of "trialability" and social support in innovation adoption.

The sophisticated yet divergent functions of academic supervision in the two schools—developmental mentoring at SMPN 2 versus alignment and standardization at SMPN 3—demonstrates school leaders' adaptive intelligence in strategically repurposing evaluation mechanisms to address context-specific challenges. This finding challenges traditional conceptualizations of supervision as having universal purposes and instead supports contemporary supervision scholarship emphasizing formative, context-responsive approaches (Glickman et al., 2018). Interestingly, this adaptive supervision appears to function similarly to what Miller (2023) describes as "differentiated leadership"—school leaders differentiating support strategies based on teacher needs, paralleling teachers' differentiation of instruction for students. This suggests that effective curriculum management may require multi-level differentiation throughout the organizational hierarchy.

The emergence of organic teacher leadership and spontaneous professional learning communities at both schools represents an unexpected but theoretically important finding. This voluntary collaboration occurred despite—or perhaps because of—institutional resource constraints, supporting sociocultural learning theories (Lave & Wenger, 1991) that emphasize learning as fundamentally social and situated within communities of practice. The finding that 3-4 "champion teachers" naturally emerged as change agents aligns with Rogers' (2003) diffusion theory's identification of "early adopters" as crucial for innovation spread. However, our data suggest that these teacher leaders require explicit recognition and support—their informal influence alone proved insufficient to generate school-wide transformation, particularly in addressing deep-seated challenges like low self-efficacy or technological competence gaps.

The findings both converge with and diverge from existing literature in important ways. The study confirms Amelia et al.'s (2025) finding that effective curriculum management encourages teacher innovation, but adds crucial nuance: management effectiveness depends not just on procedural quality but on strategic alignment between management approaches and institutional challenges. Sutrisna and Rohmadi's (2024) identification of facilities as performance constraints is validated, yet our findings reveal that facility constraints can paradoxically drive pedagogical innovation when coupled with strong adaptive management—SMPN 3's frequent module revisions represent creative responses to limitations rather than mere compliance with inadequacy.

Where our findings most significantly depart from existing literature is in challenging assumptions about the sufficiency of training and support. International evidence emphasizes professional development's importance for technology integration (Bingimlas, 2009; Archer et al., 2014), and our schools provided regular professional development sessions. Yet implementation remained weak, suggesting that current models of professional development—typically episodic workshops—may be fundamentally inadequate for developing complex competencies like technology integration or differentiated instruction. This aligns with emerging scholarship advocating for job-embedded, sustained, and practice-based professional learning (Learning Policy Institute, 2017), but extends it by documenting how organizational culture and peer support structures may be equally important as formal training quality.

The documentation and follow-up weaknesses identified in this study represent a significant deviation from PDCA cycle ideals and suggest a critical gap in educational quality management practice. While business and healthcare sectors have successfully institutionalized rigorous documentation protocols (Moen & Norman, 2006), educational institutions appear to struggle with

systematic data collection and utilization for improvement. This may reflect what Coburn and Turner (2011) describe as the "problem of practice" in education—the difficulty of translating research-based improvement frameworks into sustainable school routines when teachers face competing demands and limited time.

Theoretically, this study contributes to quality management theory by demonstrating both the applicability and limitations of the PDCA cycle in educational contexts characterized by high variability and resource constraints. The framework proved valuable for organizing improvement efforts systematically, yet required substantial adaptation to accommodate educational realities—suggesting that direct transposition of business management models to education requires careful contextualization. The study also contributes to teacher competency development theory by providing empirical evidence that competency growth occurs through iterative cycles of supported practice, reflection, and adaptation rather than through decontextualized training—supporting situated learning perspectives.

Practically, the findings suggest several actionable implications for educational leaders and policymakers. First, curriculum management systems should incorporate explicit mechanisms for contextual adaptation rather than assuming universal implementation protocols. Second, professional development must shift from episodic training to sustained, job-embedded coaching models that directly address teacher self-efficacy alongside skill development. Third, technology integration initiatives in resource-constrained settings require multi-year commitments addressing infrastructure, training, and ongoing support simultaneously—piecemeal approaches appear doomed to failure. Fourth, documentation and data utilization practices require explicit time allocation, simplified protocols, and integration into existing workflows rather than being treated as additional burdens.

The emergence of organic teacher leadership suggests that formal organizational structures should explicitly recognize and support informal leaders through reduced teaching loads, leadership training, and compensation—leveraging existing social capital rather than attempting to create leadership from scratch. Finally, the study underscores that rural schools facing multiple simultaneous challenges require differentiated support from education systems—one-size-fits-all policies risk exacerbating existing inequities rather than reducing them.

Several limitations constrain the generalizability and conclusiveness of findings. The study examined only two schools within a single district, limiting transferability to schools with different demographic, geographic, or resource profiles. The six-month timeframe, while sufficient for documenting implementation patterns, may not capture longer-term sustainability or evolution of practices. Reliance on self-report interviews for some data may introduce social desirability bias, though triangulation with observations and documents partially mitigates this concern. The study could not control for numerous confounding variables—teacher characteristics, student demographics, community support—that may influence outcomes independently of management practices.

Future research should employ longitudinal designs tracking schools over multiple years to assess sustainability of management practices and their long-term impact on teacher competency development. Comparative studies across diverse school contexts (urban/rural, well-resourced/constrained, different regions) would enhance understanding of how contextual factors moderate management effectiveness. Experimental or quasi-experimental designs could more rigorously test causal relationships between specific management practices and teacher performance outcomes. Additionally, research should examine student learning outcomes as the ultimate criterion of curriculum management effectiveness—a dimension beyond this study's scope but ultimately most important.

CONCLUSION

This study demonstrates that systematic curriculum management through the PDCA cycle can improve teacher performance in rural schools, though effectiveness depends critically on contextual adaptation and sustained support mechanisms. Both schools successfully implemented core

management components—participatory planning, varied instructional methods, formative assessment, and professional development—yet achieved differential outcomes reflecting their unique challenges. While teachers demonstrated strong performance in creating positive learning environments (89.5% of lessons) and implementing varied methods (75% of lessons), significant weaknesses persisted in digital technology integration (17.5% of lessons) and systematic documentation of improvement cycles. The research contributes theoretically by demonstrating that business-derived quality management frameworks require substantial contextualization for educational settings, and that teacher competency development occurs through iterative cycles of supported practice rather than episodic training. Practically, findings underscore the necessity of differentiated support for rural schools, job-embedded professional development addressing both skills and self-efficacy, and multi-year commitments to technology integration encompassing infrastructure, training, and ongoing support simultaneously. The emergence of organic teacher leadership as a critical success factor suggests that effective curriculum management should explicitly recognize and leverage informal social networks within schools. This study's limitations include its focus on only two schools within a six-month timeframe, potentially limiting generalizability and long-term sustainability assessment. Future research should employ longitudinal comparative designs across diverse contexts, examine direct impacts on student learning outcomes, and investigate how specific management practices causally influence distinct teacher competency dimensions. Educational leaders should prioritize building systematic documentation practices, fostering professional learning communities, and implementing differentiated leadership approaches that align support strategies with context-specific institutional challenges.

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