

From Instructional Leadership to Professional Learning Communities: Strengthening Literacy and Numeracy in Indonesian Elementary Schools

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Abstract: *This study examines how instructional leadership contributes to professional learning communities (PLCs) in strengthening literacy and numeracy practices in an Indonesian elementary school. A qualitative case study was conducted at SD Negeri Ngempon 02 Bergas, Semarang Regency, involving 11 educational personnel. Data were collected through in-depth interviews, passive participatory observations, and document analysis and analyzed using the interactive model of Miles, Huberman, and Saldaña. The findings show that instructional leadership established shared literacy and numeracy priorities, facilitated teacher collaboration, encouraged instructional innovation, and provided developmental supervision and constructive feedback. These practices fostered PLCs characterized by professional dialogue, knowledge sharing, collective problem solving, peer support, and reflective practice, which were translated into student-centered literacy and numeracy instruction. The findings imply that school leaders should strengthen organizational conditions for sustained teacher collaboration and reflective instructional improvement. However, the study is limited to one elementary school and does not quantitatively measure changes in students' literacy and numeracy achievement. Future research should examine this mechanism across multiple schools using mixed-method approaches.*

Keywords: Instructional Leadership, Professional Learning Communities, Literacy, Numeracy, Elementary Education.

Abstrak: *Penelitian ini bertujuan menganalisis bagaimana kepemimpinan instruksional berkontribusi terhadap pengembangan komunitas belajar profesional (Professional Learning Communities/PLC) dalam memperkuat praktik literasi dan numerasi di sekolah dasar Indonesia. Penelitian menggunakan pendekatan kualitatif dengan desain studi kasus di SD Negeri Ngempon 02 Bergas, Kabupaten Semarang, dengan melibatkan 11 tenaga kependidikan. Data dikumpulkan melalui wawancara mendalam, observasi partisipatif pasif, dan analisis dokumen, kemudian dianalisis menggunakan model interaktif Miles, Huberman, dan Saldaña. Hasil penelitian menunjukkan bahwa kepemimpinan instruksional membangun prioritas bersama, memfasilitasi kolaborasi guru, mendorong inovasi pembelajaran, serta memberikan supervisi dan umpan balik konstruktif. Praktik tersebut membentuk PLC melalui dialog profesional, berbagi pengetahuan, pemecahan masalah kolektif, dukungan sejawat, dan refleksi, yang kemudian diwujudkan dalam pembelajaran literasi dan numerasi yang berpusat pada siswa. Temuan ini mengimplikasikan pentingnya penguatan kolaborasi guru dan supervisi reflektif. Penelitian terbatas pada satu sekolah dan tidak mengukur perubahan kemampuan siswa secara kuantitatif. Penelitian selanjutnya disarankan melibatkan beberapa sekolah dengan pendekatan metode campuran.*

Kata kunci: Kepemimpinan Instruksional, Komunitas Belajar Profesional, Literasi, Numerasi, Pendidikan Dasar.

Introduction

Improving the quality of human resources has become a strategic priority for educational development in the twenty-first century, particularly amid rapid scientific, technological, and digital transformation. Primary education occupies a fundamental position in this agenda because it provides the foundation for developing competencies that enable students to think critically, solve problems, communicate effectively, and adapt to increasingly complex social environments. Among these competencies, literacy and numeracy are particularly important because they extend beyond basic reading, writing, and mathematical operations to include the ability to understand, interpret, evaluate, and apply information in meaningful real-life contexts. Consequently, strengthening literacy and numeracy has become a major educational priority in many countries, including Indonesia, where these competencies are increasingly regarded as indicators of educational quality and students' preparedness for future learning and social participation (Wibowo et al., 2023; Dikdik et al., 2025; Tanjung, 2024).

The urgency of strengthening literacy and numeracy is reinforced by continuing concerns regarding Indonesian students' abilities to comprehend complex texts, interpret information, reason mathematically, and solve contextual problems. These challenges suggest that literacy and numeracy development cannot be addressed merely by increasing instructional content or learning time. Instead, classroom practices need to promote reasoning, inquiry, interpretation, problem solving, and active student participation. Consistent with this orientation, the Merdeka Curriculum positions literacy and numeracy as cross-curricular competencies developed through student-centered, contextual, differentiated, and problem-based learning rather than being confined to Indonesian language and mathematics lessons (Afandi et al., 2024; Astuti et al., 2024; Pambudi & Fajrin, 2024).

However, curriculum reform alone does not automatically transform classroom practice. Its implementation depends on organizational conditions that support sustained teacher learning, including purposeful leadership, positive academic cultures, adequate resources, reflective practices, and professional collaboration (Fadlilah et al., 2022; Wibowo et al., 2023; Nurmiati et al., 2024). This shifts attention from literacy and numeracy as isolated instructional programs toward the organizational processes through which teachers collectively interpret student needs, develop instructional responses, and sustain improvement.

Teachers remain central actors in translating curriculum expectations into meaningful learning experiences. Their capacity to identify students' learning needs, conduct diagnostic assessment, design contextual activities, select appropriate instructional media, and adjust instruction to differences in student ability directly influences literacy and numeracy learning. Continuous professional development, teacher learning communities, academic supervision, mentoring, and collaborative reflection have been associated with stronger instructional practices (Dikdik et al., 2025; Afandi et al., 2024; Astuti et al., 2024; Sarwahita et al., 2024). Nevertheless, teacher development is not always sustained through individual training. Differences in professional competence, limited opportunities for professional learning, insufficient collaboration, and underutilization of assessment information remain challenges in many schools (Mubarok et al., 2024; Mulianti & Suardin, 2023; Utami & Inayah, 2024). Thus, the issue is not simply whether teachers receive professional development, but whether schools establish organizational structures that enable professional knowledge to be continuously shared, reflected upon, and translated into classroom practice.

Within this context, instructional leadership becomes particularly important. School principals are responsible not only for administrative coordination but also for establishing instructional priorities, communicating a shared vision, supporting teacher development,

facilitating collaboration, providing feedback, and creating conditions for continuous instructional improvement. Strong instructional leadership can increase teacher motivation, strengthen collaboration, and support literacy and numeracy initiatives, whereas weak or fragmented leadership may result in programs that are episodic and difficult to sustain (Dike & Parida, 2020; Wibowo et al., 2023; Fadlilah et al., 2022; Nurmiati et al., 2024). Yet, an important academic question remains: through what organizational mechanism does instructional leadership become embedded in teachers' everyday professional learning rather than remaining primarily a set of leadership practices?

Such conditions are closely associated with professional learning communities (PLCs). In a PLC, teacher learning is embedded within everyday school practices through professional dialogue, collective problem solving, shared responsibility, peer support, reflection, and collaborative improvement of instruction. Rather than viewing professional development primarily as formal training outside school, the PLC perspective recognizes teachers as professionals who generate and exchange knowledge through interaction with colleagues. Regular meetings, collaborative lesson planning, sharing instructional resources, discussion of students' difficulties, analysis of assessment results, and collective reflection can strengthen teachers' capacity to provide effective literacy and numeracy instruction. Professional collaboration also distributes expertise across teachers and helps establish literacy and numeracy as shared school responsibilities (Nurhikmah et al., 2023; Handoko et al., 2023; Marnayana et al., 2024).

The relationship between instructional leadership and PLCs, however, should not be understood simply as a sequence in which principals support collaboration and teachers subsequently work together. Instructional leadership may provide structural and cultural conditions for collective learning, while the development of a genuine PLC also depends on teacher agency, the quality of professional interaction, and whether collaboration produces changes in instructional thinking and practice. Principals can facilitate professional collaboration by providing opportunities for teachers to meet, encouraging the exchange of instructional experiences, supporting experimentation, providing constructive feedback, and creating an academic climate oriented toward collective improvement. Leadership becomes more instructionally meaningful when it enables teachers to exercise professional agency rather than merely comply with administrative requirements. Thus, instructional leadership may function as an enabling mechanism through which collaborative professional learning becomes embedded in school culture and translated into classroom practice (Mubarok et al., 2024; Muliarti & Suardin, 2023; Utami & Inayah, 2024).

This relationship is particularly significant for literacy and numeracy because effective instruction requires continuous adaptation to students' diverse learning needs. Teachers need opportunities to discuss diagnostic information, identify learning difficulties, develop appropriate instructional responses, exchange materials, and evaluate instructional effectiveness. Consequently, the value of PLCs lies not merely in increasing teacher interaction, but in transforming instructional problems into shared objects of inquiry. When instructional leadership creates conditions for such inquiry, literacy and numeracy initiatives can move beyond routine implementation toward a sustained cycle of professional learning, experimentation, evaluation, and improvement. Research has similarly emphasized that innovative instructional strategies, diagnostic assessment, professional mentoring, and sustained teacher learning contribute to stronger teacher competence and learning processes (Dikdik et al., 2025; Afandi et al., 2024; Astuti et al., 2024; Sarwahita et al., 2024).

Despite the growing literature on literacy and numeracy, school leadership, and teacher professional development, several gaps remain. Existing studies have frequently examined

instructional strategies, teacher competencies, leadership practices, professional development, or literacy and numeracy programs as relatively separate domains. Educational management studies have also emphasized systematic management practices for improving teacher performance and school effectiveness (Mubarok et al., 2024; Muliarti & Suardin, 2023; Marnayana et al., 2024). Less attention has been given to the organizational pathway connecting these domains: how instructional leadership creates conditions for collaborative professional learning, how such learning develops into PLC practices, and how these practices are translated into literacy and numeracy instruction.

Furthermore, previous studies have often focused on learning outcomes or specific instructional programs rather than examining how professional interaction, collective reflection, school leadership, and instructional improvement operate together in the everyday context of an elementary school (Handoko et al., 2023; Utami & Inayah, 2024; Pambudi & Fajrin, 2024). This limitation is particularly relevant in the Indonesian elementary school context, where the Merdeka Curriculum requires schools to connect cross-curricular literacy and numeracy priorities with differentiated instructional practices. The unresolved issue is therefore not whether leadership, collaboration, or literacy programs are important individually, but how these elements interact as an organizational learning process.

This study addresses this gap by examining literacy and numeracy strengthening through the interconnected perspectives of instructional leadership and professional learning communities at SD Negeri Ngempon 02 Bergas, Semarang Regency, Indonesia. Rather than approaching literacy and numeracy primarily as outcomes of formal managerial functions, this study focuses on how the principal's instructional leadership creates conditions for teacher collaboration, professional dialogue, shared learning, instructional innovation, feedback, and reflective improvement. Its novelty lies in explaining the transition from instructional leadership to PLCs as an organizational mechanism through which school-level priorities are converted into collective professional learning and literacy- and numeracy-oriented instructional practices. Accordingly, this study aims to analyze how instructional leadership facilitates the development of professional learning communities and how these collaborative professional practices contribute to strengthening literacy and numeracy instruction in elementary education.

Methods

This study employed a qualitative approach using a case study design to obtain an in-depth understanding of how instructional leadership facilitates the development of professional learning communities (PLCs) and contributes to strengthening literacy and numeracy practices in an Indonesian elementary school. The case study design was selected because the study examined a contemporary educational phenomenon within its natural school context and focused on how leadership, teacher collaboration, professional learning, and instructional improvement interact in practice. The study was conducted at SD Negeri Ngempon 02, Bergas District, Semarang Regency, Central Java, Indonesia. The school was purposively selected because it had implemented literacy and numeracy strengthening initiatives and teacher collaborative activities relevant to PLC development, making it an information-rich setting for examining the relationship between instructional leadership and collective professional learning.

Participants were selected using purposive sampling based on their direct involvement in instructional leadership, teacher professional learning, and literacy-numeracy implementation. The inclusion criteria were: (1) direct involvement in instructional or professional learning activities; (2) active participation in literacy and/or numeracy development; and (3) ability to provide relevant information concerning leadership, collaboration, and instructional practices.

A total of 11 participants participated in the study, comprising one principal, one vice principal/academic coordinator, seven classroom teachers, and two literacy-numeracy program coordinators or teacher facilitators. This composition was intended to obtain perspectives from different organizational positions. The principal and academic coordinator provided information about instructional leadership and school-level policies, while teachers and program facilitators provided information concerning PLC activities, professional collaboration, and classroom implementation.

Potential participants were identified in consultation with the school based on the inclusion criteria. Before participation, each individual received an explanation of the research objectives, procedures, confidentiality arrangements, and voluntary nature of participation. Only participants who agreed and provided informed consent were included in the study.

Data were collected through semi-structured interviews, non-participant observations, and document analysis to enable methodological triangulation. The interview guide was developed from the research objectives and relevant conceptual dimensions of instructional leadership, PLCs, and literacy-numeracy strengthening. The questions addressed four areas: (1) instructional leadership, including instructional priorities, supervision, feedback, and teacher support; (2) PLC practices, including professional dialogue, collaboration, peer learning, and collective reflection; (3) literacy and numeracy implementation, including instructional strategies and assessment practices; and (4) perceived changes resulting from leadership and professional collaboration. Open-ended questions and follow-up probes were used to encourage participants to provide detailed experiences and examples. Interviews were conducted individually in a quiet setting at the school and lasted approximately 30–60 minutes. With participants' permission, interviews were audio-recorded and transcribed verbatim. Field notes were also prepared to document contextual information and preliminary analytical observations.

Non-participant observations were conducted during activities relevant to instructional leadership and PLC implementation, including teacher collaborative meetings, professional discussions, instructional planning, and selected literacy-numeracy learning activities. Observation focused on naturally occurring interactions, including leadership behaviors, teacher participation, professional dialogue, collaborative problem solving, use of assessment information, and instructional practices. Field notes distinguished descriptive observations from the researcher's preliminary reflections.

Document analysis complemented interview and observation data. Documents included literacy and numeracy programs, teacher meeting records, lesson plans or teaching modules, assessment documents, and other materials demonstrating instructional planning and professional learning activities. These documents were used primarily to corroborate participants' accounts and observed practices.

Data were analyzed using an iterative thematic analysis process involving familiarization, initial coding, categorization, theme development, review, and interpretation. First, interview transcripts, observation notes, and documents were repeatedly read to establish familiarity with the data. Second, meaningful segments concerning instructional leadership, teacher collaboration, PLC practices, literacy-numeracy implementation, and instructional improvement were coded. Third, related codes were grouped into categories, and fourth, categories were compared to identify recurring patterns and relationships. Themes were subsequently reviewed against the original data to ensure that interpretations remained grounded in participants' accounts and observed evidence.

Analysis was conducted across data sources to identify convergence, complementarity, or discrepancy. For example, statements concerning the principal's support for collaboration

were compared with observed collaborative activities and relevant school documents. This process helped prevent major findings from relying solely on self-reported information.

Data saturation guided the decision to stop participant recruitment. Saturation was considered to have been achieved when successive interviews generated no substantially new codes, categories, or explanations relevant to the research questions and when emerging themes were sufficiently supported across participants and data sources. The 11th interview produced no substantive new themes beyond those identified previously; therefore, additional interviews were considered unlikely to provide meaningful new information.

The credibility of the findings was strengthened through source and method triangulation, repeated engagement with the school context, comparison of interview accounts with observations and documents, and member checking. Selected participants were invited to review preliminary interpretations to confirm the accuracy of the researchers' understanding of their statements and experiences. Dependability was supported by maintaining an audit trail of participant selection, data collection, coding, categorization, and theme development. Confirmability was strengthened by grounding interpretations in multiple sources of evidence and maintaining reflexive notes concerning researchers' assumptions and analytical decisions.

Ethical procedures were implemented throughout the study. Research permission was obtained from the relevant school authority before data collection. Each participant received information about the study objectives, procedures, confidentiality, voluntary participation, and the right to withdraw without negative consequences. Written informed consent was obtained before interviews and observations. Participant confidentiality was protected by replacing names with codes such as P1, P2, and P3 and removing potentially identifying information from the analysis and manuscript. Audio recordings, transcripts, field notes, and other research materials were stored securely and accessed only by the research team. All data were used solely for academic purposes.

The researchers maintained reflexive awareness throughout data collection and analysis because qualitative interpretation may be influenced by researchers' assumptions. Field notes therefore included reflections on emerging interpretations and potential biases. These records were reviewed during analysis to distinguish participants' perspectives from researchers' interpretations and to strengthen the transparency of the analytical process. Through these procedures, the study established a transparent and systematic process for investigating how instructional leadership and PLCs interact to strengthen literacy and numeracy practices in the selected elementary school.

Result and Discussion

Instructional Leadership Establishing Shared Literacy and Numeracy Priorities

The findings indicate that strengthening literacy and numeracy at SD Negeri Ngempon 02 was initiated through instructional leadership that established shared instructional priorities. At the beginning of the academic year, the principal facilitated meetings involving teachers and educational staff to discuss students' initial learning conditions, particularly basic literacy and numeracy abilities. The principal explained, "The planning of literacy and numeracy programs is carried out at the beginning of the academic year through meetings with teachers. We first examine students' learning outcomes, particularly their basic reading and numeracy abilities" (P). A Grade I teacher similarly stated, "We are involved in school meetings to discuss literacy and numeracy programs. Since I teach Grade I, the focus is more on students' basic reading and numeracy skills" (T1).

These findings indicate that instructional priorities were established through participatory processes rather than solely through top-down direction. The principal provided direction while teachers contributed information based on their classroom experiences. This reflects a broader conception of instructional leadership in which principals create opportunities for professional participation and collective decision-making. This finding supports He et al. (2024), who demonstrated that instructional leadership contributes to teacher professional development when principals systematically identify teachers' needs and provide appropriate professional support. Similarly, Visscher et al. (2025) emphasized that professional development becomes more effective when it is needs-based, systematically implemented, and connected with instructional improvement. Park et al. (2025) further demonstrated that sustained teacher professional development can positively contribute to students' mathematics achievement when it is aligned with instructional needs.

The findings also suggest that leadership support must be accompanied by organizational conditions that enable teachers to respond to diverse student needs. Differences in students' learning abilities and teachers' limited time to develop diverse instructional media remained challenges in the school. These conditions reinforce the argument that professional competence alone may be insufficient when teachers lack adequate time, resources, and sustained professional learning opportunities, consistent with Dikdik et al. (2025) and Utami and Inayah (2024). Thus, instructional leadership in this context extended beyond establishing expectations toward providing conditions for teachers to implement those expectations effectively.

Teacher Collaboration as the Foundation of Professional Learning Communities

The second finding concerns the transformation of routine teacher coordination into collaborative professional learning. Teachers regularly discussed instructional problems, exchanged learning materials and media, shared experiences concerning students' difficulties, and collectively searched for solutions. These practices indicate that professional collaboration at SD Negeri Ngempon 02 functioned not merely as administrative coordination but increasingly as a mechanism for teacher learning. The principal stated, "Coordination is conducted through regular meetings and discussions with teachers. If there are any problems, they are usually discussed together immediately" (P). A teacher similarly explained, "We often discuss and share experiences regarding effective learning methods for students" (T3).

An important feature of this collaboration was the distribution of responsibility for literacy and numeracy across teachers. Literacy was not treated exclusively as the responsibility of language teachers, nor was numeracy confined to mathematics instruction. Teachers incorporated these competencies into different learning contexts according to their subjects and students' needs. Such a whole-school perspective corresponds with Handoko et al. (2023) and Marnayana et al. (2024), who emphasize collective responsibility and school-wide approaches to educational improvement.

Regular professional discussions also provided opportunities for teachers to exchange pedagogical knowledge. Teachers discussed instructional strategies, student difficulties, learning materials, and possible solutions. Nurhikmah et al. (2023) similarly emphasized that professional collaboration contributes to instructional quality by facilitating knowledge exchange and dissemination of effective practices.

The findings further demonstrate that PLC development cannot be reduced to the frequency of teacher meetings. Its substantive feature was the transformation of professional interaction into collective reflection and problem solving. This corresponds with Admiraal et al. (2021), who characterized PLCs through collaborative cultures, open communication, collective reflection, and peer learning, and with Alzayed and Alabdulkareem (2021), who emphasized the

role of reflective practice in strengthening teachers' collective capacity to address instructional problems.

The principal's role in this process was primarily facilitative. Teachers were given opportunities to participate in discussions, make instructional decisions, and adapt classroom practices according to student needs. This finding is consistent with Bellibaş et al. (2021), who demonstrated that instructional and distributed leadership can influence teachers' instructional practices by creating opportunities for professional participation and shared responsibility. Support from educational staff and the availability of learning facilities also contributed to an environment conducive to literacy and numeracy activities (Pambudi & Fajrin, 2024).

Thus, the findings position teacher collaboration as the organizational mechanism connecting instructional leadership with professional learning. Leadership created the conditions, while teachers transformed those conditions into collective professional knowledge through interaction, reflection, and shared problem solving.

Translating Professional Learning into Literacy and Numeracy Instruction

The third finding concerns the translation of professional learning into classroom practice. Teacher collaboration was reflected in a range of literacy and numeracy strategies, including reading habituation, reading comprehension activities, contextual story problems, group discussions, educational games, concrete instructional media, and problem-based learning. A Grade I teacher explained, "I use letter cards, pictures, and concrete objects so that students can understand the material more easily" (T1). A Grade III teacher reported, "I often provide story problems so that students become accustomed to understanding and solving problems" (T8). A Grade VI teacher similarly stated, "We provide questions that train students to understand problems and find solutions independently" (T4).

Observation data supported these accounts, showing the use of group discussions, educational games, concrete media, contextual activities, and problem-based learning. These observations demonstrate changes in instructional practice, but they should not be interpreted as quantitative evidence of increased student achievement. Rather, they indicate that teachers adopted varied and adaptive strategies and that students were observed engaging in literacy and numeracy learning activities.

The use of student-centered and contextual instructional strategies is consistent with Afandi et al. (2024), who reported that contextual approaches can support literacy and numeracy development. Astuti et al. (2024) similarly emphasized the importance of varied instructional materials and concrete media for supporting students' engagement with learning. The findings also correspond with Nurhikmah et al. (2023), who highlighted the contribution of professional collaboration to instructional improvement.

More importantly, the present study demonstrates how such instructional adaptation emerged from collaborative professional learning. Teachers discussed strategies, exchanged materials, reflected on instructional difficulties, and learned from colleagues' experiences. Therefore, classroom innovation was not treated as an isolated individual teacher activity but as an outcome of collective professional learning. This interpretation is consistent with Wibowo et al. (2023), who emphasized collaborative school cultures in supporting literacy programs.

The findings also correspond with Bogler and Nir (2025), who demonstrated that principals' instructional leadership can directly and indirectly influence twenty-first-century pedagogy through teacher motivation and professional capacity. Ventista and Brown (2023) further indicated that continuous teacher professional development contributes to instructional quality and student outcomes. He et al. (2024) likewise emphasized the role of continuous leadership support, feedback, and opportunities for teacher learning.

The contribution of this study is therefore to show the organizational pathway behind instructional adaptation: leadership support created opportunities for collaboration; collaboration generated professional learning; and professional learning was translated into contextual and adaptive literacy-numeracy practices.

Instructional Supervision, Reflection, and Continuous Improvement

The fourth finding concerns the role of instructional supervision as a feedback mechanism. Classroom supervision at SD Negeri Ngempon 02 involved classroom observation, discussion of students' learning difficulties, feedback to teachers, and follow-up improvement. A Grade VI teacher stated, "After supervision, we usually receive suggestions and feedback related to the learning process" (T4). Teachers also reported that supervisory feedback helped them modify instructional strategies, improve teaching materials, and provide additional assistance to students experiencing literacy and numeracy difficulties.

This indicates that supervision functioned as developmental professional learning rather than merely administrative control. Mubarak et al. (2024) argued that effective supervision enables schools to identify weaknesses and develop appropriate improvement strategies. Dike and Parida (2020) similarly emphasized the value of developmental academic supervision in supporting teacher professionalism.

Regular evaluation meetings extended supervision from an individual interaction between principal and teacher into a collaborative process. Teachers discussed learning progress, instructional challenges, and possible follow-up strategies. Evaluation information was therefore returned to professional discussions and used to refine subsequent instruction. This finding corresponds with Wibowo et al. (2023), who emphasized continuous reflection and evaluation in strengthening literacy programs.

The evidence concerning students should nevertheless be interpreted cautiously. The study did not measure students' reading comprehension or numeracy achievement using standardized instruments. The available evidence consists of teacher perceptions and observations of students participating in literacy activities and engaging with reasoning-oriented numeracy tasks. Consequently, the findings support claims about observed learning processes and instructional responses rather than definitive claims of improved student achievement.

The importance of continuous feedback is supported by Visscher et al. (2025), who demonstrated that professional development becomes more consequential when accompanied by evaluation, feedback, and follow-up. Gottlieb et al. (2022) similarly emphasized reflective cultures and feedback mechanisms in professional development, while Daly et al. (2022) conceptualized schools as learning organizations in which evaluation contributes to broader organizational capacity building.

An Integrated Model: From Instructional Leadership to Continuous Improvement

Taken together, the findings reveal a recursive organizational learning mechanism that can be represented as follows: Instructional Leadership → Teacher Collaboration → Professional Learning → Instructional Practice → Supervision and Reflection → Continuous Improvement

This pathway should not be interpreted as a strictly linear sequence. Instead, it represents a continuous cycle. Instructional leadership establishes shared priorities and enabling conditions; these conditions facilitate teacher collaboration; collaboration generates professional learning; professional learning informs instructional practices; classroom implementation generates new evidence and challenges; and supervision and reflection return this evidence to the collaborative learning process.

This interpretation extends the understanding of instructional leadership beyond its direct influence on classroom practice. Bellibaş et al. (2021), Bogler and Nir (2025), and He et al. (2024) emphasize relationships among instructional leadership, professional capacity, teacher learning, and instructional practice, while Admiraal et al. (2021) and Alzayed and Alabdulkareem (2021) emphasize collaborative learning and reflection within PLCs.

The distinctive contribution of the present study is the integration of these perspectives into an empirically grounded organizational mechanism. The findings suggest that PLCs function as a bridge between instructional leadership and instructional practice, while supervision and reflection operate as feedback mechanisms that sustain the cycle. Thus, the contribution is not simply that instructional leadership and PLCs are both important, but that their interaction provides an organizational pathway for translating school-level priorities into collective teacher learning and classroom practices.

The findings also have implications for educational management. Principals seeking to strengthen literacy and numeracy should not focus exclusively on introducing programs or directing teachers. Instead, they should establish structures and cultures that enable teachers to examine learning evidence, exchange effective practices, solve instructional problems collectively, experiment with contextually appropriate strategies, and reflect on implementation. In this sense, sustainable literacy and numeracy strengthening is better understood as an organizational learning process supported by instructional leadership than as the result of isolated classroom interventions. This interpretation is consistent with Ventista and Brown (2023) regarding sustained professional learning and Visscher et al. (2025) regarding the importance of feedback and follow-up mechanisms.

Overall, the case of SD Negeri Ngempon 02 demonstrates that instructional leadership provides the initial direction and organizational conditions, teacher collaboration transforms those conditions into collective professional learning, professional learning shapes instructional practice, and supervision and reflection feed new evidence back into the cycle. This recursive process provides a conceptual explanation of how schools can move from leadership intention toward sustained professional learning and continuous strengthening of literacy and numeracy practices.

Conclusion

This study concludes that strengthening literacy and numeracy at SD Negeri Ngempon 02 is supported by a recursive organizational learning mechanism linking instructional leadership and professional learning communities (PLCs). Instructional leadership establishes shared literacy and numeracy priorities and creates enabling conditions for teacher collaboration; collaboration then develops into professional learning through professional dialogue, knowledge sharing, collective problem solving, and reflection. This professional learning is translated into contextual, student-centered, and adaptive instructional practices, while instructional supervision and feedback provide evidence for subsequent reflection and improvement. Thus, the central contribution of this study is the identification of the pathway: instructional leadership → teacher collaboration → professional learning → instructional practice → supervision and reflection → continuous improvement. Rather than functioning as separate school improvement strategies, instructional leadership and PLCs operate as interconnected organizational processes through which school-level priorities are translated into teachers' collective professional learning and literacy-numeracy practices.

The findings imply that elementary school principals should strengthen not only instructional direction but also the organizational structures that enable sustained teacher

collaboration, professional dialogue, reflective supervision, and evidence-informed instructional improvement. However, the findings should be interpreted within several limitations. The study was conducted in only one elementary school and employed a qualitative case study design, limiting the transferability of the findings to other school contexts. In addition, the study did not quantitatively measure changes in students' literacy and numeracy achievement; therefore, the observed and reported changes should be understood as evidence of instructional processes and perceptions rather than definitive evidence of improved student outcomes. Future research should examine this proposed mechanism across multiple elementary schools and contexts and consider mixed-method or quantitative designs to investigate whether and under what conditions PLCs mediate the relationship between instructional leadership and measurable literacy and numeracy outcomes.

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