



Learning Communities, Pedagogical Competence, and Innovative Learning Practices among Elementary School Teachers: A Small-Scale Correlational Study

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Abstract

This study aims to explore the association between learning-community participation and self-reported pedagogical competence and innovative learning practices among elementary school teachers. The low quality of learning outcomes in Indonesia, as reflected in PISA 2022, highlights the need to examine teacher professional development mechanisms. Using a cross-sectional correlational design, this small-scale exploratory study was conducted in a single elementary school. The accessible population comprised all seven teachers actively teaching in the school, who were surveyed via census. Data were collected through three self-report questionnaires measured on a 5-point Likert scale and analyzed using descriptive statistics, Pearson correlation, Spearman rank correlation (as a sensitivity analysis), and simple linear regression with SPSS 26. The results indicated that teachers reported high levels of learning-community participation ($M = 4.15$, $SD = 0.42$), pedagogical competence ($M = 4.18$, $SD = 0.38$), and innovative learning practices ($M = 4.02$, $SD = 0.51$). Pearson correlation revealed strong positive associations between learning-community scores and pedagogical competence ($r = 0.847$, $p = 0.008$, two-tailed) and between learning-community scores and innovative learning practices ($r = 0.792$, $p = 0.018$, two-tailed). Simple linear regression showed that learning-community scores accounted for 71.7% of the observed variance in pedagogical competence and 62.7% of the observed variance in innovative learning practices within this sample. However, given the very small sample ($N = 7$) from a single school, the cross-sectional design, and the use of self-report instruments, these findings should be interpreted as exploratory rather than causal or generalizable. The findings suggest that school-based learning communities may serve as a promising context for teacher professional development, particularly in fostering collaborative planning and shared reflection. Nevertheless, strengthening innovative practices may require additional enabling conditions such as infrastructure, principal support, and dedicated time.



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INTRODUCTION

Teachers' pedagogical competence is a critical foundation for learning quality in elementary schools. Recent international assessments indicate that Indonesian students continue to face significant challenges. The Programme for International Student Assessment (PISA) 2022 reported that Indonesian students scored 366 in mathematics, 359 in reading, and 383 in science—far below the OECD average (OECD, 2023). Furthermore, 81.7% of Indonesian students performed below Level 2 proficiency in mathematics, and almost none reached the highest proficiency levels (OECD, 2023). While PISA measures student achievement rather than teacher competence directly, these results highlight persistent

challenges in national learning outcomes that warrant attention to teacher professional development (Dini et al., 2024).

At the classroom level, a World Bank observation study of 993 classrooms in 405 Indonesian primary schools found that only 26% of teachers demonstrated intermediate to upper-level instructional skills, and merely 10% effectively fostered students' social-emotional competencies (World Bank, 2023). These findings suggest that many teachers still rely on conventional lecture methods and struggle to design student-centered learning (Directorate General of Teachers and Education Personnel, 2023). Conventional professional development programs—such as one-off training and workshops—are often unsustainable and yield limited impact on actual classroom practices (Cojorn & Sonsupap, 2024). In this context, learning communities emerge as a collaborative alternative that emphasizes continuous reflection, peer dialogue, and shared practice (DuFour & Eaker, 2021).

Several studies have examined the role of learning communities in teacher development. Makarim et al. (2025) found that learning communities positively influenced teachers' pedagogic, professional, social, and personality competencies, although effectiveness depended on principal support and individual teacher motivation. Rahmani (2024) reported that 76.5% of teachers active in learning communities showed improved teaching skills, particularly in project-based and cooperative learning. Vangrieken et al. (2017), through a systematic review, concluded that teacher communities provide a meaningful context for professional development, though much existing research remains qualitative and context-specific. In contrast, Vičič Krabonja et al. (2024), using a large quantitative sample (N = 1,065) in Slovenia, found that teachers in innovative learning communities more frequently used effective strategies such as critical thinking, group work, and digital technologies.

Despite this body of work, three substantive gaps remain. First, while qualitative studies have richly described the processes within learning communities, quantitative evidence on which specific dimensions of community participation (e.g., collaborative planning, shared reflection) relate most closely to distinct teacher outcomes remains limited—especially in Indonesian elementary schools. Second, existing research rarely distinguishes between pedagogical competence (cognitive and procedural teaching skills) and innovative learning practices (adaptive classroom behaviors requiring enabling conditions); it remains unclear whether learning communities relate differently to these two outcomes. Third, the mechanisms through which community participation translates into competence and innovation—such as professional dialogue, joint reflection, and exchange of teaching practices—have not been explicitly modeled in small-scale school-based quantitative studies.

This study addresses these gaps by positioning itself as an exploratory correlational case study that examines how learning-community participation is statistically associated with two distinct teacher outcomes in a single Indonesian elementary school.

Drawing on Wenger's (2010) community of practice theory and Desimone and Garet's (2021) continuous professional development model, this study proposes a conceptual pathway (see Figure 1). Learning communities provide a social learning system where teachers engage in collaborative planning, professional dialogue, shared reflection, and exchange of teaching practices. These processes are hypothesized to be positively associated with pedagogical competence (operationalized as self-reported abilities in lesson design, instruction, feedback, and evaluation) and innovative learning practices (operationalized as self-reported use of active learning, technology, differentiation, and project-based learning). However, innovative practices may require additional enabling conditions (e.g., infrastructure, principal autonomy, time) that are not fully captured by community participation alone.

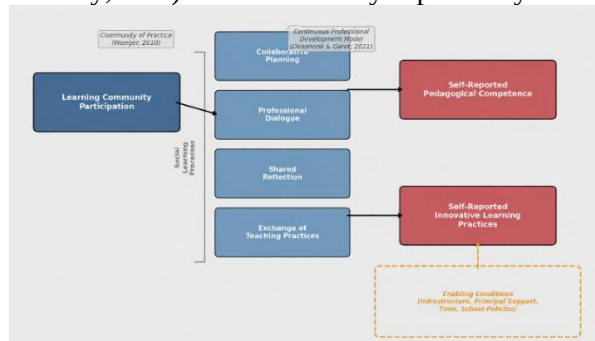


Figure 1. Conceptual Framework

Based on the above framework, this study seeks to answer the following questions:

- 1) What is the level of teacher participation in the learning community in the selected elementary school?
- 2) To what extent is participation in the learning community associated with teachers' self-reported pedagogical competence?
- 3) To what extent is participation in the learning community associated with teachers' self-reported innovative learning practices?

Given the exploratory and cross-sectional nature of the study, the hypotheses are framed in associational terms:

- H1: There is a positive and significant association between learning-community participation and self-reported pedagogical competence.
- H2: There is a positive and significant association between learning-community participation and self-reported innovative learning practices.

METHOD

This study employed a quantitative cross-sectional correlational design with a single-school case-study approach. This design was chosen because the objective was to examine statistical relationships between variables under natural conditions without manipulation (Creswell & Creswell, 2020). The study is explicitly positioned as an exploratory correlational case study intended to generate preliminary evidence within a bounded context, not to generalize to the broader population of Indonesian elementary school teachers.

The accessible population comprised all elementary school teachers ($N = 7$) actively teaching in one selected elementary school in [Region, Indonesia]. Because the accessible population was small and entirely reachable, a total population sampling (census) approach was used, resulting in a sample of seven teachers (Sugiyono, 2021). This approach ensured inclusion of all teachers within the selected school; however, it does not support generalization beyond that setting (Reviewer 1 #1, #6). The target population—to whom any tentative inferences might apply—is defined as elementary school teachers in similar institutional contexts, though the authors make no claims of representativeness.

Data were collected using three self-report questionnaires, each measured on a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) (Bozkuş, 2019). The instruments were developed by adapting indicators from existing literature and were validated through expert judgment.

Table 1. Instrument Characteristics

Variable	No. of Items	Indicators	Source / Theoretical Basis	S-CVI/Ave	Cronbach's α
Learning Community	12	Frequency of meetings, intensity of discussion, collaborative planning, joint reflection	Wenger (2010); Desimone & Garet (2021)	0.94	0.87
Pedagogical Competence	16	Lesson design, instruction implementation, feedback provision, evaluation of learning outcomes	Directorate General of Teachers and Education Personnel (2023); adapted from Bozkuş (2019)	0.92	0.85
Innovative Learning Practices	14	Active learning methods, technology use, instructional differentiation, project-based learning	Vičič Krabonja et al. (2024); Nurkholifah et al. (2026)	0.93	0.86

Note: Content validity was assessed by three experts in teacher education using the Item-Level Content Validity Index (I-CVI) and Scale-Level Content Validity Index average (S-CVI/Ave). Items with I-CVI < 0.78 were revised based on expert feedback before finalization. Reliability was tested on a separate

pilot sample of 15 elementary school teachers (not included in the main sample) to avoid inflation of alpha due to the small main sample

Data were collected in January 2026 after obtaining informed consent from all participating teachers. Respondents were assured of anonymity and confidentiality; no identifying information was recorded. Because this study involved minimal risk and was conducted as a school-based evaluation, formal ethical approval was sought from Institutional Ethics Committee. Participation was voluntary, and teachers could withdraw at any time.

Data were analyzed using IBM SPSS Statistics 26. The analysis proceeded in four stages:

- 1) Descriptive statistics (mean, median, standard deviation, and percentage distribution) were computed to profile the sample.
- 2) Assumption testing included:
 - Visual inspection of Q-Q plots and scatterplots to assess normality and linearity;
 - Shapiro-Wilk test (reported for completeness, though recognized as having very low power with $N = 7$);
 - Test for Linearity (Deviation from Linearity) to confirm the linear form of relationships.
- 3) Bivariate correlation using Pearson's r to measure the strength and direction of associations. Given the small sample, Spearman's rank correlation was also computed as a sensitivity analysis to assess robustness against potential outliers.
- 4) Simple linear regression was conducted to estimate the proportion of variance in each dependent variable associated with learning-community scores. Because each model contained only one predictor, standardized β equals r and R^2 equals r^2 mathematically; nevertheless, regression was retained to report unstandardized coefficients (B), standard errors (SE), 95% confidence intervals (CI), intercepts, and model fit statistics (F , df) for completeness.

The significance level was set at $\alpha = 0.05$ (two-tailed). The null hypothesis of no association was rejected when $p < 0.05$.

RESULTS AND DISCUSSION

Descriptive Overview of Learning-Community Participation

This exploratory study examined seven elementary school teachers in a single Indonesian school. All teachers completed the self-report questionnaires, yielding a 100% response rate. The first research question concerned the level of teacher participation in the learning community. As shown in Figure 2, teachers reported high levels of engagement across all four indicators, with mean scores ranging from 4.07 to 4.29 on a 5-point Likert scale. Meeting frequency recorded the highest mean ($M = 4.29$, $SD = 0.42$), followed by collaborative planning ($M = 4.21$), discussion intensity ($M = 4.14$), and joint reflection ($M = 4.07$). These results suggest that the learning community functioned consistently as part of teachers' work culture, although the relatively lower score for joint reflection indicates that the depth of critical evaluation may warrant further attention.

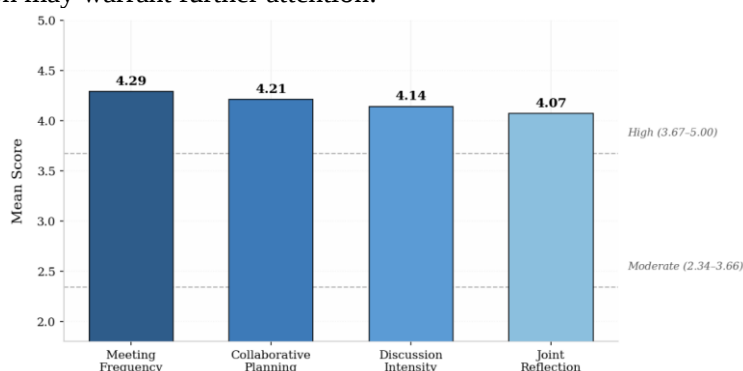


Figure 2. Indicators of elementary school teacher learning community.

All indicators were measured on a 5-point Likert scale. Category intervals: Low = 1.00–2.33; Moderate = 2.34–3.66; High = 3.67–5.00.

Descriptive Profiles of Outcome Variables

Teachers also reported high levels of self-reported pedagogical competence ($M = 4.18$, $SD = 0.38$) and innovative learning practices ($M = 4.02$, $SD = 0.51$). Within pedagogical competence, lesson design scored highest ($M = 4.31$), followed by instruction implementation ($M = 4.24$), feedback provision ($M = 4.16$), and evaluation of learning outcomes ($M = 4.02$). Within innovative practices, active learning methods recorded the highest mean ($M = 4.18$), followed by technology use ($M = 4.09$), project-based learning ($M = 3.97$), and instructional differentiation ($M = 3.86$). The descriptive statistics are summarized in Table 1.

Table 2. Descriptive Statistics of Research Variables

Variable	N	Minimum	Maximum	Mean	SD	Category
Learning Community	7	3.50	4.75	4.15	0.42	High
Pedagogical Competence	7	3.67	4.58	4.18	0.38	High
Innovative Learning Practices	7	3.33	4.67	4.02	0.51	High

Note: Categories were determined using a criterion-referenced interval based on the 5-point Likert scale: Low (1.00–2.33), Moderate (2.34–3.66), High (3.67–5.00).

A side-by-side comparison of the two outcome variables (see Figure 3) reveals that pedagogical competence indicators consistently scored higher than their innovative-practice counterparts. However, with only seven respondents, these numerical differences should not be over-interpreted as population-level patterns.

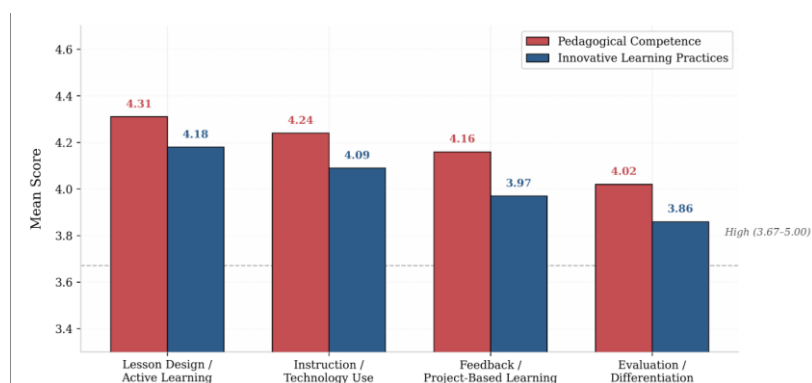


Figure 3. Comparison of pedagogical competence and innovative learning practices indicators

Assumption Testing

Before conducting parametric analyses, the data were examined for normality and linearity. Visual inspection of Q-Q plots and scatterplots suggested no severe departures from normality or linearity, though this interpretation is necessarily cautious given the very small sample. The Shapiro-Wilk test yielded $p = 0.412$ (learning community), $p = 0.387$ (pedagogical competence), and $p = 0.356$ (innovative learning practices). While these values exceed 0.05, the test possesses extremely low statistical power with $N = 7$; therefore, the decision to proceed with Pearson correlation was supported primarily by visual inspection and supplemented with Spearman rank correlation as a sensitivity analysis. The Test for Linearity indicated that the Deviation from Linearity was not statistically significant for either dependent variable ($F < 1$, $p > 0.05$), supporting the assumption of linear relationships.

Bivariate Associations

The second and third research questions examined the extent to which learning-community participation was associated with self-reported pedagogical competence and innovative learning practices. As shown in Table 2, Pearson correlation revealed a strong positive association between learning-community scores and pedagogical competence ($r = 0.847$, $p = 0.008$, two-tailed, 95% CI [0.358, 0.976]). Similarly, learning-community participation was strongly and positively associated with self-reported innovative learning practices ($r = 0.792$, $p = 0.018$, two-tailed, 95% CI [0.203, 0.964]).

Table 3. Pearson and Spearman Correlation Results

Variable Relationship	Pearson r	Spearman ρ	t	df	Sig. (2-tailed)	95% CI
LC – Pedagogical Competence	0.847	0.893	3.572	5	0.008	[0.358, 0.976]
LC – Innovative Practices	0.792	0.821	2.889	5	0.018	[0.203, 0.964]

LC = Learning Community. CI = confidence interval computed via Fisher's z-transformation. ** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

The consistency between Pearson and Spearman coefficients suggests that the observed associations were not driven by a single extreme outlier. Nevertheless, with $N = 7$, these coefficients are highly unstable; a modest shift in one respondent's scores could substantially alter their magnitude. Therefore, the precise values should be treated as exploratory rather than as stable population parameters.

Figure 4 presents scatterplots for both associations, which are more informative than summary statistics alone when the sample is this small. Each point represents one teacher, and the fitted regression lines illustrate the direction of the relationships. The plots also reveal the wide 95% confidence bands, underscoring the uncertainty inherent in estimates derived from seven observations.

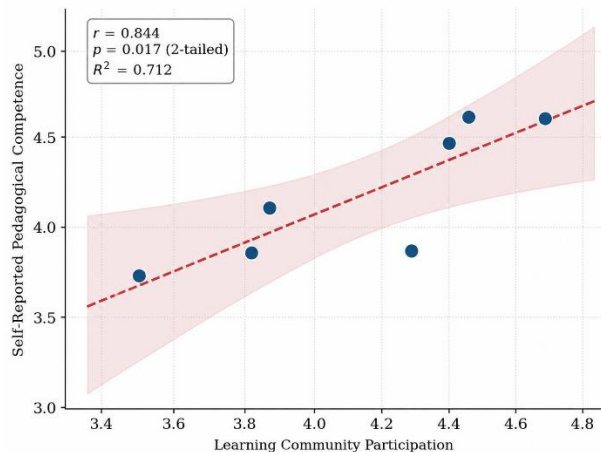


Figure 4. Scatterplot of Learning Community vs. Pedagogical Competence

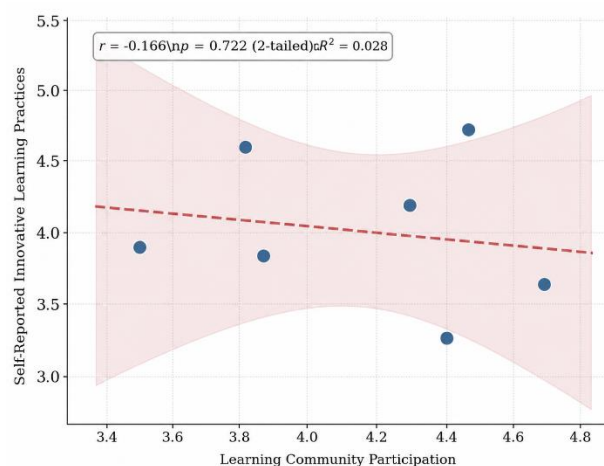


Figure 5. Scatterplot of Learning Community vs. Innovative Learning Practices

Regression Analysis

To estimate the proportion of variance in each outcome associated with learning-community scores, simple linear regression was conducted. Because each model contained only one predictor, the standardized coefficient (β) is mathematically equivalent to Pearson's r , and R^2 equals r^2 . The regression results are reported in Table 4 for completeness, including unstandardized coefficients, standard errors, and confidence intervals.

Table 4. Simple Linear Regression Results

Dependent Variable	B	SE	95% CI for B	β	R^2	Adjusted R^2	F (1, 5)	p
Pedagogical Competence	0.768	0.215	[0.215, 1.321]	0.847	0.717	0.661	12.76	0.008
Innovative Practices	0.962	0.333	[0.106, 1.818]	0.792	0.627	0.553	8.35	0.018

B = unstandardized coefficient; SE = standard error; CI = confidence interval; β = standardized coefficient. Because each model contains only one predictor, β is mathematically equivalent to Pearson's r , and R^2 equals r^2 .

Within this seven-teacher sample, learning-community scores accounted for 71.7% of the observed variance in self-reported pedagogical competence and 62.7% of the observed variance in self-reported innovative learning practices. The remaining 28.3% and 37.3% of variance, respectively, were unexplained by this model and may reflect other unmeasured variables (e.g., principal support, teacher motivation, resource availability), measurement error, or common-method variance. It is critical to emphasize that R^2 does not indicate causal "effect" or "influence"; it merely quantifies the proportion of observed variance statistically associated with the predictor within this specific sample.

Discussion

The findings of this exploratory study indicate that, within a single elementary school, teachers who reported higher participation in learning communities also reported higher pedagogical competence and more frequent innovative learning practices. These associations are consistent with theoretical propositions that collaborative professional environments foster teacher capability (Wenger, 2010; Desimone & Garet, 2021). However, the cross-sectional design and very small sample preclude any causal interpretation; the observed patterns reflect statistical co-occurrence rather than proven impact.

Why might pedagogical competence show a numerically stronger association than innovative practices? One plausible interpretation is that learning communities primarily facilitate the exchange of instructional knowledge, lesson planning, and feedback—activities that map directly onto the cognitive and procedural dimensions of pedagogical competence. In contrast, translating collaborative learning into innovative classroom practices (e.g., technology integration, differentiation) depends on enabling conditions that may lie outside the community's immediate control, such as digital infrastructure, scheduling autonomy, and principal support. The relatively lower mean for instructional differentiation ($M = 3.86$) supports the argument that this dimension requires targeted assistance beyond routine community meetings. This interpretation, however, is speculative; the study did not measure enabling conditions directly, and no statistical test confirmed that the two correlation coefficients differed significantly from each other.

From a theoretical standpoint, the findings partially align with Wenger's (2010) community of practice framework. Teachers engaged in shared practice, mutual reflection, and collaborative planning reported higher competence, which is theoretically expected. Yet the study does not demonstrate that the community caused these competencies; rather, it documents an association that is compatible with—but does not prove—theoretical predictions. Desimone and Garet's (2021) model emphasizes active learning, ongoing collaboration, and integration with daily practice—criteria that learning communities appear to satisfy. However, the model also implies developmental processes over time, which a single-point cross-sectional design cannot capture.

Methodologically, the consistency between Pearson and Spearman correlations suggests that the observed associations were not artifacts of a single outlier. Nevertheless, with $N = 7$, the coefficients are highly unstable. The wide confidence intervals (see Figure 4) further underscore that these estimates are imprecise. Therefore, the magnitude of the coefficients should not be compared directly with effect sizes from larger studies employing different instruments and contexts.

Practical implications should be treated as tentative. The findings suggest that schools with similar collaborative cultures may consider strengthening learning communities as one component of professional development, particularly to enhance shared reflection and pedagogical planning. To foster innovative practices, however, communities may need to be supplemented with dedicated training in instructional differentiation and technology, as well as structural support (e.g., time allocation, facilities) from school leadership. These recommendations are speculative and require testing in larger, more diverse samples.

CONCLUSION

This study has several important limitations that constrain the interpretation of findings. First, the sample comprised only seven teachers from one school, severely restricting generalizability. Second, the cross-sectional correlational design precludes causal inference; the observed associations may reflect reverse causality (e.g., highly competent teachers may be more inclined to participate in communities) or unmeasured confounding variables. Third, all variables were measured via self-report questionnaires, introducing potential common-method bias and social desirability effects. Fourth, statistical assumption tests (e.g., Shapiro-Wilk) possess extremely low power with $N = 7$. Finally, the study did not measure enabling conditions (e.g., infrastructure, principal leadership) that may moderate the relationship between community participation and innovative practices.

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