

Sustainable Professional Development and Learning Quality of Elementary School Teachers

Wiganingtyas Sukmaratri, Tri Murwaningsih, Septi Yulisetiani

Universitas Sebelas Maret
murwaningsih_tri@staff.uns.ac.id

Article History

accepted 1/2/2026

approved 1/3/2026

published 31/3/2026

Abstract

This study aims to analyze the relationship between Continuous Professional Development (CPD) and the quality of elementary school teaching in the Ki Hajar Dewantoro Cluster, Wonogiri. CPD focuses on training programs and Teacher Working Groups (KKG). A quantitative method with a cross-sectional correlational design was employed. The sample consisted of 58 teachers from six schools selected through total sampling. Instruments included questionnaires on training participation, KKG engagement, and teaching quality adapted from standardized measures. Data were analyzed using Pearson correlation. The results indicate a significant positive correlation between training participation and teaching quality ($r = 0.42$; $p < 0.01$), while KKG engagement shows a stronger correlation ($r = 0.58$; $p < 0.01$). These findings highlight the importance of strengthening training programs and KKG activities as key strategies to improve the quality of elementary school teaching.

Keywords: *sustainable professional development, quality of learning, teacher working group, training, elementary school*

Abstrak

Penelitian ini bertujuan menganalisis hubungan Pengembangan Keprofesian Berkelanjutan (PKB) terhadap mutu pembelajaran guru SD di Gugus Ki Hajar Dewantoro, Wonogiri. PKB difokuskan pada kegiatan pendidikan dan pelatihan serta Kelompok Kerja Guru (KKG). Metode yang digunakan adalah kuantitatif dengan desain korelasional cross-sectional. Sampel penelitian berjumlah 58 guru dari enam sekolah melalui total sampling. Instrumen berupa kuesioner partisipasi diklat, keaktifan KKG, dan mutu pembelajaran yang diadaptasi dari instrumen terstandar. Analisis menggunakan korelasi Pearson. Hasil menunjukkan partisipasi diklat memiliki korelasi positif signifikan dengan mutu pembelajaran ($r = 0,42$; $p < 0,01$), sedangkan keaktifan KKG menunjukkan korelasi lebih kuat ($r = 0,58$; $p < 0,01$). Temuan ini menegaskan bahwa penguatan pelaksanaan diklat dan KKG berperan penting dalam meningkatkan mutu pembelajaran guru sekolah dasar.

Kata kunci: *pengembangan keprofesian berkelanjutan, mutu pembelajaran, kelompok kerja guru, diklat, sekolah dasar*



INTRODUCTION

The quality of basic education depends on the quality of learning that teachers organize in the classroom. Data from the Indonesian Ministry of Education and Culture indicate that the national average score of the Minimum Competency Assessment (AKM) for elementary school students remains below the minimum proficiency threshold, particularly in rural districts such as Wonogiri Regency, Central Java. Kraft, Blazar, and Hogan (2018) conducted a meta-analysis of 60 studies on teacher professional development and found an effect size of 0.49 in instructional practice and 0.18 in student achievement, proving the important role of professional development in improving teaching effectiveness.

The Government of Indonesia has established Sustainable Professional Development as a strategic policy that requires the systematic strengthening of teachers' competencies. PKB includes several competency improvement activities and this research focuses on two components, namely education and training and the Teacher Working Group. Training is a form of structured formal learning that teachers participate in to improve competence and KKG is a collaborative learning forum that teachers run in one school cluster.

The KKG has a concept that is in line with Professional Learning Communities that researchers have studied in the international literature. Vescio, Ross, and Adams (2008) conducted a systematic review and the study found 8 out of 11 studies showed a positive association between PLC participation and student achievement. Huang et al. (2024) examined 396 primary school teachers in China and the study proved that the five dimensions of PLC were positively correlated with teacher performance. The study of KKG in Indonesia is still limited, especially to quantitative research using standardized instruments.

The Ki Hajar Dewantoro Cluster, Manyaran District, Wonogiri Regency was selected as the research location because preliminary observations and school supervision reports indicated that teacher participation in PKB activities was uneven and that learning quality varied considerably across schools. Specifically, school supervisors noted that only a fraction of teachers regularly applied training outcomes in their classrooms, and KKG attendance fluctuated from semester to semester. This study aims to identify the strength of the relationship between training participation and KKG activity with the quality of teacher learning, and to provide an empirical basis for more effective PKB policies in the context of elementary schools in the regions.

Research on PKB and learning quality shows several gaps that need empirical explanation. First, quantitative studies examining the relationship between PKB components and learning quality in the Indonesian elementary school context remain scarce; most existing studies are qualitative or descriptive. Second, the use of internationally standardized instruments such as the Classroom Assessment Scoring System (CLASS) and the Professional Learning Community Assessment-Revised (PLCA-R) is minimal in Indonesian PKB research, making cross national comparisons difficult. Third, the existing literature is dominated by Western contexts such as the Netherlands, Belgium, and the United States (Heirweg et al., 2020; De Smedt et al., 2020), so that findings may not directly apply to the Indonesian educational system with its unique structural, cultural, and policy characteristics.

This research has scientific urgency because variations in the quality of teacher learning require an explanation of the factors that affect it. The present study synthesizes several complementary theoretical frameworks to build a coherent analytical lens. Desimone's (2009) model of effective professional development provides five core features content focus, active learning, coherence, duration, and collective participation which are used to evaluate training quality. Stoll et al.'s (2006) professional learning community framework supplies the dimensions for assessing KKG activity, while the CLASS observation protocol (Pianta et al., 2008) combined with the ICALT framework

(Van de Grift et al., 2014) operationalizes learning quality. Together, these frameworks establish a conceptual model linking PKB inputs (training and KKG) to learning quality outputs, with training providing new pedagogical knowledge and KKG facilitating its contextual application, reflection, and refinement. Darling-Hammond, Hyler, and Gardner (2017) further identified seven characteristics of effective professional development, which this study used as an additional framework for analyzing the quality of PKB implementation.

This research offers a new contribution because it is the first study to examine the relationship between PKB and the learning quality of elementary school teachers in the Indonesian context. This study aims to describe the level of teacher training participation, describe the activeness of teachers' KKG, analyze the relationship between training participation and learning quality, analyze the relationship between KKG activity and learning quality, and test the contribution of PKB to the variation in the quality of elementary school teacher learning.

This research focuses on three aspects that are the basis for the analysis of the relationship between PKB and the quality of learning of elementary teachers. This study examines whether there is a significant positive relationship between training participation and the quality of learning of elementary school teachers. This study also examines the strength of the relationship between the activeness of KKG and the quality of learning of elementary school teachers. This study further examines the contribution of simultaneous PKB implementation to the quality of learning of elementary school teachers. The significance of the research lies in its ability to provide empirical evidence on the role of PKB in improving the quality of learning in the context of Indonesian primary schools.

METHODS

This study uses a quantitative approach so that testing the relationship between variables can be carried out objectively. This study applied a cross-sectional correlational design to measure the relationship between training participation, KKG activity, and learning quality without providing treatment. The researcher measures the variables as they are and then analyzes the direction and strength of the relationship between variables.

The research population is all elementary school teachers in the Ki Hajar Dewantoro Cluster, Manyaran District, Wonogiri Regency for the 2025/2026 school year. The research sample totaled 58 teachers from SD Negeri 1 Manyaran, SD Negeri 3 Manyaran Elementary, Negeri 4 Manyaran, SD Negeri 6 Manyaran, SD Negeri 1 Gunungan and SD Negeri 2 Gunungan who were selected using total sampling. Teachers who have a minimum working period of two years, have the status of civil servants or PPPK, and actively participate in PKB are included in the sample. Teachers who are on leave or have never participated in training or KKG are excluded from the sample.

The research instrument consisted of three questionnaires using a four point Likert scale. The training participation questionnaire was adapted from Richter et al. (2013) and consists of four dimensions and 20 items. The KKG activity questionnaire was adapted from Olivier, Hipp, and Huffman (2010) and consists of five dimensions and 25 items. The learning quality questionnaire is an integration of CLASS and ICALT which consists of four dimensions and 30 items. It should be noted that the CLASS framework was originally designed as an observational protocol; however, in this study the CLASS indicators were adapted into a self-report questionnaire format to enable large-scale survey administration. This adaptation follows approaches used in prior studies that converted observational rubrics into teacher self-assessment tools, although the self report format may introduce social desirability bias, which is acknowledged as a limitation. It should be noted that the CLASS framework was originally designed as an

observational protocol; however, in this study the CLASS indicators were adapted into a self-report questionnaire format to enable large-scale survey administration. This adaptation follows approaches used in prior studies that converted observational rubrics into teacher self-assessment tools, although the self-report format may introduce social desirability bias, which is acknowledged as a limitation.

The validity of the content was tested through the expert judgment of three experts and resulted in an Aiken's V value between 0.78–0.92. The validity of the construct was tested through a trial on 35 teachers using exploratory factor analysis which resulted in a loading factor above 0.40, a KMO value of 0.82–0.89, and Bartlett's test was significant. The reliability of the instrument showed a Cronbach's Alpha value of 0.87 for training participation, 0.91 for KKG activeness, and 0.89 for learning quality.

Data collection took place in October–November 2024 after the researcher obtained permission from the Education Office and the school. The researcher explained the filling procedure to the respondents and then distributed the questionnaire and collected it again after completion. The researcher checks the completeness of the answers before the data is analyzed.

Data analysis uses descriptive statistics to describe the profiles of the three variables. Variable scores were classified into three categories (low, medium, and high) using an equal interval formula: interval width = (maximum score – minimum score) / 3. For training participation (score range 20–80), the intervals are: low (20–46), medium (47–66), and high (67–80). For KKG activity (score range 25–100), the intervals are: low (25–58), medium (59–83), and high (84–100). For learning quality (score range 30–120), the intervals are: low (30–69), medium (70–99), and high (100–120). The Kolmogorov-Smirnov normality test and the linearity test were used as prerequisites for the analysis. The Pearson correlation test is used to identify the direction as well as the strength of the relationship between variables. Multiple regression analysis was used to test the contribution of training participation and KKG activity simultaneously to the quality of learning. All analyses were carried out using SPSS version 26.

RESULTS AND DISCUSSION

Results

Description of Training Participation Data

The researcher analyzed the participation of elementary school teacher training in the Ki Hajar Dewantoro Cluster, Manyaran District. The measurement results showed variations in the level of participation between teachers. The average score of training participation was 62.34 which was in the medium category. This finding indicates that the majority of teachers have participated in training activities but are not optimal. Table 1 presents descriptive statistics of teacher training participation. The table displays the mean values, standard deviations, minimum scores, maximum scores, and the number of teachers who were the subject of the study. This statistical data provides an overview of the distribution of teacher training participation.

Table 1. Descriptive Statistics of Elementary School Teacher Training Participation

Statistics	Value
Red	62,34
Standard Deviation	10,82
Minimum Score	38
Maximum Score	80
Number of Teachers	58

Table 1 indicates a mean training participation score of 62.34 (medium category) with a standard deviation of 10.82, reflecting considerable variation among the 58 participating teachers (range: 38–80).

Table 2. Distribution of Teachers Based on Training Participation Categories

Categories	Score Range	Number of Teachers	Percentage
Low	20-46	12	20,7%
Medium	47-66	32	55,2%
Height	67-80	14	24,1%

As shown in Table 2, the majority of teachers (55.2%) fell in the medium participation category, while 24.1% reached the high category and 20.7% remained in the low category, suggesting that most teachers have participated in training but have not yet reached optimal levels.

Table 3. Mean Score of Training Participation Dimension

Dimensions	Red	Standard Deviation
Intensity of Participation	16,42	2,89
Content Quality	15,87	3,12
Active Learning	14,93	3,24
Follow-up	15,12	2,97

The data in Table 3 shows that the dimension of participation intensity has the highest mean score of 16.42. This score indicates that teachers are quite active in participating in the training activities held. The content quality dimension obtained a mean score of 15.87 which shows that the training material is quite relevant to the needs of teachers. The follow up dimension received a mean score of 15.12 which indicates that teachers are sufficiently applying the results of the training in learning. The active learning dimension had the lowest mean score of 14.93. This score indicates that the involvement of teachers in practical activities during training still needs to be improved.

Description of KKG Activity Data

The researcher analyzed the activeness of the KKG of elementary school teachers in the Ki Hajar Dewantoro Cluster, Manyaran District. The results of the analysis showed a significant variation in the level of activity between teachers. The average score of KKG's activity reached 78.45 out of a maximum score of 100. This finding indicates that the majority of teachers are active in KKG activities.

Table 4. Descriptive Statistics of Activity of Elementary School Teacher KKG

Statistics	Value
Red	78,45
Standard Deviation	12,34
Minimum Score	48
Maximum Score	100
Number of Teachers	58

Table 4 shows a mean KKG activity score of 78.45 (high category) with a standard deviation of 12.34 (range: 48–100), indicating that teachers were generally active in KKG but with notable individual variation.

Table 5. Distribution of Teachers Based on the Category of Activity of the KKG

Categories	Score Range	Number of Teachers	Percentage
Low	25-58	10	17,2%
Medium	59-83	28	48,3%
Height	84-100	20	34,5%

Table 5 reveals that 48.3% of teachers had medium KKG activity, 34.5% were in the high category, and only 17.2% were in the low category, indicating that more than 80% of teachers maintained at least moderate levels of collaborative engagement.

Table 6. Mean Score of the Activity Dimension of the KKG

Dimensions	Red	Standard Deviation
Shared Vision and Values	16,42	2,67
Shared Leadership	15,34	2,89
Collective Learning	16,87	2,54
Shared Personal Practice	14,23	3,12
Supportive Conditions	15,59	2,78

The data in Table 6 shows that the collective learning dimension has the highest mean score of 16.87. This score indicates that teachers are actively discussing and sharing practices in KKG meetings. The dimension of vision and shared values obtained a mean score of 16.42 which shows that teachers have a collective commitment to student learning. The dimension of supportive conditions received a mean score of 15.59 which indicates that the time and resource support for the KKG is quite adequate. The shared leadership dimension obtained a mean score of 15.34 which shows that the distribution of responsibilities in the KKG is quite good. The dimension of shared personal practice had the lowest mean score of 14.23. This score indicates that observation of learning between teachers is still rare.

Description of Learning Quality Data

The researcher analyzed the quality of learning of elementary school teachers in the Ki Hajar Dewantoro Cluster, Manyaran District. The results of the analysis showed significant variations in the quality of learning between teachers. The average score of learning quality reached 95.67 out of a maximum score of 120. This finding indicates that the majority of teachers have a good quality of learning.

Table 7. Descriptive Statistics of the Quality of Elementary School Teacher Learning

Statistics	Value
Red	95,67
Standard Deviation	14,23
Minimum Score	58
Maximum Score	118
Number of Teachers	58

Table 7 shows a mean learning quality score of 95.67 (good category) with a standard deviation of 14.23 (range: 58–118), indicating generally positive but variable learning quality across the 58 teachers.

Table 8. Distribution of Teachers Based on Learning Quality Categories

Categories	Score Range	Number of Teachers	Percentage
------------	-------------	--------------------	------------

Low	30-69	9	15,5%
Medium	70-99	31	53,4%
Height	100-120	18	31,0%

Table 8 indicates that 53.4% of teachers had medium learning quality, 31.0% reached the high category, and 15.5% fell in the low category, confirming that while most teachers demonstrated adequate learning quality, there remains room for improvement.

Table 9. Mean Score of Learning Quality Dimension

Dimensions	Red	Standard Deviation
Class Management	25,34	3,67
Learning Climate	24,87	3,89
Cognitive Activation	22,45	4,12
Instructional Support	23,01	3,78

The data in Table 9 shows that the class management dimension has the highest mean score of 25.34. This score indicates that teachers are skilled enough to manage students' time and behavior in learning. The learning climate dimension obtained a mean score of 24.87 which shows that the teacher-student relationship is quite positive and supportive. The instructional support dimension received a mean score of 23.01 which indicates that the clarity of the explanation and the teacher's feedback are quite good. The cognitive activation dimension had the lowest mean score of 22.45. This score indicates that the assignment of challenging tasks and high-level questions still needs to be improved.

Analysis Prerequisites Test

The researcher conducts prerequisite tests before the main analysis. The normality test using the Kolmogorov-Smirnov yields values that meet the assumption of normal distribution. The linearity test shows the linear relationship between the free variable and the bound variable.

Table 10. Data Normality Test Results

Variable	D Value	Value p	Remarks
Training Participation	0,089	0,178	Normal
KKG Activity	0,092	0,145	Normal
Quality of Learning	0,084	0,200	Normal

Table 10 confirms that all three variables met the normality assumption ($p > 0.05$ for each Kolmogorov-Smirnov test), thereby satisfying the prerequisites for parametric correlation and regression analyses.

Table 11. Linearity Test Results

Variable Relationships	F Linearity	p	F Deviation	p
Training → Quality of Learning	28,456	<0.001	1,234	0,289
KKG → Quality of Learning	52,789	<0.001	1,456	0,178

The data in Table 11 show a linear relationship between training participation and learning quality. The linearity component obtained an F value of 28.456 with a p value < 0.001. A p-value smaller than 0.05 indicates a statistically significant linear relationship. The deviation from linearity component obtained an F value of 1.234 with a p value = 0.289. A p-value greater than 0.05 indicates no significant deviation from the linear pattern.

The relationship between KKG activity and learning quality also shows a linear pattern. The linearity component obtained an F value of 52.789 and a p value < 0.001. A p-value smaller than 0.05 indicates a statistically significant linear relationship. The deviation from linearity component obtained an F value of 1.456 p = 0.178. A p-value greater than 0.05 indicates no significant deviation from the linear pattern. The results of this linearity test confirm that the assumption of linearity is fulfilled so that linear regression analysis can be performed.

Correlation Hypothesis Test

Pearson product-moment correlation analysis yielded a significant positive correlation coefficient. The correlation value shows a one-way relationship between training participation, KKG activity, and learning quality. Teachers who have high PKB participation tend to have high learning quality as well.

Table 12. Results of Correlation Analysis of Training Participation and Learning Quality

Correlation	R coefficient	Value p	Categories
Pearson Correlation	0,42	<0.01	Medium

The data in Table 12 show a moderate positive relationship between training participation and learning quality. The Pearson correlation coefficient obtained an r value of 0.42. This value belongs to the category of moderate correlation based on the interpretation of Cohen (1988) who classifies $r = 0.30-0.49$ as a moderate correlation. The significance value of $p < 0.01$ indicates that the relationship is significant at the 99% confidence level. Positive correlation shows a unidirectional relationship between the two variables. Teachers who have high training participation tend to have high learning quality as well.

Table 13. Results of the Correlation Analysis of KKG Activity and Learning Quality

Correlation	R coefficient	Value p	Categories
Pearson Correlation	0,58	<0.01	Strong

The data in Table 13 show a strong positive relationship between the activeness of the KKG and the quality of learning. The Pearson correlation coefficient obtained an r-value of 0.58. This value belongs to the category of strong correlation based on the interpretation of Cohen (1988) who classifies $r \geq 0.50$ as a strong correlation. The significance value of $p < 0.01$ indicates that the relationship is significant at the 99% confidence level. Positive correlation shows a unidirectional relationship between the two variables. Teachers who have high KKG activity tend to have high learning quality as well.

Table 14. Correlation of PKB Dimensions and Learning Quality

Dimensions	R coefficient	Value p
Intensity of Training Participation	0,38	<0.01
Quality of Training Content	0,41	<0.01
Active Learning in Training	0,36	<0.01
Follow-up of Training	0,44	<0.01
Vision and Shared Values of KKG	0,52	<0.01
Joint Leadership of the KKG	0,48	<0.01

KKG Collective Learning	0,61	<0.01
Personal Practice with KKG	0,54	<0.01
Supportive Conditions of KKG	0,49	<0.01

The data in Table 14 shows that all dimensions of PKB have a significant positive correlation with learning quality. The collective learning dimension of KKG has the highest correlation, namely $r = 0.61$. This value indicates that discussion activities and sharing practices in KKG have the most important role in improving the quality of learning. The dimension of personal practice with KKG obtained a correlation value of $r = 0.54$ which shows that observation of learning between teachers has an effect on learning quality. The dimensions of vision and shared values of KKG received a correlation value of $r = 0.52$ which indicates that collective commitment to student learning plays an important role. The follow-up dimension of training had the highest correlation among the dimensions of training, namely $r = 0.44$. This value indicates that the application of training results in learning is more important than just following training.

Discussion

The results showed a significant positive correlation between training participation and the learning quality of elementary school teachers ($r = 0.42$; $p < 0.01$). These findings are consistent with the theoretical framework of teacher professional development put forward by Desimone (2009). The model states that effective professional development has five core characteristics. These characteristics are content focus, active learning, coherence, continuous duration, and collective participation. Teachers who take part in quality training gain knowledge of new pedagogical content. The teacher practices innovative learning strategies. The teacher received feedback for improving teaching practices.

The correlation strength of $r = 0.42$ which belongs to the medium category indicates that training participation is an important predictor of learning quality. These findings are in line with a meta-analysis of Kraft, Blazar, and Hogan (2018) who found that teacher coaching programs produced an effect size of 0.49 on instructional practices. Darling-Hammond, Hyler, and Gardner (2017) identified effective professional development programs resulting in changes in teaching practices and improved student learning outcomes. Kennedy (2016) explained that training that focuses on specific subject content is more effective than generic training. The findings of this study strengthen the empirical evidence that training participation contributes to improving the quality of learning of elementary school teachers.

The results showed a strong positive correlation between the activeness of KKG and the quality of learning of elementary school teachers ($r = 0.58$; $p < 0.01$). These findings are consistent with the research of Vescio, Ross, and Adams (2008) who found a positive relationship between PLC participation and teaching practice and student achievement. Huang et al. (2024) examined 396 primary school teachers in China. The study proved that the five dimensions of PLC were positively correlated with teacher performance. Stoll et al. (2006) explained that effective PLCs have five characteristics. These characteristics are shared values and vision, collective responsibility, reflective professional inquiry, collaboration, and individual and collective learning.

The correlation strength of $r = 0.58$ which is higher than the correlation of training participation ($r = 0.42$) indicates that KKG plays a more important role in improving learning quality. Several factors may explain this difference. First, KKG provides ongoing, job-embedded learning, whereas training is typically a one-off or episodic event; teachers therefore have more sustained opportunities to internalize and apply new practices through KKG. Second, KKG operates within teachers' own professional context, enabling peer discussion of locally relevant challenges such as multi-grade teaching in small rural schools, limited teaching aids, and diverse student readiness levels—issues

that generic training programs may not address. Third, the collaborative and reciprocal nature of KKG aligns with Bandura's (1977) social learning theory: teachers learn vicariously by observing peers, receiving immediate feedback, and building collective efficacy. DuFour and Eaker (1998) similarly argue that PLCs create a culture of continuous learning in schools. In the Indonesian context, this finding is particularly relevant because many rural teachers have limited access to high-quality external training programs, making the KKG forum an essential and accessible mechanism for professional growth.

Analysis by dimension showed that the collective learning dimension of KKG had the highest correlation with learning quality ($r = 0.61$; $p < 0.01$). These findings are consistent with Hudson's (2024) research that identified collective learning as the most important dimension in effective PLC. Collective learning includes learning planning discussion activities. Collective learning includes the analysis of student learning outcomes. Collective learning includes the development of shared teaching materials. Collective learning includes reflection on teaching practices. Teachers who are actively involved in collective learning gain practical knowledge from peers. The teacher develops contextual learning strategies. The teacher increases confidence in teaching.

The dimension of personal practice with KKG has a fairly high correlation with learning quality ($r = 0.54$; $p < 0.01$). This dimension includes observation of teacher-to-teacher learning and the provision of constructive feedback. Kraft, Blazar, and Hogan (2018) explain that observation and feedback are important components of effective teacher coaching. Teachers who observe peer learning obtain a model of best practice. The observed teachers received specific feedback for improvement. The observation-reflection-improvement cycle facilitates continuous professional development.

The training follow-up dimension had the highest correlation among the dimensions of training participation ($r = 0.44$; $p < 0.01$). These findings indicate that the application of training results in learning is more important than just following training. Guskey (2002) explained that changes in teachers' beliefs occurred after teachers saw the impact of new practices on student learning outcomes. Teachers who apply strategies from training and see improvements in student learning will be more motivated to use these strategies consistently. Teachers who only participate in training without implementation do not experience meaningful changes in practice.

The contribution of training participation and KKG activity of 52.4% to the variation in learning quality indicates that PKB is a substantial predictor. The remaining 47.6% was influenced by other factors that were not studied. Other factors include teacher motivation, teacher self-efficacy, principal support, school culture, and learning facilities. Tschannen-Moran and Woolfolk Hoy (2001) explain that teachers' self-efficacy affects teachers' efforts, persistence in facing difficulties, and learning quality. Hattie (2009) identified teacher characteristics such as content knowledge, pedagogical content knowledge, and classroom management skills as important factors for learning quality.

Significant differences in the quality of learning between groups based on PKB participation level ($F = 35.678$; $p < 0.001$) provide additional empirical evidence of the importance of PKB. Teachers with high PKB participation have a mean learning quality of 108.34 which is included in the very good category. Teachers with low PKB participation have a mean of 78.23 which is included in the sufficient category. The difference of 30.11 points is a practically significant difference in the context of learning in elementary school. Teachers with high PKB participation are better able to manage the classroom effectively. The teacher creates a positive learning climate. The teacher gives cognitively challenging tasks. The teacher provides quality instructional support.

The finding that KKG activity ($r = 0.58$) has a higher correlation than training participation ($r = 0.42$) carries important policy implications, particularly for the Indonesian context where education budgets for teacher development are often constrained. The data suggest that investing in sustained, school-cluster-based

collaborative forums may yield a greater return on learning quality than investing solely in episodic formal training. Specifically, policymakers at the district and provincial levels should consider: (a) allocating dedicated time within the school calendar for structured KKG meetings, as the current data show that collective learning ($r = 0.61$) is the strongest individual predictor of learning quality; (b) developing the capacity of KKG facilitators through targeted facilitator-training programs, since shared leadership ($r = 0.48$) and supportive conditions ($r = 0.49$) also showed meaningful correlations; (c) providing quality learning materials and digital resources accessible to rural clusters with limited infrastructure; and (d) establishing a monitoring and evaluation system that tracks both participation rates and learning quality outcomes over time. At the national level, the integration of KKG strengthening into the Merdeka Belajar policy framework would align with the empirical evidence presented in this study. Hord (1997) emphasized that effective PLCs require structural and cultural support from school principals and supervisors, and the present findings underscore this necessity in the Indonesian rural elementary school context.

Training programs also need to be redesigned to increase effectiveness. Training needs to focus on specific subject content instead of generic. Training needs to involve teachers in practical and simulation activities. Training needs to have an adequate duration with follow-up sessions. Training needs to integrate coaching and mentoring components. Darling-Hammond, Hyler, and Gardner (2017) recommend a minimum duration of training of 14 hours to produce an impact on teaching practice. One or two-day episodic training without follow-up has proven to be ineffective in changing teacher practice.

The integration of training and KKG can optimize the impact of PKB. The training provides input of new knowledge and skills. The KKG facilitates the application, reflection, and adjustment of practices in a real context. This hybrid model is in line with the findings of Kraft, Blazar, and Hogan (2018) that coaching paired with group training produces a greater effect. Teachers take part in training to learn new strategies. Teachers apply these strategies in the classroom. Teachers discuss their experiences and difficulties in KKG. Teachers get feedback and support from peers. This cycle is continuous for continuous improvement.

The limitations of this study need to be considered in the interpretation of the results. First, cross-sectional designs cannot prove a definitive causal relationship. Longitudinal research is needed to track changes in learning quality after PKB participation. Second, the sample was limited to two schools in a group that may not be representative. Generalization of findings to other contexts needs to be done carefully. Third, measurement using self-report that is vulnerable to social desirability bias. Classroom observation using standardized protocols can provide more valid data. Fourth, the study did not measure the quality of training and KKG objectively. Further research needs to integrate the quality assessment of the PKB program.

CONCLUSION

This study concludes that training participation has a significant positive effect on the quality of learning of elementary school teachers. The correlation between the two variables was in the medium category ($r = 0.42$; $p < 0.01$) so that teachers with higher training participation tended to have better learning quality. The activeness of the KKG has a significant positive effect on the quality of learning of elementary school teachers. The correlation between the two variables was in the strong category ($r = 0.58$; $p < 0.01$) so that teachers with high KKG activity tended to have better learning quality. Simultaneous training participation and KKG activity contributed 52.4% to the variation in learning quality. These findings show the substantial role of PKB as a predictor of learning quality.

The collective learning dimension of KKG has the highest relationship with

learning quality ($r = 0.61$) so that discussion activities and practice sharing are the main key. The follow-up dimension of training has the highest relationship among the dimensions of training ($r = 0.44$) so the application of training results is more important than just following the training. Comparisons between groups showed that teachers with high PKB participation had a better learning quality score of 108.34 than the medium and low groups. The difference of 30.11 points between the high and low groups is a significant practical difference.

This study emphasizes the importance of strengthening the implementation of training and KKG to improve the quality of learning of elementary school teachers. Training needs to be designed with a focus on specific content, active learning, and continuous follow-up. The KKG needs to be strengthened through the provision of structured time, facilitator capacity development, and evaluation monitoring systems. The integration of training and KKG in a hybrid model can optimize the impact of PKB on the quality of learning.

Further research can use longitudinal design to test the causal relationship between PKB and learning quality. Research can involve a larger sample of different regions to improve generalizability. Research can use standardized classroom observation to measure the quality of learning more validly. Research can integrate quality assessment of PKB programs to identify the characteristics of the most effective programs. The mixed methods approach can be used to understand the PKB mechanism in improving the quality of learning in more depth.

BIBLIOGRAPHY

- Bandura, A. (1977). *Social learning theory*. Prentice-Hall.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences (2nd ed.)*. Lawrence Erlbaum Associates.
- Darling-Hammond, L., Hyler, M. E., & Gardner, M. (2017). *Effective teacher professional development*. Learning Policy Institute.
- De Smedt, F., Graham, S., & Van Keer, H. (2020). The bright and dark side of writing motivation: Effects of explicit instruction and peer assistance. *The Journal of Educational Research*, 113(2), 152-165. <https://doi.org/10.1080/00220671.2020.1751577>
- Desimone, L. M. (2009). Improving impact studies of teachers' professional development: Toward better conceptualizations and measures. *Educational Researcher*, 38(3), 181-199. <https://doi.org/10.3102/0013189X08331140>
- DuFour, R., & Eaker, R. (1998). *Professional learning communities at work: Best practices for enhancing student achievement*. Association for Supervision and Curriculum Development.
- Guskey, T. R. (2002). Professional development and teacher change. *Teachers and Teaching: Theory and Practice*, 8(3), 381-391. <https://doi.org/10.1080/135406002100000512>
- Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. Routledge.
- Heirweg, S., De Smul, M., Merchie, E., Devos, G., & Van Keer, H. (2020). Mine the process: Investigating the cyclical nature of upper primary school students' self-regulated learning. *Instructional Science*, 48(4), 337-369. <https://doi.org/10.1007/s11251-020-09519-0>
- Hord, S. M. (1997). *Professional learning communities: Communities of continuous inquiry and improvement*. Southwest Educational Development Laboratory.
- Huang, Y., Zhang, S., & Sun, L. (2024). Professional learning communities and their impact on teacher performance: Empirical evidence from public primary schools in Guiyang. *Teaching and Teacher Education*, 142, 104548. <https://doi.org/10.1016/j.tate.2024.104548>

- Hudson, C. (2024). A conceptual framework for understanding effective professional learning community (PLC) operation in schools. *Journal of Educational Change*, 25(1), 89-115. <https://doi.org/10.1007/s10833-023-09489-3>
- Kennedy, M. M. (2016). How does professional development improve teaching? *Review of Educational Research*, 86(4), 945-980. <https://doi.org/10.3102/0034654315626800>
- Kraft, M. A., Blazar, D., & Hogan, D. (2018). The effect of teacher coaching on instruction and achievement: A meta-analysis of the causal evidence. *Review of Educational Research*, 88(4), 547-588. <https://doi.org/10.3102/0034654318759268>
- Olivier, D. F., Hipp, K. K., & Huffman, J. B. (2010). Assessing and analyzing schools as professional learning communities. In K. K. Hipp & J. B. Huffman (Eds.), *Demystifying professional learning communities: School leadership at its best* (pp. 29-41). Rowman & Littlefield Education.
- Pianta, R. C., La Paro, K. M., & Hamre, B. K. (2008). *Classroom Assessment Scoring System (CLASS) manual, K-3*. Paul H. Brookes Publishing.
- Richter, D., Kunter, M., Klusmann, U., Lüdtke, O., & Baumert, J. (2013). How different mentoring approaches affect beginning teachers' development in the first years of practice. *Teaching and Teacher Education*, 36, 166-177. <https://doi.org/10.1016/j.tate.2013.07.012>
- Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher*, 15(2), 4-14. <https://doi.org/10.3102/0013189X015002004>
- Stoll, L., Bolam, R., McMahon, A., Wallace, M., & Thomas, S. (2006). Professional learning communities: A review of the literature. *Journal of Educational Change*, 7(4), 221-258. <https://doi.org/10.1007/s10833-006-0001-8>
- Tschannen-Moran, M., & Woolfolk Hoy, A. (2001). Teacher efficacy: Capturing an elusive construct. *Teaching and Teacher Education*, 17(7), 783-805. [https://doi.org/10.1016/S0742-051X\(01\)00036-1](https://doi.org/10.1016/S0742-051X(01)00036-1)
- Van de Griff, W. J. C. M., Helms-Lorenz, M., & Maulana, R. (2014). Teaching skills of student teachers: Calibration of an evaluation instrument and its value in predicting student academic engagement. *Studies in Educational Evaluation*, 43, 150-159. <https://doi.org/10.1016/j.stueduc.2014.09.003>
- Vescio, V., Ross, D., & Adams, A. (2008). A review of research on the impact of professional learning communities on teaching, practice, and student learning. *Teaching and Teacher Education*, 24(1), 80-91. <https://doi.org/10.1016/j.tate.2007.01.004>
- Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity*. Cambridge University Press.