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In-house training with peer tutoring and teacher pedagogical competence: a systematic literature review

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ABSTRACT

This systematic literature review examines the extent to which In-House Training (IHT) integrated with peer tutoring is associated with improvements in teachers' pedagogical competence, and identifies the conditions that facilitate or constrain its effectiveness. Methods: Guided by PRISMA 2020, we searched Google Scholar, Scopus, DOAJ, and Garuda for empirical studies published between 2019 and 2026. Of 1,247 records, 42 empirical studies met the inclusion criteria. Pedagogical competence was operationalized across five dimensions: instructional planning, instructional implementation, assessment and evaluation, reflection on practice, and professional collaboration. Data were synthesized using thematic synthesis (Thomas & Harden, 2008), with descriptive aggregation of reported effect sizes where available. Study quality was appraised using the Mixed Methods Appraisal Tool (MMAT). Results: Across the 42 studies, IHT with peer tutoring was most consistently associated with positive changes in reflection on practice and professional collaboration, followed by instructional implementation, planning, and assessment. Reported effect sizes, where available, ranged from moderate to large (e.g., d = 1.24–1.52 in quasi-experimental studies), although most studies used pre-experimental designs without control groups. Five facilitating conditions were identified: (1) substantive school leadership support, (2) structured time allocation, (3) a non-evaluative culture of trust, (4) availability of resources and technology, and (5) sustainability through professional learning communities. Main constraints included teacher workload, limited time, and resistance to change. Conclusion: IHT with peer tutoring is a promising contextual model for teacher professional development, but effectiveness claims should be qualified by the methodological heterogeneity of the evidence base and by the presence of the five facilitating conditions.

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Introduction

Pedagogical competence is central to teacher professionalism because it directly concerns the ability to design, implement, and evaluate instruction. In contemporary education, demands on pedagogical competence have become increasingly complex, encompassing technology integration, differentiated instruction, and student-centered learning (Darling-Hammond et al., 2017; Selwyn, 2022). In Indonesia, national assessment data and school-based studies indicate that the quality of learning still requires improvement, partly because teachers' pedagogical competence is not yet optimal (Rustiyana, 2023).

In-House Training (IHT) has been recognized as a contextual professional development model because it is implemented within the school environment and adapted to teachers' immediate needs (Corinorita, 2017; Sujoko & Alfaris, 2012). IHT enables collaborative learning, sharing of good practices, and collective problem-solving around specific instructional issues (Baharuddin & Kanada, 2017; Fianda & Surya, 2026). School action research in Indonesia has reported that IHT can improve teachers' ability to prepare lesson plans, apply scientific approaches, and use IT-based media (Aidawati & Endriani, 2022; Fadil & Aryani, 2021; Jasmati, 2019; Sudiartini, 2021). Aliyah et al. (2026) reported that contextually designed IHT improved the digital pedagogical competence of Islamic Religious Education teachers with a large effect size (d = 1.24).

However, conventional IHT is often designed as a one-shot training event that lacks sustained follow-up (Darling-Hammond et al., 2017). From a professional development theory perspective, this design weakness can be explained through three complementary frameworks. First, Guskey's (2000) model of teacher change posits that lasting change occurs when teachers observe changes in student learning outcomes, which in turn alters their beliefs and attitudes; one-shot training rarely provides the sustained classroom evidence needed for this cycle. Second, Clarke and Hollingsworth's (2002) interconnected model emphasizes that professional growth requires repeated cycles of enactment and reflection across four domains (personal, external, practice, and consequence); single events do not generate such cycles. Third, Desimone's (2009) core features framework specifies that effective professional development must focus on content, involve active learning, be coherent, be of sufficient duration, and involve collective participation. Conventional IHT typically satisfies only the content and collective participation dimensions while lacking duration and active learning.

These theoretical accounts suggest that the weakness of conventional IHT is not merely a design flaw but a systemic constraint: it lacks a mechanism for sustained, reciprocal feedback and situated practice. Peer tutoring—conceptualized here as a reciprocal, non-hierarchical form of peer coaching in which two or more teachers observe each other, provide feedback, and reflect on instructional practice—offers such a mechanism (Canaran, 2023; Rainville et al., 2023). Unlike mentoring or clinical supervision, which are often hierarchical, peer tutoring emphasizes equality, trust, and reciprocal learning (O'Keeffe et al., 2021). Empirical evidence indicates that peer tutoring is associated with improved reflection, collaboration, self-confidence, and pedagogical quality (Dönmez & Şahin, 2022; Chen et al., 2023; García, 2024). Bignell and Holligan (2025) found that dialogic co-coaching through video increased teachers' awareness of their interactional practices and encouraged changes toward more dialogic teaching.

Integrating peer tutoring into IHT offers a potential synergy: IHT provides structure, content, and context, while peer tutoring provides a mechanism for sustained, situated, and reciprocal learning. However, the extent to which this integrative model is associated with pedagogical competence, and which conditions facilitate its success, has not been systematically examined. Existing literature tends to examine IHT or peer tutoring separately, or examines their impact on teacher competence in general without specifically linking it to pedagogical competence (Hairon et al., 2017; Johnson et al., 2022).

The novelty of this review lies in three aspects. First, it examines the integration of IHT and peer tutoring as a single intervention model rather than as separate entities. Second, it focuses on pedagogical competence as the outcome of interest, covering planning, implementation, assessment, reflection, and collaboration. Third, it identifies facilitating conditions that may explain why and under what conditions this model is associated with positive outcomes, thereby providing practical guidance for schools and policymakers. This contribution is primarily conceptual and contextual: it synthesizes a fragmented evidence base, proposes an integrated model, and identifies conditions that should be tested in future experimental research.

The review is guided by two questions:

Q1: To what extent is IHT with peer tutoring associated with improvements in teachers' pedagogical competence?

Q2: What conditions facilitate or constrain the effectiveness of IHT with peer tutoring in improving teachers' pedagogical competence?

Method

Review Protocol and Registration

This review followed the PRISMA 2020 statement (Page et al., 2021). The protocol was registered on the Open Science Framework (OSF) prior to data extraction.

Eligibility Criteria

Inclusion criteria: (1) empirical studies (quantitative, qualitative, or mixed methods) evaluating IHT, peer tutoring, or their combination; (2) participants were in-service or pre-service teachers; (3) studies reported outcomes related to pedagogical competence or its dimensions; (4) published in peer-reviewed journals or indexed proceedings; (5) full text available.

Exclusion criteria: (1) conceptual articles or opinion pieces without empirical data; (2) studies focusing exclusively on professional or personality competence without relation to pedagogical competence; (3) duplicate publications; (4) full text inaccessible; (5) studies in higher education or pre-service teacher education unless they explicitly examined peer tutoring in relation to pedagogical competence.

Operational definition of pedagogical competence. Pedagogical competence was operationalized across five dimensions, drawing on Indonesian national teacher standards (Permendikdasmen 21/2025) and international frameworks (Darling-Hammond et al., 2017): (a) instructional planning, (b) instructional implementation, (c) assessment and evaluation, (d) reflection on practice, and (e) professional collaboration. Studies were included if they reported at least one of these dimensions through a named instrument, observational rubric, self-report scale, or explicit qualitative evidence.

Operational definition of peer tutoring. Peer tutoring was defined as a reciprocal, non-hierarchical form of peer coaching involving classroom observation, feedback, and joint reflection between teachers of equal status. Studies using hierarchical mentoring or clinical supervision were excluded unless the reciprocal component was explicitly documented.

Search Strategy

Searches were conducted in Google Scholar, Scopus, DOAJ, and Garuda. The search string combined: ("In House Training" OR "IHT" OR "in-service training") AND ("tutor sebaya" OR "peer tutoring" OR "peer coaching" OR "peer mentoring" OR "coaching") AND ("kompetensi pedagogik" OR "pedagogical competence" OR "teacher competence") AND ("guru" OR "teacher"). Indonesian terms were back-translated by two bilingual reviewers to reduce retrieval bias. Database-specific syntax and full Boolean strings are provided in Supplementary File 2. Searches were limited to 2019–2026 and to Indonesian and English publications.

Database yields (before deduplication): Google Scholar n = 812; Scopus n = 96; DOAJ n = 143; Garuda n = 196; total n = 1,247.

Study Selection

Two reviewers independently screened titles and abstracts. Disagreements were resolved through discussion; if unresolved, a third reviewer adjudicated. Inter-rater reliability for title/abstract screening was substantial (Cohen's $\kappa = 0.81$). Full-text screening was conducted by the same two reviewers ($\kappa = 0.78$).

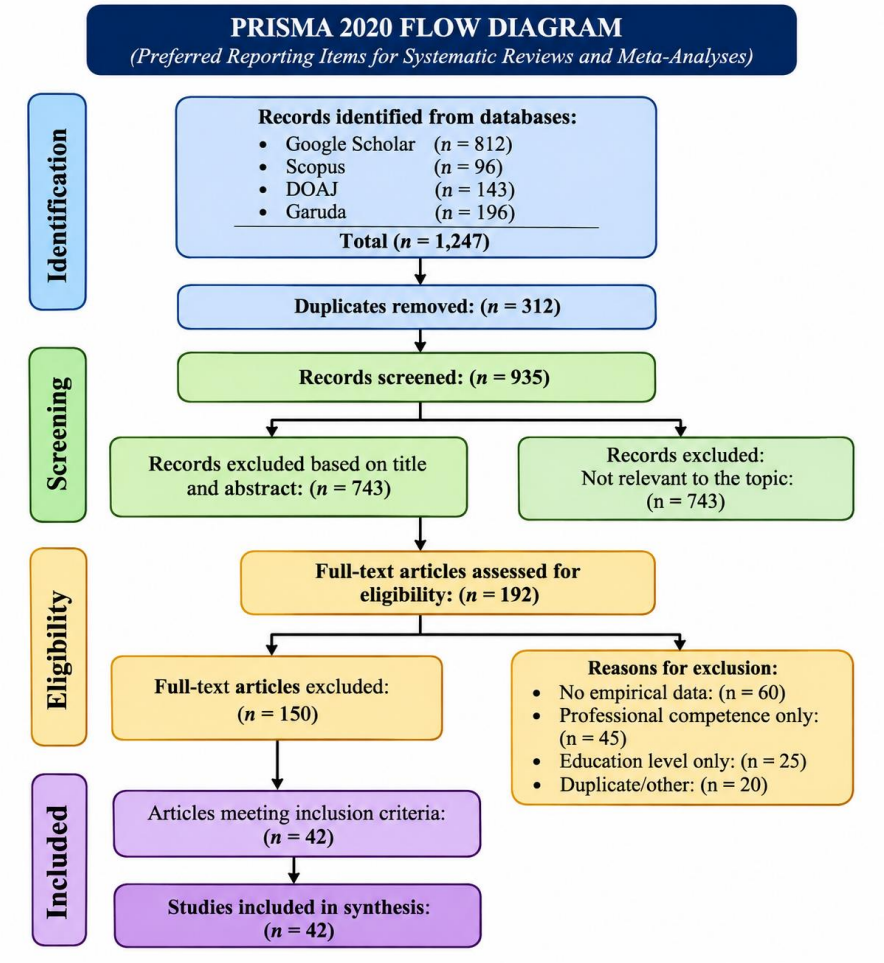


Figure 1. PRISMA 2020 Flow Diagram

Quality Appraisal

Study quality was appraised using the Mixed Methods Appraisal Tool (MMAT) version 2018 (Hong et al., 2018). Each study was rated on five criteria appropriate to its design. Two reviewers independently appraised all 42 studies; disagreements were resolved by consensus. Inter-rater agreement on MMAT ratings was moderate to substantial ($\kappa = 0.72$). Quality ratings were used descriptively to contextualize the strength of synthesized claims, not to exclude studies.

Data Extraction and Synthesis

Data were extracted using a standardized form covering: (1) study characteristics (authors, year, country, design, sample); (2) intervention characteristics (type of IHT, duration, peer tutoring components); (3) outcome measures (dimensions of pedagogical competence and instruments); and (4) main findings (effects, facilitating conditions, constraints).

Data were synthesized using thematic synthesis (Thomas & Harden, 2008), which involves line-by-line coding, development of descriptive themes, and generation of analytical themes. A coding protocol was developed a priori and refined inductively. Two reviewers independently coded a random subsample of 10 studies; inter-coder agreement was substantial ($\kappa = 0.76$). Where studies reported quantitative effect sizes, these were extracted and summarized descriptively (range, median) rather than pooled, because substantial heterogeneity in designs, instruments, and contexts precluded meta-analysis. Heterogeneity was assessed narratively and, where possible, through design-based subgroup description.

Results and Discussions

Characteristics of Reviewed Studies

Of the 42 studies, 28 (66.7%) were conducted in Indonesia, 5 in Malaysia, 3 in Australia, and 6 in other countries. By design: 18 qualitative (case study, ethnography), 14 quantitative (pre-experimental, quasi-experimental), and 10 mixed methods. Sample sizes ranged from 8 to 120 teachers. Most interventions lasted 4–12 weeks. Common peer tutoring components included reciprocal classroom observation, feedback sessions, collaborative planning, and joint reflection (Fianda & Surya, 2026; Magay, 2026; Syarofi, 2025).

Quality appraisal. Based on MMAT ratings, 6 studies (14.3%) met all five quality criteria, 14 (33.3%) met four, 15 (35.7%) met three, and 7 (16.7%) met two or fewer. Only 4 studies (9.5%) used a comparison group; the majority relied on pre–post or qualitative designs. These quality differences should be considered when interpreting the strength of claims.

Table 1. Characteristics of the 42 Reviewed Studies

Category	n	%
Country: Indonesia	28	66.7
Country: Malaysia	5	11.9
Country: Australia	3	7.1
Country: Other	6	14.3
Qualitative design	18	42.9
Quantitative design	14	33.3
Mixed methods	10	23.8
With comparison group	4	9.5
MMAT: 5/5 criteria met	6	14.3
MMAT: 4/5 criteria met	14	33.3
MMAT: ≤3/5 criteria met	22	52.4

Association Between IHT with Peer Tutoring and Pedagogical Competence (Q1)

Across the 42 studies, IHT with peer tutoring was most consistently reported as associated with positive changes in the dimensions of reflection on practice and professional collaboration, followed by instructional implementation, instructional planning, and assessment. Table 2 summarizes the number of studies reporting positive, mixed, or null findings per dimension.

Table 2. Reported Directions of Association by Dimension of Pedagogical Competence

Dimension	Studies reporting positive findings (n)	Studies reporting mixed/null findings (n)	Illustrative findings
Reflection on practice	32	3	Increased self-awareness and reflective dialogue (Bignell & Holligan, 2025; Charteris & Smardon, 2015; Oikarinen et al., 2026)
Professional collaboration	28	2	Strengthened collaborative culture and trust (Dosoo et al., 2026; Oikarinen et al., 2026; Rosselló & De la Iglesia, 2021)
Instructional implementation	27	5	Increased active learning and technology integration (Fianda & Surya, 2026; Jasmati, 2019; Magay, 2026)
Instructional planning	24	4	Improved differentiated lesson plans (Aidawati & Endriani, 2022; Sudiartini, 2021; Syarofi, 2025)
Assessment and evaluation	17	5	Improved formative assessment and feedback (Fadil & Aryani, 2021; Amarullah & Prasojo, 2026; Wylie & Lyon, 2020)

Reflection on practice was the most consistently reported dimension. Studies using video-based peer tutoring reported that teachers gained the ability to "see themselves from a distance" and identify previously unnoticed teaching behaviors (Bignell & Holligan, 2025; Fukkink & Tavecchio, 2010). This is consistent with De la Iglesia et al. (2026), who found that reciprocal feedback improved the quality of practice and strengthened professional relationships.

Instructional implementation improved when peer tutoring was integrated into IHT, allowing teachers to practice new strategies with collegial support. In Syarofi (2025), teachers developed digital learning media (Canva, Quizizz) through a peer tutoring cycle of demonstration, practice, and feedback. This aligns with

meta-analytic evidence that sustained coaching has a greater effect than single training sessions (Kraft et al., 2018; Ventista & Brown, 2023).

Assessment and evaluation showed the least consistent pattern. This may reflect the complexity of assessment skills and the need for deep content knowledge. Studies that explicitly targeted formative assessment through peer tutoring reported meaningful improvement (Amarullah & Prasojo, 2026; Wylie & Lyon, 2020).

Effect sizes reported in individual studies. Effect sizes were available in a minority of studies. Aidawati and Endriani (2022) reported a mean increase from 67.05 (pre-test) to 85.30 (post-test) with $d > 1.0$. Aliyah et al. (2026) reported $d = 1.24$ for digital instructional planning and $d = 1.52$ for total competence. Fadil and Aryani (2021) reported $p < 0.01$. Because most studies did not report effect sizes and used pre-experimental designs, these values should be interpreted as illustrative rather than pooled estimates.

Conditions Facilitating and Constraining Effectiveness (Q2)

Thematic synthesis identified five facilitating conditions. Because these conditions were derived from thematic analysis rather than statistical mediation analysis, they are described as facilitating conditions rather than "mediating factors."

Substantive school leadership support (n = 38). Visionary and supportive principals provided resources, time, and legitimacy (Fianda & Surya, 2026; Oikarinen et al., 2026). Support took the form of budget allocation, scheduling, teacher autonomy, and active participation in reflection sessions (Bignell & Holligan, 2025; Nurbani et al., 2026). Nurbani et al. (2026) found that substantive principal support—not merely rhetorical appeals—was the strongest predictor of learning community success.

Structured time allocation (n = 32). Limited time was the most frequently reported barrier. Effective programs integrated peer tutoring into the formal school schedule (Magay, 2026; Syarofi, 2025). Programs without clear time allocation tended not to be sustainable (Colvin & Ashman, 2010; Jacobs et al., 2018).

Non-evaluative culture of trust (n = 30). Teachers needed to feel safe sharing weaknesses without fear of judgment (Bignell & Holligan, 2025; Dosoo et al., 2026). When peer tutoring was perceived as evaluation, teachers became defensive; when positioned as collaborative learning, involvement increased (Oikarinen et al., 2026).

Availability of resources and technology (n = 22). Infrastructure moderated effectiveness. In limited-infrastructure contexts, creativity with local resources (e.g., mobile phones, WhatsApp groups) partially compensated (Magay, 2026; Oikarinen et al., 2026). Multi-stakeholder support was important (Rasmitadila et al., 2025).

Sustainability through professional learning communities (n = 26). Successful programs developed into broader professional learning communities (Oikarinen et al., 2026; Stoll et al., 2006). Teacher working groups (KKG) emerged as indicators of sustainability (Fianda & Surya, 2026; Hargreaves & O'Connor, 2018).

Table 3. Facilitating Conditions, Constraints, and Strategies

Facilitating Condition	Description	Related Constraints	Strategies
Leadership support	Principal provides resources, time, legitimacy	Administrative, non-sustainable support	Strategic planning; involve principal in reflection
Time structure	Dedicated schedule for observation, feedback, reflection	Teacher workload; competing activities	Integrate into academic calendar; use existing free periods
Culture of trust	Equal, non-evaluative relationships	Fear of judgment; resistance	Build reciprocity norms; start with low-risk activities
Resources & technology	Devices, internet, materials	Limited infrastructure; digital divide	Use simple technology; develop local material banks
Sustainability (PLC)	Development into learning community	Program stops after formal training	Form teacher working groups; schedule regular meetings

Comparison with Previous Research

The findings are consistent with evidence that effective professional development should be collaborative, sustained, and connected to classroom practice (Darling-Hammond et al., 2017; Desimone, 2009; Ventista & Brown, 2023). They also align with Kraft et al. (2018), who found that coaching has a positive effect on instruction and achievement. The finding on non-evaluative culture is consistent with Bignell and Holligan (2025) and O'Keeffe et al. (2021).

Engagement with theoretical frameworks. The findings can be interpreted through Guskey's (2000) model: peer tutoring provides the sustained classroom evidence and feedback that enables changes in teacher beliefs.

Through Clarke and Hollingsworth's (2002) interconnected model, peer tutoring creates the repeated cycles of enactment and reflection across the personal, practice, and consequence domains that one-shot IHT lacks. Through Desimone's (2009) core features, the integration addresses the duration and active learning dimensions that conventional IHT typically neglects. These frameworks collectively explain why the integration may be more potent than either component alone.

Null and contradictory findings. Not all studies reported positive outcomes. Five studies reported mixed or null findings on at least one dimension (e.g., assessment), often attributed to insufficient time, lack of leadership support, or resistance to change. These findings suggest that the integration is conditionally effective rather than universally effective.

Differences from previous studies. Aidawati and Endriani (2022) found that conventional IHT (without peer tutoring) was also associated with improved pedagogical competence. The present review suggests that adding peer tutoring may provide additional value on reflection and collaboration dimensions, but the evidence base is not strong enough to claim that the integrated model is superior to conventional IHT. This remains a hypothesis for future experimental testing.

Theoretical and Practical Implications

Theoretically, this review contributes by integrating three professional development frameworks (Guskey, 2000; Clarke & Hollingsworth, 2002; Desimone, 2009) to explain why the IHT–peer tutoring integration may address the limitations of one-shot training. It also extends communities of practice theory (Wenger, 1999) by showing how peer tutoring operationalizes mutual engagement and joint enterprise within the IHT context.

Practically, schools and policymakers should: (1) integrate peer tutoring as a core component of IHT, not an optional add-on; (2) secure substantive leadership support; (3) allocate structured time; (4) build a non-evaluative culture; and (5) design for sustainability through learning communities. Schools should also consider local infrastructure and teacher workload (Fianda & Surya, 2026; Magay, 2026).

Conclusions

Based on the synthesis of 42 empirical studies, IHT with peer tutoring is most consistently associated with positive changes in teachers' pedagogical competence, particularly in reflection on practice and professional collaboration. The evidence also suggests positive associations with instructional planning, implementation, and assessment, though these are less consistent. Five facilitating conditions were identified: substantive leadership support, structured time allocation, a non-evaluative culture of trust, availability of resources and technology, and sustainability through learning communities. Main constraints include teacher workload, limited time, and resistance to change. The theoretical contribution of this review is the integration of three professional development frameworks to explain the potential mechanism of the IHT–peer tutoring model. The practical contribution is the identification of facilitating conditions that can guide program design. However, effectiveness claims must be qualified: the evidence base is heterogeneous, dominated by Indonesian studies, and largely composed of pre-experimental designs without comparison groups. Only 4 of 42 studies (9.5%) used a comparison group, and only 6 (14.3%) met all MMAT quality criteria. These limitations preclude strong causal claims.

Future research should: (1) conduct experimental or quasi-experimental studies with comparison groups; (2) conduct longitudinal studies measuring sustained impact; (3) test the five facilitating conditions as moderators or mediators using appropriate statistical models; and (4) explore how digital technology can strengthen peer tutoring in diverse contexts.

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