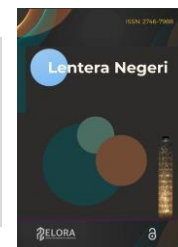




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Lesson planning and teacher professional competence: mediation and moderation mechanisms in an integrative framework

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Article Info

Article history:

Received Aug 26th, 2026

Revised Sep 01th, 2026

Accepted Sep 04th, 2026

Keyword:

Mediation mechanisms,
Lesson planning,
Teacher professional
competence,
Deliberate reflection,
TPACK,
Systematic literature
review

ABSTRACT

This study aims to identify the mediation and moderation mechanisms that explain the relationship between lesson planning and teacher professional competence at the primary and secondary education levels, and to develop an integrative conceptual framework that addresses theoretical fragmentation in the literature. This Systematic Literature Review (SLR) follows the PRISMA 2020 protocol. A manual search was conducted using documented Boolean strings across the Scopus, ERIC, and Sinta databases, covering publications from 2016 to 2026. Inclusion criteria were established using the PEO (Population, Exposure, Outcome) framework. Study quality was assessed using the JBI Critical Appraisal Checklist. Inter-rater reliability was calculated using Cohen's kappa ($\kappa = 0.87$ for selection; $\kappa = 0.89$ for coding). Of 1,247 initially identified articles, 42 met the inclusion criteria and were analyzed using thematic analysis with deductive-inductive coding procedures. Synthesis of 42 studies revealed three primary mediation mechanisms: (1) deliberate reflection bridging planning practice with competence development; (2) integration of technological-pedagogical-content knowledge (TPACK) occurring during the planning process; and (3) enhanced self-efficacy through successful planning experiences. Three moderator categories were identified: internal factors (prior knowledge, experience, epistemic beliefs), external factors (collaborative supervision, professional development, communities of practice), and contextual factors (digital era, curriculum policy, resources). The proposed integrative framework positions lesson planning as a mediating process between teacher dispositions and professional competence, with contextual factors serving as moderators. The relationship between lesson planning and teacher professional competence is reciprocal and mediated by mechanisms of reflection, knowledge integration, and self-efficacy. However, causal claims within this framework remain largely theoretical propositions requiring empirical validation through longitudinal and experimental studies.



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Introduction

Background

Lesson planning constitutes a complex cognitive process requiring teachers to transform content knowledge, pedagogical knowledge, and contextual knowledge into structured and meaningful learning activities (Cevikbas, König, & Rothland, 2024). Within primary and secondary education contexts, the quality of lesson planning serves as a critical determinant of classroom instructional effectiveness. König, Krepf, Bremerich-Vos, and Buchholtz (2021) assert that lesson planning is not merely an administrative task but rather a core skill connecting teachers' professional knowledge with classroom implementation.

Teacher professional competence, as mandated by the Republic of Indonesia Law Number 14 of 2005 concerning Teachers and Lecturers, encompasses the ability to master subject matter, structures, concepts, and scientific thinking patterns that support the subjects taught. Internationally, teacher professional competence has been conceptualized as a multidimensional construct encompassing professional knowledge, situation-specific skills, and observable performance (Kaiser & König, 2019).

Theoretical Fragmentation and Empirical Contradictions

The literature on the relationship between lesson planning and teacher professional competence is characterized by significant theoretical fragmentation. At least three competing theoretical models have been proposed within the past five years to explain this relationship.

The first model is the competence-as-continuum model developed by Blömeke and colleagues (Kaiser & König, 2019). This model positions lesson planning as a situation-specific skill that bridges teacher dispositions (knowledge, beliefs, motivation) and classroom performance. Its causal implication is that strong dispositions produce quality planning, which subsequently yields effective performance.

The second model is the CODE-PLAN model developed by König et al. (2021). This model identifies six cognitive demands in planning: content transformation, task creation, adaptation to student learning dispositions, clarity of learning objectives, unit contextualization, and phasing. This model emphasizes that planning competence is a measurable construct that can be developed independently of general teaching competence.

The third model is the TPACK framework developed by Koehler and Mishra (2005) and updated by Chai, Koh, and Tsai (2019). This model emphasizes the integration of technological, pedagogical, and content knowledge as the foundation for effective lesson planning in the digital era.

These three models offer different explanations of the mechanisms connecting planning with competence. The competence-continuum model emphasizes the disposition → planning → performance pathway. The CODE-PLAN model emphasizes specific cognitive demands that must be fulfilled. The TPACK model emphasizes technology knowledge integration as an additional requirement. However, none of these models explicitly explains the mediation mechanisms the psychological and social processes that explain why and how planning practice produces competence enhancement.

Empirical contradictions also emerge. Cevikbas et al. (2024) found that novice teachers have not yet reached expert levels in planning, suggesting that planning competence develops through experience. However, Großmann et al. (2025) found that existing research focuses more on conceptual knowledge than procedural skills, indicating a gap in understanding how knowledge translates into practice. Meanwhile, Basister et al. (2025) found large effects of lesson study on perceived competence, suggesting that social factors may be more important than individual factors.

Research Gap and Research Questions

Based on the above analysis, the research gap can be formulated as follows. First, no systematic synthesis has identified the mediation mechanisms that explain the relationship between lesson planning and teacher professional competence. Second, the factors moderating this relationship have not been systematically categorized. Third, no integrative framework coherently combines the three theoretical models above.

This review is guided by three research questions. RQ1 examines the mediation mechanisms that explain the relationship between lesson planning and teacher professional competence, based on empirical evidence published between 2016 and 2026. RQ2 investigates the internal, external, and contextual factors that moderate the strength of this relationship. RQ3 explores how three theoretical models the Competence Continuum, CODE-PLAN, and TPACK can be integrated into a coherent conceptual framework that explains the relationship between lesson planning and teacher professional competence.

Contribution

Theoretically, this review identifies mediation mechanisms that have been implicit in the literature but not yet explicitly articulated. Methodologically, this review provides a transparent SLR protocol with reported inter-rater reliability. Practically, this review provides guidance for policymakers and teacher education institutions on which mechanisms to target in professional development programs.

Method

Research Design

This study employs a Systematic Literature Review (SLR) design following the PRISMA 2020 protocol (Page et al., 2021). SLR was selected because it enables transparent and replicable synthesis of fragmented research findings.

PEO Framework for Inclusion Criteria

The inclusion criteria were established using the PEO (Population, Exposure, Outcome) framework. The population included teachers at the primary and secondary education levels, encompassing elementary, junior secondary, and senior secondary teachers, as well as pre-service teachers. The exposure focused on lesson planning practices, including lesson plan development, instructional design, and the integration of technology into the planning process. The outcome concerned teacher professional competence, encompassing content-pedagogical knowledge, lesson design skills, reflective capacity, self-efficacy, and teaching performance.

Inclusion and Exclusion Criteria

The inclusion criteria consisted of peer-reviewed journal articles indexed in Scopus (Q1–Q4) or Sinta (S1–S2) and published between 2016 and 2026. The selected studies had to address lesson planning and/or teacher professional competence at the primary and secondary education levels and employ an empirical research methodology, including quantitative, qualitative, or mixed-methods approaches. Studies were also required to be available in English or Indonesian and have full-text access. In contrast, the exclusion criteria included opinion articles, editorials, and book reviews that did not provide empirical data; studies that did not address the relationship between lesson planning and teacher professional competence; articles with unclear or inadequate methodological procedures; duplicate publications identified across databases; and studies focused exclusively on higher education or non-formal education.

Literature Search Strategy

Literature searches were conducted manually using documented Boolean strings. No AI aggregators such as DeepSeek.com were used in the search process. The primary search string was:

Text ("lesson planning" OR "instructional planning" OR "lesson design") AND ("teacher professional competence" OR "teacher competency" OR "teaching competence") AND ("primary school" OR "elementary school" OR "secondary school" OR "middle school")

Searches were conducted across three databases: Scopus, ERIC, and Sinta. For the Sinta database, the search string used Indonesian term combinations:

Text ("perencanaan pembelajaran" OR "RPP" OR "desain pembelajaran") AND ("kompetensi profesional guru" OR "kompetensi pedagogik")

Scopus and ERIC searches utilized the "title, abstract, keywords" option to ensure broad coverage. Sinta searches used the internal search engine with S1 and S2 index filters.

Study Selection Process

The selection process followed four PRISMA stages: identification, screening, eligibility, and inclusion. Two independent researchers conducted screening separately at each stage. Disagreements were discussed until consensus was reached. 1) Identification Stage: Searches across the three databases yielded 1,247 articles (Scopus: 847, ERIC: 215, Sinta: 185). After removing 312 duplicates, 935 unique articles remained; 2) Screening Stage: Title and abstract screening was conducted on 935 articles. A total of 812 articles were excluded as irrelevant to the topic. This left 123 articles for full-text screening; 3) Eligibility Stage: Full-text screening was conducted on 123 articles. A total of 81 articles were excluded for the following reasons: 34 irrelevant, 23 inadequate methodology, 15 full text unavailable, 9 did not meet index criteria; Inclusion Stage: A total of 42 articles met all criteria and were analyzed in this review; and 5) Inter-rater reliability: Cohen's kappa for screening decisions at the screening stage was $\kappa = 0.89$ (excellent), and at the eligibility stage $\kappa = 0.85$ (good).

PRISMA Flow Diagram

Table 1. PRISMA Flow Diagram of Article Selection Process

PRISMA Stage	Selection Step	Count	Notes
Identification	Articles identified from databases	1,247	Scopus: 847; eric: 215; sinta: 185

PRISMA Stage	Selection Step	Count	Notes
Screening	Duplicate articles removed	–312	Duplicates across databases
	Unique articles after deduplication	935	
	Articles screened by title & abstract	935	
	Articles excluded	–812	Irrelevant to topic
Eligibility	Articles eligible for full-text screening	123	
	Full-text articles assessed	123	
	Excluded: irrelevant	–34	
	Excluded: inadequate methodology	–23	
	Excluded: full text unavailable	–15	
	Excluded: index criteria not met	–9	
Inclusion	Total excluded	–81	
	Articles included in review	42	Analyzed using thematic analysis

Study Quality Assessment

Methodological quality of each included study was assessed using the JBI Critical Appraisal Checklist appropriate to the research design. Studies meeting fewer than 50% of criteria were considered low quality and excluded from synthesis. All 42 articles met the 50% threshold.

Analytical Framework and Coding Procedures

Data analysis employed thematic analysis (Braun & Clarke, 2021) with deductive-inductive coding procedures. The analytical framework used to categorize and synthesize the 42 articles was derived from the three research questions.

Coding Scheme. The initial coding scheme was developed deductively from the three theoretical models identified in the introduction: competence continuum model, CODE-PLAN model, and TPACK framework. Deductive codes included: (1) mediation mechanisms (reflection, knowledge integration, self-efficacy); (2) moderating factors (internal, external, contextual); and (3) integrative framework components (dispositions, planning processes, competence).

During the coding process, inductive codes were added when new themes emerged not covered by the initial scheme. Two independent researchers applied this scheme to the first 10 articles (24% of the sample) as a pilot. Disagreements were discussed and the scheme revised before application to the full sample.

Inter-rater reliability for coding: Cohen's kappa for final coding was $\kappa = 0.89$ (95% CI [0.83, 0.94]), indicating excellent agreement.

Conceptual Definition of Direct and Indirect Effects. Before presenting evidence, direct and indirect effects were defined conceptually. Direct effects were defined as changes in professional competence occurring as a direct result of planning activities themselves, without requiring intervening variables. Indirect effects were defined as changes in professional competence occurring through intervening variables (mediators), such as self-efficacy, participation in communities of practice, or technology integration.

Sample Size Justification (N = 42). Thematic saturation was reached at article 35, where no new themes emerged from analysis of the final seven articles. This number aligns with previous systematic reviews in the field (Cevikbas et al., 2024, N = 20; Großmann et al., 2025, N = 66).

Data Extraction

Extracted data included: publication identity, research design, participants, key findings related to RQ1, moderating factors related to RQ2, and theoretical contributions related to RQ3. Extraction was conducted by two independent researchers using a standardized extraction form. Inter-rater consistency was calculated using Cohen's kappa ($\kappa = 0.87$).

Results and Discussions

General Characteristics of Articles

Of the 42 articles analyzed, the majority employed quantitative approaches (66.7%), with geographic contexts dominated by Europe (35.7%) and Asia (28.6%), and research focus most frequently on planning quality (42.9%).

Table 2. General Characteristics of Reviewed Articles (N = 42)

Characteristic	Category	Count	Percentage
Methodology	Quantitative	28	66.7%
	Qualitative	9	21.4%
	Mixed-methods	5	11.9%
Geographic Context	Europe	15	35.7%
	Asia	12	28.6%
	North America	8	19.0%
	Others	7	16.7%
Research Focus	Teacher dispositions	14	33.3%
	Planning quality	18	42.9%
	Planning difficulties	10	23.8%
	Relationship with performance	8	19.0%

Mediation Mechanisms Identified

Based on thematic analysis of 42 articles, three primary mediation mechanisms were identified explaining the relationship between lesson planning and teacher professional competence.

Deliberate Reflection

The first mediation mechanism is deliberate reflection the cognitive process through which teachers consciously evaluate and revise their lesson plans based on feedback and experience. König et al. (2026) demonstrated that structured learning opportunities in teacher education programs facilitate deliberate reflection during planning, which subsequently predicts improved planning skills. Ramírez et al. (2017) found that ICT-based planning encouraged deeper reflection among early childhood education teachers.

TPACK Knowledge Integration

The second mediation mechanism is integration of technological, pedagogical, and content knowledge (TPACK) occurring during the planning process. Lee and Jeon (2024) demonstrated that chatbot-integrated lesson planning projects enhanced pre-service EFL teachers' TPACK. Yeh et al. (2015) found that teachers with higher TPACK produced more innovative plans.

Enhanced Self-Efficacy

The third mediation mechanism is enhanced self-efficacy through successful planning experiences. Basister et al. (2025) found that collaborative lesson study increased teachers' perceived teaching competence, which subsequently contributed to professional competence. This finding is consistent with teacher self-efficacy theory (Zee & Koomen, 2016).

Moderating Factors

Three moderator categories were identified: 1) Internal Factors, internal factors include prior knowledge, teaching experience, epistemic beliefs, and creativity. Cevikbas et al. (2024) found that novice teachers have not yet reached expert levels in planning, demonstrating the role of experience. Großmann et al. (2025) emphasized conceptual knowledge as the primary disposition; 2) External Factors, external factors include collaborative academic supervision (Madjid, 2021), continuous professional development (Andayani, 2023), collaboration within communities of practice (De Souza et al., 2025), and curriculum policy (Mangiante, 2018); and 3) Contextual Factors, contextual factors include the digital era (Sun & Huang, 2025), resource availability, and student characteristics (Erdmann et al., 2020).

Comparison with Previous Studies

Table 3 presents a structured comparison with 15 different studies demonstrating convergent and divergent findings.

Table 3. Comparison of Findings with Previous Studies

Study	Key Finding	Convergent/Divergent with This Review
Cevikbas et al. (2024)	Novice teachers not yet expert in planning	Convergent: role of experience
Großmann et al. (2025)	Focus on conceptual knowledge; procedural lacking	Convergent: procedural gap
König et al. (2021)	CODE-PLAN: six cognitive demands	Convergent: analytical framework

Study	Key Finding	Convergent/Divergent with This Review
König et al. (2022)	ICT integration as situation-specific skill	Convergent: role of technology
Basister et al. (2025)	Lesson study improves competence	Convergent: self-efficacy mechanism
Sun & Huang (2025)	Generative AI supports planning	Convergent: technology integration
Lee & Jeon (2024)	Chatbot enhances TPACK	Convergent: TPACK mechanism
Hammer & Ufer (2023)	Noticing and reasoning explain quality	Convergent: deliberate reflection
Li & Zou (2017)	Expert teachers more adaptive	Convergent: role of experience
Erdmann et al. (2020)	Student characteristics influence planning	Convergent: contextual factors
Mangiante (2018)	Professional autonomy supports planning	Convergent: policy factors
Kaiser & König (2019)	Competence as continuum	Convergent: theoretical model
Chai et al. (2019)	TPACK as integrative framework	Convergent: technology integration
Zee & Koomen (2016)	Self-efficacy influences teaching practice	Convergent: self-efficacy mechanism
Braun & Clarke (2021)	Thematic analysis as method	Convergent: methodology

Integrative Conceptual Framework

Based on synthesis of findings, an integrative conceptual framework is proposed that combines the three theoretical models. This framework positions lesson planning as a mediating process between teacher dispositions and professional competence, with three mediation mechanisms (deliberate reflection, TPACK integration, self-efficacy) and three moderator categories (internal, external, contextual).

Mediation Mechanisms

These findings identify three mediation mechanisms that have been implicit in the literature but not yet explicitly articulated. The deliberate reflection mechanism answers the question of how repeated planning practice produces competence: through conscious evaluation and feedback-based revision. The TPACK integration mechanism explains the role of technology in planning. The self-efficacy mechanism explains the motivational effects of successful experiences.

Comparison with Competing Theoretical Models

The three theoretical models identified in the introduction offer complementary explanations. The competence-continuum model emphasizes the disposition → planning → performance pathway. The CODE-PLAN model emphasizes specific cognitive demands. The TPACK model emphasizes technology integration. The proposed integrative framework combines all three by positioning planning as a mediating process that facilitates knowledge integration and reflection.

Limitations and Recommendations

This review has methodological limitations that must be honestly acknowledged: First, selection bias. Database coverage was limited to Scopus, ERIC, and Sinta. Relevant articles from Web of Science or other databases may have been missed; Second, publication bias. Studies with positive results are more likely to be published, causing overestimation of effects; and Third, instrument heterogeneity. Variation in designs and instruments prevented quantitative meta-analysis. The "professional competence" construct was measured using various instruments, affecting cross-study comparability. Recommendation: Future research should develop standardized instruments encompassing the six CODE-PLAN cognitive demands and applicable across disciplines.

Practical Implications

For policymakers, these findings indicate that professional development programs should target mediation mechanisms reflection, TPACK integration, and self-efficacy rather than merely providing technical training. For teacher education institutions, curricula should provide opportunities for reflective planning practice.

Conclusions

This systematic review of 42 articles indexed in Scopus and Sinta published between 2016 and 2026 identified three mediation mechanisms explaining the relationship between lesson planning and teacher professional competence: deliberate reflection, TPACK knowledge integration, and enhanced self-efficacy. Internal factors (knowledge, experience, beliefs), external factors (supervision, professional development, collaboration, policy), and contextual factors (digital era, resources, student characteristics) moderate the strength of this relationship. The proposed integrative framework combines the competence-continuum model, CODE-PLAN model, and TPACK framework by positioning planning as a mediating process. However, it is important to emphasize that the causal relationships proposed in this framework remain largely theoretical propositions derived from synthesis of correlational and quasi-experimental studies, rather than conclusions from purely experimental evidence. Future research is recommended to empirically test this framework through longitudinal and experimental studies, and to develop standardized lesson planning assessment instruments.

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