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IN-SERVICE TEACHER DEVELOPMENT POLICY: A SYSTEMIC ANALYSIS OF PEDAGOGICAL AND PROFESSIONAL COMPETENCE ENHANCEMENT

Muhammad Junaidi [a*)], Titi Kadi [a)]

[a*)] *Sultan Aji Muhammad Idris State Islamic University Samarinda, Indonesia*

[*)]*Corresponding Author: Junzikirfikiramal@gmail.com*

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Abstract. In-service teacher development is a strategic policy instrument for maintaining educational quality because it connects national reform priorities with classroom-level professional learning. This article analyzes the policy concept of in-service teacher development, its contribution to pedagogical and professional competence, and the implementation challenges that limit its impact in Indonesian schools. The study used a descriptive qualitative design based on library research and policy analysis. Recent international journal articles, policy-oriented studies, and empirical evidence on teacher professional development, professional learning communities, digital competence, and instructional leadership were synthesized through content analysis. The findings indicate that in-service development contributes to pedagogical competence when it strengthens reflective practice, formative assessment, differentiated instruction, and lesson-based collaboration. It contributes to professional competence when it supports content mastery, digital pedagogy, and Technological Pedagogical Content Knowledge. However, the impact is constrained by administrative formalism, unequal resources, top-down training, weak school leadership, and limited evaluation of classroom outcomes. The article recommends a systemic, collaborative, digitally supported, and impact-oriented model of teacher development.

Keywords: Education Policy; In-Service Teacher Development; Pedagogical Competence; Professional Competence; Professional Learning Community; TPACK

I. INTRODUCTION

Teachers remain the most decisive professional actors in the education system because curriculum, assessment, learning resources, and technology only become meaningful when they are translated into purposeful classroom practice. In Indonesia, the demand for teacher professionalism has intensified alongside curriculum transformation, digitalization, differentiated learning, and the expectation that schools should produce students who are not only knowledgeable but also adaptive, collaborative, and capable of higher-order thinking. Recent literature on Indonesian teacher professional development argues that the improvement of teacher quality is directly connected with national commitments to inclusive and equitable quality education [1]. Empirical work on Indonesian elementary teachers also shows that professional development is expected to address teacher shortages, uneven competence, qualification mismatches, and the changing demands of science and technology [2].

In-service teacher development, often referred to as continuing professional development or teacher professional development, is therefore not merely a technical training agenda. It is a policy mechanism through which the state and educational institutions attempt to maintain the professional capacity of teachers after they enter the profession. International evidence describes teacher learning as a sociocultural process in which knowledge is constructed through participation, dialogue, mentoring, and reflection, not through short one-way workshops alone [3]. A systematic analysis of teacher learning also confirms that professional development has stronger potential when its design connects teachers' prior beliefs, classroom problems, collaborative inquiry, and sustained follow-up [4].

The policy problem addressed in this article is the persistent gap between the formal existence of teacher development programs and their actual influence on classroom competence. Many programs have already been implemented through certification, workshops, supervisory activities, online platforms, teacher working groups, and professional learning communities. Nevertheless, the quality of learning does not automatically improve when teachers only receive certificates or attend short training sessions. Recent reviews of teacher professional development in digital instructional integration show that effective programs require hands-on practice, mentoring, institutional support, and collaborative learning environments [5]. This finding is significant for Indonesia because teacher development is frequently constrained by administrative orientation, uneven digital infrastructure, and unequal access between urban and disadvantaged areas.

Theoretically, this article integrates three complementary perspectives. First, a policy implementation perspective explains how communication, resources, implementer

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commitment, and bureaucratic structure affect the execution of teacher development programs. Second, pedagogical competence is interpreted through the logic of pedagogical content knowledge, namely the ability to transform content into teachable, assessable, and meaningful learning experiences. Third, professional competence is examined through the logic of technological pedagogical content knowledge, which requires teachers to integrate disciplinary content, pedagogy, and digital tools in coherent instructional designs. Recent studies on digital competence and online professional development demonstrate that teacher readiness depends not only on access to technology but also on literacy, social presence, confidence, and institutional support [6], [7].

Based on this background, this article aims to answer three analytical questions: how should the policy of in-service teacher development be conceptualized within a systemic education framework; how does it contribute to the enhancement of pedagogical and professional competence; and what strategies are required to optimize its implementation in Indonesian schools. The contribution of the article lies in its synthesis of policy analysis and competence-based teacher development. Instead of treating training as a stand-alone activity, the article positions in-service teacher development as an integrated ecosystem that must connect policy design, school leadership, teacher collaboration, digital support, and evidence of student learning.

II. RESEARCH METHODS

This study employed a descriptive qualitative approach using library research and policy analysis. The approach was selected because the purpose of the article was not to measure the statistical effect of a single training program, but to synthesize conceptual, empirical, and policy-based evidence related to in-service teacher development. The analysis focused on the relationship between teacher development policy, pedagogical competence, professional competence, digital competence, school leadership, and professional learning communities.

The data sources consisted of recent journal articles and open-access scholarly publications published mainly between 2021 and 2025. The literature was selected by considering four criteria: relevance to in-service teacher development or continuing professional development; direct relationship with teacher competence, digital pedagogy, professional learning communities, instructional leadership, or policy implementation; availability through open access or free download; and publication in internationally indexed or reputable journals. Several recent studies on in-service professional development, online and blended teacher learning, and digital competence were used to build the analytical framework [8]–[14].

The data were analyzed through content analysis. First, key concepts were identified from the literature, including professional learning, reflective practice, needs assessment, digital competence, TPACK, instructional leadership, collaboration, and impact-based evaluation. Second, the concepts were classified into policy dimensions, competence dimensions, implementation barriers, and optimization strategies. Third, the findings were synthesized into a systemic model of in-service teacher development. This procedure allowed the article to interpret teacher development not as an isolated training event, but as a policy cycle that begins with needs diagnosis, continues through learning design and implementation, and ends with evaluation of classroom impact.

Table 1. Analytical framework of the study

Analytical Dimension	Core Focus	Operational Meaning in This Article
Policy implementation	Communication, resources, disposition, and bureaucracy	Explains why centrally designed development programs may produce uneven classroom impact.
Pedagogical competence	Instructional design, assessment, classroom interaction, and differentiation	Explains how training improves teachers' ability to manage meaningful learning.
Professional competence	Content mastery, digital literacy, TPACK, and lifelong learning	Explains how teachers update disciplinary and technological expertise.
Professional learning ecosystem	PLC, mentoring, leadership, and reflective culture	Explains how school-based collaboration sustains competence development.
Impact evaluation	Evidence of changes in classroom practice and student learning	Explains why certificates and training hours are insufficient indicators.

III. RESULTS AND DISCUSSION

In-service teacher development as a systemic policy instrument

In-service teacher development should be understood as a systemic policy instrument rather than as a collection of short training activities. A systemic approach means that the success of teacher development depends on the alignment between national policy, local implementation capacity, school leadership, teacher motivation, learning resources, and evaluation mechanisms. The Indonesian context illustrates this requirement clearly: programs may be formally available, yet their impact varies because teachers face different levels of infrastructure, time allocation, mentoring quality, and school support. Recent comparative research on online training programs and policy implementation emphasizes that digital education policy must go beyond access indicators and must address usability, equity, and teacher agency [15].

A policy-oriented interpretation also clarifies why teacher development often becomes administrative. When policy communication stresses compliance, credit points, certificates, or allowance requirements more strongly than professional learning, teachers may interpret development activities as bureaucratic obligations. This pattern weakens intrinsic motivation and reduces the probability that new knowledge will be tested in the classroom. Conversely, when teacher development is communicated as professional inquiry, teachers are more likely to relate it to their instructional problems, student needs, and school improvement goals. The literature on implementation challenges in teacher professional

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development shows that program sustainability depends on school-level ownership and the fit between program design and local conditions [16].

The systemic view also requires attention to resources. Digital platforms can expand access to training for teachers in remote or disadvantaged areas, but access alone does not guarantee professional learning. Teachers need stable connectivity, relevant modules, coaching, time, and opportunities to collaborate with peers. Studies of digital competence and teacher preparedness indicate that professional learning requires both technological readiness and pedagogical interpretation of digital tools [17], [18]. Therefore, policy should not treat digitalization as a replacement for professional communities; rather, digital platforms should function as infrastructure that supports mentoring, collaborative planning, evidence sharing, and reflective feedback.

Contribution to pedagogical competence

Pedagogical competence refers to the teacher's ability to design, implement, assess, and improve learning in ways that fit students' characteristics and curriculum objectives. In-service development contributes to this competence when it helps teachers move from routine teaching to reflective, diagnostic, and adaptive instruction. Recent research on pedagogical competence development shows that contemporary educators need learning models that connect theory, practice, and the reflective analysis of instructional decisions [19]. For Indonesian schools, this is especially relevant because curriculum transformation requires teachers to apply differentiated instruction, formative assessment, project-based learning, and contextual learning rather than simply delivering content.

The most important mechanism for improving pedagogical competence is practice-based learning. Training that explains teaching strategies in abstract terms rarely changes classroom behavior. Teachers need to observe examples, design lesson plans, test strategies, receive feedback, and revise their practice. Lesson study, peer observation, classroom action research, and teacher working groups are relevant because they place teachers' real classroom problems at the center of professional learning. A Frontiers in Education study on lesson study demonstrates that repeated cycles of collaborative planning, observation, and reflection can develop teacher professional community [20]. This confirms that pedagogical competence develops through iterative inquiry rather than through isolated seminars.

Professional learning communities also strengthen pedagogical competence because they normalize collaborative problem solving. Instead of treating classroom difficulties as individual failure, PLCs allow teachers to analyze learning evidence together, compare instructional strategies, and design collective responses. Recent studies on professional learning communities show that PLCs can support school readiness, student development, and organizational learning when they are guided by shared goals and sustained collaboration [21], [22]. For in-service teacher development, this means that the most strategic unit of change is not only the individual teacher but also the school-based professional community.

Pedagogical competence also depends on teachers' ability to use assessment as learning evidence. Impact-oriented development requires teachers to analyze student misconceptions, formative assessment results, classroom engagement, and learning difficulties. Professional learning communities focused on science education show that teacher-led inquiry can help educators address student misconceptions through action research and collective reflection [23]. This finding supports a shift in Indonesian teacher development from attendance-based evaluation to classroom evidence-based evaluation.

Contribution to professional competence and digital pedagogy

Professional competence includes mastery of subject matter, curriculum interpretation, continuous knowledge renewal, professional ethics, and the ability to use relevant technologies. In the digital era, professional competence cannot be separated from digital pedagogy. Teachers must understand not only how to operate digital tools but also how those tools support content representation, student interaction, assessment, and feedback. A theoretical review of teacher professional development in EFL contexts also links professional development with students' learning achievement, indicating that teacher learning should ultimately be judged by its contribution to learning processes and outcomes [24]. Research on TPACK among teachers further indicates that professional development should integrate technological, pedagogical, and content dimensions rather than train teachers in generic tool use [10], [11].

Online professional development can widen access, but its quality depends on teacher acceptance, digital literacy, and social presence. Mailizar, Umam, and Elisa found that digital literacy and social presence affected teachers' acceptance and continued use of online professional development [7]. This finding has direct implications for Indonesian in-service development. If online platforms are built only as repositories of modules, teachers may complete tasks without deep engagement. Platforms become more professionally meaningful when they include interaction, mentoring, discussion forums, feedback, and opportunities to apply learning to classroom tasks.

Professional competence also requires continuous adaptation to new educational technologies. A study on teachers' digital competence in vocational education found that digital competence can influence technology acceptance [25]. Similarly, research on assessing teachers' digital competence in primary and secondary education shows that digital competence is multidimensional and should be assessed through instruments that capture knowledge, attitudes, and practical use [13]. These studies suggest that in-service development must move beyond basic digital literacy and develop teachers' capacity to select, adapt, and evaluate digital tools according to learning objectives.

However, the development of digital competence must be context-sensitive. Teachers in different regions, school types, and career stages may have different needs. Research on professional development needs indicates that teachers require differentiated programs that respond to teaching experience, mentoring needs, and pedagogical skill gaps [26]. For Indonesia, this supports the use of needs assessment before

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program design. A uniform national module may be useful for baseline orientation, but sustained competence improvement requires local diagnosis and school-based adaptation.

Implementation barriers

The literature synthesis and policy analysis identify five major barriers that limit the contribution of in-service teacher development. The first barrier is administrative formalism. Teacher development is often measured by completion of training hours, certificates, or documents rather than by changes in teaching quality. This creates a compliance culture in which teachers prioritize administrative evidence over instructional experimentation. The second barrier is top-down design. Programs that are planned without sufficient teacher input may fail to address real classroom needs.

The third barrier is unequal resources. Teachers in urban schools generally have better access to digital infrastructure, training providers, and professional networks than teachers in remote or disadvantaged regions. The fourth barrier is weak instructional leadership. Even when teachers attend training, school leaders may not provide time, coaching, peer observation structures, or feedback systems that enable implementation. Research on leadership and teacher professional development in Jakarta shows that principal instructional and distributed leadership can influence teachers' professional development [27].

Table 2. Implementation barriers and policy implications

Barrier	Observed Policy Problem	Implication for Improvement
Administrative formalism	Training success is reduced to certificates, hours, and reports.	Use evidence of classroom practice and student learning as core indicators.
Top-down training design	Modules may not fit teachers' actual classroom problems.	Conduct needs assessment and allow local adaptation.
Resource inequality	Teachers in remote areas face limited access to infrastructure and mentoring.	Combine digital platforms with targeted support for disadvantaged schools.
Weak instructional leadership	School leaders do not always sustain post-training implementation.	Prepare principals as instructional leaders and PLC facilitators.
Limited impact evaluation	Program evaluation rarely captures changes in pedagogy.	Use portfolios, lesson observation, peer feedback, and formative data.

The fifth barrier is weak impact evaluation. Many programs are evaluated through satisfaction surveys, attendance lists, or online completion status. These indicators are easy to collect but do not show whether teachers have changed their lesson design, assessment practice, classroom interaction, or student support. Recent evidence on factors influencing the implementation of teacher professional development programs shows that programs may fail when schools do not maintain engagement and when implementation conditions are not adequately supported [16]. Impact evaluation should therefore examine classroom evidence, teacher portfolios, peer feedback, and changes in student learning processes.

Optimization strategy: toward a systemic and impact-oriented model

Optimizing in-service teacher development requires a transformation from a transmissive training model to a systemic professional learning model. The first strategy is to institutionalize professional learning communities at school and subject-group levels. PLCs provide the social structure for teachers to learn continuously, discuss evidence, and test instructional changes. Research on PLCs in secondary schools emphasizes that PLCs are effective when they are oriented toward student learning, collective responsibility, and systematic response to learning difficulties [28].

The second strategy is to strengthen instructional leadership. Principals should not only manage administration but also create the conditions for teacher learning. This includes allocating time for collaborative planning, facilitating peer observation, encouraging lesson study, connecting teachers with external resources, and protecting teachers from excessive administrative burdens. The relationship between distributed leadership, PLCs, and teacher professional development suggests that leadership works best when responsibility for improvement is shared and professional communities are empowered [29].

The third strategy is to build a blended and digital ecosystem for teacher development. Digital platforms should provide accessible modules, but they must also be connected to mentoring, discussion, classroom application, and feedback. In-service development in remote areas can benefit from smart education strategies when technology is integrated with collaboration and local capacity building [30]. This approach is particularly important for addressing inequality between urban and 3T regions.

The fourth strategy is to redesign evaluation. Evaluation should move from input and output indicators to outcome and impact indicators. Input indicators include budget, participants, and platforms. Output indicators include modules completed and certificates obtained. Outcome indicators include improved lesson plans, assessment tools, and classroom interaction. Impact indicators include better student engagement, formative progress, and reduced learning gaps. This layered evaluation model ensures that professional development remains accountable to learning quality rather than administrative completion.

The fifth strategy is to contextualize teacher development. Needs assessment should identify teachers' subject areas, career stages, school resources, student characteristics, and digital readiness. Early-career teachers may need mentoring and classroom management support, while experienced teachers may need leadership roles, action research opportunities, or advanced digital pedagogy. Contextualization also requires attention to values, character education, and spiritual-professional integrity in Indonesian educational settings. A systemic model does not ignore national standards; rather, it connects national standards with local professional realities.

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Table 3. Recommended model for optimizing in-service teacher development

Strategic Area	Recommended Action	Expected Contribution
Collaborative model	Shift from one-way workshops to PLC, lesson study, mentoring, and peer inquiry.	Strengthens reflective pedagogical competence.
Digital acceleration	Use LMS, open resources, and online mentoring for equitable access.	Improves professional and digital competence.
Instructional leadership	Train principals to support teacher learning cycles.	Sustains school-level implementation.
Impact-based evaluation	Assess classroom application, student engagement, and formative learning evidence.	Prevents administrative formalism.
Needs-based design	Differentiate programs according to teacher context and school needs.	Improves relevance and teacher ownership.

IV. CONCLUSION

In-service teacher development is a strategic education policy instrument for improving pedagogical and professional competence. Its contribution to pedagogical competence appears when teachers are supported to design meaningful instruction, apply formative assessment, differentiate learning, and reflect on classroom evidence. Its contribution to professional competence appears when teachers update their subject knowledge, strengthen digital pedagogy, and integrate technology, pedagogy, and content knowledge in coherent learning designs. The effectiveness of in-service teacher development is constrained by administrative formalism, top-down program design, unequal resources, weak instructional leadership, and limited impact evaluation. These constraints show that teacher development cannot be improved only by increasing the number of training programs. It must be redesigned as a systemic professional learning ecosystem. The recommended model includes collaborative PLC-based learning, digital access with mentoring, instructional leadership, needs-based program design, and evaluation focused on classroom impact. For policymakers, the main implication is the need to reform teacher development indicators from certificate completion toward evidence of teaching improvement. For schools, principals must act as instructional leaders who sustain professional learning communities. For teachers, continuing professional development should be understood as a moral and professional responsibility to improve student learning, not merely as a bureaucratic requirement. Future empirical research should test the proposed systemic model through school-based intervention studies and evaluate its effect on teacher practice and student learning outcomes.

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