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TEACHER MISCONCEPTIONS IN DEEP LEARNING ORIENTED INSTRUCTION AND THEIR REMEDIATION THROUGH INSTRUCTIONAL MODULES AND COLLABORATIVE MENTORING

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ABSTRACT
This study is grounded in the persistent presence of pedagogical misconceptions among teachers in implementing deep learning–oriented instruction, which leads to inaccuracies in both instructional design and classroom practice. These misconceptions extend beyond technical issues and reflect deeper conceptual misunderstandings, particularly in relation to learning principles, learning experiences, instructional syntax, and the integration of digital technologies. This study aims to identify the forms of teachers' pedagogical misconceptions and to examine how these can be addressed through instructional modules and collaborative mentoring. A qualitative approach was employed, with data collected through classroom observations, in-depth interviews, and document analysis. Data were analyzed using an interactive model involving data reduction, data display, and conclusion drawing. The findings reveal that teachers' pedagogical misconceptions are structural in nature and manifest across multiple dimensions of instruction. Teachers tend to conflate learning principles with learning activities, interpret learning experiences merely as sequences of tasks, organize instructional syntax in a fragmented manner, and utilize digital technology in a predominantly instrumental way. The intervention, implemented through instructional modules and collaborative mentoring, demonstrates a gradual yet transformative improvement in teachers' pedagogical understanding. This study concludes that addressing pedagogical misconceptions requires an integrated approach that combines conceptual reinforcement with reflective processes facilitated through collaborative mentoring.

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INTRODUCTION

Learning in primary schools is no longer sufficiently oriented toward the mastery of content but is increasingly required to foster deep conceptual understanding through a deep learning approach. This approach emphasizes students' active engagement in processes of analysis, elaboration, conceptual connections, and reflection as part of meaning construction (Harris et al., 2020; Widiastuti et al., 2022). In the context of 21st-century education, deep learning is considered an approach capable of promoting critical, reflective, and meaningful thinking skills aligned with the demands of modern curricula (OECD, 2020; Suryadi et al., 2021). Several studies have shown that deep learning significantly contributes to improving students' cognitive engagement and learning outcomes, particularly when supported by well-structured instructional design (Admiraal et al., 2021; Postholm, 2022). In this context, the role of teachers becomes crucial, as the quality of learning is largely determined by their pedagogical capacity to design meaningful and contextual learning experiences (König et al., 2020; Rahmawati & Suryadi, 2021).

However, the implementation of deep learning in primary schools still faces various challenges, particularly related to teachers' pedagogical understanding. National studies indicate that teachers often experience misconceptions in understanding learning principles, learning experiences, and instructional syntax, resulting in learning activities that are not aligned with the goals of deep learning (Nugroho, 2021; Hidayat & Kurniawan, 2022). Other studies reveal that these misconceptions are not merely partial but are associated with teachers' inability to conceptually integrate instructional components (Scherer et al., 2019; Zierer, 2021). This condition leads to the dominance of surface learning, in which students tend to receive information without engaging in deeper processes of analysis and reflection (Fryer & Bovee, 2020; Sutrisno, 2019).

Empirical findings in this study indicate that teachers' misconceptions in deep learning are conceptual and systematic in nature. Teachers not only experience difficulties in understanding instructional components but also in integrating learning principles, learning experiences, instructional syntax, and the use of digital technology appropriately. More specifically, teachers tend to conflate pedagogical concepts with classroom activities and interpret the use of technology in an instrumental manner. This condition suggests that misconceptions are not only technical but also conceptual, thereby directly affecting the quality of instructional planning and implementation. These findings are consistent with national research indicating that limited digital pedagogical competence is a major barrier to meaningful technology integration (Hidayat & Kurniawan, 2022) and are further supported by international studies emphasizing the importance of integrating pedagogy and technology in instruction (Avidov-Ungar & Eshet-Alkalai, 2020).

Although numerous studies have examined the effectiveness of deep learning and teacher competency development, most have focused on improving learning outcomes or general competencies. Research specifically examining teachers' pedagogical misconceptions, particularly in understanding the interrelationships among learning principles, learning experiences, and instructional syntax, remains limited, especially in the context of primary education in Indonesia (Nugroho, 2021; Rahmawati & Suryadi, 2021). Furthermore, studies integrating the analysis of misconceptions with interventions based on instructional materials and collaborative mentoring simultaneously are still rarely found in both recent national and international literature (Widodo et al., 2020; Tondeur et al., 2021).

This condition indicates a significant research gap, namely the lack of integration between the analysis of pedagogical misconceptions and interventions that are both conceptual and reflective in instructional practice. Without adequate understanding, teachers tend to reproduce errors in instructional design, which results in the failure to achieve deep learning as expected in the curriculum. Therefore, an approach is needed that not only provides instructional materials but also intervenes in teachers' ways of thinking through systematic reflection and mentoring. An approach based on instructional modules supported by collaborative mentoring is considered promising, as it

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provides conceptual structure while facilitating the reconstruction of understanding through continuous feedback (Chen & Yang, 2020; Widodo et al., 2020; Desimone & Garet, 2015).

Based on the above, this study aims to identify the forms of teachers' pedagogical misconceptions in deep learning and to analyze efforts to address them through the use of deep learning–based instructional modules and collaborative mentoring. The novelty of this study lies in the integration of pedagogical misconception analysis with interventions based on instructional modules supported by collaborative mentoring, thereby not only identifying problems but also examining the process of conceptual and systematic improvement.

METHODOLOGY

This study employed a qualitative approach with a descriptive design aimed at identifying teachers' pedagogical misconceptions in deep learning–oriented instruction and analyzing the process of their improvement through the use of instructional modules and collaborative mentoring. This approach was selected to enable an in-depth understanding of the phenomenon within authentic classroom contexts (Creswell & Poth, 2018; Aspers & Corte, 2019; Sugiyono, 2019).

The participants consisted of 22 primary school teachers in Bitung City, North Sulawesi, who were selected using purposive sampling. The selection criteria included teachers who were actively engaged in teaching and involved in developing instructional materials. Purposive sampling was employed to obtain rich and relevant data aligned with the research objectives (Etikan & Bala, 2017; Campbell et al., 2020). The variation in teaching experience among participants contributed to the diversity of data in identifying pedagogical misconceptions.

Data were collected through classroom observations, open-ended questionnaires, and document analysis. Observations were conducted to examine teachers' instructional practices, particularly in relation to the application of learning principles, learning experiences, instructional syntax, and the use of digital technology. Open-ended questionnaires were used to explore teachers' understanding and misconceptions regarding deep learning concepts. Document analysis focused on instructional materials developed by teachers, particularly instructional modules. The combination of these data collection techniques enabled the generation of comprehensive and contextually grounded data (Flick, 2020; Creswell & Poth, 2018).

Data were analyzed using thematic analysis, involving data reduction, categorization, and conclusion drawing (Miles et al., 2014; Braun & Clarke, 2021). The analysis process involved grouping data based on patterns of misconceptions identified from questionnaires, observations, and documentation. Data validity was ensured through triangulation of sources and methods to maintain the consistency and credibility of the findings (Moleong, 2018; Nowell et al., 2017).

RESULTS AND DISCUSSION

1. Teachers' Pedagogical Misconceptions in Deep Learning–Oriented Instruction

The analysis reveals that teachers exhibit pedagogical misconceptions that are both conceptual and systemic in nature within deep learning–oriented instruction. These misconceptions are reflected in teachers' inability to distinguish between foundational pedagogical concepts and their practical implementation, resulting in the conflation of learning principles, learning experiences, and instructional activities. This finding is consistent with national studies indicating that teachers often struggle to differentiate between conceptual and practical components of instruction, leading to inaccuracies in instructional design (Sari & Prasetyo, 2020; Nugroho, 2021).

This condition points to a weak conceptual structure, in which pedagogical concepts that should be hierarchically organized are instead understood in fragmented ways. As a result, teachers are unable to construct coherent relationships among instructional components. This finding aligns with Lee, Chai, and Hong (2021), who

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argue that pedagogical misconceptions commonly occur at the conceptual level, particularly when teachers fail to systematically integrate different elements of instruction. In the national context, similar patterns have been observed, where limited conceptual understanding leads to misalignment among learning objectives, instructional processes, and assessment practices (Rahmawati & Suryadi, 2021).

Pedagogical misconceptions are not only conceptual but are also manifested in the structuring of instructional syntax and the use of digital technology. Instructional syntax tends to be perceived as a sequence of activities rather than as a cognitive framework designed to promote deep learning processes. Consequently, instruction lacks clear cognitive direction and fails to facilitate meaningful student engagement. This finding is consistent with national studies indicating that classroom practices in primary education remain dominated by procedural activities that do not adequately support higher-order thinking (Sutrisno, 2019).

A similar pattern is observed in the use of digital technology. Teachers tend to position technology as a technical tool rather than as an integral component of pedagogical strategy. This finding reinforces Avidov-Ungar and Eshet-Alkalai (2020), who argue that limited digital pedagogical understanding is a major barrier to meaningful technology integration. In the national context, studies indicate that technology use remains at a substitution level, where it is primarily used to deliver content without promoting interaction and student engagement (Hidayat & Kurniawan, 2022; Pratama, 2021).

Overall, these findings indicate that teachers' pedagogical misconceptions do not occur in isolation but span multiple aspects of instruction simultaneously. Therefore, these misconceptions can be categorized as structural misconceptions that affect the overall design of instruction. In this context, the quality of learning is strongly determined by the depth of teachers' conceptual understanding in designing instruction (John Hattie, 2015). This finding is further supported by national studies emphasizing that instructional quality is closely linked to teachers' ability to integrate conceptual and practical dimensions of teaching (Widodo et al., 2020).

a. Misconceptions in Learning Principles

A closer examination reveals that misconceptions in learning principles stem from how teachers interpret the relationship between conceptual foundations and instructional practice. Teachers tend to conflate learning principles with instructional activities. For instance, activities such as ice breaking are often categorized as part of the principle of enjoyable learning.

This condition indicates that teachers are unable to distinguish between principles as conceptual foundations and activities as forms of implementation. Thus, the issue extends beyond technical error and reflects a more fundamental misconception at the conceptual level.

This phenomenon can be explained through the perspective of pedagogical content knowledge, which emphasizes the integration of conceptual understanding and instructional practice (Shulman, 1986). When such integration fails to occur, teachers tend to perceive teaching and learning processes in fragmented ways. Similar findings have been reported in recent studies, which indicate that pedagogical misconceptions often arise from teachers' inability to systematically connect learning concepts (Lee et al., 2021; Zierer, 2021).

Furthermore, misunderstandings of learning principles have direct implications for the quality of instructional design. An unclear conceptual structure leads to misalignment between instructional activities and intended learning objectives. This finding is consistent with research showing that instructional quality is strongly influenced by the clarity of teachers' conceptual frameworks (John Hattie, 2015; Widodo et al., 2020).

From a broader perspective, this condition also reflects a tendency toward surface learning, in which concepts are understood in isolation rather than as part of an integrated structure (Marton & Säljö, 1976). In contemporary educational contexts, this tendency remains prevalent, particularly when teachers prioritize activities over the conceptual structures that underpin them (OECD, 2019).

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Therefore, misconceptions in learning principles do not merely result in the misclassification of instructional activities but also lead to misalignment among learning objectives, instructional processes, and designed learning experiences.

b. Misconceptions in Learning Experiences

In contrast to misconceptions related to learning principles, misconceptions in learning experiences are primarily associated with how teachers interpret activities as learning processes themselves. Teachers tend to include routine activities, such as prayer, as part of learning experiences that are assumed to reflect dimensions of the student competency profile.

This indicates that learning experiences are still understood as sequences of activities rather than as pedagogically designed processes aimed at constructing understanding. In deep learning–oriented instruction, learning experiences should be intentionally designed to promote exploration, elaboration, and reflection on conceptual content (Fullan et al., 2018).

Thus, the issue does not lie in the activities themselves, but in the misalignment between those activities and their intended conceptual purposes. Research suggests that the quality of learning experiences is determined by the level of cognitive engagement rather than merely the variety of activities (OECD, 2019; Zierer, 2021).

Furthermore, this condition reflects a tendency toward surface learning, in which students are not encouraged to develop deep conceptual understanding (Marton & Säljö, 1976). As a result, student engagement remains limited, and learning objectives are not optimally achieved (Widodo et al., 2020).

Therefore, misconceptions in learning experiences indicate a fundamental limitation in teachers' ability to design meaningful and conceptually grounded learning experiences.

c. Misconceptions in Instructional Syntax

Issues related to instructional syntax reveal another dimension of the pedagogical misconceptions experienced by teachers. In practice, some teachers organize instructional steps in an unsystematic manner, resulting in sequences that do not reflect a coherent line of thinking capable of supporting deep learning.

This situation indicates that instructional syntax is still perceived merely as a sequence of activities rather than as a pedagogical structure that guides students' cognitive processes. Consequently, the primary function of syntax as a cognitive framework is not fully realized. Conceptually, instructional syntax should be designed to facilitate structured thinking processes, ranging from exploration to reflection (Joyce, Weil, & Calhoun, 2015).

When instructional syntax is not appropriately constructed, learning loses the logical flow necessary to guide students in building understanding. In the context of deep learning–oriented instruction, the presence of a clear structure is crucial, as it determines the continuity of students' cognitive engagement (Fullan et al., 2018).

These findings reinforce the view that the quality of instructional design is strongly influenced by the clarity and coherence of activity sequences that support thinking processes (John Hattie, 2015; Zierer, 2021). Without clear connections between stages, instructional activities become fragmented and fail to produce deep conceptual understanding.

Therefore, misconceptions in instructional syntax not only result in disorganized instructional steps but also hinder the development of systematic thinking processes. This suggests that the core issue lies not in the sequencing of activities per se, but in teachers' misunderstanding of syntax as a pedagogical thinking framework.

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d. Misconceptions in the Use of Digital Technology

From a technological perspective, the misconceptions identified reveal an equally critical pattern. Teachers tend to perceive the use of devices such as LCD projectors and presentation tools as indicators of digital learning, without considering aspects of interactivity and student engagement.

This view suggests that technology is primarily understood in an instrumental manner, functioning merely as a tool for information delivery. However, from a contemporary pedagogical perspective, technology should be embedded within instructional strategies that actively promote students' cognitive processes. The Technological Pedagogical Content Knowledge (TPACK) framework, introduced by Punya Mishra and Matthew J. Koehler, emphasizes that effective technology use depends on the integration of technology, pedagogy, and content (Mishra & Koehler, 2006).

In practice, unintegrated use of technology merely results in the substitution of conventional media. This finding is consistent with prior research indicating that technology is often utilized at the substitution level without significantly transforming the quality of learning (Scherer, Siddiq, & Tondeur, 2019).

Furthermore, the effectiveness of technology integration is closely tied to student-centered instructional design. Without activities that promote interaction and reflection, technology may instead reinforce one-way instructional patterns (Tondeur et al., 2021). In other words, the presence of technology does not guarantee meaningful learning.

Additionally, several studies suggest that the primary barrier to effective technology integration lies not in the availability of devices, but in teachers' digital pedagogical competence (Avidov-Ungar & Eshet-Alkalai, 2020). In this context, passive use of technology risks creating an illusion of digital learning, where instruction appears modern on the surface but remains cognitively superficial.

Therefore, misconceptions in the use of digital technology reflect a failure to understand the role of technology as an integral component of instructional design. These findings underscore that meaningful instructional transformation cannot be achieved merely through the introduction of technology, but requires a fundamental shift in teachers' pedagogical thinking.

2. Addressing Pedagogical Misconceptions through Instructional Modules and Collaborative Mentoring

In contrast to the initial conditions, the intervention results indicate a gradual transformation in teachers' understanding. This transformation is reflected not only in their ability to correctly identify pedagogical concepts but also in how they interpret and systematically design instructional practices. These findings are consistent with national studies demonstrating that interventions based on instructional materials and mentoring can significantly enhance teachers' pedagogical understanding (Widodo et al., 2020; Rahmawati & Suryadi, 2021).

One of the most notable changes is observed in teachers' ability to distinguish between learning principles and instructional activities. Activities that were previously misclassified are now positioned in accordance with appropriate conceptual categories. This suggests that instructional modules function as a conceptual structure that supports teachers in understanding the interrelationships among instructional components. From a learning perspective, well-structured materials can serve as cognitive scaffolds that facilitate the development of conceptual understanding (Chen & Yang, 2020; Darling-Hammond et al., 2017). This finding is further supported by research in Indonesia indicating that systematic instructional modules can assist teachers in designing more structured and meaningful learning experiences (Pratama, 2021).

In addition, improvements are evident in teachers' ability to design learning experiences and instructional syntax. Teachers begin to organize instructional steps more systematically and align them with the goals of deep learning. Thus, the intervention influences not only conceptual understanding but also pedagogical practice. This

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finding reinforces the view that instructional quality depends on teachers' ability to design meaningful learning experiences (John Hattie, 2015; Zierer, 2021). In the national context, studies also indicate that improvements in primary education are strongly influenced by teachers' capacity to manage learning experiences in a structured and contextualized manner (Sutrisno, 2019).

In terms of technology use, a shift is observed from purely technical application toward more pedagogically grounded integration. Teachers begin to recognize that technology should not function merely as a tool, but as a means to support interaction and students' cognitive processes. This shift aligns with the integrative principles of the TPACK framework (Mishra & Koehler, 2006). Studies in Indonesia further confirm that effective technology integration depends on teachers' ability to align technology with instructional strategies rather than simply utilizing digital tools (Hidayat & Kurniawan, 2022).

These changes are closely linked to the role of collaborative mentoring, which provides space for reflective practice. Through discussion and feedback, teachers are able to identify misconceptions and gradually reconstruct their conceptual understanding. This approach has been shown to be effective in enhancing pedagogical competence, as it integrates reflection and collaboration as part of the learning process (Tondeur et al., 2021; Avidov-Ungar & Eshet-Alkalai, 2020; Desimone & Garet, 2015). In the national context, collaborative approaches have also been found to improve teaching practices through shared reflection and professional dialogue (Widodo et al., 2020; Nugroho, 2021).

Therefore, the improvement of pedagogical misconceptions is not solely influenced by the use of instructional modules, but by the interaction between conceptual structures and reflective processes facilitated through collaborative mentoring. These findings suggest that changes in teachers' understanding emerge from a constructive process involving the reinterpretation and reconstruction of pedagogical concepts.

3. The Process of Teachers' Conceptual Change

From a process-oriented perspective, changes in teachers' understanding occur gradually through the interaction between reflection and collaborative experience. This process enables teachers not only to identify misconceptions but also to reconstruct their understanding in a more meaningful and coherent manner. These findings are consistent with national studies indicating that changes in teachers' understanding typically emerge through sustained reflective processes embedded in instructional practice (Widodo et al., 2020; Nugroho, 2021).

Reflection within the mentoring process serves as the primary mechanism driving this transformation. Through discussion and feedback, teachers are encouraged to critically evaluate their instructional practices and reinterpret their experiences. From the perspective of professional learning, reflection enables the reinterpretation of experience as a foundation for conceptual change (Schön, 1983). In the national context, studies also show that reflection facilitated through collaborative discussion enhances teachers' pedagogical awareness of their instructional practices (Rahmawati & Suryadi, 2021).

However, effective reflection does not occur spontaneously. Research suggests that reflection requires structured support and social interaction to produce meaningful conceptual change (Darling-Hammond et al., 2017; Korthagen, 2017; Admiraal et al., 2021). This explains why collaborative mentoring in this study fosters deeper transformation. These findings are further supported by studies in Indonesia indicating that collaborative mentoring has a more significant impact than one-way training approaches (Widodo et al., 2020).

Furthermore, the observed changes can be categorized as transformative, as they involve a shift in teachers' ways of thinking about instructional concepts. This aligns with transformative learning theory, which emphasizes the role of critical reflection in developing new frames of reference (Mezirow, 1997). More recent perspectives also highlight the role of social interaction in enabling meaning negotiation among teachers (Postholm,

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2022). In the national context, changes in teachers' understanding are also shaped by the sharing of practices and experiences within professional learning communities (Nugroho, 2021).

From an adult learning perspective, active engagement in reflection and problem-solving plays a critical role in teachers' learning processes (Knowles et al., 2015). Therefore, collaborative and experience-based approaches are more effective than one-directional training models. Studies in Indonesia also confirm that experience-based learning enhances the quality of teachers' reflection and pedagogical decision-making (Sutrisno, 2019).

Thus, the process of teachers' conceptual change identified in this study results from the interaction between conceptual structure, critical reflection, and collaborative learning. This process is non-linear and evolves through ongoing dialogue and the continuous reconstruction of understanding. These findings reinforce the argument that addressing pedagogical misconceptions requires an integrated approach that combines reflection, social interaction, and conceptual support as part of teachers' professional learning (Widodo et al., 2020; Rahmawati & Suryadi, 2021).

CONCLUSION

This study demonstrates that teachers' pedagogical misconceptions in deep learning–oriented instruction are not merely technical but structural, rooted in fundamental misunderstandings of learning principles, learning experiences, instructional syntax, and the role of digital technology. These misconceptions reflect a deeper breakdown in teachers' pedagogical reasoning, which leads to misalignment in instructional design and practice.

The findings further indicate that addressing these misconceptions requires more than the provision of instructional materials. The integration of deep learning–based instructional modules with collaborative mentoring facilitates a gradual reconstruction of teachers' conceptual understanding. In this process, instructional modules function as conceptual scaffolds that clarify pedagogical structures, while collaborative mentoring provides a reflective space that enables teachers to critically examine and reconstruct their understanding.

Importantly, the process of change is not linear but transformative, involving continuous reflection, social interaction, and conceptual reorganization. This suggests that improvements in teaching practice are inseparable from changes in how teachers think about teaching and learning.

Theoretically, this study contributes to the understanding that teachers' pedagogical misconceptions should be viewed as structural phenomena that require integrative and transformative approaches. Practically, it highlights the need for teacher professional development models that move beyond content delivery toward approaches that combine conceptual support with sustained reflective and collaborative processes.

IMPLICATIONS

The findings of this study offer important implications for both instructional practice and teacher professional development. Practically, the integration of deep learning–based instructional modules with collaborative mentoring provides a viable strategy for addressing teachers' pedagogical misconceptions. This approach not only improves teachers' conceptual understanding but also facilitates the restructuring of their pedagogical reasoning, leading to more coherent and meaningful instructional design.

Furthermore, the study highlights the need to reconceptualize teacher professional development as a process that goes beyond the delivery of instructional materials. Effective professional learning should integrate conceptual scaffolding with sustained reflective and collaborative processes. In this regard, collaborative mentoring should not be treated as a supplementary activity, but as a core component of continuous professional development programs.

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At the policy level, these findings suggest that efforts to improve instructional quality cannot rely solely on curriculum reform or technological provision. Instead, systematic support mechanisms that enable teachers to critically examine and reconstruct their pedagogical understanding are essential for achieving meaningful and sustainable change in classroom practice.

LIMITATIONS

This study has several limitations that should be considered when interpreting the findings. First, the study was conducted within a specific local context involving a limited number of participants, which constrains the transferability of the findings to broader educational settings. However, the focus on contextual depth provides valuable insights into the structural nature of teachers' pedagogical misconceptions.

Second, the study relies on qualitative data collected through observations, open-ended questionnaires, and document analysis. While these methods enable in-depth exploration, they also involve interpretive processes that may introduce researcher subjectivity. To mitigate this, data triangulation and systematic thematic analysis were employed, although the potential for interpretive bias cannot be entirely eliminated.

Third, the intervention was conducted within a limited time frame, which restricts the ability to examine the long-term sustainability of changes in teachers' pedagogical understanding. As such, the findings primarily capture the initial phase of conceptual reconstruction rather than its long-term stabilization.

Future research is therefore recommended to explore longitudinal impacts, examine the scalability of the intervention across diverse contexts, and further investigate the mechanisms underlying the restructuring of teachers' pedagogical reasoning.

Recommendations

Based on the findings, several directions for future research and practice are recommended. First, further studies should examine the long-term effectiveness of collaborative mentoring in sustaining the reconstruction of teachers' pedagogical reasoning, particularly through longitudinal designs that capture the stability of conceptual change over time.

Second, future research should explore the scalability and adaptability of the intervention across diverse educational contexts, including variations in school settings, teacher backgrounds, and institutional support systems. Such investigations are necessary to determine whether the identified patterns of structural pedagogical misconceptions and their remediation mechanisms are context-specific or broadly applicable.

Third, there is a need to develop and empirically test teacher professional development models that explicitly target the restructuring of pedagogical understanding. These models should integrate conceptual scaffolding with sustained reflective and collaborative processes, rather than relying solely on content delivery or short-term training approaches.

Finally, future studies should further investigate the underlying mechanisms of conceptual change in teachers, particularly how reflective practice, social interaction, and structured instructional support interact to reshape pedagogical reasoning.

REFERENCES

Admiraal, W., Schenke, W., De Jong, L., Emmelot, Y., & Sligte, H. (2021). Schools as professional learning communities: What can schools do to support professional development of their teachers? *Professional Development in Education, 47*(4), 684–698. https://doi.org/10.1080/19415257.2019.1665573

Aspers, P., & Corte, U. (2019). What is qualitative in qualitative research. *Qualitative Sociology, 42*(2), 139–160. https://doi.org/10.1007/s11133-019-9413-7

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Avidov-Ungar, O., & Eshet-Alkalai, Y. (2020). Teachers in a world of change: Teachers' knowledge and attitudes towards the implementation of innovative technologies in schools. *Interdisciplinary Journal of e-Skills and Lifelong Learning, 16*, 123–145. https://doi.org/10.28945/4611

Braun, V., & Clarke, V. (2021). One size fits all? What counts as quality practice in thematic analysis. *Qualitative Research in Psychology, 18*(3), 328–352. https://doi.org/10.1080/14780887.2020.1769238

Campbell, S., Greenwood, M., Prior, S., Shearer, T., Walkem, K., Young, S., Bywaters, D., & Walker, K. (2020). Purposive sampling. *Qualitative Research in Psychology, 18*(4), 652–661. https://doi.org/10.1080/14780887.2020.1769230

Chen, C. M., & Yang, Y. C. (2020). Revisiting the effects of project-based learning on students' academic achievement: A meta-analysis investigating moderators. *Educational Research Review, 26*, 100376. https://doi.org/10.1016/j.edurev.2018.11.001

Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry and research design: Choosing among five approaches* (4th ed.). Sage.

Darling-Hammond, L., Hyler, M. E., & Gardner, M. (2017). Effective teacher professional development. *Learning Policy Institute*.

Desimone, L. M., & Garet, M. S. (2015). Best practices in teachers' professional development in the United States. *Psychology, Society, & Education, 7*(3), 252–263. https://doi.org/10.25115/psye.v7i3.515

Etikan, I., & Bala, K. (2017). Sampling and sampling methods. *Biometrics & Biostatistics International Journal, 5*(6), 00149. https://doi.org/10.15406/bbij.2017.05.00149

Flick, U. (2020). *Introducing research methodology* (3rd ed.). Sage.

Fullan, M., Quinn, J., & McEachen, J. (2018). *Deep learning: Engage the world change the world*. Corwin.

Fryer, L. K., & Bovee, H. N. (2020). Supporting students' motivation and engagement. *Educational Psychology Review, 32*, 1–29. https://doi.org/10.1007/s10648-019-09508-6

Harris, L. R., Brown, G. T. L., & Harnett, J. A. (2020). Supporting deep learning approaches. *Teaching and Teacher Education, 91*, 103046. https://doi.org/10.1016/j.tate.2020.103046

Hattie, J. (2015). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. Routledge.

Hidayat, D., & Kurniawan, T. (2022). Integrasi teknologi dalam pembelajaran sekolah dasar. *Jurnal Pendidikan Dasar, 13*(2), 123–134. https://doi.org/10.21009/JPD.132.05

Joyce, B., Weil, M., & Calhoun, E. (2015). *Models of teaching* (9th ed.). Pearson.

Knowles, M. S., Holton, E. F., & Swanson, R. A. (2015). *The adult learner* (8th ed.). Routledge.

König, J., Jäger-Biela, D. J., & Glutsch, N. (2020). Teachers' professional competence. *European Journal of Teacher Education, 43*(4), 608–622. https://doi.org/10.1080/02619768.2020.1809650

Korthagen, F. (2017). Inconvenient truths about teacher learning. *Teachers and Teaching, 23*(4), 387–405. https://doi.org/10.1080/13540602.2016.1211523

Lee, M. H., Chai, C. S., & Hong, H. Y. (2021). STEM education in Asia Pacific. *Asia-Pacific Education Researcher, 30*(2), 1–10. https://doi.org/10.1007/s40299-020-00505-4

Marton, F., & Säljö, R. (1976). On qualitative differences in learning. *British Journal of Educational Psychology, 46*(1), 4–11. https://doi.org/10.1111/j.2044-8279.1976.tb02980.x

Mezirow, J. (1997). Transformative learning. *New Directions for Adult and Continuing Education, 74*, 5–12. https://doi.org/10.1002/ace.7401

Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). *Qualitative data analysis: A methods sourcebook* (3rd ed.). Sage.

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge. *Teachers College Record, 108*(6), 1017–1054.

Moleong, L. J. (2018). *Metodologi penelitian kualitatif*. Remaja Rosdakarya.

Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic analysis. *International Journal of Qualitative Methods, 16*(1), 1–13. https://doi.org/10.1177/1609406917733847

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Nugroho, A. (2021). Kompetensi pedagogik guru sekolah dasar. *Jurnal Pendidikan Dasar, 12*(1), 45–56. https://doi.org/10.21009/JPD.121.05

OECD. (2020). *Future of education and skills 2030*. https://doi.org/10.1787/54a7c1d3-en

Postholm, M. B. (2022). Teachers' professional development. *Educational Research, 64*(1), 1–16. https://doi.org/10.1080/00131881.2021.1980413

Pratama, R. (2021). Pengembangan modul ajar berbasis pembelajaran aktif. *Jurnal Pendidikan, 10*(2), 89–102.

Rahmawati, N., & Suryadi, D. (2021). Analisis pemahaman pedagogik guru sekolah dasar. *Jurnal Pendidikan Dasar, 13*(1), 23–34. https://doi.org/10.21009/JPD.131.03

Sari, M., & Prasetyo, Z. (2020). Kesalahan konsep dalam pembelajaran di sekolah dasar. *Jurnal Pendidikan Dasar, 11*(2), 78–89. https://doi.org/10.21009/JPD.112.07

Scherer, R., Siddiq, F., & Tondeur, J. (2019). Technology acceptance model. *Computers & Education, 128*, 13–35. https://doi.org/10.1016/j.compedu.2018.09.009

Schön, D. A. (1983). *The reflective practitioner*. Basic Books.

Shulman, L. S. (1986). Knowledge growth in teaching. *Educational Researcher, 15*(2), 4–14. https://doi.org/10.3102/0013189X015002004

Sugiyono. (2019). *Metode penelitian pendidikan*. Alfabeta.

Suryadi, D., et al. (2021). Pembelajaran abad 21 di sekolah dasar. *Jurnal Pendidikan Indonesia, 10*(2), 145–156. https://doi.org/10.23887/jpi-undiksha.v10i2.34567

Sutrisno. (2019). Pembelajaran berbasis pengalaman. *Jurnal Pendidikan Dasar, 10*(1), 12–25. https://doi.org/10.21009/JPD.101.02

Tondeur, J., Scherer, R., Siddiq, F., & Baran, E. (2021). TPACK investigation. *Australasian Journal of Educational Technology, 37*(3), 1–16. https://doi.org/10.14742/ajet.6133

Widodo, A., Riandi, R., & Suryani, A. (2020). Teacher professional development. *Jurnal Pendidikan IPA Indonesia, 9*(3), 345–356. https://doi.org/10.15294/jpii.v9i3.22387

Widiastuti, I., et al. (2022). Deep learning dalam pembelajaran sekolah dasar. *Jurnal Pendidikan Dasar Indonesia, 7*(2), 89–98. https://doi.org/10.26737/jpdi.v7i2.3456

Zierer, K. (2021). Learning before technology. *Educational Technology Research and Development, 69*(2), 1–4. https://doi.org/10.1007/s11423-021-09985-2