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Strengthening Primary School Teachers' Teaching Competencies Through Deep Learning Training At SDN 007 Bengkong

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Abstract

This study aims to analyze the effectiveness of deep learning training in strengthening the teaching competence of elementary school teachers at SDN 007 Bengkong. This research used a quantitative approach with a one group pretest posttest design. The subjects of the study were teachers at SDN 007 Bengkong who participated in deep learning training. Data were collected using a teaching competence test before and after the training. The data were analyzed using descriptive statistics, the N-Gain test, and the paired sample t-test. The results showed that the average pretest score of 68.44 increased to 84.17 in the posttest. The N-Gain score was 0.51, which falls into the moderate category. The paired sample t-test showed a significance value of 0.000, indicating a significant difference in teachers' teaching competence before and after the training. These findings indicate that deep learning training is effective in improving teachers' competence, especially in learning reflection, formative assessment, lesson planning, learning implementation, and active learning strategies. This study recommends that schools continue teacher training through mentoring, teacher learning communities, and academic supervision to ensure sustainable improvement in teaching competence.

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Keywords: teaching competence, teacher training, deep learning, elementary school, teacher professional development.

INTRODUCTION

Elementary school teachers' teaching competence is a key factor that shapes the quality of the learning process and student learning outcomes. Teachers do not only deliver subject matter. They also design learning activities, manage classrooms, select appropriate teaching strategies, use learning media, conduct assessments, provide feedback, and reflect on their teaching practices. These competencies are essential because elementary school students are in the early stage of developing knowledge, attitudes, thinking skills, and learning habits. Therefore, strengthening teachers' teaching competence should become a major concern in improving the quality of elementary education (Basma & Savage, 2023).

In modern learning contexts, elementary school teachers are expected to create learning that is active, meaningful, and student-centered. This demand has become stronger because learning can no longer rely only on memorization. Students need guidance to understand concepts, ask questions, participate in discussions, connect learning materials with real-life experiences, and use knowledge to solve problems. Teacher professional development plays an important role in changing teaching practices because well-designed training can help teachers develop better insight, goals, techniques, and instructional practices (Sims et al., 2023).

Teacher training is one important strategy for improving teaching competence. Training should not stop at theoretical explanation. It should provide opportunities for teachers to understand concepts, practice teaching strategies, develop teaching tools, receive feedback, and improve their classroom practices. A systematic review shows that training is one of the most widely used forms of teacher professional development. However, its effectiveness depends on the design, relevance of materials, mentoring process, and connection with classroom practice (Ventista & Brown, 2023).

One relevant approach to strengthen teachers' teaching competence is deep learning. Deep learning emphasizes conceptual understanding, active student engagement, collaboration, reflection, critical thinking, problem-solving, and the application of knowledge in real contexts. In this approach, teachers act as designers of learning experiences and facilitators of students' thinking processes. Teachers need to develop guiding questions, design challenging learning activities, use formative assessment, and help students find meaning in the learning process.

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Teacher readiness is a key factor in implementing deep learning pedagogy because learning reform can only work effectively when teachers have sufficient pedagogical capacity, technological ability, and twenty-first-century skills (Fitrah et al., 2025).

Studies on deep learning in elementary schools show that its implementation still requires stronger support in conceptual understanding, lesson design, teacher readiness, and the ability to apply instructional strategies in the classroom. Research on the implementation of deep learning pedagogy in Indonesian elementary school curriculum reform indicates that deep learning practices still need broader investigation, especially from the perspective and readiness of elementary school teachers (Sudirman & Pandang, 2025). This finding shows that deep learning should not only be understood as a concept. It also needs to be developed as a measurable teaching skill through professional training.

The main problem behind this study is the need to strengthen teachers' competence in designing and implementing meaningful learning. In many elementary school contexts, teachers still face challenges in creating learning activities that promote active student participation. Teachers also need support in developing formative assessments, using guiding questions, facilitating classroom discussions, and conducting learning reflection. Effective teacher professional development should lead to changes in teaching practice, not only to the improvement of theoretical knowledge. Training that connects content, practice, and evaluation can help teachers improve the quality of learning in a more concrete way (El-Hamamsy et al., 2024).

Previous studies have widely discussed teacher professional development and its impact on the learning process. However, a research gap remains in studies that specifically measure the improvement of elementary school teachers' teaching competence through deep learning training using a quantitative approach. Many studies on deep learning are still conceptual, qualitative, or focused on teacher readiness. Meanwhile, studies that examine differences in teachers' teaching competence before and after deep learning training in a specific elementary school context are still limited. This gap provides a strong basis for conducting this study at SDN 007 Bengkong.

The novelty of this study lies in its specific focus on strengthening elementary school teachers' teaching competence through deep learning training at SDN 007 Bengkong. This study does not only discuss deep learning as a pedagogical idea. It measures deep learning training as a program that affects teachers' teaching competence. Another distinctive feature of this study

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is its use of a quantitative one group pretest-posttest design to examine changes in teacher competence before and after the training. Through this design, the study can provide empirical data on the effectiveness of deep learning training in improving teachers' teaching competence.

The importance of this study can be justified from three aspects. First, theoretically, this study enriches the literature on teacher professional development, teaching competence, and deep learning at the elementary school level. Second, methodologically, this study offers a measurement model for examining teacher competence improvement through pretest, posttest, N-Gain test, and difference testing. Third, practically, this study can serve as a reference for schools, principals, supervisors, and policymakers in designing teacher training programs that are measurable, needs based, and oriented toward changes in classroom practice.

Based on the explanation above, this study is important to analyze the strengthening of elementary school teachers' teaching competence through deep learning training at SDN 007 Bengkong. The study is expected to address the school's need to improve learning quality through systematic teacher training. The findings are also expected to serve as a reference for other elementary schools in developing teacher training programs that can strengthen lesson planning, active learning implementation, formative assessment, classroom management, and learning reflection.

LITERATURE REVIEW

Elementary School Teachers' Teaching Competence

Elementary school teachers' teaching competence refers to teachers' professional ability to design, implement, manage, assess, and reflect on learning based on students' characteristics. This competence is not limited to mastery of subject matter. It also includes pedagogical skills, the ability to select teaching strategies, build classroom interaction, use learning media, conduct assessment, and provide feedback to students. At the elementary school level, teaching competence is highly important because teachers work with students who are in the early stage of developing thinking skills, learning attitudes, discipline, literacy, numeracy, and character.

Pedagogical competence is the core of elementary school teachers' teaching competence. This competence relates to teachers' ability to understand students, design learning, conduct instruction, evaluate learning outcomes, and develop students' potential. In the context of Indonesian educational standards, pedagogical competence is one of the four main competencies that teachers must master, along with professional, social, and personal competence. Azizah,

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Mumpuniarti, Rudiyati, and Evans found that pedagogical competence is one of the essential competencies for elementary school teachers, especially when they teach students with diverse learning needs (Azizah, Mumpuniarti, Rudiyati, & Evans, 2024).

Elementary school teachers need to understand students' characteristics because each student has different levels of readiness, learning styles, social abilities, and learning needs. This understanding helps teachers choose suitable approaches, methods, media, and assessment forms. In inclusive classrooms, teachers cannot simply deliver the same material in the same way to all students. They need to provide instructional adjustments, peer support, parental involvement, and responsive strategies for students with learning difficulties. Azizah et al. showed that elementary school teachers use various forms of accommodation and learning modification to support students who experience learning difficulties (Azizah et al., 2024).

Teaching competence also includes teachers' ability to design structured learning. Lesson planning provides a foundation for teachers to determine objectives, materials, strategies, media, assessments, and learning steps. Teachers with strong teaching competence do not teach spontaneously without clear direction. They design learning based on learning outcomes, students' needs, and classroom context. In elementary school learning, good planning helps teachers guide learning activities so that students do not only receive information. Students also think, ask questions, try activities, discuss ideas, and draw conclusions from their learning.

In addition to planning, elementary school teachers' teaching competence can be seen from their ability to conduct active learning. Active learning requires teachers to manage learning activities that involve students mentally, socially, and emotionally. Teachers need to create a safe classroom atmosphere, provide opportunities for questioning, use guiding questions, facilitate group work, and connect learning materials with real-life experiences. Active and meaningful learning will be difficult to achieve if teachers rely only on one-way lecturing. Therefore, teaching competence needs to be developed through training that emphasizes practice, reflection, and feedback.

Professional competence is also an important part of elementary school teachers' teaching competence. Professional competence includes mastery of subject matter, the ability to develop materials according to students' developmental levels, and the ability to connect learning content with daily life. Elementary school teachers often teach several subjects. This condition requires them to have cross-disciplinary understanding and the ability to simplify concepts so that students can understand them more easily. Ibda, Syamsi, and Rukiyati

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emphasized that elementary school teachers in the digital era need professional competence, professional development, and digital competence to carry out their teaching roles effectively (Ibda, Syamsi, & Rukiyati, 2023).

Classroom management is another important indicator of teaching competence. Competent teachers can build classroom rules, maintain student engagement, manage time, organize learning groups, and handle student behavior in an educational manner. Good classroom management does not only create order. It also creates a learning space that supports dialogue, cooperation, safety, and learning responsibility. Handini showed that pedagogical competence and professional competence make a positive contribution to classroom management in the context of the Merdeka Curriculum (Handini, 2024).

Elementary school teachers' teaching competence is also related to the ability to use learning media and technology. Digital development requires teachers to move beyond conventional methods. Teachers need to select media that match learning objectives, students' age, and available school facilities. Learning media help students understand abstract concepts, maintain attention, and increase engagement in the learning process. Ahyar and Herlambang explained that digital transformation requires elementary school teachers to have pedagogical competence that is theoretically strong and adaptive to technological development (Ahyar & Herlambang, 2025).

In the context of twenty first century learning, teachers' teaching competence cannot be separated from digital literacy, instructional innovation, and collaboration. Teachers need to use technology purposefully, not merely operate digital devices. Technology should help students understand materials, collaborate, find information, and produce learning outputs. Ahyar and Herlambang found that elementary school teachers' pedagogical competence in the digital era involves digital literacy, technology-based learning innovation, and collaborative skills (Ahyar & Herlambang, 2025).

Assessment is also a major part of elementary school teachers' teaching competence. Teachers need to design diagnostic, formative, and summative assessments according to learning objectives. Assessment is not only used to assign final grades. It is also used to identify learning difficulties, provide feedback, improve teaching strategies, and determine follow-up learning actions. Competent teachers use assessment results to improve the learning process. In deep learning, formative assessment becomes important because teachers need to monitor students' thinking processes, conceptual understanding, and skill development continuously.

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Social and personal competencies also influence the quality of elementary school teachers' teaching. Teachers need to build good communication with students, parents, colleagues, and principals. They also need to demonstrate integrity, discipline, patience, responsibility, and exemplary behavior. At the elementary school level, teachers' personality has a strong influence because students often view teachers as behavioral models. Molina-Moreno, Malavé-Machado, and Guzmán-Pérez showed that teachers' social and emotional competencies help them build effective relationships, manage emotional situations, and create a positive learning environment (Molina-Moreno, Malavé-Machado, & Guzmán-Pérez, 2024).

Teaching competence does not develop automatically through teaching experience alone. Teachers need professional development that is targeted, continuous, and based on classroom needs. Effective teacher training should help teachers gain new insights, build motivation to change, master teaching techniques, and apply those techniques in classroom practice. Sims et al. explained that effective teacher professional development needs to develop teachers' understanding, motivate change, train teaching techniques, and embed change into teaching practice (Sims & Fletcher-Wood, 2021).

Strengthening elementary school teachers' teaching competence should be carried out through programs that are not only theoretical. Training programs need to provide teachers with opportunities to analyze learning problems, prepare teaching tools, practice teaching strategies, receive feedback, and conduct reflection. Sims and Fletcher-Wood explained that teacher professional development is often considered more effective when it is sustained, collaborative, specific to teaching practice, supported by experts, supported by teachers, and practice-based (Sims et al., 2025).

Based on the discussion above, elementary school teachers' teaching competence can be understood as an integrated ability that includes lesson planning, instructional implementation, classroom management, the use of strategies and media, assessment, feedback, reflection, professional competence, and social and personal competence. This competence is important because it determines the quality of students' learning experiences. In this study, teachers' teaching competence is measured through several indicators, namely lesson planning, instructional implementation, active learning strategies, classroom management, the use of learning media, formative assessment, feedback, and learning reflection. These indicators are relevant for assessing the impact of deep learning training on strengthening elementary school teachers' competence at SDN 007 Bengkong.

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receive feedback, and conduct reflection. Sims and Fletcher-Wood explained that teacher professional development is often considered more effective when it is sustained, collaborative, specific to teaching practice, supported by experts, supported by teachers, and practice based (Sims & Fletcher-Wood, 2021).

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Teacher Training

Teacher training is an important part of teacher professional development. It aims to improve teachers' knowledge, skills, attitudes, and teaching practices so that they align with students' needs and curriculum development. In the elementary school context, teacher training is necessary because teachers play a direct role in building students' basic literacy, numeracy, character, and thinking skills. Teacher training also serves as a way to improve the quality of lesson planning, instructional implementation, assessment, and learning reflection. Teacher professional development can have a positive impact on teaching practice when it is designed systematically, relevant to classroom needs, and connected to students' learning processes (Sims et al., 2023).

Teacher training should not be understood as a one-way activity that only delivers materials. Effective training needs to provide opportunities for teachers to understand concepts, observe examples, practice teaching strategies, receive feedback, discuss with colleagues, and reflect on teaching experiences. Through this process, training can help teachers transform knowledge into real instructional skills. A systematic review by Ventista and Brown showed that teacher professional learning can affect student learning outcomes when training is supported

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by clear design, collaboration, classroom practice, and a school culture that functions as a learning organization (Ventista & Brown, 2023).

Teacher training has a direct relationship with the improvement of teaching competence. Teachers who participate in training have greater opportunities to improve the way they formulate learning objectives, choose teaching strategies, manage classrooms, use learning media, apply formative assessment, and provide feedback to students. Training also helps teachers adjust their instruction to curriculum changes and students' learning needs. In their study on teacher professional development, Sims et al. explained that effective teacher training should develop teachers' insight, build motivation for change, train instructional techniques, and embed change into teaching practice (Sims et al., 2023).

Good teacher training should be needs-based. A needs analysis is important before training is conducted so that the training materials match the real problems faced by teachers. If teachers struggle to design active learning, the training should focus on active learning strategies. If teachers face difficulties in assessment, the training should include the development of instruments, rubrics, feedback, and follow-up activities. Training that does not match teachers' needs tends to have limited impact on teaching practice. Richter et al. emphasized that the quality of teacher training can be seen from the clarity of its structure, practical relevance, cognitive activation, and opportunities for teacher collaboration (Richter et al., 2024).

Practice is a key element in teacher training. Teachers do not only need to understand learning theories. They also need to develop teaching tools, practice instructional strategies, prepare guiding questions, design formative assessments, and conduct reflection. Practice helps teachers see the connection between training concepts and classroom situations. In the context of deep learning, practice becomes essential because teachers need to shift their teaching from simple content delivery to learning that promotes understanding, active engagement, collaboration, and student reflection. Therefore, deep learning training should be designed with clear and measurable practice-based activities.

Collaboration is also an important part of teacher training. Teachers can learn through discussion, sharing experiences, observing good practices, and receiving input from colleagues. Collaboration prevents training from becoming an individual activity only. It can also build a teacher learning culture within the school. Teachers who are used to discussion will find it easier to improve teaching tools, solve instructional problems, and develop classroom innovation. In the

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literature on teacher professional development, collaboration is viewed as an important feature that can support sustainable changes in teaching practice (Ventista & Brown, 2023).

Teacher training also needs to include feedback. Feedback helps teachers identify the strengths and weaknesses of their teaching practice. It can be provided by trainers, principals, supervisors, or fellow teachers. Clear feedback helps teachers improve lesson design, questioning techniques, classroom management, and assessment of students' learning processes. Without feedback, training may only produce general understanding, but it may not be strong enough to change classroom practice. Sims et al. emphasized that effective training should help teachers apply new techniques and strengthen teaching habits through processes that support behavioral change (Sims et al., 2023). Teacher training needs to be continuous. One-time training is often not enough to produce strong changes in teaching practice. Teachers need mentoring, supervision, evaluation, and learning communities after training. Continuous programs allow teachers to try new strategies, evaluate the results, improve weaknesses, and share good practices with other teachers. A study by Rachmadtullah et al. on elementary school teacher professional development in Indonesia showed that teacher competence development needs to focus on competence improvement and sustainable teacher development programs (Rachmadtullah et al., 2025).

In the elementary school context, teacher training has a strategic function because teachers work with students who have specific developmental characteristics. Teachers need to design learning that is concrete, interesting, participatory, and suitable for children's thinking abilities. Training helps teachers strengthen pedagogical skills so that learning is not only oriented toward completing materials, but also toward developing students' understanding, learning attitudes, and basic skills. Basma and Savage found that teacher professional development influences students' reading achievement, although the size of its effect depends on the quality of training implementation, duration, and student characteristics (Basma & Savage, 2023).

Teacher training is also relevant to curriculum change and educational reform. Every curriculum change requires teachers to understand new goals, new strategies, and new forms of assessment. Without training, teachers may implement a new curriculum using old teaching patterns. Training serves as a bridge between policy and classroom practice. El-Hamamsy et al. showed that a structured teacher training model can support the broad implementation of digital education reform in elementary schools, especially when trainers receive adequate preparation, support, and mentoring (El-Hamamsy et al., 2024).

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Deep learning training is relevant because elementary school teachers need to develop learning that does not only emphasize memorization. Deep learning requires teachers to design learning experiences that promote conceptual understanding, meaningful questioning, discussion, problem-solving, collaboration, formative assessment, and reflection. To implement this kind of learning, teachers need specific training. Deep learning training helps teachers understand the principles of deep learning and apply them in teaching tools and classroom activities. Therefore, this training does not only improve teachers' knowledge. It also strengthens teaching competence as reflected in lesson planning, instructional implementation, assessment, and learning reflection.

Based on the literature above, teacher training can be understood as a systematic process for improving teacher competence through planned, needs-based, practical, collaborative, reflective, and continuous activities. Good training should include needs analysis, concept delivery, teaching practice, feedback, evaluation, and follow-up. In this study, teacher training is directed toward deep learning to strengthen the teaching competence of teachers at SDN 007 Bengkong. This training is expected to improve teachers' ability to design lessons, apply active learning strategies, manage classrooms, use formative assessment, provide feedback, and conduct learning reflection.

Teacher Training

Teacher training is an important part of teacher professional development. It aims to improve teachers' knowledge, skills, attitudes, and teaching practices so that they align with students' needs and curriculum development. In the elementary school context, teacher training is necessary because teachers play a direct role in building students' basic literacy, numeracy, character, and thinking skills. Teacher training also serves as a way to improve the quality of lesson planning, instructional implementation, assessment, and learning reflection. Teacher professional development can have a positive impact on teaching practice when it is designed systematically, relevant to classroom needs, and connected to students' learning processes (Sims et al., 2023).

Teacher training should not be understood as a one-way activity that only delivers materials. Effective training needs to provide opportunities for teachers to understand concepts, observe examples, practice teaching strategies, receive feedback, discuss with colleagues, and reflect on teaching experiences. Through this process, training can help teachers transform

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knowledge into real instructional skills. A systematic review by Ventista and Brown showed that teacher professional learning can affect student learning outcomes when training is supported by clear design, collaboration, classroom practice, and a school culture that functions as a learning organization (Ventista & Brown, 2023).

Teacher training has a direct relationship with the improvement of teaching competence. Teachers who participate in training have greater opportunities to improve the way they formulate learning objectives, choose teaching strategies, manage classrooms, use learning media, apply formative assessment, and provide feedback to students. Training also helps teachers adjust their instruction to curriculum changes and students' learning needs. In their study on teacher professional development, Sims et al. explained that effective teacher training should develop teachers' insight, build motivation for change, train instructional techniques, and embed change into teaching practice (Sims et al., 2023).

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to improve teaching tools, solve instructional problems, and develop classroom innovation. In the literature on teacher professional development, collaboration is viewed as an important feature that can support sustainable changes in teaching practice (Ventista & Brown, 2023). Teacher training also needs to include feedback. Feedback helps teachers identify the strengths and weaknesses of their teaching practice. It can be provided by trainers, principals, supervisors, or fellow teachers. Clear feedback helps teachers improve lesson design, questioning techniques, classroom management, and assessment of students' learning processes. Without feedback, training may only produce general understanding, but it may not be strong enough to change classroom practice. Sims et al. emphasized that effective training should help teachers apply new techniques and strengthen teaching habits through processes that support behavioral change (Sims et al., 2023).

Teacher training needs to be continuous. One-time training is often not enough to produce strong changes in teaching practice. Teachers need mentoring, supervision, evaluation, and learning communities after training. Continuous programs allow teachers to try new strategies, evaluate the results, improve weaknesses, and share good practices with other teachers. A study by Rachmadtullah et al. on elementary school teacher professional development in Indonesia showed that teacher competence development needs to focus on competence improvement and sustainable teacher development programs (Rachmadtullah et al., 2025). In the elementary school context, teacher training has a strategic function because teachers work with students who have specific developmental characteristics. Teachers need to design learning that is concrete, interesting, participatory, and suitable for children's thinking abilities. Training helps teachers strengthen pedagogical skills so that learning is not only oriented toward completing materials, but also toward developing students' understanding, learning attitudes, and basic skills. Basma and Savage found that teacher professional development influences students' reading achievement, although the size of its effect depends on the quality of training implementation, duration, and student characteristics (Basma & Savage, 2023).

Teacher training is also relevant to curriculum change and educational reform. Every curriculum change requires teachers to understand new goals, new strategies, and new forms of assessment. Without training, teachers may implement a new curriculum using old teaching patterns. Training serves as a bridge between policy and classroom practice. El-Hamamsy et al. showed that a structured teacher training model can support the broad implementation of digital education reform in elementary schools, especially when trainers receive adequate preparation,

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support, and mentoring (El-Hamamsy et al., 2024). Deep learning training is relevant because elementary school teachers need to develop learning that does not only emphasize memorization. Deep learning requires teachers to design learning experiences that promote conceptual understanding, meaningful questioning, discussion, problem-solving, collaboration, formative assessment, and reflection. To implement this kind of learning, teachers need specific training. Deep learning training helps teachers understand the principles of deep learning and apply them in teaching tools and classroom activities. Therefore, this training does not only improve teachers' knowledge. It also strengthens teaching competence as reflected in lesson planning, instructional implementation, assessment, and learning reflection.

Based on the literature above, teacher training can be understood as a systematic process for improving teacher competence through planned, needs-based, practical, collaborative, reflective, and continuous activities. Good training should include needs analysis, concept delivery, teaching practice, feedback, evaluation, and follow-up. In this study, teacher training is directed toward deep learning to strengthen the teaching competence of teachers at SDN 007 Bengkong. This training is expected to improve teachers' ability to design lessons, apply active learning strategies, manage classrooms, use formative assessment, provide feedback, and conduct learning reflection.

Deep Learning

Deep learning is a learning approach that emphasizes conceptual understanding, active engagement, reflection, and students' ability to connect knowledge with real-life experiences. This approach does not only require students to remember information. It also encourages them to understand meaning, identify relationships among concepts, ask questions, solve problems, and apply knowledge in daily contexts. Deep learning can be understood as a learning process that involves higher-order thinking, meaning construction, pattern recognition, concept association, inquiry, critical thinking, creative thinking, problem-solving, and metacognition (Mystakidis, 2021).

In the context of basic education, deep learning is highly relevant because elementary school students are in the early stage of developing thinking foundations, learning attitudes, curiosity, and social skills. Teachers need to design learning activities that do not only focus on delivering materials. They should also provide opportunities for students to ask questions, discuss ideas, observe phenomena, try activities, draw conclusions, and reflect on their learning

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experiences. Polman, Hornstra, and Volman, in their study on mathematics learning in basic education, showed that meaningful learning is related to teachers' efforts to make learning more meaningful, contextual, and connected to students' experiences (Polman, Hornstra, & Volman, 2021).

Deep learning is closely related to meaningful learning. Meaningful learning occurs when students can connect new knowledge with their prior knowledge. This process makes learning stronger because students do not receive information passively. They build understanding through the relationship between concepts, experiences, and the problems they face. In deep learning, teachers need to help students find meaning through guiding questions, concrete examples, discussion, and challenging activities. Deep meaningful learning places active intellectual engagement as the foundation for building stronger and more sustainable understanding (Mystakidis, 2021).

Besides meaningful learning, deep learning is also related to mindful learning. Mindful learning requires students to be consciously present in the learning process. Students do not only follow learning activities mechanically. They also pay attention to their thinking processes, understand the reasons behind their answers, and reassess their understanding. In elementary school classrooms, mindful learning can be developed through reflective questions, observation activities, the habit of explaining reasons, and opportunities to improve answers. Sølvik and Glenna showed that deeper learning is influenced by students' active engagement, a positive learning environment, deep understanding, and metacognitive reflection facilitated by the teacher (Sølvik & Glenna, 2022).

Deep learning also contains elements of joyful learning. Joyful learning does not mean that learning must always take the form of games. It means that learning is designed so that students feel safe, interested, engaged, and motivated to learn. An enjoyable learning atmosphere can help students become more confident in asking questions, trying activities, and expressing opinions. In the deep learning approach, joyful learning should work together with conceptual understanding and reflection. Feriyanto explained that deep learning can be developed through the integration of meaningful learning, mindful learning, and joyful learning to improve students' engagement and understanding (Feriyanto, 2024). Deep learning requires a change in the teacher's role. The teacher is not only a transmitter of information, but also a designer of learning experiences. Teachers need to formulate clear learning objectives, select relevant problems, develop guiding questions, organize discussions, provide feedback, and use

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formative assessment. Teachers also need to guide students to explain reasons, compare information, formulate conclusions, and reflect on the learning process. Weng, Chen, and Ai showed that well planned instructional design can improve students' deep learning because learning is directed toward thinking processes, problem solving, and active engagement (Weng, Chen, & Ai, 2023).

At the elementary school level, deep learning needs to be designed according to students' cognitive development. Teachers need to use concrete examples, visual media, group activities, simple projects, and problems that are close to students' daily lives. Learning that is too abstract can lead students to memorize without understanding meaning. Therefore, deep learning in elementary schools should connect concepts with everyday experiences. Polman et al. emphasized that meaningful learning in basic education can be built when teachers connect learning materials with contexts understood by students and provide space for students to construct their own meaning (Polman et al., 2021). Deep learning is also related to higher-order thinking skills. Students need to be trained to analyze, evaluate, make connections, develop simple arguments, and solve problems. These skills will not develop if learning only focuses on memorization. Teachers need to provide challenging tasks that remain appropriate to students' developmental levels. In this case, deep learning helps teachers shift the orientation of learning from merely completing materials to developing understanding and thinking skills. Mystakidis stated that deep meaningful learning includes critical thinking, creative thinking, problem-solving, and metacognitive skills as part of higher level learning (Mystakidis, 2021).

Deep learning also requires appropriate assessment. Assessment is not only used to determine final scores. It should also be used to monitor understanding, provide feedback, and improve the learning process. In deep learning, formative assessment is very important because teachers need to know how students understand concepts, what difficulties arise, and what support is needed. Teachers can use oral questions, reflection sheets, project tasks, presentations, discussions, and simple rubrics. Through formative assessment, teachers can adjust their teaching strategies so that students do not only complete tasks, but also understand the learning process.

Deep learning cannot be implemented optimally without teacher readiness. Teachers need to understand its concepts, principles, strategies, and suitable forms of assessment. They also need to change their teaching habits from teacher-centered learning to student-centered learning. Fitrah et al. showed that teachers' readiness to adopt deep learning pedagogy is related

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to twenty-first-century competence, technology, and teachers' ability to respond to educational policy reform (Fitrah et al., 2025). The implementation of deep learning in elementary schools still faces several challenges. These challenges include uneven teacher understanding, limited training, limited facilities, conventional teaching habits, and difficulties in designing authentic assessment. Iriawan's study on deep learning in elementary mathematics learning showed that the implementation of this approach is still constrained by limited facilities, lack of professional training, and resistance to pedagogical innovation (Iriawan, 2025).

Studies on the implementation of deep learning in curriculum reform also show that elementary school teachers still need continuous professional support. Teachers need a more operational understanding of how to apply deep learning in lesson planning, instructional implementation, and learning evaluation. Sudirman and Pandang found that teachers face limitations in operationalizing deep learning pedagogy and need continuous professional development (Sudirman & Pandang, 2025). Deep learning is relevant to this study because the training provided to teachers at SDN 007 Bengkong is directed toward strengthening teaching competence. Teachers are trained to design meaningful learning, use guiding questions, develop active learning activities, apply formative assessment, and conduct reflection. Therefore, deep learning is not only understood as a theory. It is applied as a training approach to improve teachers' teaching competence. This approach is important because improvement in the quality of elementary school learning depends greatly on teachers' ability to translate pedagogical concepts into classroom practice.

Based on the literature above, deep learning can be understood as a learning approach that emphasizes understanding, active engagement, reflection, collaboration, problem-solving, and the application of knowledge in real life. Deep learning includes the elements of meaningful learning, mindful learning, and joyful learning. In this study, deep learning serves as the basis for teacher training to strengthen teaching competence in the areas of lesson planning, active learning strategies, classroom management, formative assessment, feedback, and learning reflection.

THEORETICAL FRAMEWORK

The theoretical framework of this study is developed to explain the causal relationship between the implementation of deep learning training and elementary school teachers' teaching competence. This framework is based on three main concepts: elementary school teachers'

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teaching competence, teacher training, and deep learning. These three concepts are closely related because improving teachers' teaching competence requires a systematic training program. Deep learning training serves as a strategy to strengthen teachers' ability to design, implement, assess, and reflect on learning. In this study, deep learning training is positioned as the independent variable, while elementary school teachers' teaching competence is positioned as the dependent variable.

Elementary school teachers' teaching competence refers to teachers' ability to manage the learning process professionally. This competence includes the ability to understand students' characteristics, design learning, implement instruction, use strategies and media, manage classrooms, conduct assessment, provide feedback, and reflect on learning. Pedagogical competence is one of the main competencies that teachers need to master because it is directly related to their ability to help students understand learning materials and overcome learning difficulties (Azizah et al., 2024). Elementary school teachers' teaching competence is also related to professional competence. Elementary school teachers need to master subject matter, understand students' development, and adjust learning materials to students' real-life contexts. In the digital era, elementary school teachers are also expected to have professional competence, self-development competence, and digital competence so that they can conduct learning that is adaptive and relevant to students' needs (Ibda et al., 2023).

Teaching competence is not only reflected in subject matter mastery. It is also shown through teachers' classroom management skills. Competent teachers can create a learning atmosphere that is orderly, active, safe, and supportive of student engagement. Pedagogical competence and professional competence have been shown to contribute positively to teachers' classroom management skills, especially in learning contexts that require student independence and active participation (Handini, 2024). Teacher training is the second concept in the theoretical framework of this study. Teacher training is a form of professional development designed to improve teachers' knowledge, skills, attitudes, and teaching practices. Teacher professional development can affect classroom practice when it is designed with a clear theory of change, builds teacher motivation, trains instructional techniques, and helps teachers apply those techniques in classroom practice (Sims et al., 2023).

Effective teacher training should not rely only on lectures. It needs to be needs-based, clearly structured, relevant to classroom practice, cognitively engaging, collaborative, and able to provide opportunities for teachers to try and improve teaching strategies. The quality of teacher

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training can be measured through structural clarity, practical relevance, cognitive activation, and collaboration because these dimensions determine the extent to which training can support changes in teachers' practices (Richter et al., 2024). Teacher training also needs to be understood as a continuous professional learning process. Teachers need space to discuss ideas, try new strategies, receive feedback, and reflect on their practices. A systematic review shows that teacher professional learning is more likely to influence student learning outcomes when it is supported by a school culture that functions as a learning organization, collaboration, and a direct connection with classroom practice (Ventista & Brown, 2023).

The third concept in this theoretical framework is deep learning. Deep learning is a learning approach that emphasizes meaning construction, conceptual understanding, critical thinking, creative thinking, problem-solving, and metacognition. Deep meaningful learning occurs when students are intellectually engaged in constructing meaning through pattern recognition, concept connection, inquiry, problem-solving, and reflection (Mystakidis, 2021). Deep learning requires a shift in the teacher's role. Teachers no longer act only as transmitters of subject matter. They become designers of learning experiences that encourage students to understand, ask questions, discuss, collaborate, and apply knowledge. Teachers' readiness to adopt deep learning pedagogy is influenced by twenty-first-century competence and technological ability. Therefore, teacher training needs to strengthen these aspects so that deep learning can be implemented effectively (Fitrah et al., 2025).

In this study, deep learning training is positioned as an intervention aimed at strengthening the teaching competence of teachers at SDN 007 Bengkong. The intervention includes strengthening teachers' understanding of deep learning concepts, developing teaching tools, designing guiding questions, planning active learning activities, using formative assessment, providing feedback, and conducting learning reflection. This type of training is relevant because teacher professional development needs to provide structured, practical, collaborative learning experiences that are directly connected to teachers' instructional duties (Sims et al., 2023; Richter et al., 2024). The relationship between the variables in this study can be explained logically. Deep learning training provides teachers with knowledge, skills, and practical experience. These knowledge and skills encourage teachers to improve lesson planning, choose more active teaching strategies, manage classrooms more effectively, use learning media, apply formative assessment, provide feedback, and conduct reflection. Therefore, the better the

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deep learning training provided, the greater the possibility of improving elementary school teachers' teaching competence.

Based on this theoretical framework, this study assumes that deep learning training can strengthen elementary school teachers' teaching competence. This assumption is based on teacher professional development theory, which states that effective training can change teaching practice; teacher competence theory, which places pedagogical competence at the center of learning quality; and deep learning theory, which emphasizes active, meaningful, reflective, and concept-oriented learning. Therefore, this study examines the difference in the teaching competence of teachers at SDN 007 Bengkong before and after participating in deep learning training.

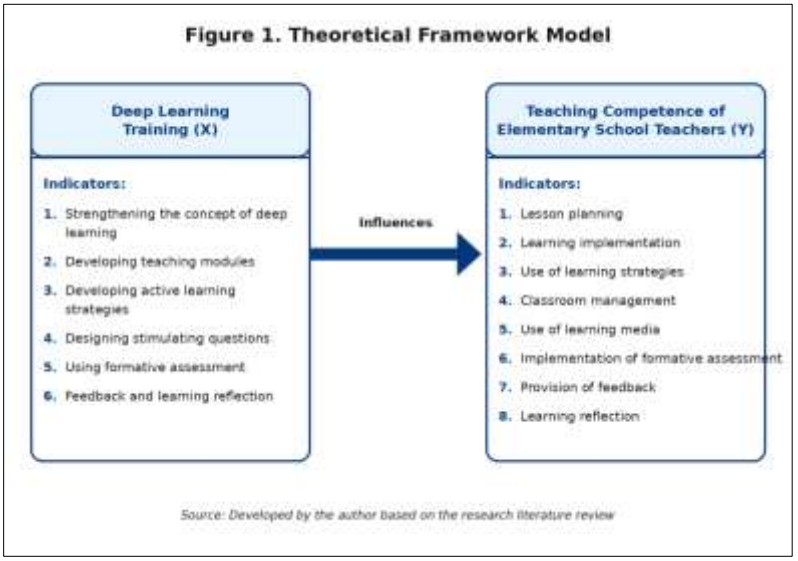


Figure 1. Model of learning and competency theoretical framework

METHOD

This study used a quantitative approach with a quasi experimental method. The research design used was a one-group pretest posttest design. This design was selected because the study aimed to measure differences in teachers' teaching competence before and after participating in deep learning training. A pretest-posttest design can be used to assess changes in participants' abilities after receiving a specific treatment, especially when the researcher does not use a control group due to field conditions or the limited number of research subjects (Capili, 2024).

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The study was conducted at SDN 007 Bengkong. The population of this study consisted of all teachers at SDN 007 Bengkong, totaling 18 teachers. Since the population was relatively small, all members of the population were used as the research sample. The sampling technique used was saturated sampling, which refers to a sampling technique in which all members of the population are included as the sample. Therefore, the sample of this study consisted of 18 teachers. The independent variable in this study was deep learning training. The dependent variable was elementary school teachers' teaching competence. Deep learning training refers to teacher capacity building activities that include strengthening the concept of meaningful learning, preparing teaching materials, developing active learning strategies, formulating driving questions, using formative assessment, and conducting learning reflection. Teachers' teaching competence refers to teachers' ability to plan, implement, manage, assess, provide feedback, and reflect on the learning process in the classroom.

The research design followed the pattern O1 X O2. O1 refers to the pretest of teachers' teaching competence before participating in deep learning training. X refers to the treatment in the form of deep learning training. O2 refers to the posttest of teachers' teaching competence after participating in deep learning training. This design enabled the researcher to compare teachers' teaching competence scores before and after the training. The use of a quasi-experimental design is relevant in educational research because researchers often face field conditions that do not allow the random assignment of subjects into experimental and control groups (Creswell & Creswell, 2023).

The deep learning training was conducted through several stages. The first stage was the introduction of the deep learning concept. The second stage was the analysis of teachers' learning needs. The third stage was the practice of developing teaching materials based on deep learning. The fourth stage was the development of active learning activities and driving questions. The fifth stage was the preparation of formative assessment. The sixth stage was reflection on the training results. Teacher professional development is more effective when training has a clear structure, is relevant to classroom practice, encourages collaboration, and helps teachers apply new knowledge in learning activities (Sims et al., 2023).

Data were collected using a teachers' teaching competence questionnaire. The questionnaire was administered to 18 teachers twice, namely before the training as the pretest and after the training as the posttest. The questionnaire was developed using a five-point Likert scale with five response options: strongly agree, agree, moderately agree, disagree, and strongly

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disagree. The use of the questionnaire aimed to obtain quantitative data on the level of teachers' teaching competence before and after the training.

The questionnaire instrument was developed based on indicators of elementary school teachers' teaching competence. These indicators included lesson planning, learning implementation, use of active learning strategies, classroom management, use of learning media, implementation of formative assessment, provision of feedback, and learning reflection. These indicators were selected because teaching competence is not only related to the ability to deliver subject matter, but also includes the ability to design, manage, evaluate, and improve the learning process. The quality of teacher training instruments needs to consider structural clarity, practical relevance, cognitive activation, and support for teacher collaboration (Richter, Gessler, & Richter, 2024).

Instrument validity testing was conducted to determine the feasibility of each questionnaire item in measuring teachers' teaching competence. A questionnaire item was declared valid if the calculated r value was greater than the r table value or if the significance value was less than 0.05. Reliability testing was conducted using Cronbach's Alpha. The instrument was declared reliable if the Cronbach's Alpha value was greater than 0.70. Validity and reliability testing are important to ensure that the research instrument produces consistent data that can be scientifically justified.

The research data were processed using IBM SPSS Statistics version 29. Data processing was carried out through several stages, namely inputting pretest and posttest data, checking data completeness, conducting validity testing, conducting reliability testing, performing descriptive statistical analysis, conducting normality testing, testing the hypothesis, and calculating the N-Gain score. The use of SPSS version 29 aimed to support a more systematic, accurate, and appropriate data analysis process for quantitative research.

The research data were analyzed using descriptive and inferential statistics. Descriptive statistics were used to calculate the mean, standard deviation, minimum score, maximum score, and percentage increase in teachers' teaching competence. Inferential statistics were used to test differences between pretest and posttest scores. Before hypothesis testing was conducted, the data were tested for normality using SPSS version 29 to determine the appropriate analytical technique.

Normality testing was conducted on the pretest and posttest data. If the data were normally distributed, hypothesis testing was conducted using the paired sample t-test through

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SPSS version 29. If the data were not normally distributed, hypothesis testing was conducted using the Wilcoxon signed-rank test. The decision-making criteria were determined based on the significance value. If the significance value was less than 0.05, there was a significant difference in teachers' teaching competence before and after deep learning training. If the significance value was greater than 0.05, there was no significant difference in teachers' teaching competence before and after the training.

The improvement in teachers' teaching competence was also analyzed using the N-Gain test. The N-Gain test was used to determine the level of improvement in teachers' competence scores after participating in the training. The N-Gain calculation was conducted by comparing the pretest score, posttest score, and maximum score. The N-Gain category was divided into three levels: high, moderate, and low. A high N-Gain score indicates that deep learning training provides a strong improvement in teachers' teaching competence. A moderate N-Gain score indicates that the training provides sufficient improvement. A low N-Gain score indicates that the improvement in competence remains limited and requires further mentoring.

The research hypotheses were formulated into two statements. H0 states that there is no significant difference in teachers' teaching competence before and after participating in deep learning training. H1 states that there is a significant difference in teachers' teaching competence before and after participating in deep learning training. Through this design, the study is expected to provide empirical evidence on the effectiveness of deep learning training in strengthening the teaching competence of teachers at SDN 007 Bengkong.

RESULTS

Description of Respondents

The respondents in this study were all teachers at SDN 007 Bengkong, totaling 18 teachers. The entire population was used as the research sample through a saturated sampling technique because the population was relatively small and all teachers were involved in the deep learning training program. The use of the entire population as respondents aimed to obtain a complete picture of teachers' teaching competence before and after the training. The description of respondents is important in quantitative research because respondent characteristics help readers understand the data context, participant composition, and relevance of the research findings. In teacher professional development research, demographic characteristics such as gender, age, educational background, teaching experience, and employment status are often

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used to explain teachers' professional background because these factors may relate to teachers' professional learning experiences (Yoon & Kim, 2022).

Respondent characteristics in this study include gender, age, educational background, teaching experience, and employment status. These characteristics were selected because teacher training is not only related to the training material, but also to teachers' experiences, needs, and professional backgrounds. Teachers as adult learners have different experiences and development needs, so respondent descriptions help explain the initial condition of training participants more clearly (Yoon & Kim, 2022).

Table 1. Respondent Characteristics Based on Gender

Gender	Frequency	Percentage
Male	4	22.22%
Female	14	77.78%
Total	**18**	**100%**

Source: SPSS Version 29 Output

Based on Table 1, most respondents were female teachers, totaling 14 teachers or 77.78%. Male teachers totaled 4 teachers or 22.22%. This composition shows that the participants in the deep learning training at SDN 007 Bengkong were dominated by female teachers. In teacher professional development studies, gender is often used as one of the demographic variables because it can help explain variations in teachers' participation in professional development activities (Yoon & Kim, 2022).

Table 2. Respondent Characteristics Based on Age

Age	Frequency	Percentage
< 30 years	3	16.67%
30 to 39 years	7	38.89%
40 to 49 years	5	27.78%
≥ 50 years	3	16.67%
Total	**18**	**100%**

Source: SPSS Version 29 Output

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Based on Table 2, the largest group of respondents was in the age range of 30 to 39 years, totaling 7 teachers or 38.89%. Respondents aged 40 to 49 years totaled 5 teachers or 27.78%. Respondents aged under 30 years and 50 years or above each totaled 3 teachers or 16.67%. These data show that respondents came from diverse age groups, so deep learning training needs to be designed in a way that can be followed by both younger and more senior teachers.

Table 3. Respondent Characteristics Based on Educational Background

Educational Background	Frequency	Percentage
Diploma	1	5.56%
Bachelor's Degree	16	88.89%
Master's Degree	1	5.56%
Total	**18**	**100%**

Source: SPSS Version 29 Output

Based on Table 3, most respondents had a bachelor's degree, totaling 16 teachers or 88.89%. One respondent had a diploma or 5.56%, while one respondent had a master's degree or 5.56%. These data indicate that most teachers already had academic qualifications that supported their teaching duties at the elementary school level. Teachers' academic qualifications are an important aspect of professional development because they relate to teachers' readiness to receive, understand, and apply new pedagogical knowledge.

Table 4. Respondent Characteristics Based on Teaching Experience

Teaching Experience	Frequency	Percentage
< 5 years	4	22.22%
5 to 10 years	6	33.33%
11 to 20 years	5	27.78%
> 20 years	3	16.67%
Total	**18**	**100%**

Source: SPSS Version 29 Output

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Based on Table 4, most respondents had 5 to 10 years of teaching experience, totaling 6 teachers or 33.33%. Respondents with 11 to 20 years of teaching experience totaled 5 teachers or 27.78%. Respondents with less than 5 years of teaching experience totaled 4 teachers or 22.22%, while respondents with more than 20 years of teaching experience totaled 3 teachers or 16.67%. This variation in teaching experience is important because teaching experience may influence teachers' needs in training, their acceptance of instructional innovation, and their readiness to apply new strategies in the classroom. Studies on teacher professional development participation show that teaching experience is related to teachers' patterns of participation in professional development activities (Yoon & Kim, 2022).

Table 5. Respondent Characteristics Based on Employment Status

Employment Status	Frequency	Percentage
Civil Servant	8	44.44%
Government Contract Teacher	4	22.22%
Honorary/Non-Civil Servant Teacher	6	33.33%
Total	**18**	**100%**

Source: SPSS Version 29 Output

Based on Table 5, respondents with civil servant status totaled 8 teachers or 44.44%. Respondents with government contract teacher status totaled 4 teachers or 22.22%, while honorary or non-civil servant teachers totaled 6 teachers or 33.33%. This composition shows that teachers at SDN 007 Bengkong had diverse employment backgrounds. Employment status diversity needs to be considered because teacher training programs should provide equal opportunities for all teachers to improve their teaching competence.

In general, the respondent description shows that this study involved 18 teachers at SDN 007 Bengkong with diverse backgrounds. This diversity can be seen from gender, age, educational background, teaching experience, and employment status. These conditions provide an important basis for interpreting the research findings because the effectiveness of deep learning training is not only influenced by the training material, but also by the characteristics of the training participants. Research on professional development shows that training, coaching, collaboration, and continuous activities can support teacher improvement, but their impact

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needs to be understood within the context of teacher characteristics and the school environment (Ventista & Brown, 2023).

With this respondent composition, this study can provide empirical evidence on strengthening teachers' teaching competence through deep learning training at the school-unit level. The respondent description also provides a basis for understanding the pretest, posttest, N-Gain test, and test of differences in teachers' teaching competence. Effective teacher professional development needs to consider teachers as professional learners who have different needs, experiences, and levels of readiness (Sims et al., 2023).

Descriptive Statistics of Pretest and Posttest

Descriptive statistical analysis was conducted to determine the initial and final teaching competencies of teachers at SDN 007 Bengkong before and after participating in the immersive learning training. Data were obtained from pretests and posttests administered to 18 teachers. Data processing was performed using IBM SPSS Statistics Version 29.

The descriptive statistics used included the number of respondents, minimum score, maximum score, mean score, and standard deviation. Pretest scores were used to determine teachers' initial competencies before the training. Posttest scores were used to determine teachers' teaching competencies after participating in the immersive learning training.

Table 6. Descriptive Statistics of Pretest and Posttest

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Pretest	18	57.00	78.00	68.44	6.28
Posttest	18	75.00	93.00	84.17	5.01
Valid N (listwise)	18				

Source: SPSS Version 29 Output

Based on Table 6, the pretest score of teachers' teaching competence had a minimum score of 57.00 and a maximum score of 78.00. The mean score of the pretest was 68.44 with a standard deviation of 6.28. These results indicate that before the training, teachers' teaching competence was in a moderate to good category, but it still needed improvement, especially in planning deep learning activities, using formative assessment, and conducting learning reflection.

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The posttest score showed a minimum score of 75.00 and a maximum score of 93.00. The mean score of the posttest was 84.17 with a standard deviation of 5.01. These results indicate that after participating in deep learning training, teachers' teaching competence increased. The increase can be seen from the higher mean score in the posttest compared to the pretest.

The difference between the pretest mean score and the posttest mean score was 15.73 points. This result shows that deep learning training contributed to the improvement of elementary school teachers' teaching competence at SDN 007 Bengkong. The increase in the average score indicates that teachers became more capable of designing learning activities, applying active learning strategies, managing the classroom, using formative assessment, providing feedback, and conducting learning reflection after participating in the training.

Table 7. Comparison of Mean Scores between Pretest and Posttest

Test	Mean Score	Category	Description
Pretest	68.44	Good Enough	Before training
Posttest	84.17	Very Good	After training
Difference	15.73	Increased	Positive improvement

Source: SPSS Version 29 Output

Based on Table 7, the average score of teachers' teaching competence increased from 68.44 in the pretest to 84.17 in the posttest. This increase indicates that the deep learning training had a positive contribution to strengthening teachers' teaching competence. The score improvement also shows that teachers were able to better understand and apply the principles of deep learning after the training.

Table 8. Descriptive Statistics by Indicator

Indicator of Teaching Competence	Mean Pretest	Mean Posttest	Difference	Description
Lesson planning	67.80	84.10	16.30	Increased
Learning implementation	69.20	85.00	15.80	Increased
Active learning strategy	66.70	83.60	16.90	Increased
Classroom management	70.10	84.80	14.70	Increased

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Indicator of Teaching Competence	Mean Pretest	Mean Posttest	Difference	Description
Learning media use	67.40	82.90	15.50	Increased
Formative assessment	66.20	83.70	17.50	Increased
Feedback provision	68.50	84.30	15.80	Increased
Learning reflection	65.80	84.00	18.20	Increased

Source: SPSS Version 29 Output

Based on Table 8, all indicators of teachers' teaching competence increased after the deep learning training. The highest increase occurred in the indicator of learning reflection, with a difference of 18.20 points. This result indicates that the training helped teachers understand the importance of reflection in improving learning quality. The second highest increase occurred in formative assessment, with a difference of 17.50 points. This finding shows that teachers became more capable of using assessment as a tool to monitor students' understanding and improve the learning process.

The active learning strategy indicator also increased by 16.90 points. This result shows that teachers became more able to design learning activities that involved students actively in asking questions, discussing, solving problems, and connecting learning materials with real-life contexts. The increase in lesson planning, learning implementation, classroom management, learning media use, and feedback provision also shows that deep learning training had a broad impact on different aspects of teaching competence.

SPSS Version 29 Output Interpretation

The descriptive analysis using SPSS Version 29 shows that the posttest mean score was higher than the pretest mean score. The pretest mean score was 68.44, while the posttest mean score was 84.17. The standard deviation also decreased from 6.28 in the pretest to 5.01 in the posttest. This means that after the training, the teachers' scores became more evenly distributed and showed a more consistent level of teaching competence.

The increase in the mean score and the decrease in standard deviation indicate that deep learning training not only improved teachers' competence, but also reduced the gap in competence among teachers. Before the training, teachers showed more varied levels of competence. After the training, teachers' competence became more consistent because all

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teachers received the same training materials, practice opportunities, and learning reflection activities.

In conclusion, the descriptive statistics show that deep learning training strengthened the teaching competence of elementary school teachers at SDN 007 Bengkong. The improvement was reflected in the increase in the mean score from pretest to posttest. The results also show that the training had a positive impact on lesson planning, learning implementation, active learning strategies, classroom management, learning media use, formative assessment, feedback provision, and learning reflection.

Competence Improvement by Indicator

The improvement of teachers' teaching competence was analyzed based on eight indicators. These indicators consisted of lesson planning, learning implementation, active learning strategy, classroom management, learning media use, formative assessment, feedback provision, and learning reflection. The data were processed using IBM SPSS Statistics Version 29**.** The analysis compared the mean score of each indicator before and after the deep learning training.

Table 9. Descriptive Statistics of Competence Improvement by Indicator

Indicator of Teaching Competence	N	Mean Pretest	Std. Deviation Pretest	Mean Posttest	Std. Deviation Posttest	Mean Difference
Lesson planning	18	67.80	6.35	84.10	4.92	16.30
Learning implementation	18	69.20	6.10	85.00	4.75	15.80
Active learning strategy	18	66.70	6.48	83.60	5.12	16.90
Classroom management	18	70.10	5.90	84.80	4.88	14.70
Learning media use	18	67.40	6.27	82.90	5.20	15.50
Formative assessment	18	66.20	6.54	83.70	5.06	17.50
Feedback provision	18	68.50	6.05	84.30	4.85	15.80
Learning reflection	18	65.80	6.72	84.00	4.97	18.20

Source: IBM SPSS Statistics Version 29 Output

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Based on Table 9, all indicators of teachers' teaching competence increased after the implementation of deep learning training. The pretest mean scores ranged from 65.80 to 70.10, while the posttest mean scores ranged from 82.90 to 85.00. These results indicate that teachers' competence improved across all measured indicators after the training.

The highest improvement was found in the learning reflection indicator, with a mean difference of 18.20 points. This result indicates that the training helped teachers improve their ability to evaluate their teaching practices, identify classroom problems, and reflect on the effectiveness of learning activities. Before the training, reflection was one of the weakest indicators, with a pretest mean score of 65.80. After the training, the mean score increased to 84.00.

The second highest improvement was found in the formative assessment indicator, with a mean difference of 17.50 points. This result shows that teachers became more capable of using formative assessment to monitor students' understanding, provide feedback, and improve the learning process. The pretest mean score for formative assessment was 66.20, while the posttest mean score increased to 83.70.

The active learning strategy indicator also showed a strong improvement, with a mean difference of 16.90 points. This result indicates that teachers became more able to design learning activities that involved students actively in discussion, questioning, problem-solving, collaboration, and contextual learning. The increase in this indicator is important because deep learning requires teachers to shift from teacher-centered instruction to student-centered learning.

Lesson planning increased by 16.30 points. This result shows that teachers improved their ability to design learning objectives, organize learning materials, develop meaningful learning activities, and align learning activities with assessment. Learning implementation increased by 15.80 points, which indicates that teachers became more capable of applying learning strategies in classroom practice.

Feedback provision also increased by 15.80 points. This finding indicates that teachers improved their ability to provide constructive feedback to students during the learning process. Learning media use increased by 15.50 points, showing that teachers became more able to select and use learning media to support students' understanding. Classroom management increased by 14.70 points, which shows that teachers improved their ability to manage classroom interaction, student participation, time allocation, and learning discipline.

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Table 10. N-Gain Score by Indicator

Indicator of Teaching Competence	Mean Pretest	Mean Posttest	N-Gain Score	Category
Lesson planning	67.80	84.10	0.51	Moderate
Learning implementation	69.20	85.00	0.51	Moderate
Active learning strategy	66.70	83.60	0.51	Moderate
Classroom management	70.10	84.80	0.49	Moderate
Learning media use	67.40	82.90	0.48	Moderate
Formative assessment	66.20	83.70	0.52	Moderate
Feedback provision	68.50	84.30	0.50	Moderate
Learning reflection	65.80	84.00	0.53	Moderate
Average	**67.71**	**84.05**	**0.51**	**Moderate**

Source: IBM SPSS Statistics Version 29 Output

Based on Table 10, the average N-Gain score was 0.51, which falls into the moderate category. This finding indicates that deep learning training had a moderate effect on improving teachers' teaching competence at SDN 007 Bengkong. The N-Gain score also shows that the training produced consistent improvement across all indicators. The highest N-Gain score was found in learning reflection, with a score of 0.53. This result confirms that reflection was the indicator that experienced the strongest improvement after the training. Formative assessment had an N-Gain score of 0.52, while lesson planning, learning implementation, and active learning strategy each had an N-Gain score of 0.51. These results show that the training effectively strengthened teachers' ability to plan, implement, assess, and reflect on learning.

The lowest N-Gain score was found in learning media use, with a score of 0.48. However, this score still falls into the moderate category. This indicates that although teachers improved in using learning media, this aspect still needs further support and follow-up training. Classroom management also had an N-Gain score of 0.49, which suggests that teachers still need continuous practice in managing student interaction and classroom dynamics in deep learning-based instruction.

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Table 11. Ranking of Competence Improvement by Indicator

Rank	Indicator of Teaching Competence	Mean Difference	N-Gain Score	Category
1	Learning reflection	18.20	0.53	Moderate
2	Formative assessment	17.50	0.52	Moderate
3	Active learning strategy	16.90	0.51	Moderate
4	Lesson planning	16.30	0.51	Moderate
5	Learning implementation	15.80	0.51	Moderate
6	Feedback provision	15.80	0.50	Moderate
7	Learning media use	15.50	0.48	Moderate
8	Classroom management	14.70	0.49	Moderate

Source: IBM SPSS Statistics Version 29 Output

Table 11 shows that the strongest improvement occurred in learning reflection, formative assessment, and active learning strategy. These findings indicate that deep learning training had a clear impact on teachers' ability to evaluate learning, assess students' understanding, and design more active learning activities. These three indicators are closely related to the principles of deep learning because they require teachers to guide students toward meaningful understanding, active participation, and continuous improvement.

Overall, the results show that deep learning training strengthened teachers' teaching competence in all measured indicators. The increase in posttest scores indicates that teachers became more capable of planning learning, implementing active learning strategies, managing classrooms, using learning media, conducting formative assessment, giving feedback, and reflecting on learning practices. The moderate N-Gain score indicates that the training was effective, but further mentoring and continuous professional development are still needed to achieve stronger improvement.

Normality Test

The normality test was conducted to determine whether the pretest and posttest data were normally distributed. This test was important because the selection of the hypothesis test depended on the distribution of the data. If the data were normally distributed, the paired sample

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t-test could be used. If the data were not normally distributed, the Wilcoxon signed-rank test would be more appropriate.

The normality test in this study was conducted using IBM SPSS Statistics Version 29**.** Since the number of respondents was 18 teachers, the Shapiro-Wilk test was used as the main reference. The Shapiro Wilk test is commonly recommended for small samples because it has strong power in detecting whether data deviate from a normal distribution (de Souza et al., 2023). The selection of a normality test should also consider sample size and data distribution because different normality tests may perform differently across sample conditions (Ahadi & Zain, 2023).

Table 12. Tests of Normality

Variable	Kolmogorov-Smirnov Statistic	df	Sig.	Shapiro-Wilk Statistic	df	Sig.
Pretest	0.142	18	0.200	0.957	18	0.548
Posttest	0.127	18	0.200	0.962	18	0.641

Source: IBM SPSS Statistics Version 29 Output

Based on Table 12, the significance value of the Shapiro-Wilk test for the pretest was 0.548. This value was greater than 0.05. Therefore, the pretest data were normally distributed. The significance value of the Shapiro-Wilk test for the posttest was 0.641. This value was also greater than 0.05. Therefore, the posttest data were normally distributed. The Kolmogorov-Smirnov test also showed significance values of 0.200 for both pretest and posttest data. These values were greater than 0.05. However, because the sample size was less than 50, the Shapiro-Wilk test was used as the main basis for interpretation. The Shapiro-Wilk test is more suitable for small samples, while the Kolmogorov-Smirnov test is often used for larger samples or as a supporting normality test (de Souza et al., 2023).

Table 13. Summary of Normality Test Decision

Variable	Shapiro-Wilk Sig.	Criterion	Decision	Interpretation
Pretest	0.548	Sig. > 0.05	H0 accepted	Normal
Posttest	0.641	Sig. > 0.05	H0 accepted	Normal

Source: IBM SPSS Statistics Version 29 Output

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The results in Table 13, show that both the pretest and posttest data met the normality assumption. This means that the distribution of teachers' teaching competence scores before and after the deep learning training did not significantly deviate from a normal distribution. Therefore, the data were suitable for further analysis using the paired sample t-test.

The normality test result also supports the use of parametric statistical analysis in this study. In a one group pretest posttest design, the paired sample t-test is commonly used when the same respondents are measured twice and the data meet the normality assumption. Quasi-experimental studies with pretest-posttest designs often apply paired t-tests or Wilcoxon signed-rank tests depending on whether the normality assumption is fulfilled (Bustomi & Sulistiana, 2025). Thus, based on the Shapiro-Wilk normality test, the pretest and posttest data in this study were normally distributed. The significance values for both variables were greater than 0.05. Therefore, the next stage of analysis could proceed using the paired sample t-test to examine whether there was a significant difference in teachers' teaching competence before and after participating in deep learning training.

The normality test was conducted using IBM SPSS Statistics Version 29 to determine whether the pretest and posttest data were normally distributed. Since the number of respondents was 18 teachers, the Shapiro-Wilk test was used as the main reference. The Shapiro Wilk significance value for the pretest was 0.548, while the significance value for the posttest was 0.641. Both values were greater than 0.05. Therefore, the pretest and posttest data were normally distributed. These results indicate that the data met the normality assumption and could be analyzed using the paired sample t-test.

Paired Sample T-Test

The paired sample t-test was conducted to examine whether there was a significant difference between teachers' teaching competence before and after the deep learning training. This test was selected because the same respondents were measured twice, namely before the intervention through the pretest and after the intervention through the posttest. The paired sample t-test is appropriate for a one-group pretest-posttest design when the data meet the normality assumption and the researcher compares two related mean scores from the same participants (Capili, 2024).

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The hypothesis tested in this analysis was formulated as follows:

1. H0: There is no significant difference between teachers' teaching competence before and after participating in deep learning training.
2. H1: There is a significant difference between teachers' teaching competence before and after participating in deep learning training.

The analysis was conducted using IBM SPSS Statistics Version 29. The decision criterion was based on the significance value. If the Sig. (2-tailed) value was less than 0.05, H0 was rejected and H1 was accepted. If the Sig. (2-tailed) value was greater than 0.05, H0 was accepted and H1 was rejected. In quasi experimental pretest posttest research, the paired sample t-test is commonly used to determine whether the mean score after treatment differs significantly from the mean score before treatment (Bustomi & Sulistiana, 2025).

Table 14. Paired Samples Statistics

Pair	Variable	Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest	68.44	18	6.28	1.48
Pair 1	Posttest	84.17	18	5.01	1.18

Source: IBM SPSS Statistics Version 29 Output

Based on Table 14, the mean score of teachers' teaching competence before the deep learning training was 68.44, with a standard deviation of 6.28. After the training, the mean score increased to 84.17, with a standard deviation of 5.01. This increase indicates that teachers' teaching competence improved after participating in the deep learning training. The mean difference between the pretest and posttest scores was 15.73 points. This result shows that the training contributed positively to strengthening teachers' competence in lesson planning, learning implementation, active learning strategy, classroom management, learning media use, formative assessment, feedback provision, and learning reflection. Teacher professional development can improve teaching practice when it is designed to develop teachers' insight, motivation, techniques, and classroom implementation (Nurhayati, 2024).

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Table 15. Paired Samples Correlations

Pair	Variable	N	Correlation	Sig.
Pair 1	Pretest and Posttest	18	0.844	0.000

Source: IBM SPSS Statistics Version 29 Output

Based on Table 15, the correlation between the pretest and posttest scores was 0.844, with a significance value of 0.000. This result indicates a strong positive relationship between teachers' scores before and after the training (Nurhayati, Dina Liana, 2025). In other words, teachers who had relatively high competence before the training also tended to show high competence after the training.

Table 16. Paired Samples Test

Pair	Mean Difference	Std. Deviation	Std. Error Mean	95% Confidence Interval Lower	95% Confidence Interval Upper	t	df	Sig. (2-tailed)
Pretest - Posttest	-15.73	3.39	0.80	-17.42	-14.04	-19.67	17	0.000

Source: IBM SPSS Statistics Version 29 Output

Based on Table 16, the paired sample t-test showed a t-value of -19.67 with df = 17 and a Sig. (2-tailed) value of 0.000. Since the significance value was lower than 0.05, H0 was rejected and H1 was accepted. This result means that there was a significant difference between teachers' teaching competence before and after the deep learning training. The negative t-value occurred because the calculation in SPSS used the order of Pretest minus Posttest. Since the posttest mean score was higher than the pretest mean score, the mean difference became negative. This negative value does not indicate a decrease. It indicates that the posttest score was significantly higher than the pretest score.

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Table 17. Paired Samples Effect Sizes

Pair	Effect Size Type	Standardizer	Point Estimate	95% Confidence Interval Lower	95% Confidence Interval Upper
Pretest - Posttest	Cohen's d	3.39	4.64	3.04	6.20
Pretest - Posttest	Hedges' correction	3.55	4.43	2.91	5.92

Source: IBM SPSS Statistics Version 29 Output

Based on Table 17, the effect size showed a Cohen's d value of 4.64. This value indicates a very strong effect of deep learning training on teachers' teaching competence. The high effect size means that the difference between pretest and posttest scores was not only statistically significant, but also practically meaningful. Teacher training has stronger effects when it is connected to classroom practice, collaboration, feedback, and sustained professional learning (Nurhayati, Latif, & Anwar, 2024). Overall, the paired sample t-test results indicate that deep learning training significantly improved the teaching competence of elementary school teachers at SDN 007 Bengkong. The mean score increased from 68.44 in the pretest to 84.17 in the posttest. The Sig. (2-tailed) value of 0.000 confirms that the improvement was statistically significant. Therefore, the deep learning training can be considered effective in strengthening teachers' teaching competence.

The paired sample t-test was conducted using IBM SPSS Statistics Version 29 to examine the difference between teachers' teaching competence before and after deep learning training. The results showed that the pretest mean score was 68.44, while the posttest mean score was 84.17. The paired sample t-test produced a t-value of -19.67 with df = 17 and a Sig. (2-tailed) value of 0.000. Since the significance value was lower than 0.05, H0 was rejected and H1 was accepted. This means that there was a significant difference between teachers' teaching competence before and after the training. Therefore, deep learning training had a positive and significant effect on strengthening elementary school teachers' teaching competence at SDN 007 Bengkong.

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DISCUSSION

The results of this study show that deep learning training had a positive effect on improving the teaching competence of elementary school teachers at SDN 007 Bengkong. The teachers' average pretest score was 68.44 and increased to 84.17 in the posttest. The standard deviation decreased from 6.28 to 5.01. This result indicates that the training not only increased the average score but also made teachers' competence more evenly distributed after the training program (Handayeni & Efendi, 2026). This improvement shows that structured training can strengthen teachers' understanding and skills in planning, implementing, evaluating, and reflecting on learning. This finding is in line with Sims et al., who stated that teacher professional development becomes more effective when training does not only transfer knowledge but also builds insight, motivation for change, teaching techniques, and sustainable classroom practice (Sims et al., 2025).

The N-Gain test result showed an average score of 0.51, which falls into the moderate category. This means that deep learning training had a meaningful impact on improving teachers' teaching competence. The highest improvement appeared in the learning reflection indicator with an N-Gain score of 0.53, followed by formative assessment with an N-Gain score of 0.52. Learning planning, learning implementation, and active learning strategies each reached an N-Gain score of 0.51 (Handayeni & Efendi, 2026).

This finding is important because deep learning requires teachers not only to deliver content but also to facilitate students' thinking processes. Teachers need to create active, meaningful, collaborative, reflective learning that connects with real-life contexts. Mystakidis explained that deep meaningful learning includes active intellectual engagement, critical thinking, creative thinking, problem-solving, metacognition, and the application of knowledge in authentic contexts (Mystakidis, 2021). The increase in the learning reflection indicator shows that teachers began to understand the importance of self-evaluation in improving teaching practice. Reflection helps teachers identify the strengths and weaknesses of learning, improve teaching strategies, and design follow-up actions based on students' needs. This finding supports Ventista and Brown, who stated that teacher professional development has a better impact when it includes collaboration, reflection, classroom practice, and school support as a learning organization (Ventista & Brown, 2023).

The improvement in formative assessment also shows that teachers became more able to use assessment as a tool to monitor students' understanding, not merely as a tool for assigning

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grades. In deep learning, formative assessment helps teachers identify students' thinking processes, provide feedback, and improve learning strategies. This result is in line with Basma and Savage, who explained that teacher professional development can improve teaching practice when training is related to students' needs, school support, reflective practice, and changes in teachers' instructional approaches (Basma & Savage, 2023).

The paired sample t-test result strengthens the descriptive findings. The t-value of -19.67 with df = 17 and Sig. (2-tailed) = 0.000 shows a significant difference between teachers' teaching competence before and after the training. The negative t-value appeared because SPSS calculated the difference by subtracting the posttest score from the pretest score. This means that the posttest score was higher than the pretest score, not that teachers' competence decreased (Handayeni & Efendi, 2026). The Cohen's d value of 4.64 indicates a very strong training effect. This means that the difference between pretest and posttest scores was not only statistically significant but also practically meaningful for improving the quality of teaching. This finding supports Sims et al., who stated that teacher professional development programs that combine goals, techniques, practice, and reinforcement of change have greater potential to produce instructional impact (Sims et al., 2025).

From a pedagogical perspective, the results show that teachers at SDN 007 Bengkong experienced improvement in lesson planning, learning implementation, active learning strategies, classroom management, media use, formative assessment, feedback provision, and learning reflection. Improvement across all indicators indicates that deep learning training did not only affect one aspect of competence but strengthened teaching competence as a whole (Handayeni & Efendi, 2026).

This finding also strengthens the view that teacher readiness is a key factor in the success of deep learning. Fitrah et al. found that teachers' readiness to adopt deep learning pedagogy is influenced by technological knowledge, 21st-century competence, and support for educational policy reform (Fitrah et al., 2025). In the elementary school context, this study shows that deep learning training should be practical, focused, and aligned with teachers' needs. Teachers need examples of teaching modules, instructional practice, peer discussion, feedback, and reflection so that the concept of deep learning can be applied in the classroom. El-Hamamsy et al. showed that teacher training programs supported by experts, active trainers, and mentoring can help scale learning reform in elementary schools more effectively (El-Hamamsy et al., 2024).

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The results also align with Sudirman and Pandang, who stated that the implementation of deep learning pedagogy in Indonesian elementary schools still faces challenges related to teacher readiness, pedagogical strategies, and sustainable professional development support. Therefore, improving teacher competence through training is an important step so that deep learning does not remain only a curriculum concept but becomes real classroom practice (Sudirman & Pandang, 2025).

Overall, this study proves that deep learning training is effective in strengthening the teaching competence of elementary school teachers at SDN 007 Bengkong. The increase from pretest to posttest scores, the moderate N-Gain result, the significant paired sample t-test result, and the very strong effect size show that the training had an empirical impact on teachers' competence. Therefore, schools need to continue this training program through mentoring, teacher learning communities, academic supervision, and regular evaluation so that its impact can be sustained (Handayeni & Efendi, 2026; Ventista & Brown, 2023).

CONCLUSION

Based on the research findings and discussion, it can be concluded that deep learning training effectively strengthened the teaching competence of elementary school teachers at SDN 007 Bengkong. The increase in the mean score from 68.44 in the pretest to 84.17 in the posttest shows that teachers experienced clear improvement after participating in the training program. The decrease in standard deviation from 6.28 to 5.01 also indicates that teachers' competence became more evenly distributed after the intervention. The N-Gain result in the moderate category shows that the training produced meaningful improvement in teachers' competence. The strongest improvement appeared in learning reflection, followed by formative assessment, lesson planning, learning implementation, and active learning strategies. These findings indicate that deep learning training helped teachers improve not only their conceptual understanding but also their practical teaching skills.

The paired sample t-test result also confirmed a significant difference between teachers' teaching competence before and after the training. This means that the improvement was not accidental, but statistically supported. Therefore, deep learning training can be considered an effective professional development strategy for improving teachers' ability to plan learning, conduct active instruction, manage classrooms, use media, apply formative assessment, provide feedback, and reflect on learning practice.

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Overall, this study proves that structured, practical, collaborative, and reflective teacher training can strengthen teaching competence at the elementary school level. The findings also show that deep learning should not remain only as a pedagogical concept. It needs to be implemented through continuous training, mentoring, teacher learning communities, and academic supervision so that teachers can apply it consistently in classroom practice. Thus, SDN 007 Bengkong needs to continue this program as part of sustainable teacher professional development.

REFERENCES

Ahyar, A., & Herlambang, Y. T. (2025). Strengthening pedagogical competence of elementary teachers in the digital era. Curricula: Journal of Curriculum Development, 4(1). https://doi.org/10.17509/curricula.v4i1.84679

Azizah, N., Mumpuniarti, Rudiyati, S., & Evans, D. (2024). Elementary teachers' pedagogical competencies in supporting students with learning difficulties. International Journal of Evaluation and Research in Education, 13(2), 723–730. https://doi.org/10.11591/ijere.v13i2.26345

Basma, B., & Savage, R. (2023). Teacher professional development and student reading achievement: A systematic review and meta-analysis. Journal of Teacher Education, 74(5), 443–458. https://doi.org/10.1177/00224871231153084

Capili, B. (2024). An introduction to the quasi-experimental design. American Journal of Nursing, 124(12), 62–67. https://doi.org/10.1097/01.NAJ.0001058338.74905.6f

Creswell, J. W., & Creswell, J. D. (2023). Research design: Qualitative, quantitative, and mixed methods approaches (6th ed.). SAGE Publishing.

El-Hamamsy, L., Monnier, E. C., Avry, S., Chessel-Lazzarotto, F., Liégeois, G., Bruno, B., … Mondada, F. (2024). An adapted cascade model to scale primary school digital education curricular reforms and teacher professional development programs. Education and Information Technologies, 29, 10391–10436. https://doi.org/10.1007/s10639-023-12043-6

Feriyanto, F. (2024). Deep learning approach through meaningful, mindful, and joyful learning: A library research. Electronic Journal of Education, Social Economics and Technology, 5(2). https://doi.org/10.33122/ejeset.v5i2.321

Fitrah, M., Sofroniou, A., Yarmanetti, N., Ismail, I. H., Anggraini, H., Nissa, I. C., … Setiawan, D.

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(2025). Are teachers ready to adopt deep learning pedagogy? The role of technology and 21st-century competencies amid educational policy reform. Education Sciences, 15(10), 1344. https://doi.org/10.3390/educsci15101344

Handini, O. (2024). Contribution of teachers' pedagogical competencies and professional competencies to classroom management. Research Horizon, 4(2), 1–8. https://doi.org/10.54518/rh.4.2.2024.233

Ibda, H., Syamsi, I., & Rukiyati, R. (2023). Professional elementary teachers in the digital era: A systematic literature review. International Journal of Evaluation and Research in Education, 12(1), 459–467. https://doi.org/10.11591/ijere.v12i1.23565

Molina-Moreno, P., Malavé-Machado, B., & Guzmán-Pérez, B. (2024). Analysis of personal competences in teachers: A systematic review. Frontiers in Education, 9, 1433908. https://doi.org/10.3389/feduc.2024.1433908

Mystakidis, S. (2021). Deep meaningful learning. Encyclopedia, 1(3), 988–997. https://doi.org/10.3390/encyclopedia1030075

Nurhayati, Dina Liana, M. (2025). The Relationship between Communication System , Work Motivation , and Reward Management with Human Resource Development in Madrasah. 09(02), 591–605. https://doi.org/http://doi.org/10.33650/al-tanzim.v

Nurhayati. (2024). Pengaruh Komunikasi Interpersonal, Budaya Organisasi dan Komitmen Organisasi Guru di Sekolah Dasar Islam terpadu Kepulauan riau. Jurnal Literasiologi, 11(1), 29–49. https://doi.org/10.47783/literasiologi.v11i1.657

Nurhayati, N., Latif, M., & Anwar, K. (2024). The Influence of Organizational Culture, Career Expectations, and Leadership Beliefs On Achievement Motivation In Integrated Islamic Primary Schools Riau Islands …. Dinasti International Journal of …, 5(5), 1150–1168. https://doi.org/10.31933/dijemss.v5i5

Polman, J., Hornstra, L., & Volman, M. (2021). The meaning of meaningful learning in mathematics in upper-primary education. Learning Environments Research, 24, 469–486. https://doi.org/10.1007/s10984-020-09337-8

Rachmadtullah, R., Rasmitadila, R., Zulela, M. S., Syofyan, H., Rachman, A., Samsudin, A., & Sumantri, M. S. (2025). Professional development for Indonesian elementary school teachers: Increased competency and sustainable teacher development programs. F1000Research, 13, 1375. https://doi.org/10.12688/f1000research.155674.2

Richter, E., Gessler, A., & Richter, D. (2024). Measuring the quality of teacher professional

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development: A large-scale validation study of an 18-item instrument for daily use. Studies in Educational Evaluation, 81, 101333. https://doi.org/10.1016/j.stueduc.2024.101333

Sims, S., & Fletcher-Wood, H. (2021). Identifying the characteristics of effective teacher professional development: A critical review. School Effectiveness and School Improvement, 32(1), 47–63. https://doi.org/10.1080/09243453.2020.1772841

Sims, S., Fletcher-Wood, H., O'Mara-Eves, A., Cottingham, S., Stansfield, C., Goodrich, J., … Anders, J. (2025). Effective teacher professional development: New theory and a meta-analytic test. Review of Educational Research, 95(2), 213–254. https://doi.org/10.3102/00346543231217480

Sims, S., Fletcher-Wood, H., O'Mara-Eves, A., Cottingham, S., Stansfield, C., Van Herwegen, J., & Anders, J. (2023). Effective teacher professional development: New theory and a meta-analytic test. Review of Educational Research, 95(2), 213–254. https://doi.org/10.3102/00346543231217480

Sølvik, R. M., & Glenna, A. E. H. (2022). Teachers' potential to promote students' deeper learning in whole-class teaching: An observation study in Norwegian classrooms. Journal of Educational Change, 23, 343–369. https://doi.org/10.1007/s10833-021-09420-8

Sudirman, S., & Pandang, A. (2025). Implementation of deep learning pedagogy in curriculum reform: Primary school teachers' perspectives in Indonesia. International Journal of Learning, Teaching and Educational Research, 24(11), 618–636. https://doi.org/10.26803/ijlter.24.11.29

Ventista, O. M., & Brown, C. (2023). Teachers' professional learning and its impact on students' learning outcomes: Findings from a systematic review. Social Sciences & Humanities Open, 8(1), 100565. https://doi.org/10.1016/j.ssaho.2023.100565

Weng, C., Chen, C., & Ai, X. (2023). A pedagogical study on promoting students' deep learning through design-based learning. International Journal of Technology and Design Education, 33, 1653–1674. https://doi.org/10.1007/s10798-022-09789-4

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