



Optimizing the Role of School Principals Through Deep Learning Training to Improve the Quality of Elementary School Teachers' Instruction in Kotamobagu City

Kusnadi Pobela^{1*}, Rr Eko Susetyarini², Baiduri³

Universitas Muhamadiyah Malang

Corresponding Author: Kusnadi Pobela kusnadipobela@gmail.com

ARTICLE INFO

Keywords: Deep Learning, Instructional Leadership, Learning Quality, Elementary School, Educational Transformation

Received: 19, April

Revised: 20, May

Accepted: 30, June

©2026 Pobela, Susetyarini, Baiduri: This is an open-access article distributed under the terms of the [Creative Commons Attribution 4.0 International](https://creativecommons.org/licenses/by/4.0/).



ABSTRACT

This study examines the urgency of deep learning training in supporting educational transformation and optimizing the role of elementary school principals as instructional leaders in Kotamobagu City. Using a descriptive qualitative approach through library research and best-practice studies based on field experience, this research explores the concepts of instructional leadership, deep learning, and learning quality improvement. Data were observed during the implementation of training and mentoring activities for school principals and teachers. The findings indicate that deep learning training enhances principals' capacity in academic supervision, teacher mentoring, and technology-based learning innovation. The training also encourages more active, contextual, and student-centered learning practices. Therefore, sustainable practice-based training is essential to support adaptive 21st-century education transformation.

INTRODUCTION

Educational transformation in Indonesia has become an important part of realizing the vision of Golden Indonesia 2045, which emphasizes the development of superior, adaptive, and globally competitive human resources. Education functions not only as a means of improving the quality of human resources but also as a medium for strengthening national character and social civilization. Therefore, improving the quality of education has become a strategic national agenda that requires support from all educational components, including school principals as instructional leaders.

Educational transformation in Indonesia has become a strategic effort in realizing the vision of Golden Indonesia 2045, which emphasizes the development of superior, adaptive, and globally competitive human resources. Education plays an important role not only in improving the quality of human resources but also in strengthening national character, social values, and community civilization. Therefore, improving educational quality has become a national priority that requires strong collaboration among all educational stakeholders, particularly school leaders who are directly involved in managing learning processes in schools (Yusuf & Arfiansyah, 2021; Harris & Jones, 2020).

In elementary education, school principals have significant responsibilities in ensuring the effectiveness of teaching and learning activities. Principals are expected to function not only as administrative managers but also as instructional leaders who can guide teachers, improve academic quality, and create conducive learning environments. Effective instructional leadership has been recognized as one of the most influential factors in improving teacher performance, school effectiveness, and student learning outcomes (Hallinger et al., 2020). Moreover, Bellibaş, Kılınç, and Polatcan (2021) emphasized that instructional leadership positively affects teacher professional learning and instructional improvement through collaborative and transformational leadership practices.

The rapid development of digital technology has also transformed educational practices and created new challenges for school leadership. Educational institutions are increasingly required to integrate digital technology into teaching, learning, assessment, and school management processes. Consequently, school principals need to develop adaptive leadership competencies capable of responding to technological changes and supporting innovation in learning practices. Liu, Bellibaş, and Gümüş (2021) explained that instructional leadership and collaborative school culture significantly influence teacher self-efficacy and professional development in educational transformation contexts. Likewise, Zaini and Mansor (2021) found that effective instructional leadership contributes positively to teacher professional learning and school improvement.

The challenges of educational transformation became more apparent after the COVID-19 pandemic, which accelerated the implementation of digital learning and technology integration in schools. Harris and Jones (2020) argued that school leaders must possess adaptive and innovative leadership capacities to manage educational changes effectively in uncertain situations. In addition,

Patfield, Gore, and Harris (2023) highlighted that sustainable professional learning programs are essential for strengthening teachers' instructional competence and supporting educational improvement in changing educational environments.

In this context, deep learning training has emerged as a relevant strategy to strengthen principals' leadership capacities and improve learning quality in schools. Deep learning in education emphasizes meaningful learning processes that encourage critical thinking, collaboration, creativity, communication, and problem-solving skills. This approach supports the development of 21st-century competencies and promotes student-centered learning practices. Cassata and Allensworth (2021) explained that practice-based professional learning programs significantly contribute to instructional improvement and teacher professional development. Furthermore, Antinluoma, Ilomäki, and Toom (2021) emphasized that collaborative professional learning communities play important roles in strengthening sustainable educational innovation and reflective teaching practices.

Deep learning training also provides opportunities for principals to strengthen their instructional leadership capacities through authentic learning experiences, mentoring activities, and collaborative professional development. Bellibaş, Polatcan, and Kılınç (2022) found that instructional leadership practices supported by collaborative professional learning environments positively influence teacher instructional effectiveness and school learning quality. Therefore, strengthening principals' capacities through deep learning training becomes increasingly important in supporting educational transformation and improving elementary school learning quality.

Although many studies have discussed instructional leadership and digital transformation in education, studies specifically examining the optimization of principals' roles through deep learning training in elementary schools, particularly in regional educational contexts, remain limited. Most previous studies focused on general leadership practices or technology integration without specifically analyzing how deep learning training contributes to strengthening principals' instructional leadership and improving teachers' learning quality. Therefore, this study contributes to enriching educational leadership literature by integrating deep learning training, instructional leadership development, and learning quality improvement within the local context of Kotamobagu City.

The novelty of this study lies in its focus on integrating deep learning training with instructional leadership strengthening and teacher learning quality improvement in elementary schools. This study also highlights the importance of sustainable mentoring, collaborative professional learning communities, and policy support in ensuring the effectiveness of educational transformation programs.

Based on these issues, this study aims to analyze the urgency of deep learning training in supporting educational transformation, examine its contribution to optimizing the role of principals as instructional leaders, and

formulate effective and sustainable training strategies to improve the quality of elementary school teachers' learning in Kotamobagu City.

LITERATURE REVIEW

Instructional Leadership Theory

Instructional leadership emphasizes the role of school principals in improving the quality of teaching and learning processes within schools. Unlike traditional leadership, which mainly focuses on administrative management, instructional leadership places learning improvement as the core responsibility of school leaders. Hallinger (2011) explained that instructional leaders are responsible for defining school missions, managing instructional programs, and creating positive learning climates. Through effective instructional leadership, principals can influence teacher performance, strengthen academic supervision, and encourage continuous professional development.

In the context of elementary education, instructional leadership becomes increasingly important in responding to educational transformation and curriculum changes. Principals are expected to facilitate teacher innovation, improve pedagogical practices, and ensure that learning activities remain student-centered. Effective instructional leadership also supports collaboration among teachers and encourages reflective teaching practices to improve learning outcomes.

Deep Learning in Education

Deep learning in education refers to meaningful learning processes that enable learners to connect knowledge with real-life situations, think critically, solve problems, and develop collaborative and creative skills. Fullan, Quinn, and McEachen (2017) emphasized that deep learning is essential for developing global competencies required in the 21st century, including communication, collaboration, critical thinking, creativity, citizenship, and character development.

The implementation of deep learning requires systematic and contextual learning approaches supported by strong educational leadership. According to van Merriënboer and Kirschner (2018), meaningful learning can be achieved through practice-based training, authentic problem-solving activities, and continuous mentoring processes. In school leadership contexts, deep learning training can strengthen principals' abilities to guide teachers, integrate technology into learning, and create innovative learning environments.

Digital Transformation in Education

Digital transformation in education refers to the integration of digital technologies into teaching, learning, and school management processes. This transformation requires educational institutions to adapt to technological advancements while maintaining learning quality and educational values. Mishra and Koehler (2006), through the Technological Pedagogical Content Knowledge (TPACK) framework, explained that successful technology integration depends on the balance between technological knowledge, pedagogical competence, and subject content mastery.

For school principals, digital transformation creates new challenges in leadership practices. Principals must be capable of managing technological

changes, supporting teachers' digital competencies, and encouraging the use of innovative learning strategies. Therefore, leadership capacity development through deep learning training becomes highly relevant to support educational transformation in elementary schools.

LITERATURE REVIEW

This qualitative study is based on the assumption that educational transformation in the digital era requires school principals to strengthen their roles as instructional leaders. Deep learning training is considered a strategic approach to improving principals' leadership capacities, particularly in academic supervision, teacher mentoring, learning innovation, and technology integration. Strengthened instructional leadership is expected to improve teachers' learning quality through more active, contextual, and student-centered learning practices. In the context of Kotamobagu City, sustainable and practice-based deep learning training supported by educational policies and teacher learning communities is expected to contribute significantly to improving the quality of elementary education and achieving 21st-century educational goals.

METHODOLOGY

This study employed a qualitative approach with a descriptive research design to analyze the implementation of deep learning training in optimizing the role of school principals and its impact on the quality of elementary school teachers' learning in Kotamobagu City. The research combined library research and descriptive studies based on field experience (*best practice*).

The library research method was conducted by reviewing books, scientific journals, policy documents, and previous studies related to instructional leadership, deep learning, educational transformation, and teacher professional development. Meanwhile, the *best practice* approach was used to describe the implementation of deep learning training activities experienced directly in the educational context of elementary schools in Kotamobagu City.

The focus of this study involved school principals and elementary school teachers who participated in deep learning training programs. Data were obtained through document analysis, reflective observations, and relevant literature reviews related to the implementation of training and educational practices in schools.

Data analysis was conducted using descriptive qualitative analysis techniques, including data reduction, data presentation, interpretation, and conclusion drawing. The analysis process aimed to identify the contribution of deep learning training in strengthening instructional leadership, improving teacher learning quality, and supporting educational transformation in elementary schools.

RESULTS AND DISCUSSION

This study was conducted through several stages to analyze the implementation of deep learning training in optimizing the role of school

principals and improving the quality of elementary school teachers' learning in Kotamobagu City. The first stage involved collecting relevant literature related to instructional leadership, deep learning, educational transformation, and teacher professional development. The second stage involved analyzing best-practice experiences from the implementation of deep learning training activities attended by school principals and teachers in elementary schools. The final stage involved interpreting the findings through descriptive qualitative analysis.

The implementation of deep learning training showed several important findings related to changes in instructional practices, principals' leadership roles, and learning innovation in schools. The findings were summarized based on the main focus of the study, as presented in Table 1.

Table 1. Summary of Research Findings

Research Focus	Main Findings	Implications
Urgency of deep learning training	Teachers shifted from teacher-centered learning to student-centered learning approaches	Learning became more active, contextual, and meaningful
Principals' instructional leadership	Principals improved academic supervision and teacher mentoring practices	Strengthened instructional leadership and teacher performance
Educational transformation	Increased integration of technology and innovative learning strategies	Supported digital transformation in elementary education
Training optimization strategies	Practice-based training, mentoring, policy support, and teacher learning communities were effective	Sustainable implementation of deep learning practices

The findings indicate that deep learning training contributed positively to improving principals' leadership capacities and teachers' learning quality. Teachers demonstrated greater involvement in applying critical thinking activities, collaborative discussions, and contextual problem-solving approaches in classroom learning. In addition, principals became more active in supervising learning processes and encouraging educational innovation within their schools.

The study also identified several supporting factors for successful implementation, including continuous mentoring programs, collaboration among teachers through learning communities, and support from local educational stakeholders. These factors strengthened the sustainability of deep learning implementation in elementary schools in Kotamobagu City.

The findings of this study demonstrate that deep learning training plays an important role in supporting educational transformation in the digital era. The shift from conventional learning approaches toward more student-centered learning reflects the growing awareness among teachers and school leaders regarding the importance of meaningful learning processes. Teachers began to implement learning activities that encouraged critical thinking, collaboration,

discussion, and contextual problem-solving. These findings indicate that deep learning training contributes positively to improving the quality of classroom instruction and developing more meaningful learning experiences for students.

This finding is supported by Bellibaş, Kılınç, and Polatcan (2021), who explained that instructional leadership significantly influences teacher professional learning and instructional practices through collaborative and transformational leadership approaches. Their study emphasized that school leaders who actively support teacher professional learning can improve instructional effectiveness and educational reform implementation. In addition, Alanoglu (2022) found that instructional leadership positively affects teacher self-efficacy and teaching effectiveness, particularly in the context of educational change and professional development.

The implementation of deep learning training also strengthened the role of school principals as instructional leaders. Principals became more involved in academic supervision, teacher mentoring, and the promotion of innovative learning practices. The findings indicate that principals were no longer limited to administrative responsibilities but increasingly functioned as facilitators of teacher learning and educational innovation. This aligns with the findings of Liu and Hallinger (2022), who stated that instructional leadership contributes significantly to the development of professional learning communities and collaborative school cultures that support continuous teacher improvement.

Another important finding concerns the effectiveness of practice-based training approaches. Participants gained direct experience in designing and implementing deep learning strategies within classroom settings. This practical approach enabled teachers and principals to connect theoretical understanding with authentic educational challenges encountered in schools. Cassata and Allensworth (2021) explained that teacher leadership and collaborative instructional practices play important roles in scaling instructional improvement and strengthening professional learning implementation in schools. Likewise, Miller and Anthony (2021) emphasized that professional learning plans and collaborative problem-solving approaches can improve instructional practices and strengthen school leadership capacity.

The findings further indicate that sustainable mentoring and collaborative teacher learning communities play significant roles in maintaining the continuity of training outcomes and strengthening professional learning cultures in schools. Teachers who participated in collaborative learning communities demonstrated stronger motivation to continue implementing innovative learning approaches. Antinluoma, Ilomäki, and Toom (2021) explained that professional learning communities contribute significantly to collaborative learning cultures, shared leadership, and continuous professional development in schools. These findings reinforce the importance of sustainable mentoring, collaboration, and policy support in ensuring the success of educational transformation programs.

Overall, this study confirms that deep learning training can become a strategic approach to optimizing principals' instructional leadership and improving the quality of elementary school learning. The integration of

training, mentoring, policy support, and collaborative professional learning contributes significantly to the success of educational transformation efforts in Kotamobagu City. Furthermore, the findings strengthen the view that educational transformation in the digital era requires adaptive leadership, continuous teacher professional development, and meaningful learning approaches that support 21st-century educational competencies.

CONCLUSIONS AND RECOMMENDATIONS

This study concludes that deep learning training has an important role in supporting educational transformation and improving the quality of elementary school learning in Kotamobagu City. The implementation of the training contributes positively to strengthening the role of school principals as instructional leaders, particularly in academic supervision, teacher mentoring, and encouraging innovative learning practices. In addition, the training encourages teachers to implement more active, contextual, and student-centered learning approaches that support the development of 21st-century competencies.

The findings also show that the effectiveness of deep learning training is influenced by several supporting factors, including practice-based training approaches, continuous mentoring, policy support from local governments, and collaboration through teacher learning communities. Therefore, deep learning training can become a strategic effort in strengthening educational leadership and improving the quality of elementary education in the digital transformation era.

Based on the findings of this study, several recommendations can be proposed. First, local governments and educational institutions should implement sustainable deep learning training programs for school principals and teachers to strengthen instructional leadership and learning innovation. Second, continuous mentoring programs need to be strengthened to ensure the effective implementation of training outcomes in schools. Third, schools should encourage collaborative professional learning communities to support the sharing of best practices and continuous teacher development. Finally, future researchers are encouraged to conduct broader studies involving more diverse educational contexts and empirical field data to enrich the development of deep learning-based educational leadership research.

FURTHER STUDY

This study has several limitations. First, the research used a qualitative descriptive approach based on library research and best-practice experiences, so the findings are limited to descriptive analysis and have not measured the effectiveness of deep learning training quantitatively. Second, the study focused only on the context of elementary schools in Kotamobagu City, which may limit the generalization of findings to other educational settings or regions. Third, the study relied mainly on reflective observations and literature analysis without involving broader empirical field data through interviews or surveys.

Therefore, future research is recommended to use mixed-method or quantitative approaches to measure the effectiveness of deep learning training

on principals' leadership performance and teachers' learning outcomes more comprehensively. Further studies may also involve broader samples from different regions and educational levels to obtain more diverse findings. In addition, future researchers are encouraged to explore the long-term impact of deep learning training on educational transformation, school culture, and students' 21st-century competencies.

ACKNOWLEDGMENT

The author would like to express sincere gratitude to all parties who contributed to the completion of this research. Special appreciation is addressed to the school principals and elementary school teachers in Kotamobagu City who participated in and supported the implementation of the deep learning training activities. The author also extends gratitude to colleagues and academic partners who provided valuable suggestions, insights, and constructive feedback throughout the research and writing process.

Furthermore, appreciation is given to the local education stakeholders and institutions that supported the implementation of educational transformation programs and professional development activities in elementary schools. Their support and collaboration greatly contributed to the completion of this study.

REFERENCES

- Alanoglu, M. (2022). The effect of instructional leadership behaviors of school principals on teacher self-efficacy and collective teacher efficacy. *Educational Process: International Journal*, 11(1), 7-28.
- Antinluoma, M., Ilomäki, L., & Toom, A. (2021). Practices of professional learning communities: A systematic literature review. *Frontiers in Education*, 6, 617613. <https://doi.org/10.3389/feduc.2021.617613>
- Bellibaş, M. Ş., Kılınç, A. Ç., & Polatcan, M. (2021). The moderation role of transformational leadership in the effect of instructional leadership on teacher professional learning and instructional practice: An integrated leadership perspective. *Educational Administration Quarterly*, 57(5), 776-814.
- Bellibaş, M. Ş., Polatcan, M., & Kılınç, A. Ç. (2022). Linking instructional leadership to teacher practices: The mediating effect of shared practice and agency in learning effectiveness. *Educational Management Administration & Leadership*, 50(5), 812-831.
- Cassata, A., & Allensworth, E. (2021). Teacher leadership development: Supporting instructional improvement and professional learning. *Professional Development in Education*, 47(4), 573-589.
- Hallinger, P., Gümüş, S., & Bellibaş, M. Ş. (2020). Are principals instructional leaders yet? A science map of the knowledge base on instructional leadership, 1940-2018. *Scientometrics*, 122(3), 1629-1650.
- Harris, A., & Jones, M. (2020). COVID-19 – School leadership in disruptive times. *School Leadership & Management*, 40(4), 243-247.

- Liu, Y., Bellibaş, M. Ş., & Gümüş, S. (2021). The effect of instructional leadership and distributed leadership on teacher self-efficacy and job satisfaction: Mediating roles of supportive school culture and teacher collaboration. *Educational Management Administration & Leadership*, 49(3), 430–453.
- Miller, R., & Anthony, J. (2021). Professional learning communities and collaborative instructional improvement in schools. *Journal of Educational Change*, 22(4), 589–610.
- Patfield, S., Gore, J., & Harris, J. (2023). Teacher professional learning in changing educational contexts: Implications for instructional improvement. *Teaching and Teacher Education*, 126, 104074.
- Yusuf, M., & Arfiansyah, A. (2021). Transformasi pendidikan digital di era pandemi Covid-19. *Jurnal Pendidikan Indonesia*, 2(8), 1256–1266.
- Zaini, N. H., & Mansor, M. (2021). The influence of instructional leadership on teacher professional learning in Malaysian schools. *International Journal of Instruction*, 14(3), 417–432.