



The Role of Principal Leadership in Encouraging Teacher Innovation in Higher Order Thinking Skills (HOTS) Based Learning

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ABSTRACT

Higher Order Thinking Skills (HOTS)-based learning innovation has become a key in preparing students to face the challenges of the 21st century. However, its implementation requires effective leadership at the school level. This study examines the role of the principal in driving HOTS learning innovation at Darul Hikam Integrated School Secondary Lembang. Using a qualitative case study design, this study collected data through interviews and document analysis. The main findings indicate that the principal acts as an inspirator, training conceptor, administrator, and supervisor. As an inspirator, the principal provides an example by participating in international events that prioritize learning innovation. As a training conceptor, the principal designs various workshops to support HOTS implementation, like STEM training. As an administrator, the principal conveys the foundation's policies and handles teacher obstacles. As a supervisor, the principal is directly involved in ensuring the sustainability of STEM-based learning and research. This study recommends that other schools can adopt similar practices and engage in more collaboration with external institutions to strengthen learning innovation. Besides, this study recommends that further research explore the long-term impact of the principal's role on student achievement and examine collaboration between schools and external parties in supporting HOTS learning innovations.

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1. INTRODUCTION

The implementation of Higher Order Thinking Skills (HOTS) in the Indonesian education system has become the main focus of the Ministry of Education, Culture, Research, and Technology with the main objective of improving students' critical, analytical, and creative thinking skills to face global challenges through various policies and programs, such as the 2013 Curriculum and the Merdeka Curriculum. Most recently, despite the change of the Ministry to the Ministry of Primary and Secondary Education, the main focus remains HOTS through the In-depth Learning policy. The government is trying to integrate HOTS into the learning process at all levels of education. However, its implementation in the field still faces various challenges, including teacher readiness, supporting facilities, and adaptation of teaching methods.

One of the significant challenges in implementing HOTS is the lack of understanding and skills of teachers in designing and implementing learning that emphasizes high-level thinking skills. In addition, limited resources and facilities in some regions hinder the optimization of HOTS implementation. The Ministry of Education, Culture, Research and Technology has provided various training and resources to support teachers in implementing HOTS, but disparities in the quality of education between regions are still an issue that needs to be addressed.

On the other hand, some private schools have shown initiative in implementing HOTS-based learning. For example, Darul Hikam Integrated School Secondary Lembang has integrated HOTS into its curriculum to encourage students to think critically and creatively. This school applies a learning method that emphasizes problem solving, group discussions, and innovative projects designed to improve students' analytical skills. Support from school management and ongoing training for teachers are the keys to success in implementing HOTS in this school.

The success of HOTS implementation in schools is greatly influenced by the role of the principal as a school management leader. The principal has the responsibility to create a conducive environment for learning innovation and teacher professional development. According to Agustin and Tungm (2024), the principal's transformational leadership can encourage teachers to adopt innovative learning methods, such as the Montessori Curriculum, which focuses on developing student character. This shows that an inspirational and supportive leadership style can increase teacher motivation in implementing learning innovation.

In addition, research by Basri, Khairina, and Firman (2021) shows that effective principal management can improve teacher function in high schools. Principals who are able to manage resources well, provide clear direction, and support teacher competency development can encourage teachers to be more innovative in the learning process. This support includes providing facilities, training opportunities, and rewards for teacher initiatives in developing creative teaching methods.

Firdaus et al. (2024) also emphasized the importance of the principal's role in improving teacher function through effective management. In SMA Negeri 3 Praya, the principal who was proactive in providing guidance and support to teachers succeeded in creating a school climate that was conducive to learning innovation.

Responsive leadership to the needs of teachers and students can improve the overall quality of education.

Previous studies have widely discussed the role of principals in encouraging learning innovation. Isa, Asrori, and Muharini (2022) highlighted that principals play a key role in the implementation of the Merdeka Curriculum in elementary schools. Principals who are able to direct and motivate teachers to adopt new curricula can increase the effectiveness of learning. In addition, Lapir (2024) discussed principal leadership from the perspective of effective schools, showing that visionary and innovative principals can create a productive learning environment.

Marce, Ahmad, and Eddy (2020) studied the leadership management of principals as administrators in improving teacher competence. The results of their study showed that principals who act as good administrators can improve teacher competence through structured training and development programs. This has a positive impact on the quality of learning in the classroom. Although many studies have discussed the role of principals in driving innovation in learning, there is still a gap in the literature regarding how principals can effectively address the challenges in implementing HOTS in various school contexts. This study aims to fill this gap by exploring principals' leadership strategies in driving teacher innovation in HOTS-based learning.

The significance of this study lies in its contribution in providing practical insights for principals and education policymakers on how to support teachers in implementing HOTS. By understanding the strategic role of principals, it is hoped that more effective training programs and policies can be developed to improve the quality of education in Indonesia. In addition, this study is also expected to provide recommendations for schools in creating a culture of innovation that supports HOTS-based learning. Thus, students can develop into individuals who think critically, creatively, and are ready to face future challenges. In the context of globalization and rapid technological developments, high-level thinking skills are a very important competency. Therefore, the role of the principal in encouraging teacher innovation in HOTS-based learning is a relevant and urgent topic for further research. Thus, this study not only contributes to the development of educational leadership theory but also has significant practical implications for improving the quality of education in Indonesia. It is hoped that the results of this study can be a strategic reference for various parties, including principals, teachers, and other education stakeholders. With the right leadership approach, it is hoped that innovation in Higher Order Thinking Skills (HOTS)-based learning can be more optimally implemented in schools throughout Indonesia.

2. LITERATURE REVIEW

Principal leadership plays an important role in creating a conducive environment for learning innovation. According to Lapir (2024), an effective principal is able to apply strategic leadership principles, such as providing clear direction, building a collaborative culture, and supporting teacher competency development. The principal not only acts as an administrator, but also as an inspirator who is able to motivate teachers to continue to innovate in the learning process. This role is

becoming increasingly crucial in facing the demands of 21st century education, including the development of Higher Order Thinking Skills (HOTS)-based learning.

Marce, Ahmad, and Eddy (2020) emphasize the importance of the role of the principal as an administrator who is able to improve teacher competence through effective management. According to them, principals who are oriented towards educational innovation tend to be more proactive in providing training, resources, and emotional support for teachers. In addition, principals who have good communication skills can bridge teacher needs with available resources, allowing teachers to create more creative and innovative teaching methods. Sari, Muazza, and Rahman (2021) highlight the principal's leadership strategy in encouraging educational innovation. The principal uses a collaborative approach by involving teachers in the planning and evaluation process of learning innovation. This strategy not only increases teacher participation but also encourages a sense of ownership of the innovation program being implemented. This shows that the active involvement of teachers in decision-making can increase the effectiveness of educational innovation in schools.

Furthermore, Marce et al. (2020) emphasized that principals who are able to carry out their role as transformational leaders have a positive impact on improving teacher competence. Transformational leadership involves providing inspiration, motivation, and support to teachers to go beyond conventional boundaries in the learning process. Effective principals are able to encourage teachers to explore new approaches to teaching, such as the use of technology and the application of project-based methods. Lapid (2024) also highlighted that effective principals are able to create an innovative work environment by building an organizational culture that supports continuous learning. In this case, principals need to ensure that there is space for teachers to experiment with new methods without fear of failure. This supportive environment is an important element in encouraging teachers to innovate and continue learning.

Literature shows that the role of the principal in encouraging teacher innovation is closely related to visionary, communicative, and collaborative leadership. Principals who are able to integrate transformational leadership strategies with effective management tend to be more successful in encouraging teachers to innovate. With the right approach, principals can become agents of change who not only improve teacher competence, but also the quality of learning in schools.

3. RESEARCH METHODS

The qualitative approach was chosen in this study because the main objective of the study was to deeply understand the role of the principal in encouraging teacher innovation in Higher Order Thinking Skills (HOTS)-based learning. According to Creswell and Poth (2018), a qualitative approach allows researchers to explore the experiences, views, and perspectives of participants holistically. This study uses a case study research design, which is in accordance with the characteristics of this study which focuses on exploring certain phenomena in real contexts (Yin, 2014). Case studies allow researchers to gain an in-depth understanding of the dynamics of

principal leadership in encouraging teacher innovation in certain schools, as well as the factors that influence the implementation of HOTS in learning. Through this design, this study can provide rich insights and specific contexts related to the role of the principal in facilitating HOTS-based learning innovation.

This research was conducted at Darul Hikam Integrated School Secondary Lembang, a private school in West Bandung that is known for its innovative approach to education. The research location was chosen because this school has integrated HOTS-based learning into its curriculum and has a track record that shows the active role of the principal in driving change in learning. This school also has a managerial structure that supports innovation and teacher professional development. Through the selection of this location, the research is expected to provide an overview of how the principal can lead innovation in the context of a progressive school based on comprehensive educational values.

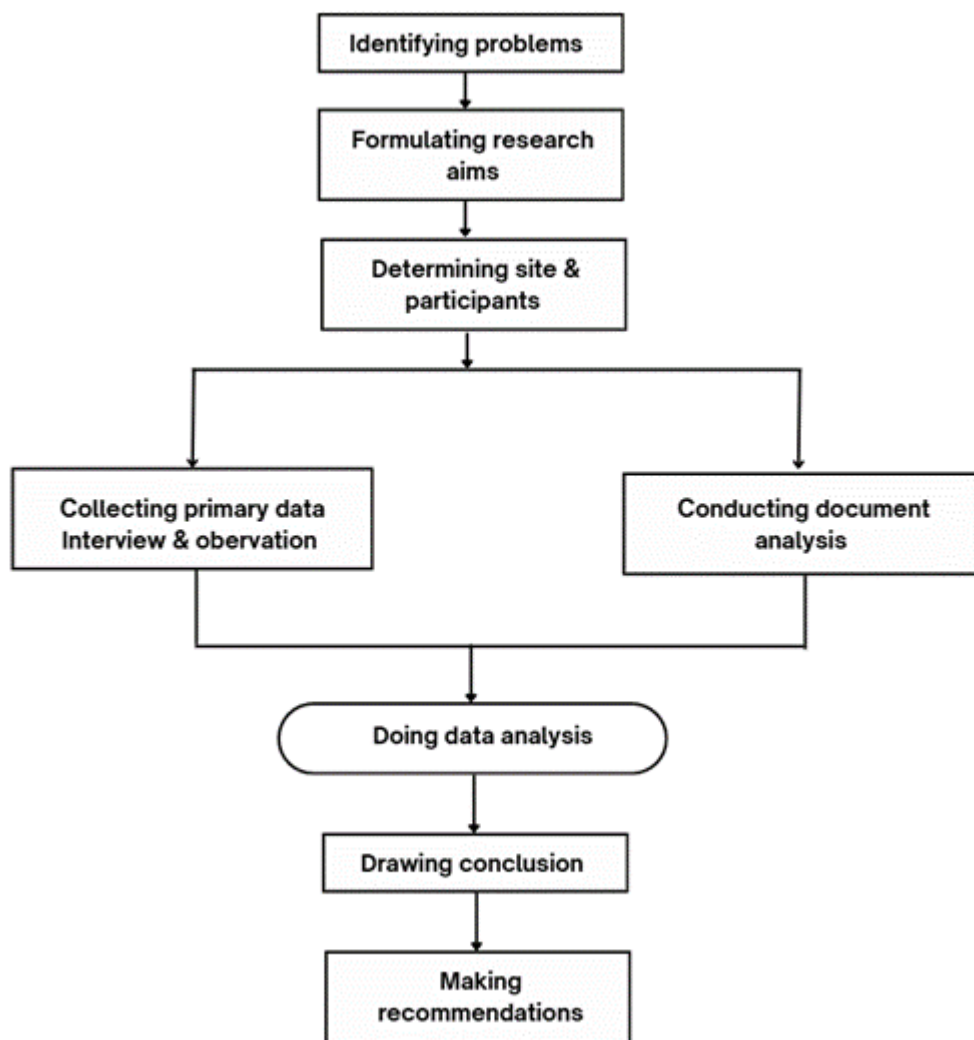


Figure 1. Research flows

Data collection in this study was conducted using two main methods, namely interviews and document studies. Interviews were conducted with principals, teachers, and related staff to explore their perspectives on the role of principals in

encouraging HOTS-based learning innovations. Interviews allow researchers to obtain deeper and more personal information from participants regarding the challenges and successes experienced in implementing HOTS. In addition, document studies will be conducted to analyze school policies, lesson plans, and other relevant documents that can provide an overview of the policies and approaches implemented by the principal. The justification for using these two methods is to obtain comprehensive data and triangulation between information obtained from interviews and existing documents, so as to strengthen the validity of the research findings.

4. RESULTS AND DISCUSSION

a. The Principal as an Inspirator

One of the main findings in this study is the role of the principal as an inspirator who provides positive encouragement and motivation to his teachers to continue to innovate in learning. The principal at Darul Hikam Integrated School Secondary Lembang demonstrated this role by participating in the Ki Hajar Dewantara Award international competition held by SEAMEO QITEP at the ASEAN level. This competition focuses on innovation in learning, especially in the field of Natural Sciences (IPA), and is a very prestigious event for educators in the Southeast Asia region. The principal succeeded in becoming Indonesia's representative in the event, which not only shows personal achievement but also serves as a source of inspiration for the entire educational community in the school. The principal's participation in this event has a significant impact on teachers in the school. The principal not only introduced new ideas and innovative approaches that he learned from the event, but also inspired teachers to dare to take similar steps, explore new approaches in teaching, and participate in activities that can develop their competence. According to the teachers interviewed, the principal not only talked about the importance of innovation in learning, but also gave real examples by participating in international competitions and applying the results in the daily learning process.



Figure 2. Principal in Ki Hajar Dewantara Awards

The principal's success in achieving this international achievement gave teachers a sense of pride and confidence that innovation in learning is something that is very possible to achieve. As a visionary leader, the principal not only provides inspiration through words, but also through concrete actions that motivate teachers to not only develop their skills, but also to participate in initiatives that can bring positive changes to the education system in schools. This is a real example of inspiring leadership, which is able to raise enthusiasm and confidence among teachers to innovate.

This finding is in line with the research of Sari et al. (2021) and Ristianti et al. (2021) which highlights the importance of the principal's leadership strategy in driving educational innovation. The principal at Darul Hikam acts as an inspiration by providing real examples through participation in international competitions. This reflects the transformational aspect of leadership also discussed by Agustin and Tungm (2024) in the context of the Montessori curriculum, where the principal provides an example and inspiration for staff to achieve higher standards.

b. The Principal as a Training Conceptor

In this study, it was found that the principal at Darul Hikam Integrated School Secondary Lembang acted as the main conceptualizer in designing various trainings and workshops to support the implementation of Higher Order Thinking Skills (HOTS) in the classroom. This principal had a clear vision of the importance of developing teacher competencies in applying HOTS-based learning, and as part of his efforts to achieve this, he designed and facilitated a number of training involving various parties, including international and local institutions.

One of the main trainings designed by the principal was a workshop on STEM (Science, Technology, Engineering, and Mathematics) in collaboration with SEAMEO QITEP in Science and the UPI Bandung STEM Team. This workshop aimed to introduce teachers to STEM-based learning methods, which combine scientific approaches with technology and engineering, and how they can be integrated with HOTS to improve students' higher-order thinking skills. In addition, the principal also designed a workshop on Computational Thinking facilitated by SEAMEO QITEP in Science, which aimed to develop students' logical thinking and problem-solving skills, as well as support teaching that prioritizes HOTS in mathematics and science learning.

Furthermore, the principal also held a workshop to improve the effectiveness of English teaching as part of a strategy to strengthen HOTS learning instruction in the classroom. In this workshop, teachers were introduced to English teaching techniques that can help improve students' cognitive skills in high-level thinking, such as analysis, synthesis, and evaluation. Not only that, the principal also initiated a workshop that taught teachers how to determine Quranic verses that are relevant to the topics to be taught in class. This approach aims to enrich students' learning experiences, by

integrating religious values into HOTS-based learning, as well as creating a deeper and more meaningful learning atmosphere.

The role of the principal as the conceptor of this training is very important in creating a HOTS-focused learning culture, where teachers are encouraged to continue to develop their competencies through relevant training based on the latest methodologies. Through this training, the principal succeeded in creating an educational ecosystem that not only supports the implementation of HOTS, but also strengthens collaboration between teachers and other educational institutions, which in turn contributes to improving the quality of teaching in schools.

The role of the principal as a training conceptor is relevant to the findings of Basri et al. (2021) and Firdaus et al. (2024), which highlight the importance of planning teacher training by the principal to improve teacher skills. In the context of Darul Hikam, training such as STEM and Computational Thinking are designed to support HOTS-based learning. This is also related to the findings of Minsih et al. (2019) and Wati et al. (2022), which highlight the importance of teacher training as part of effective school development.

c. The Principal as an Administrator

The findings of this study indicate that the principal at Darul Hikam Integrated School Secondary Lembang also plays an important role as an administrator who is tasked with conveying and following up on policies from the foundation related to the direction of learning innovation in schools, including STEM-based learning and research. As an administrator, the principal is responsible for ensuring that the policies issued by the foundation are in line with the school's vision and mission and the needs for developing the quality of learning in the classroom. One of the policies implemented is strengthening STEM learning which aims to facilitate students in developing 21st century skills, such as problem solving, creativity, and collaboration, which are very important in the implementation of HOTS. The principal routinely provides direction and ensures that teachers understand and implement the policies in their learning activities.

In addition, the principal also serves as a liaison between teachers and the foundation in dealing with obstacles faced by teachers in implementing HOTS-based learning. In his administrative role, the principal accommodates and listens to problems and challenges experienced by teachers during the learning process, whether problems related to limited facilities, time, or understanding of the application of the HOTS method. The principal actively facilitates solutions by organizing regular meetings or group discussions to evaluate existing challenges and find solutions. For example, if teachers have difficulty integrating STEM learning or research techniques into their teaching materials, the principal works with the foundation to provide additional training, add facilities, or even improve the existing curriculum to better support the implementation of HOTS.

As an administrator, the principal is also responsible for motivating and providing support to teachers so that they do not feel isolated in facing these challenges. The principal maintains open and transparent communication with teachers to create an environment conducive to innovation and improving the quality of learning. Through this role, the principal has succeeded in creating space for teachers to continue to develop themselves and improve their competence in implementing HOTS-based learning, as well as ensuring that the foundation's policies can be implemented properly and effectively.

This finding is in line with research by Marce et al. (2020) and Sukmadewi (2022), which emphasizes the importance of the principal's role as an administrator in ensuring that school policies are implemented effectively. The principal at Darul Hikam plays a role as a liaison between the foundation and teachers to ensure that the implementation of STEM learning runs smoothly. This also reflects what was found by Nuraeni et al. (2022) about the importance of principal management in creating an effective team.

d. The Principal as a Supervisor

In this study, it was found that the principal at Darul Hikam Integrated School Secondary Lembang also has a very significant role as a supervisor in ensuring the sustainability and quality of the STEM learning process, project collaboration, and research, especially for the final grade. The principal is responsible for ensuring that every element of STEM-based learning in the classroom runs according to the established standards and can have a positive impact on the development of students' high-level thinking skills (HOTS). As a supervisor, the principal not only plays a role in overseeing the progress of learning activities but is also directly involved in each process, providing the necessary direction, and ensuring that these innovative learning activities can be implemented properly by teachers. The principal routinely checks the implementation of collaborative projects involving students, where students are given the opportunity to work on real-world problem-based projects that require critical thinking and high-level problem solving. This collaborative project also teaches students to work together, share ideas, and develop their creativity in facing existing challenges. The principal not only monitors remotely but is also involved in discussions and guidance during the project, providing constructive input to teachers and students to ensure that the learning process remains focused on developing HOTS competencies.

In addition, the principal also plays a role in supervising the research process carried out by final year students, especially to ensure that students can carry out research with the right methodology and are relevant to the context of STEM learning. The principal checks the progress of students' research regularly and provides direct guidance to help students overcome the difficulties they face in the research process. On several occasions, the principal also invites experts or external parties to provide additional supplies or guidance for students in completing their

research. The role of the principal as a supervisor not only includes aspects of administrative supervision, but also in-depth intensive guidance to ensure the quality of student learning and development in terms of research and collaborative projects remains optimal.

The role of the principal as a supervisor is related to the research of Isa et al. (2022) which highlights the principal's supervision in the implementation of the Merdeka curriculum. In the context of Darul Hikam, the principal ensures that STEM-based learning and student research run according to standards. This also supports Lapir's (2024) findings on principal leadership in creating effective schools with a focus on supervision and guidance.

5. CONCLUSION

This study aims to explore the role of principal leadership in encouraging teacher innovation in Higher Order Thinking Skills (HOTS)-based learning at Darul Hikam Integrated School Secondary Lembang. Based on the findings obtained, it can be concluded that the principal plays four key roles that support the success of HOTS implementation in schools, namely as an inspirator, training conceptor, administrator, and supervisor.

As an inspirator, the principal successfully inspired teachers to innovate through his participation in the international Ki Hajar Dewantara Award event which focused on science learning innovation, providing a real example in developing self-competence and increasing the spirit of innovation among teaching staff. As a training conceptor, the principal designed and facilitated various workshops, including STEM training, Computational Thinking, and English language teaching relevant to HOTS, which led to improving the quality of teaching in the classroom. In his role as an administrator, the principal conveyed the foundation's policies that support learning innovation and accommodate the obstacles faced by teachers in implementing HOTS, so that solutions can be found together. Finally, as a supervisor, the principal was directly involved in monitoring and assisting the STEM-based learning process, collaborative projects, and student research, ensuring that the process runs according to the desired goals and standards.

Based on these findings, it is recommended that further research can explore more deeply the long-term impact of the principal's leadership role on student development, especially in terms of achieving HOTS skills and their academic success. Further research can also expand its focus to other schools outside Darul Hikam, including public schools, to compare the effectiveness of various leadership approaches in implementing HOTS. In addition, further studies can include the role of collaboration between school principals and external parties, such as training institutions or higher education institutions, in supporting teacher professional development and strengthening the implementation of innovation-based learning.

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