

THE PRINCIPAL'S STRATEGY TO IMPROVE DEEP LEARNING-BASED LEARNING QUALITY

Ainur Rofiq¹, Kaniati Amalia², Supriyanto³

¹²³Universitas Negeri Surabaya; Indonesia

Correspondence E-mail; 25010845095@mhs.unesa.ac.id

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Abstract

This study aims to analyze the principal's strategy for improving the quality of Deep Learning-based instruction at SMA Negeri 13 Surabaya, Strategic planning, Deep Learning deployment, Academic oversight, evaluation and assessment, and professional development for teachers, enabling and impeding conditions, and follow-up measures for ongoing improvement are the main topics of the study. A case study methodology combined with a descriptive qualitative design was used. Data were collected through semi-structured interviews, passive-participation observations, and documentation involving the principal, vice principal for curriculum, teachers, and students. Observations were conducted from 22 June to 5 September 2026. The Plan, Do, Check, Act (PDCA) framework was used as the substantive analytical framework. Data condensation, data display, cross-source comparison, and conclusion verification were used to examine the data. The findings show that the principal's strategy operates as an integrated instructional leadership cycle. The Plan stage includes collaborative curriculum planning, analysis, teacher competency development, resource preparation, and quality targets. The Do stage translates the strategy into mindful, meaningful, joyful, collaborative, contextual, and student-centered learning supported by mentoring, learning communities, technology, and innovation. The Check stage uses academic supervision, classroom observation, diagnostic, formative, and summative assessment, curriculum evaluation, and reflection. The Act stage converts evidence into coaching, mentoring, IHT, workshops, MGMP, learning innovation, and subsequent improvement. The study concludes that the principal's strategy is systematic, collaborative, evidence-informed, and continuous. Its main contribution is explaining how school-level leadership connects Deep Learning pedagogy with a continuous quality-improvement mechanism rather than treating Deep Learning as a classroom technique alone.

Keywords

Principal Leadership; Instructional Leadership; Learning Quality; Deep Learning; PDCA.



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INTRODUCTION

The ability of secondary schools to transition from curriculum compliance to learning experiences that are intellectually challenging, meaningful, thoughtful, and engaging is becoming increasingly important to the quality of education. (Fatihah, Husnul Mulyadi, Dadi Melinda, 2025) According to Indonesian policy, deep learning is a pedagogical strategy that incorporates happy, meaningful, and attentive learning. (Mulyani et al., 2025). It is therefore distinct from deep learning in artificial intelligence. Students' active participation in comprehending, applying, linking, and reflecting on knowledge is emphasized by the method. According to recent Indonesian research, Deep Learning is a component of a larger shift in the quality of education that calls for adjustments to pedagogy, evaluation, teacher competence, and the learning environment (Andayanie et al., 2025);(Kurniatiningsih et al, 2025);(Rahmawati et al., 2025).

The implementation of this approach creates a leadership challenge. A principal cannot make classroom learning deeper merely by issuing a policy or asking teachers to use new methods. The school needs an organizational system that connects instructional goals, teacher learning, curriculum planning, learning resources, supervision, assessment, and follow-up. Research on school leadership consistently demonstrates that instructional leadership is connected to teacher learning and instructional practice, albeit the degree of the relationship varies depending on the setting and the channels through which leadership functions (Al-mahdy et al, 2024);(Dorukbaşı et al, 2024);(Hallinger et al., 2025). A meta-analysis with three levels by (Tan et al, 2021). demonstrates the connection between student results and leadership strategies pertaining to instructional management, teacher capability, and stakeholder involvement. These findings suggest that the principal's role is better understood as a process of creating conditions for instructional improvement than as a direct determinant of student achievement.

According to the 2025 Education Report, Learning Quality scored 67, placing it in the Good category. Nevertheless, there is still a disconnect between the learning outcomes of students and a number of aspects of the learning process, such as instructional leadership, curriculum management, teacher reflection, and psychological support. Strategies for systematic improvement are needed in these areas. This state offers a starting point for creating more profound and significant learning strategies.

Table 1. Baseline Condition of Learning Quality Prior to the Study

No	Aspect	Baseline Data	Academic Interpretation
1	Learning quality	Score 67, Good category	Learning quality is already in the good category, but there is still room for improvement
2	Classroom management	70.52	Indicates relatively strong classroom management
3	Psychological support	67.42	Requires further strengthening, particularly in terms of attention, care, and constructive feedback
4	Learning methods	65	Requires strengthening to promote more interactive and adaptive learning
5	Teacher reflection and improvement of learning practices	63.51	Teacher reflection and improvement practices are not yet as strong as classroom management
6	Learning about teaching and learning	57.89	Indicates the need to strengthen teachers' professional development
7	Reflection on teaching practices	64.75	Reflection practices are already present, but have not yet been optimized
8	Innovative learning practices	64.52	Innovation has been implemented, but needs to be expanded and institutionalized
9	Instructional leadership	54.22	Represents a strategic area that requires strengthening
10	Curriculum management	52.16	Indicates the need to strengthen curriculum management based on learning outcomes
11	Support for teacher reflection	51.84	Indicates the need for a more structured system of reflection and feedback
12	Literacy	93.33% achieved the minimum competency level	Indicates relatively strong academic achievement
13	Numeracy	95.56% achieved the minimum competency level	Indicates relatively strong academic achievement
14	Character	67.50	Requires further strengthening, particularly in creativity
15	Creativity	57.73	Represents one of the weaker areas within the character dimension
16	Utilization of resources for quality improvement	18.17%	Indicates that the proportion of resources allocated to quality improvement remains relatively low

Source: 2025 Education Report of SMA Negeri 13 Surabaya

One of the poorer components of the character dimension is originality, according to the Education Report data included in the School Operational Curriculum (KSP). The document suggests enhancing teacher proficiency, putting creative learning activities into practice, and creating school rules that encourage students' creative growth.

Table 2. Areas Showing Decline and Their Potential Impact

No	Aspect	2025 Score	Change	Problem Significance	Potential Impact on Learning
1	Psychological support	67.42	Decreased by 1.73	Affective support and constructive feedback are not yet consistently provided	Students may receive less optimal emotional support and feedback
2	Curriculum management	52.16	Decreased by 8.69	Curriculum management represents a weakness within instructional leadership	Curriculum implementation may vary across teachers
3	Support for teacher reflection	51.84	Decreased by 5.59	The system supporting teacher reflection requires further strengthening	Improvements in teaching practices may not occur systematically
4	Teachers' psychological well-being	64	Decreased by 12.56	Teachers' psychological well-being has declined	This may affect teacher motivation and the quality of teacher-student interactions
5	Diversity and inclusion climate	76	Decreased by 2.07	Several aspects of tolerance have declined	The school needs to strengthen an inclusive learning culture
6	Proportion of resources allocated to quality improvement	18.17	Decreased by 0.72	The proportion of resources allocated to quality improvement remains relatively low	Professional development and learning facilities may require greater resource allocation
7	Non-personnel expenditure for learning quality improvement	15.91	Decreased by 2.08	Direct financial support for learning quality improvement remains limited	Innovation and the development of learning media require greater budgetary priority
8	Student creativity	57.73	Increased slightly	Creativity remains one of the relatively weaker aspects of the character dimension	Learning should provide more opportunities for students to create and produce meaningful work

Source: 2025 Education Report of SMA Negeri 13 Surabaya

These results allow for the identification of a number of important elements. First, Curriculum management has not yet been shown to be a useful instrument for improving educational standards. Second, teacher reflection support needs to be strengthened even more. Third, more robust structures and opportunities for ongoing introspection and professional growth are required for educators. Fourth, in order to foster more engaging, significant, flexible, and student-centered learning experiences, teaching strategies must be further developed. The antithesis in this instance does not imply that the principal's approach is at odds with the school's current circumstances. Rather, the antithesis is a calculated reaction to the shortcomings and gaps found in

the initial circumstances. The initial condition indicates that while learning quality is generally acceptable, a few of the components have not yet attained optimal levels. In order to close these gaps, the principal's strategy makes systematic efforts to strengthen curriculum planning, develop teacher competency, implement Deep Learning, conduct academic supervision, strengthen assessment procedures, encourage reflection, use technology, and develop innovative learning practices.

The problem becomes more complex because Deep Learning requires teachers to change established instructional routines. Studies of Deep Learning in Indonesia identify teacher readiness, technological capacity, contextual instructional design, reflection, and assessment alignment as important implementation conditions (Andayanie et al., 2025);(Chotimah & Fantofik, 2025);(Nafi'ah & Faruq, 2025);(Siregar et al, 2025). Recent studies further show that meaningful, mindful, and joyful learning should operate as an integrated pedagogical framework rather than as three unrelated classroom activities (Kurniatiningsih et al, 2025);(Rosyidah et al, 2026). Consequently, the principal needs to manage both pedagogical transformation and organizational learning (Fauziah et al., 2025).

Previous studies have provided important evidence about Deep Learning and about instructional leadership, but these strands have often been examined separately. Deep Learning studies tend to emphasize pedagogy, student engagement, teacher readiness, contextual learning, and technological support (Andayanie et al., 2025);(Nafi'ah & Faruq, 2025);(Prasetya et al, 2025). Conversely, leadership studies focus on instructional leadership, teacher professional development, supervision, teacher efficacy, and student outcomes (He et al., 2024);(Hallinger et al., 2025);(Ningrum, 2026). There remains a need to explain how a principal integrates these dimensions into one continuous school-level quality-improvement process. This study addresses that need by analyzing the principal's strategy at SMA Negeri 13 Surabaya through the PDCA cycle, focusing on preparation, execution, monitoring, assessment, and follow-up. The study aims to analyze how the principal organizes the conditions and processes required to improve Deep Learning-based learning quality at SMA Negeri 13 Surabaya. Specifically, it examines: (1) strategic planning; (2) implementation of Deep Learning; (3) supervision, assessment, and evaluation; (4) teacher professional development and follow-up; and (5) supporting and inhibiting conditions. The study is expected to contribute an empirically grounded explanation of how instructional leadership can be connected with continuous quality improvement in an Indonesian secondary-school context.

The framework also accommodates the possibility of uneven improvement. A school can have a good aggregate learning-quality score while particular dimensions require attention. Leadership should therefore use multiple forms of evidence rather than relying on a single indicator. In this study, the Education Report, supervision records, assessment information, observations, interviews, and school documents are interpreted together. This position is consistent with contemporary leadership research showing that effects vary by outcome, context, culture, and mediating mechanism (Eryilmaz & Strietholt, 2025);(Karadağ et al, 2025);(Pietsch, 2025). The resulting research position is that sustainable Deep Learning implementation depends on alignment among leadership direction, teacher learning, classroom pedagogy, evidence generation, and continuous organizational response.

The conceptual relationship can be expressed as a leadership-to-learning chain. First, the principal establishes direction and identifies instructional needs. Second, the school develops teacher capacity and provides resources that make the intended pedagogy feasible. Third, teachers implement Deep Learning through contextual, collaborative, reflective, and student-centered practices. Fourth, supervision and assessment generate evidence about the quality of implementation. Fifth, the evidence is converted into professional learning, coaching, mentoring, innovation, and revised planning. Evidence that instructional leadership affects teacher practice through professional development and teacher agency supports this connection. (Al-mahdy et al., 2024);(Dorukbaşı et al., 2024);(Thien, 2024). It also corresponds with research showing that professional learning communities and teacher collaboration can strengthen professional development (Grimm, 2024);(Wang & Guo, 2023).

Continuous quality improvement provides the organizational logic connecting leadership and pedagogy. Rather than treating planning, implementation, supervision, assessment, and teacher development as separate programs, the study uses the PDCA cycle to interpret how evidence moves through the school system. Plan identifies needs and establishes priorities; Do translates priorities into practice; Check generates evidence about implementation and learning; and Act converts evidence into corrective, developmental, or innovative action. The value of PDCA in this study is therefore analytical rather than methodological. The research remains a qualitative case study, while PDCA helps organize the substantive leadership process. This distinction is important because the study seeks to explain the mechanism of school improvement rather than to test PDCA as an experimental intervention.

The framework's teaching component is provided by deep learning. The Indonesian educational approach, focused on conscious, purposeful, and joyful learning, is referred to in this study as Deep Learning. Mindful learning concerns students' awareness, attention, and reflection; meaningful learning concerns connections between concepts, experience, context, and authentic problems; and joyful learning concerns positive, engaging, and motivating learning experiences. The three dimensions are expected to operate together. (Kurniatiningsih et al, 2025) describe them as an integrated pedagogical framework, while (Siregar et al, 2025) demonstrate their relevance to conceptual understanding, contextual application, and transfer. The theoretical position of this study is that Deep Learning requires organizational support because teachers need time, professional learning, resources, assessment information, and feedback to change established instructional routines.

The study is positioned at the intersection of instructional leadership, Deep Learning pedagogy, and continuous quality improvement. Instructional leadership is used to interpret the principal's role in setting instructional direction, coordinating curriculum, developing teacher capacity, monitoring classroom practice, and creating a school climate that supports learning. School leadership is linked to teacher efficacy, professional learning, instructional practice, and student outcomes, according to recent meta-analytic and systematic review evidence. However, these relationships are typically mediated by organizational and professional processes rather than being produced by leadership alone (Hallinger et al., 2025);(Özdemir et al, 2022);(Shen & Wu, 2024). The present study, therefore, treats the principal as a designer of conditions and processes rather than as the sole actor responsible for learning outcomes.

METHOD

This study employed a descriptive qualitative design and a case study technique. The principle of SMA Negeri 13 Surabaya's strategy for improving the standard of instruction through deep learning was in question. A qualitative case study was appropriate because the study sought to explain a contemporary leadership process within its real school context and to integrate multiple sources of evidence (Khairiyah et al., 2026) The substantive focus was not to estimate a statistical effect of leadership, but to understand how leadership actions were planned, enacted, monitored, and followed up.

Data were collected through semi-structured interviews, passive-participation observations, and documentation. Informants consisted of the principal as the key policy and strategy informant, Teachers as classroom practitioners, students as supportive informants about direct learning experiences, and the vice principal for curriculum as the technical informant for curriculum planning and monitoring. The study also used relevant school documents. Observation was conducted at SMA Negeri 13 Surabaya from 22 June to 5 September 2026. The observation focused on teacher preparation, classroom practice, student participation, collaboration, problem solving, contextual learning, technology use, reflection, and the implementation of mindful, meaningful, and joyful learning. It also covered academic supervision, teacher mentoring, professional learning, and the use of facilities supporting Deep Learning.

The documentary sources included the 2026/2027 School Curriculum, teacher learning modules and instructional planning documents, school program plans, RKAS and relevant budget documents, academic supervision records, teacher professional-development records such as IHT, workshops, MGMP, coaching, and mentoring, learning assessment and evaluation records, curriculum evaluation records, and photographs or other visual records. The 2025 Education Report of SMA Negeri 13 Surabaya was used as baseline documentary evidence of learning quality. The documents were compared with interview and observation evidence so that the analysis did not depend on a single informant or source.

Data analysis was conducted continuously during and after data collection. First, the researcher condensed the data by selecting information directly related to the four PDCA stages. Plan included needs analysis, quality targets, curriculum planning, teacher competency development, school programs, learning resources, and preparation for Deep Learning. Do include mentoring, professional learning, classroom implementation, student-centered learning, technology use, and leadership support. Check included academic supervision, classroom observation, teacher performance evaluation, assessment, reflection, and curriculum evaluation. The act included coaching, IHT, workshops, MGMP, mentoring, innovation, and adjustments to subsequent practice.

Second, the principal, vice principal, instructors, and students' points of view were compared, and interview statements were contrasted with observations and documentation to present the condensed facts. Third, conclusions were drawn and verified by identifying recurring patterns and examining inconsistencies. For example, teacher competency needs identified in planning were compared with subsequent IHT, workshops, MGMP, coaching, or mentoring. Claims

about supervision were compared with observation records, teacher responses, and follow-up actions. Claims about Deep Learning were examined through classroom observations and teacher and student accounts, especially concerning student participation, collaboration, problem solving, contextual learning, and reflection. This cross-source process strengthened the credibility of the interpretation.

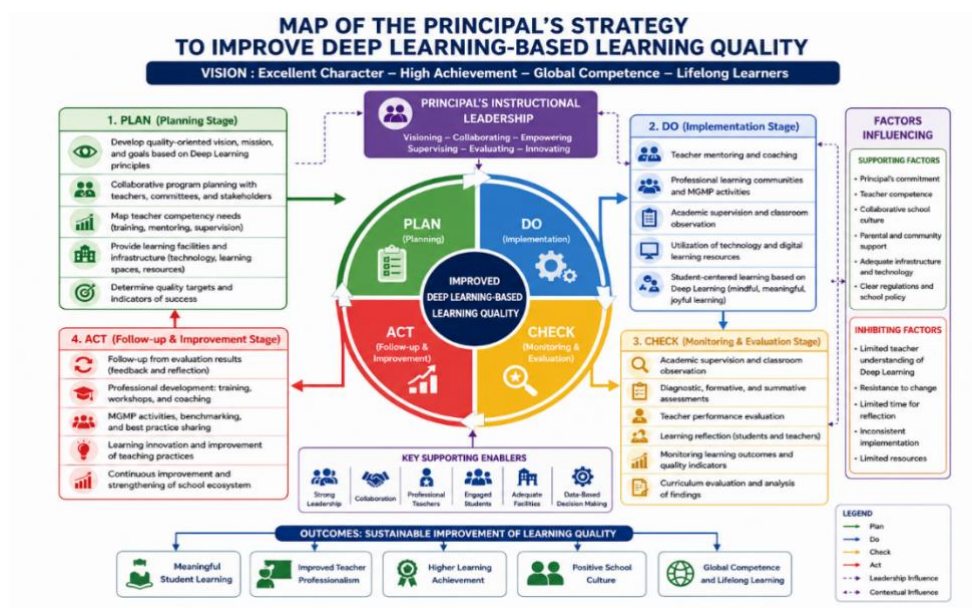


Figure 1. Map of The Principal's Strategy

FINDINGS AND DISCUSSION

Findings

The findings are organized according to the PDCA analytical framework. The framework is used substantively to explain how the principal's strategy moves from planning to implementation, evidence generation, and continuous improvement.

Table 3. Implementation of the Principal's Strategy

No	PDCA Stage	Principal Strategy	Main Activities	Quality-Improvement Evidence
1	Plan	Systematic learning-quality planning	CP analysis, TP/ATP, teaching modules, assessment planning, needs analysis, teacher development, facilities, quality targets	More systematic and aligned instructional planning
2	Do	Direction and support for Deep Learning	Mindful, meaningful, joyful, collaborative, contextual, and student-centered learning; projects; technology	More active participation, collaboration, and contextual learning
3	Check	Monitoring and evaluation	Academic supervision, pre-observation, observation, post-observation,	Evidence about teaching quality,

4	Act	Follow-up and continuous improvement	diagnostic/formative/summative assessment, reflection	learning progress, and improvement needs
			Feedback, coaching, IHT, workshops, MGMP, mentoring, innovation, and replanning	Teacher capacity and instructional practices are continuously refined

Source: Research findings from interviews and school documents.

Integrated Planning

The findings show that the principal's strategy forms an integrated PDCA cycle. In the Plan stage, the school develops learning-quality priorities through collaborative curriculum planning, analysis of learning needs, teacher competency mapping, preparation of learning resources, and quality targets. The principal, vice principal, teachers, school committee, and school supervisor are all involved in the planning process. Curriculum planning also takes into account the outcomes of prior assessments, enabling the school to decide which practices should be kept the same and which need to be improved.

Implementation of Deep Learning

In the Do stage, the principal translates the strategy into classroom practice through teacher mentoring, academic supervision, learning communities, professional development, motivation, appreciation, and the creation of a positive working climate. Teachers implement discussion, collaboration, problem solving, projects, presentations, reflection, and contextual learning. Students report more varied and participatory learning experiences. Technology and digital learning media are used to expand access to resources and support collaboration, creativity, and problem-solving. Project-based activities are also connected with local contexts and real environmental problems.

Supervision, Assessment, and Evaluation

The Check stage is characterized by academic supervision and assessment. Academic supervision consists of pre-observation, post-observation, and classroom observation dialogue. The principal uses supervision not only to monitor teaching but also to provide constructive and solution-oriented professional guidance. Diagnostic assessment is used to identify initial learning conditions, formative assessment supports instructional adjustment, and summative assessment is used to evaluate achievement and determine follow-up. Reflection is also incorporated into learning and evaluation.

Follow-Up and Professional Development

The Act stage converts evidence from supervision and assessment into professional and instructional action. The school responds through IHT, workshops, MGMP, coaching, mentoring,

training, and learning innovation. Examples of innovation include project-based learning connected with local contexts and digital gamification. The important feature is that evaluation is not treated as an administrative endpoint. Instead, evidence from the Check stage becomes input for the next improvement cycle.

Supporting and Inhibiting Conditions

The supporting conditions include principal commitment, teacher professional-learning structures, facilities and laboratories, technological capacity, collaboration among school actors, and a culture of instructional improvement. Potential inhibiting conditions include differences in teacher readiness, variation in teachers' capacity to implement Deep Learning, the need to continuously optimize technology and resources, and the need to ensure that evaluation results are consistently followed by improvement. The findings, therefore, indicate that implementation quality cannot be assumed to be uniform across teachers.

Education-Report Context

The 2025 Education Report provides an important contextual baseline. The overall D.1 learning-quality indicator was 67.00 and remained in the "Good" category. However, the dimensions moved differently: classroom management and learning methods improved, while psychological support declined. Literacy achievement also declined slightly, while numeracy and character indicators improved. These data reinforce the qualitative finding that quality improvement must be differentiated. The principal's task is not simply to increase one aggregate score, but to sustain strengths and respond to dimensions that remain vulnerable.

Discussion

The principal's role as an instructional leader is the subject of the first significant interpretation. The results demonstrate that planning at SMA Negeri 13 Surabaya encompasses more than just administrative setup. Curriculum objectives, instructional modules, assessment, teacher capacity, facilities, and quality targets are all connected by the principle. This is consistent with the contemporary concept of instructional leadership, which is leadership that organizes the instructional core and creates the foundation for teachers to advance their careers. (Hallinger et al., 2025) discovered a moderate correlation between teacher efficacy and principal instructional leadership in 66 quantitative studies. (He et al., 2024) found a connection between instructional leadership and teacher professional development. These studies support the current conclusion that, when planning is specifically focused on teaching and learning, it is an instructional leadership job.

The planning result also aligns with the data showing that professional development, rather than direct control over classroom instruction, is frequently how leadership impacts function. (Dorukbaşı et al., 2024) found that teacher professional learning mediates the relationship between instructional leadership and teacher instructional practices. (Thien, 2024) similarly show the role of teacher self-efficacy in the relationship between instructional leadership and professional learning. In the Indonesian context, (Amzat & Yanti, 2022) discovered a link between teacher professional development in Jakarta and instructional and dispersed leadership. discovered a link between teacher professional development in Jakarta and instructional and dispersed leadership. Thus, the collaborative planning found at SMA Negeri 13 Surabaya can be interpreted as an organizational mechanism that prepares teachers to enact the intended instructional changes.

An important antithesis, however, is that planning quality cannot be inferred solely from the completeness of documents. A detailed curriculum, teaching module, or annual program may remain administrative if teachers do not receive continuing support and if evidence from classroom practice does not return to the planning process. The present study, therefore, places the value of planning in its connection with Do, Check, and Act. This interpretation is consistent with (Wibowo & Wijayanti, 2025), who emphasize that effective supervision begins with systematic and collaborative planning aligned with teachers' actual needs. The finding also avoids an overly linear view of leadership: planning is a starting point, not the endpoint of quality improvement.

The application of deep learning is the subject of the second interpretation. Discussion, teamwork, problem-solving, project work, contextual activities, reflection, and digital learning are all practices at the school that are in line with current Indonesian research. (Andayanie et al., 2025) Teacher preparedness, suitable learning spaces, technology, and pedagogical adaptability are all necessary for Deep Learning, an approach that blends attentive, meaningful, and happy learning. (Nafi'ah & Faruq, 2025) emphasize that the three principles can support critical thinking, creativity, reflection, emotional development, and engagement. (Siregar et al, 2025) In a similar vein, link Deep Learning to transfer, contextual application, critical thinking, and conceptual understanding.

The findings also affirm (Kurniatiningsih et al, 2025), who conceptualize Learning is an integrated pedagogical framework that is pleasant, meaningful, and conscious. The implementation at SMA Negeri 13 Surabaya demonstrates that these principles are translated into active and contextual learning rather than being treated as isolated labels. (Chotimah & Fantofik, 2025) found a similar pattern in which teachers acted as facilitators and used project-based activities, reflection, and

contextual discussions. (Prasetya et al, 2025) also show that digital Deep Learning requires more than technology use because meaningful, mindful, and joyful dimensions must remain connected to the learning process.

Nevertheless, the findings require a critical distinction. Projects, technology, group work, and games do not automatically constitute Deep Learning. Whether students gain comprehension, relate ideas to real-world situations, reflect on their education, and apply what they have learned determines how deeply they have learned (Sun et al, 2024). Therefore, joyful learning should not be reduced to entertainment, and digital tools should not become an end in themselves (Anwar, 2025). This contrast is crucial because the principal's job is to safeguard Deep Learning's teaching content while letting instructors experiment. The recent review by (Rahmawati et al., 2025) is relevant here because it frames Deep Learning as a transformation of the learning system rather than as a single teaching technique.

The third interpretation concerns Academic Monitoring and Evaluation as Quality Control. The study found that supervision at SMA Negeri 13 Surabaya consists of pre-observation, observation, and post-observation dialogue. This model moves supervision away from inspection toward professional learning. (Asmadi et al., 2023) discovered that in order to enhance the quality of education, academic supervision can include preparation, execution, assessment, reflection, and follow-up (Riyanto et al, 2021). The significance of preparation, execution, evaluation, and follow-up in academic supervision has also been documented. (Wibowo & Wijayanti, 2025) further emphasize collaboration and alignment between supervision and actual teacher needs. The assessment component strengthens this quality-assurance mechanism. Diagnostic, formative, and summative assessments are used for different purposes rather than being treated as interchangeable. (Yao et al, 2024) A meta-analysis of 118 primary papers with 258 effect sizes found that formative assessment had a positive overall influence on K–12 learning. (Sortwell et al., 2024) also reported generally positive effects of formative evaluation while highlighting the evidence's variability.

In the present case, formative assessment becomes particularly compatible with Deep Learning because it produces information that teachers can use to adjust instruction while learning is still occurring. The antithesis is that supervision and assessment may lose their developmental value when they become compliance-oriented. If supervision is perceived as an inspection, teachers may concentrate on formal indicators rather than examining their instructional decisions. For this reason, the relationship aspect of leadership is crucial. (Al-mahdy et al, 2024) discovered that the impact of

instructional leadership on classroom instruction and teacher agency was reinforced by smaller Power distance in professional contacts between principals and teachers, (Nisa et al., 2023) additionally discovered that through personal learning networks, computerized academic supervision might support teachers' professionalism. These results corroborate the study's conclusions about the constructive and dialogic nature of supervision.

The fourth interpretation concerns professional development as the Act stage. The school does not stop after identifying instructional problems. Supervision results are followed by IHT, workshops, MGMP, coaching, mentoring, and innovation. This pattern is consistent with (He et al., 2024);(Ningrum, 2026), and (Wang & Guo, 2023) who stress the value of professional learning frameworks and instructional leadership for teacher development. (Grimm, 2024) further demonstrates that teacher leadership within professional learning communities can support teaching improvement through collaborative learning conversations.

However, the number of professional development activities should not be confused with their effectiveness. (Visscher et al., 2025), based on 128 high-quality studies, discovered significant variance amongst interventions but an average positive effect of professional development for teachers on student results. (Lindvall et al., 2025) similarly caution that evidence about typical professional development is often correlational and that methodological quality matters when interpreting effects. Therefore, the strength of the strategy at SMA Negeri 13 Surabaya is not simply the existence of IHT, workshops, or MGMP, but their integration with evidence from supervision and their relevance to identified instructional needs.

The fifth interpretation concerns organizational conditions. The school has learning facilities, laboratories, digital resources, professional-learning structures, and collaboration among school actors. These conditions provide capacity for Deep Learning, but they do not guarantee uniform implementation. Recent research shows that leadership effects are context-sensitive. (Özdemir et al, 2022) Stress that school leadership affects student achievement through a variety of mediating pathways in a systematic review of 144 research papers. (Pietsch, 2025) The connection between student learning and instructional leadership accomplishment must be viewed from a cultural and contextual viewpoint, as demonstrated by the use of worldwide large-scale assessment data from over 1.5 million students in 75 countries. (Karadağ et al, 2025) Further reports that educational leadership effects vary across cultures and school contexts.

The Education Report evidence reinforces this contextual interpretation. The overall learning-quality indicator of 67.00, being categorized as good, does not mean that every dimension improved. Psychological support decreased while classroom management and learning methods increased. Literacy also showed a slight decrease, even as numeracy and character indicators improved. The antithesis is therefore that school improvement cannot be reduced to a single aggregate measure. The principal must use disaggregated evidence to determine where to maintain, strengthen, or redesign practice. The school leadership literature supports this differentiated approach because leadership effects are not uniform across contexts, outcomes, or organizational mechanisms (Eryilmaz & Strietholt, 2025)

The final interpretation is the integrated PDCA model. The findings indicate that the principal's strategy is best understood as a cycle: Plan identifies priorities and prepares capacity; Do translates priorities into classroom and professional practice; Check produces evidence through supervision, assessment, and reflection; Act converts evidence into professional development, innovation, and revised practice. This interpretation is consistent with research showing that leadership operates through multiple routes rather than a single direct influence. (Tan et al, 2021) found small but substantial correlations between student results and leadership behaviors, particularly in regard to teacher ability and instructional management. (Shen & Wu, 2024) found that principal leadership effects varied according to conceptualization and outcome measures, reinforcing the importance of examining mechanisms rather than assuming direct causality.

Therefore, an organizational explanation of Deep Learning deployment is given in this work. While leadership research has demonstrated the significance of instructional leadership and professional learning, prior research has demonstrated the pedagogical advantages of conscious, meaningful, and joyful learning. The contribution of this study is to connect these strands in a school-level quality-improvement cycle. The principal does not merely introduce Deep Learning; the principal creates an organizational system in which teachers learn, practice, receive feedback, reflect, and improve. The strategy can consequently be represented as: Strategic Planning → Deep Learning Implementation → Supervision and Assessment → Reflection and Feedback → Teacher Professional Development → Instructional Improvement → Replanning.

This interpretation must remain methodologically cautious. The qualitative case study does not establish that the principal's strategy caused the changes in the Education Report or student achievement (Sutisna et al., 2023). The evidence explains the leadership processes and mechanisms

observed at SMA Negeri 13 Surabaya. The study's contribution is therefore explanatory and contextual: it shows how a principal can organize instructional leadership, teacher learning, supervision, assessment, and follow-up into a continuous improvement system (Syofian, S., Waruwu, M., & Enawaty, 2024). This distinction is consistent with recent evidence that leadership and professional development effects vary across contexts and that causal claims require stronger designs (Karadağ et al, 2025); (Lindvall et al., 2025).

CONCLUSION

This study concludes that improving the quality of Deep Learning-based instruction at SMA Negeri 13 Surabaya requires principal leadership that connects pedagogical direction with systematic school-level quality improvement. Within the scope of this study, the principal's role extends across instructional leadership, teacher professional learning, academic supervision, evidence-based evaluation, and organizational support. The PDCA perspective provides an integrated understanding of how these leadership functions are connected to sustain Deep Learning as part of the school's instructional culture rather than as an isolated classroom approach.

Overall, the study shows that leadership, teacher capability, instructional practice, supervision, evaluation, and continual improvement must all be in harmony for Deep Learning to be sustainable. The principal's strategic role is therefore essential in creating the conditions in which meaningful, mindful, joyful, collaborative, contextual, and student-centered learning can develop consistently. By placing Deep Learning within a larger quality-improvement framework, the study advances our understanding of school leadership and lays the groundwork for future investigations into the viability and adaptability of this leadership strategy in various secondary school environments.

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