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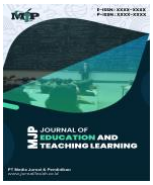

The Transformation of Deep Learning in the Merdeka Curriculum at Madrasahs: Instructional Leadership and Strengthening the 6C Competencies

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ABSTRACT

This study was motivated by the demands of 21st-century educational transformation, which promotes more meaningful, reflective, and learner-centered learning through the implementation of deep learning in the Merdeka Curriculum at madrasahs. The study aims to analyze the transformation of deep learning, the role of the madrasah principal's instructional leadership, and its contribution to strengthening students' 6C competencies at MA Sultan Fatah Demak. The research employs a qualitative approach using a case study design. Data were collected through semi-structured interviews, non-participant observation, and documentation involving the madrasah principal, the vice principal for curriculum, and teachers. Data analysis was conducted using the Miles, Huberman, and Saldaña model through data condensation, data presentation, and drawing conclusions. The results of the study indicate that the implementation of deep learning drives a shift in learning from teacher-centered to student-centered learning that is more active, collaborative, based on higher-order thinking skills (HOTS), and reflective. The instructional leadership of the madrasah principal plays a crucial role in fostering an academic culture, supervising learning, and facilitating professional collaboration among teachers. Furthermore, the implementation of deep learning contributes to the holistic strengthening of students' 6C competencies. This study concludes that the deep learning transformation in madrasahs is not merely a change in teaching methods but also a shift in learning culture that supports sustainable 21st-century learning.

Informasi Artikel

Kata Kunci:

Deep Learning; Kurikulum Merdeka; Kepemimpinan Instruksional; Kompetensi 6C; Madrasah.

ABSTRAK

Penelitian ini dilatarbelakangi oleh tuntutan transformasi pendidikan abad ke-21 yang mendorong pembelajaran lebih bermakna, reflektif, dan berpusat pada peserta didik melalui implementasi deep learning dalam Kurikulum Merdeka di madrasah. Penelitian bertujuan menganalisis transformasi pembelajaran deep learning, peran kepemimpinan instruksional kepala madrasah, serta kontribusinya terhadap penguatan kompetensi 6C peserta didik di MA Sultan Fatah Demak. Penelitian menggunakan pendekatan kualitatif dengan jenis studi kasus. Data diperoleh melalui wawancara semi-terstruktur, observasi non-partisipan, dan dokumentasi terhadap kepala madrasah, wakil kepala bidang kurikulum, dan guru. Analisis data dilakukan menggunakan model Miles, Huberman, dan Saldaña melalui kondensasi data, penyajian data, dan penarikan kesimpulan. Hasil penelitian menunjukkan bahwa implementasi deep learning mendorong perubahan pembelajaran dari teacher-centered menuju student-centered learning yang lebih aktif, kolaboratif, berbasis HOTS, dan reflektif. Kepemimpinan instruksional kepala madrasah berperan penting dalam membangun budaya akademik, supervisi pembelajaran, dan kolaborasi profesional guru. Selain itu, implementasi deep learning berkontribusi terhadap penguatan kompetensi 6C peserta didik secara holistik. Penelitian ini menyimpulkan bahwa transformasi deep learning di madrasah tidak hanya menjadi perubahan metode pembelajaran, tetapi juga perubahan budaya belajar yang mendukung pembelajaran abad ke-21 secara berkelanjutan.

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1. Introduction

The transformation of education in the 21st century demands that educational institutions move away from rote memorization and administrative learning toward an approach that emphasizes deep understanding, critical thinking, creativity, collaboration, and the resolution of real-world problems [1]. These global changes have emerged in response to technological advancements, social complexity, and the increasingly dynamic demands of future competencies. In an international context, the deep learning approach is viewed as a learning strategy capable of fostering active student engagement through processes of reflection, exploration, and the contextual interpretation of knowledge [2]. Fullan, Quinn, and McEachen (2018) explains that deep learning encourages students to understand concepts in a meaningful way and apply them in various real-life situations. This approach is also closely linked to the development of global competencies such as critical thinking, communication, collaboration, creativity, character, and citizenship collectively known as the 6C competencies. In many countries, deep learning-based educational transformation is being implemented as part of educational reforms to enhance the quality of learning, making it more human-centered, reflective, and learner-centered [4]. These changes indicate that modern education no longer views students as passive recipients of information, but as active participants who construct knowledge through meaningful learning experiences.

In the Indonesian context, this educational transformation is beginning to be implemented through the Merdeka Curriculum, which emphasizes differentiated instruction, character building, and the development of 21st-century skills [5]. The Merdeka Curriculum was introduced in response to the need for more flexible pedagogical approaches focused on the holistic development of students' potential. However, the implementation of deep learning in madrasahs still faces various challenges, such as the prevalence of administrative-based learning, teachers' limited understanding of deep learning, and a weak culture of reflection in the teaching-learning process [6]. On the other hand, the success of educational transformation depends not only on teachers' abilities but is also influenced by the instructional leadership of school principals in fostering an academic culture, supervising instruction, and facilitating teachers' professional development. Previous research has shown that instructional leadership has a significant impact on improving the quality of instruction and promoting pedagogical change in schools [7]. However, research on the relationship between instructional leadership, the implementation of deep learning, and the strengthening of 6C competencies in the context of madrasahs remains relatively limited, particularly regarding the implementation of the Merdeka Curriculum in Indonesian Islamic education [8]. Therefore, this study is important for examining how the transformation of deep learning is implemented in madrasahs, how the instructional leadership of madrasah principals facilitates this change, and how the implementation of deep learning contributes to strengthening students' 6C competencies.

The transformation of learning in the implementation of the Merdeka Curriculum has been a major focus of various educational studies in Indonesia in recent years [9]. However, most studies still focus on the administrative aspects of curriculum implementation, the readiness of teaching materials, and teachers' adaptation to changes in education policy [10]. A systematic review conducted by Idris and Adawiah (2024) indicates that research on the Merdeka Curriculum in Indonesian madrasahs primarily focuses on general implementation strategies and teacher readiness, while the dimension of

pedagogical transformation based on deep learning remains relatively limited. Other studies have also found that the implementation of the Merdeka Curriculum in madrasahs often faces challenges due to the lack of changes in classroom teaching practices, as the learning orientation remains administrative in nature and centered on the completion of teaching materials [12]. In fact, recent studies show that the implementation of deep learning in schools and madrasahs often stops at the use of the term "deep learning" without being followed by substantive changes in critical thinking, reflection, exploration, and students' active engagement in learning [13]. This situation highlights a gap between the ideal direction of the Merdeka Curriculum and the reality of its implementation in the classroom. On the other hand, an official report from the Ministry of Education, Culture, Research, and Technology emphasizes that the Merdeka Curriculum is designed to promote flexible, learner-centered learning and to support the development of 21st-century competencies through meaningful and contextual learning [5].

In a global context, the transformation of learning based on deep learning is viewed as a crucial approach to developing students' future competencies. Fullan et al. (2018) explain that deep learning is not merely a change in teaching methods, but a transformation of the learning culture that enables students to construct knowledge in a reflective, collaborative, and contextual manner. Meanwhile, Hattie (2009) asserts that learning focused on deep understanding has a more significant impact on improving the quality of learning than learning that emphasizes only the transfer of information. However, various international studies indicate that the success of educational transformation is greatly influenced by the instructional leadership of school principals in fostering an academic culture, supervising instruction, and developing teacher professionalism [7]. Unfortunately, research on the relationship between instructional leadership, deep learning transformation, and the development of 6C competencies in the context of Islamic education remains relatively limited, particularly in Indonesian madrasahs. Most previous studies have tended to treat the implementation of the Merdeka Curriculum, madrasah principal leadership, and students' 21st-century competencies as separate topics [14]. In fact, the 6C competencies critical thinking, creativity, collaboration, communication, character, and citizenship are the primary focus of global education and should be integrated into deep learning practices. Therefore, this study is important to address the research gap regarding how the transformation of deep learning in madrasahs takes place through the instructional leadership of madrasah principals and its contribution to strengthening students' 6C competencies.

Research on the transformation of deep learning in the Merdeka Curriculum reveals three main trends. First, research that emphasizes pedagogical shifts toward meaningful, reflective, and student-centered learning [15], [16], [17]. Second, research highlighting the importance of instructional leadership and teacher strategies in supporting the implementation of deep learning in schools and madrasahs [18], [19]. Third, research linking deep learning to the development of 21st-century competencies, or the 6Cs, in the implementation of the Merdeka Curriculum. [1], [3], [20]. However, research integrating deep learning transformation, instructional leadership by madrasah principals, and the strengthening of 6C competencies in the context of Islamic education remains relatively limited. Based on this trend, this study aims to address three research questions: (1) how is deep learning implemented within the Merdeka Curriculum in madrasahs; (2) how does the instructional leadership of madrasah principals facilitate the implementation of deep learning; and

(3) how does this implementation contribute to the enhancement of students' 6C competencies. Therefore, this study aims to analyze the implementation of deep learning in madrasahs, examine the role of the madrasah principal's instructional leadership, and describe its contribution to strengthening the 6C competencies in learning based on the Merdeka Curriculum.

The transformation of deep learning-based education within the Merdeka Curriculum is increasingly being discussed as a pedagogical approach that emphasizes meaningful, reflective learning focused on strengthening 21st-century competencies [21]. However, most previous studies have focused primarily on classroom teaching practices, teacher readiness, or curriculum implementation in general, while the relationship between the instructional leadership of madrasah principals, deep learning transformation, and the strengthening of students' 6C competencies has rarely been examined in an integrated manner, particularly in the context of Islamic education [22]. Previous studies have generally viewed deep learning as a pedagogical strategy for enhancing student engagement and critical thinking [2], [3], Meanwhile, research on instructional leadership focuses more on improving teacher professionalism and overall school quality [7], [23]. On the other hand, the implementation of deep learning in the Merdeka Curriculum also continues to face a gap between theory and practice in the field due to a lack of a culture of collaborative learning, academic supervision, and teachers' pedagogical readiness [24]. Therefore, this study offers a novel approach by integrating three key aspects: the transformation of deep learning, the instructional leadership of madrasah principals, and the strengthening of 6C competencies within the context of madrasahs implementing the Merdeka Curriculum. This study also expands the discourse on Islamic educational leadership by positioning madrasah principals as agents of pedagogical transformation who play an active role in fostering a culture of deep learning and developing students' 21st-century competencies.

2. Theoretical Framework

The transformation of deep learning in the Merdeka Curriculum stems from a shift in the educational paradigm from one previously focused on the transfer of knowledge to one that emphasizes deep understanding, reflection, active student engagement, and contextual learning. From the perspective of classical progressive education, John Dewey asserted that education must be built through real-world experiences (learning by doing) so that students can understand knowledge through social experiences and reflection on everyday life [25]. This idea is reinforced by David Ausubel, who explains that meaningful learning occurs when new information is linked to the learner's existing knowledge structure, so that learning results not merely in rote memorization but in deep conceptual understanding [26]. In addition, Michael Fullan explains that deep learning is a learning process that encourages students to think critically, collaboratively, and creatively, and to apply their knowledge to solve real-world problems [3]. This concept aligns with the research framework that identifies mindful learning, meaningful learning, and student-centered learning as the core of the learning transformation in the Merdeka Curriculum at madrasahs.

The transformation of deep learning is also closely linked to constructivism and active learning, which place students at the center of the learning process. Jean Piaget explained that students' cognitive development occurs through the processes of assimilation and accommodation in response to learning experiences actively acquired [27]. Furthermore, Lev Vygotsky emphasized that learning develops through social interaction and collaboration in the learning environment through the concept of the zone of proximal development

[28]. This perspective supports the implementation of collaborative learning, problem-solving, and inquiry-based learning in deep learning. Furthermore, Jerome Bruner, through his theory of discovery learning, explains that students need to be given the opportunity to discover knowledge independently through exploration, investigation, and reflection on their learning [29]. Therefore, the use of project-based learning, problem-based learning, and inquiry-based learning, as illustrated in the research diagram, indicates a shift in learning from teacher-centered to student-centered learning that is more reflective, active, and meaningful.

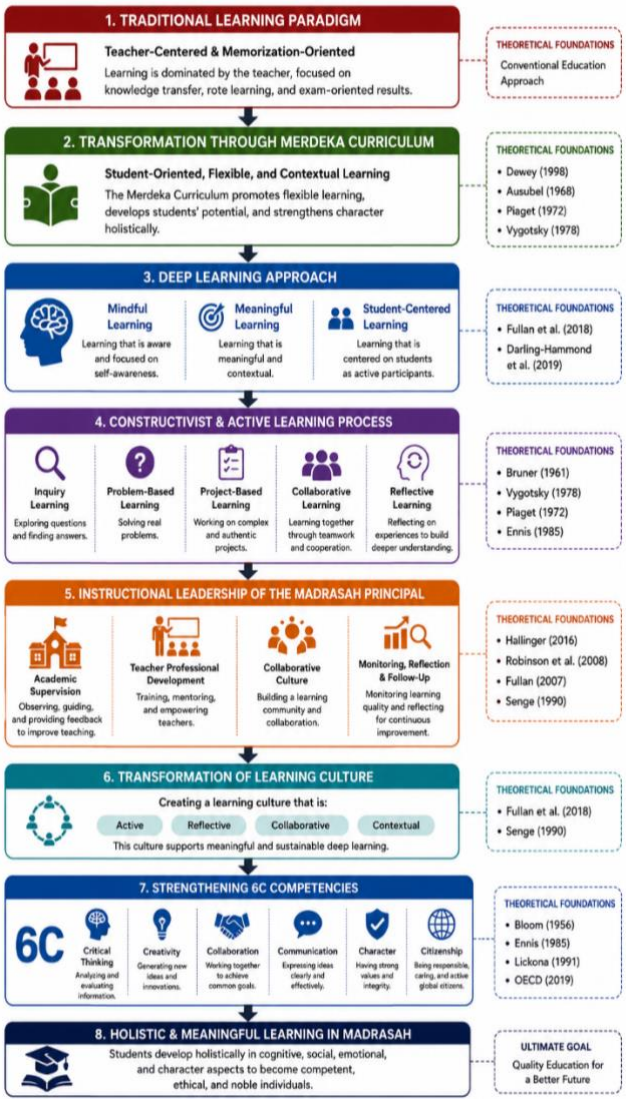
Implementing this educational transformation requires educational leadership that is not merely administratively oriented but also focused on improving the quality of learning. In classical educational leadership theory, Philip Hallinger explains that instructional leadership is a form of leadership that places learning at the center by establishing an academic vision, supervising instruction, monitoring student learning outcomes, and fostering teacher professional development [30]. Madrasah principals serve not only as administrative managers but also as instructional leaders who drive pedagogical change within the school environment. This perspective aligns with research findings indicating that the instructional leadership of madrasah principals is manifested through establishing a vision for learning, guiding and facilitating teachers, fostering a collaborative culture, and conducting monitoring, reflection, and follow-up on learning. In the context of curriculum change, instructional leadership is a critical factor because learning transformation cannot proceed optimally without continuous professional development and academic support for teachers.

In addition to Hallinger, Viviane Robinson explains that the type of educational leadership that has the greatest impact on improving student learning outcomes is leadership that is directly involved in curriculum development and teacher professional development [6]. This view is reinforced by Michael Fullan, who asserts that educational change cannot be achieved through administrative policies alone, but requires a culture of collaboration, reflective learning, and continuous teacher professional development [31]. Furthermore, Peter Senge, through his concept of the learning organization, explains that effective educational organizations must be able to foster a culture of collaborative learning, collective reflection, and continuous professional development [32]. Therefore, in this study, the instructional leadership of the madrasah principal is understood as a driving force that facilitates the transformation of deep learning through academic supervision, the strengthening of the teachers' learning community, and the creation of an innovative learning culture at the madrasah.

The transformation of deep learning is ultimately aimed at strengthening 21st-century competencies, which in this study are mapped through the 6C framework: critical thinking, creativity, collaboration, communication, citizenship, and character. From a modern educational perspective, Benjamin Bloom, through his cognitive taxonomy, explains that the goal of education is not merely to achieve the ability to recall information, but also the ability to analyze, evaluate, and create [33]. This concept forms the foundation for developing critical thinking and creativity in deep learning. Robert Ennis goes on to explain that critical thinking is a reflective and rational thought process used to make sound

decisions or take appropriate actions [34]. In the context of learning, these skills develop through discussion, problem-solving, exploration of ideas, and reflection on learning, as illustrated by the use of problem-solving and inquiry-based learning in the research diagram. Thus, the implementation of deep learning not only enhances conceptual understanding but also builds students' higher-order thinking skills. In addition to critical thinking and creativity, deep learning also contributes to strengthening students' social competencies and character. Thomas Lickona explains that character education must help students understand moral values, develop social attitudes, and apply these values in daily life [35]. Furthermore, Andy Hargreaves and Michael Fullan explain that 21st-century education must produce students who are able to collaborate, communicate effectively, demonstrate social responsibility, and adapt to global changes [36]. In the context of madrasahs, strengthening character and citizenship is crucial because Islamic education emphasizes not only academic achievement but also the development of moral character, social responsibility, and a humanistic learning culture. Therefore, the relationship between the Merdeka Curriculum, the instructional leadership of madrasah principals, the transformation of learning toward deep learning, and the strengthening of the 6C competencies, as illustrated in the research diagram, demonstrates a conceptually integrated framework for building reflective, collaborative, innovative, and relevant learning that addresses the challenges of 21st-century education.

Figure 1. Theoretical Framework of Deep Learning Transformation in the Merdeka Curriculum



3. Method Research

This study is a field research project using a qualitative approach and a case study design to understand the transformation of deep learning in the Merdeka Curriculum at madrasahs, particularly with regard to the instructional leadership of madrasah principals and the strengthening of students' 6C competencies at MA Sultan Fatah [37]. A qualitative approach was chosen because the study focuses on understanding the meanings, experiences, processes, and dynamics of contextual learning implementation through descriptive data in the form of words,

actions, and documents, rather than through statistical analysis [38]. The case study method was used because the research focused in depth on a single location, thereby enabling the researcher to understand the phenomenon of deep learning implementation in the real-world context of a madrasah following the Merdeka Curriculum [39]. The study was conducted at Sultan Fatah Islamic High School in Demak Regency, Central Java, from April 22 to May 8, 2026.

The research data sources consisted of primary and secondary data. Primary data were obtained through in-depth interviews and observations of informants selected via purposive sampling based on their involvement in the implementation of deep learning in the Merdeka Curriculum [40]. The research informants consisted of the madrasah principal as the key informant, the vice principal for curriculum, male English teachers, as well as female SKI and Biology teachers who were actively involved in the implementation of deep learning-based instruction. Meanwhile, secondary data was obtained from madrasah vision and mission documents, madrasah principals' work programs, teaching modules, Merdeka Curriculum learning tools, academic supervision documents, and documentation of learning activities and teacher professional development at the madrasah.

Table 1. Research Informant Data

No	Informant	Gender	Position
1	KS	Male	Principal
2	WK	Male	Vice Principal for Curriculum
3	GBI	Male	English Teacher
4	GSKI	Female	SKI Teacher
5	GBIO	Female	Biology Teacher

Data collection was conducted through semi-structured interviews, non-participant observation, and documentation. Semi-structured interviews were used to explore the informants' experiences, strategies, and perspectives regarding the transformation of deep learning, the instructional leadership of madrasah principals, academic supervision, and the strengthening of students' 6C competencies [41]. Non-participant observation was conducted to directly observe teaching practices, teacher-student interactions, the learning culture, and the implementation of deep learning-based instruction in the classroom. Documentation was used to corroborate data from interviews and observations through the analysis of learning materials, supervision programs, teaching modules, and madrasah academic activity records. Data validity was tested through source triangulation, methodological triangulation, and temporal triangulation to ensure the credibility and consistency of the research data [42].

Data analysis was conducted using the interactive analysis model proposed by Miles, Huberman, and Saldaña. (2014), which includes data condensation, data presentation, and drawing conclusions and verification. Data condensation was performed by selecting, grouping, and coding data from interviews, observations, and documentation based on research themes such as the transformation of deep learning, instructional leadership, academic supervision, and the strengthening of 6C competencies. The analysis process was conducted through the stages of open coding, axial coding, and selective coding to identify relationships between categories and construct the core themes of the research [43]. The analyzed data were then presented in the form of narrative descriptions and thematic matrices, resulting in a deep interpretation of the transformation of deep learning in the Merdeka Curriculum at MA Sultan Fatah.

4. Result

4.1 The Transformation of Deep Learning in the Implementation of the Merdeka Curriculum at Madrasahs

The research findings indicate that the implementation of deep learning at MA Sultan Fatah has undergone a significant shift from conventional teacher-centered learning toward a more active, collaborative, and student-centered approach. Based on observations in English, SKI, and Biology classes, the learning process is no longer dominated by teacher lectures but now involves group discussions, problem-solving, presentations of work, and learning reflections. In the researchers' observations, students demonstrated more active engagement in the learning process, particularly during project-based activities and group discussions. Teachers began to direct learning toward activities that require higher-order thinking skills, such as analysis, evaluation, and problem-solving. Nevertheless, the level of deep learning implementation still varies among teachers, depending on their pedagogical readiness and understanding of the Merdeka Curriculum.

The Madrasah Principal (KS) emphasized that this transformation is part of efforts to improve the quality of learning at the madrasah. In an interview, he stated:

"We encourage teachers to shift their teaching methods from simply presenting material to a learning approach that engages students, fosters critical thinking, and enables them to solve problems independently" (Interview, KS, April 30, 2026).

This statement indicates that educational transformation is not only taking place at the classroom level but is also being driven by madrasah policies and leadership direction.

The Deputy Head of the Madrasah for Curriculum Affairs (WK) also explained that the implementation of deep learning is carried out by strengthening lesson planning and providing guidance to teachers in the development of teaching materials for the Merdeka Curriculum. He stated:

"Teachers are encouraged to develop instructional modules that focus not only on content but also on students' thinking processes, collaboration, and reflection on learning" (Interview, WK, April 30, 2026).

This finding is supported by observations that teaching materials in madrasahs are beginning to incorporate activities that encourage active student participation, although implementation remains uneven across all subjects.

From the perspective of the instructor, the English teacher (GBI) noted that the application of deep learning makes the learning process more interactive and challenging. He stated:

"I've started incorporating more discussions and project-based assignments. The students have become more active, even though they initially needed some time to adjust to thinking more independently" (Interview, GBI, May 1, 2026).

The SKI Teacher (GSKI) also added that learning today can no longer be one-way:

"Modern education requires students to be active participants. They must discuss, ask questions, and express their opinions, not just listen" (Interview, GSKI, May 1, 2026).

Meanwhile, Biology Teachers (GBIO) highlighted the challenges involved in changing students' learning culture:

"The biggest challenge is changing the habits of students who are used to passively receiving information. Now they must take a more active role in seeking out and processing information on their own" (Interview, GSKI, May 1, 2026).

Overall, the research findings indicate that the transformation of deep learning at MA Sultan Fatah is a gradual process of change involving

synergy between the principal's policies, the role of the vice principal for curriculum, and teachers' adaptation of teaching practices. This transformation not only affects teaching methods but also involves a shift in the learning paradigm toward more active, meaningful, and student-centered learning.

Table 2. Before vs After Comparison: Deep Learning

Aspect	Before	After
Learning	Lecture	Active & collaborative
Students	Passive	Active
Assessment	Rote memorization	HOTS

4.2 Instructional Leadership of Madrasah Principals in Building a Culture of Deep Learning

The research findings indicate that the instructional leadership of the principal at MA Sultan Fatah plays a crucial role in fostering a sustainable culture of deep learning within the madrasah. Based on the observation results, the principal functions not only as an administrator but also as the primary guide of the learning process through academic supervision, learning monitoring, and guidance for teachers in the implementation of the Merdeka Curriculum. Supervisory activities are not carried out merely as a formality but place greater emphasis on mentoring and learning reflection, which encourage teachers to improve their teaching practices.

In the researcher's observation, the principal's leadership was evident in efforts to foster close academic communication with teachers through coordination meetings, discussions on instructional development, and periodic evaluations of teaching materials. The principal also encourages the creation of a collaborative learning culture among teachers through internal MGMP forums and in-house training (IHT) activities. This demonstrates that a deep learning culture is not only built in the classroom but is also reinforced through the academic leadership system at the madrasah level.

The Madrasah Principal (KS) emphasized that changes in teaching and learning cannot be separated from the role of active leadership in guiding teachers. He stated:

"We not only monitor the learning process, but also support teachers so that they truly understand how active, critical, and meaningful learning is implemented in the classroom" (Interview, KS, April 30, 2026).

This statement indicates that the madrasah principal positions himself as an instructional leader who is directly involved in the process of improving the quality of learning, rather than merely an administrative decision-maker.

The Deputy Head of the Madrasah for Curriculum Affairs (WK) also explained that the role of instructional leadership is strengthened through curriculum management and support for teachers in developing deep learning-based teaching materials. He stated:

"We assist teachers in developing instructional modules, ensuring that learning focuses not only on the subject matter but also on students' thinking processes and 21st-century skills" (Interview, KS, April 30, 2026).

The results of the interviews reinforce the observational findings that there is a systematic effort to guide teachers toward making instruction more focused on higher-order thinking and active student engagement.

From the teachers' perspective, the English teacher (GBI) noted that the principal's support has had a significant impact on changes in classroom teaching methods. He stated:

"The principal often provides guidance and

feedback during supervision, particularly on how to make students more active rather than just passively receiving the material" (Interview, GBI, May 1, 2026).

The SKI teacher (GSKI) also added that the guidance provided by the madrasah principal has made teachers more confident in implementing new teaching methods:

"We feel supported, not just evaluated. So we're more willing to try more active learning models" (Interview, GSKI, May 1, 2026).

Meanwhile, Biology Teachers (GBIO) noted that the culture of collaboration among teachers has also grown stronger thanks to the encouragement of the madrasah principal:

"Now we often discuss with our fellow teachers to explore more effective teaching methods. This is also due to encouragement from the school principal" (Interview, GBIO, May 1, 2026).

Overall, the research findings indicate that the instructional leadership of the madrasah principal serves as the primary driving force in fostering a culture of deep learning at MA Sultan Fatah. Through supportive academic supervision, teacher capacity building, and the creation of a collaborative culture, the principal has successfully established a learning ecosystem that is more innovative, reflective, and focused on improving the quality of students' learning processes.

Table 3. The Instructional Leadership Style of Madrasah Principals

Leadership Aspects	Forms of Implementation	Impact on Deep Learning
Academic supervision	Classroom observation & feedback	Improvement of teaching strategies
Teacher training	Workshop, In-Service Training, Internal Subject Teacher Association	Improving teacher competence
Learning monitoring	Evaluation of teaching materials	Consistency in the implementation of the Merdeka Curriculum
Collaborative culture	Interdisciplinary Teacher Discussion	Strengthening learning innovation

4.3 Strengthening the 6C Competencies through Deep Learning Transformation

The research findings indicate that the implementation of deep learning in the Merdeka Curriculum at MA Sultan Fatah significantly contributes to strengthening 21st-century competencies known as the 6Cs: character, citizenship, collaboration, communication, creativity, and critical thinking. Based on observations in English, SKI, and Biology classes, students not only act as recipients of information but are also active participants in the learning process through discussions, group work, presentations, and contextual problem-solving. These learning activities indicate a shift from simple cognitive learning toward deeper and more meaningful learning.

In the researcher's observation, collaboration skills were most evident when students worked in groups to complete project-based assignments. Students discussed ideas with one another, divided tasks, and pooled their ideas to produce learning outcomes. Meanwhile, communication skills developed through activities such as presenting the results of their discussions in front of the class, during which students began to demonstrate the courage to express their opinions and defend their arguments. This indicates an increase in students' self-confidence and interpersonal communication skills.

Critical thinking skills also appear to develop through problem-based learning activities

that require students to analyze, evaluate, and find solutions to problems presented by the teacher. Biology teachers (GBIO) emphasize that learning today no longer focuses on memorization, but on the students' thinking process:

"Students today can no longer simply memorize the material; they must be able to analyze it and find solutions to the problems presented" (Interview, GBIO, May 1, 2026).

In addition, creativity is developed through project-based tasks that allow students to produce a variety of learning products, such as posters, digital presentations, and creative analysis reports. An English teacher (GBI) stated:

"I assign project-based assignments so that students can be more creative and not just rely on textbooks" (Interview, GBI, May 1, 2026).

In terms of character development, deep learning also fosters a sense of responsibility, discipline, and academic integrity. This is evident in the learning reflection process that students engage in after each lesson. Meanwhile, citizenship competencies are developed through discussions on social issues and national values in the SKI curriculum taught by GSKI, where students are encouraged to understand the values of tolerance, social responsibility, and civic duty.

Overall, the research findings indicate that the implementation of deep learning has an impact not only on cognitive aspects but also on the development of students' social, emotional, and character competencies. This transformation demonstrates that the Merdeka Curriculum at MA Sultan Fatah has begun to shift toward holistic learning focused on the development of 21st-century competencies.

Table 4. Strengthening the 6C Competencies through Deep Learning Transformation

6C Competencies	Field Indicators	Deep Learning Implementation	Research Findings
Character	Responsibility, discipline, honesty	Learning reflection, attitude assessment, independent practice	Students are more responsible and disciplined in completing their assignments
Citizenship	Social responsibility, tolerance, national values	Discussions on social themes in SKI and contextual learning	Students demonstrate social awareness and an understanding of national values
Collaboration	Cooperation, division of labor	Project-Based Learning, group discussion	Student collaboration has improved in completing group assignments
Communication	Presentations, discussions, debates	Project presentation and class discussion	Students are more confident in expressing their opinions
Creativity	Innovation, new ideas, products	Project assignments, poster creation, and digital presentations	Students' creativity in producing learning materials has increased
Critical Thinking	Analysis, evaluation, problem-solving	Problem-based learning, case analysis	Students are better able to think analytically and solve problems

5. Discussion

Overall, the results of the data analysis indicate that the implementation of deep learning at MA Sultan Fatah has undergone a gradual transformation from a conventional, teacher-

centered learning model toward a more participatory, collaborative, and student-centered approach. This change is evident not only in teaching methods but also in the shifting role of students, who are becoming increasingly active in the learning process through discussions, group work, presentations, and problem-solving activities. On the other hand, the research findings also confirm that this transformation does not occur in isolation but is influenced by the instructional leadership of the madrasah principal, who drives changes in learning culture through academic supervision, teacher mentoring, and the strengthening of professional collaboration. This indicates that the implementation of deep learning is not merely a pedagogical innovation at the classroom level, but rather the result of the interaction between leadership policies and learning practices in the field.

In addition, the implementation of deep learning-based instruction also contributes to strengthening students' 6C competencies, as reflected in improvements in critical thinking, creativity, communication, and collaboration, as well as character development and civic engagement. Thus, the educational transformation that has taken place can be understood as an integrative process involving simultaneous changes in the pedagogical, leadership, and student learning outcomes dimensions. These summary findings can then be understood more comprehensively through an empirical model mapping that illustrates the relationships among the main variables in this study. To clarify the relationship between the learning transformation process, the role of instructional leadership, and the strengthening of the 6C competencies, a visualization of the empirical model is presented in figure 2 below:

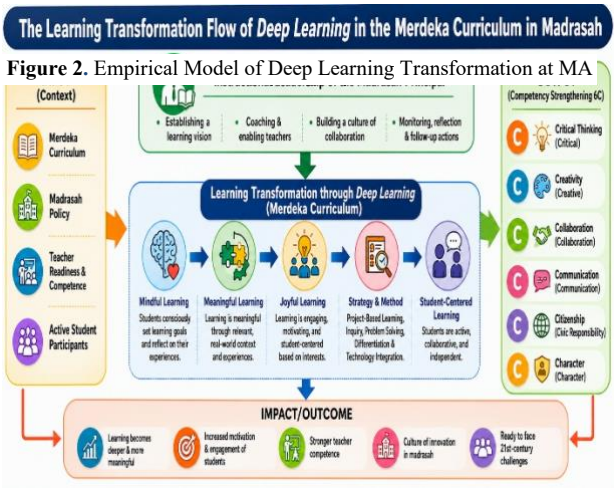


Figure 2. Empirical Model of Deep Learning Transformation at MA

The research findings indicate that the transformation of deep learning at MA Sultan Fatah has undergone a significant shift from traditional learning patterns toward a more student-centered, active, and collaborative approach. These findings suggest that teaching practices are beginning to align with the characteristics of meaningful learning as described by Ausubel, who emphasizes the importance of linking new knowledge to students' existing cognitive structures [26]. Furthermore, this change is also consistent with Dewey's idea that experiential learning (learning by doing) is at the heart of meaningful education [25]. However, although there has generally been an increase in student engagement, variations in implementation among teachers suggest that this transformation has not yet been fully realized and is still influenced by differences in pedagogical understanding. This indicates that deep learning is not merely a change in method, but also a paradigm shift that requires educators to consistently internalize the concepts, as emphasized by Fullan, who argues that educational reform requires a change in the culture of learning, not merely technical changes in teaching [3], [31].

Furthermore, from the perspective of instructional leadership, the findings of this study confirm that the role of the madrasah principal makes a significant contribution to guiding the implementation of deep learning through academic supervision, teacher mentoring, and the development of a collaborative culture. This is consistent with Hallinger's theory, which positions the principal as an instructional leader focused on improving the quality of learning through academic vision and monitoring of learning [36]. These findings also support the view of Robinson et al. that the leadership most influential on learning outcomes is that which is directly involved in the learning process and teacher development [6]. However, the effectiveness of this leadership approach still faces challenges regarding the consistency of its implementation at the classroom level, particularly regarding teachers' readiness to integrate HOTS-based learning and reflection. In terms of student competencies, the research findings also indicate that the implementation of deep learning contributes to strengthening the 6C competencies, which align with the OECD framework on 21st-century

competencies that emphasizes the importance of critical thinking, collaboration, and citizenship in modern education [1]. and supported by Bloom (1956) and Ennis (1985), who emphasize the importance of developing higher-order thinking skills in the learning process.

The findings of this study indicate that the transformation of deep learning in madrasahs represents a significant pedagogical shift from teacher-centered learning toward student-centered learning that is more active, collaborative, and reflective. These results align with John Dewey's view, which emphasizes that meaningful learning experiences can only occur through students' active engagement in the process of "learning by doing" [25]. In addition, the research findings also support Lev Vygotsky's concept that learning develops through social interaction and collaboration within the zone of proximal development [28]. In this context, the group discussions, presentations, and project-based learning observed in the field indicate that learning is no longer transmissive in nature, but rather constructive and social. These findings are also consistent with Jerome Bruner's theory, which emphasizes the importance of discovery learning in building conceptual understanding through students' active exploration [29]. Thus, the transformation taking place in madrasahs can be understood as a concrete implementation of the constructivist paradigm in modern education.

Furthermore, the results of this study also indicate that the success of deep learning implementation is significantly influenced by the instructional leadership of madrasah principals, who serve as catalysts for pedagogical change. This finding supports Philip Hallinger's theory, which asserts that instructional leadership focuses on improving the quality of learning through supervision, monitoring, and teacher professional development [30]. This is also consistent with Viviane Robinson's findings, which show that leadership focused on learning has the most significant impact on student learning outcomes [6]. In addition, the role of the madrasah principal in fostering a collaborative and reflective culture also aligns with Michael Fullan's concept of educational change as a cultural process that requires ongoing collaboration and the strengthening of teachers' capacities [3], [31]. Thus, these findings confirm that the adoption of deep learning cannot stand alone as a pedagogical approach, but must be supported by a strong leadership ecosystem within educational institutions.

6. Conclusion

The findings of this study reveal a rather striking conclusion: the transformation of deep learning in madrasahs extends beyond changes in teaching methods and has evolved into a comprehensive shift in learning culture. The implementation of the Merdeka Curriculum at MA Sultan Fatah demonstrates a tangible shift from previously teacher-centered learning toward active, reflective, and collaborative learning focused on strengthening students' 6C competencies. Interestingly, the success of this transformation is not solely determined by technological readiness or curriculum tools, but is more influenced by the instructional leadership of the madrasah principal, who is able to foster an academic culture, provide learning supervision, and sustain professional collaboration among teachers. This finding confirms that deep learning in the madrasah context is not merely a pedagogical strategy but also a process of educational cultural change that simultaneously involves leadership, teachers, and students.

Nevertheless, this study still has several limitations. The research was conducted at only one madrasah using a case study approach; therefore, the findings cannot yet be broadly generalized to all madrasahs in Indonesia. Furthermore, the study focused more on the aspects of learning implementation and instructional leadership; thus, it has not yet thoroughly examined the influence of other factors such as external policy support, technological readiness, parental involvement, or the impact of students' socioeconomic backgrounds on the success of deep learning. Another limitation is evident in the variation in implementation among teachers, indicating that pedagogical understanding of deep learning is not yet fully consistent; consequently, this study has not been able to comprehensively describe the level of implementation effectiveness across all subjects and grade levels.

Based on these findings and limitations, future research is recommended to expand its scope

to include various types of madrasahs and schools in different regions in order to obtain a more comprehensive picture of the implementation of deep learning within the Merdeka Curriculum. Future research could also employ a mixed-methods approach or a longitudinal study to measure the long-term impact of deep learning on learning outcomes, the development of 6C competencies, and changes in students' learning culture. Additionally, future studies should analyze the integration of digital technology, the strengthening of teacher learning communities, and adaptive models of Islamic educational leadership in supporting 21st-century learning transformation in madrasahs.

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