Deep Learning vs Differentiated Learning: Learning Innovation in Islamic Boarding School-Based Middle Schools

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Abstract

This study aims to examine the implementation of deep learning and differentiated learning approaches in Islamic boarding school-based junior high schools (SMP) in order to improve the quality of meaningful, contextual, and humanistic learning. Using a descriptive qualitative approach, data were collected through in-depth interviews, classroom observations, and documentation studies in three Islamic boarding school junior high schools that integrate national and religious curricula. The results of the study indicate that learning strategies such as project-based learning, reflective discussions, and collaborative activities are effective in building conceptual understanding and spiritual values of students. Differentiated learning enables the creation of an inclusive learning environment by adjusting content, processes, and products according to students' learning profiles. Implementation challenges arise in terms of time constraints, dual curriculum burdens, and teacher professional readiness. Authentic project-based and portfolio-based evaluations are more relevant in measuring cognitive, affective, and spiritual competencies holistically. This study recommends the need for educational policies that are more adaptive to the characteristics of Islamic boarding schools, including contextual teacher training, curriculum flexibility, and an inclusive and sustainable evaluation system. These findings confirm that deep learning and differentiated learning have great potential in transforming Islamic boarding school education towards 21st-century learning that is more humanistic, reflective, and transformative.

Keywords: 21st century education, authentic assessment, curriculum flexibility, deep learning, differentiated learning, professional teachers

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1. Introduction

In the 21st century, advancements in information and communication technology (ICT) have transformed nearly all aspects of global society, including the field of education (Maghfiroh et al., 2023). In Indonesia, the national education system continues to adapt to these changes by emphasizing the development of 21st-century skills, namely critical thinking, creativity, communication, and collaboration (4C). In this context, education is not merely regarded as an intellectual necessity, but also as a fundamental human need equally essential as food, clothing, and shelter (Anjarwati et al., 2022; Mahardhani et al., 2021; Fayza et al., 2024; Ajid et al., 2025).

To address these demands, deep learning and differentiated instruction have increasingly gained attention as transformative pedagogical strategies for enhancing the quality of

education (Chernigovtseva, 2022). In particular, junior secondary schools (SMP) affiliated with Islamic boarding schools (pondok pesantren) present unique complexities, as they integrate the national curriculum with a religious curriculum. This educational model requires an approach that not only facilitates the transmission of academic knowledge but also instills spiritual and moral values throughout the learning process (Efendy et al., 2022).

In this context, an adaptive and relevant learning system is essential to ensure that the learning experience remains meaningful and contextual for students. Recent studies highlight the importance of examining the effectiveness of deep learning and differentiated instruction within pesantren-based educational environments, in order to create a synergy between intellectual development and the cultivation of spiritual character (Masbur, 2022).

The deep learning approach, as articulated by Fullan and Langworthy (2014), emphasizes deep conceptual understanding, the interconnection of ideas, and the development of higher-order thinking skills. Beyond focusing on cognitive aspects, this approach also facilitates students' ability to apply knowledge critically across various real-life contexts (Hattie, 2009; Biggs & Tang, 2011). As such, students are positioned as active learning agents capable of solving problems in innovative ways (Kovac et al., 2023). Within the pesantren environment, this approach holds significant potential for bridging the integration between general scientific knowledge and religious values, enabling students not only to comprehend academic content but also to internalize these values in their daily attitudes and behaviors (Bella & Tamami, 2022).

The high diversity of student characteristics in educational institutions such as pesantren-based junior secondary schools (SMP) necessitates the implementation of instructional strategies that can accommodate these differences. Differentiated instruction addresses this need by adapting the learning process to students' readiness, interests, and learning styles (Tomlinson, 2001; Hall, 2002). Its core principle lies in valuing each individual's uniqueness through flexible and personalized teaching practices (Subban, 2006).

The implementation of differentiated instruction enables teachers to design inclusive and empowering learning environments by differentiating content, process, product, and learning environment. This approach is particularly relevant in pesantren-based SMP, which serve students from diverse academic and religious backgrounds (Salsabila et al., 2022). Through this strategy, students can experience more optimal, adaptive, and meaningful learning while simultaneously reinforcing humanistic values within the educational process (Amalia & Gunawan, 2023; Sista & Budiman, 2020).

The implementation of differentiated instruction allows teachers to design inclusive and empowering learning environments by differentiating content, process, product, and learning environment. This approach is highly relevant in pesantren-based junior secondary schools (SMP), which are characterized by a diverse student population in terms of both academic ability and religious understanding (Salsabila et al., 2022). Through this strategy, students are able to engage in learning experiences that are more optimal, adaptive, and meaningful (Amalia & Gunawan, 2023), while simultaneously reinforcing humanistic values within the educational process (Sista & Budiman, 2020).

Empirical studies that specifically integrate deep learning and differentiated

instruction within the context of pesantren-based SMP remain relatively limited. Therefore, this study aims to explore the effectiveness of integrating these two approaches in developing an adaptive, contextual, and transformational learning model both cognitively and spiritually. The findings of this research are expected to contribute theoretically to the development of holistic learning models and offer practical recommendations for improving the quality of education in faith-based educational institutions in Indonesia.

2.   Method

This study employs a descriptive qualitative approach aimed at exploring the implementation strategies of deep learning and differentiated instruction in junior secondary schools (SMP) based in Islamic boarding schools (pondok pesantren). This approach is chosen for its capacity to provide an in-depth understanding of pedagogical processes and policy dynamics within the pesantren education context, which is characterized by its distinctive curriculum, values, and institutional culture.

A.   Research Subjects and Setting

This research was conducted at three junior secondary schools (SMP) affiliated with Islamic boarding schools (pondok pesantren) located in the provinces of Central Java and the Special Region of Yogyakarta (DIY). These schools have implemented elements of innovative teaching and learning practices. The selection of research sites was carried out purposively based on the following criteria:

1) Integration of the national curriculum with a religious curriculum.
2) Implementation of project-based learning and/or differentiated instruction.
3) Willingness to provide the researcher with access for observation and interviews.

B.   Data Collection Techniques

Data were collected using the following techniques:

(a) In-depth interviews: Conducted with school principals, core subject teachers (Mathematics, Indonesian Language, Islamic Education), and curriculum coordinators. These interviews aimed to explore perceptions, experiences, and challenges related to the implementation of deep learning and differentiated instruction.
(b) Non-participant observation: Carried out during classroom activities to document the actual practices of instructional strategies and the forms of assessment employed.
(c) Document analysis: Included curriculum documents, instructional tools (lesson plans, modules), student assessment results, and internal school policies that support the implementation of innovative learning approaches.

C.   Data Analysis Techniques

Data were analyzed thematically through the following stages:

1) Data reduction: Selecting relevant data from interview transcripts, classroom observations, and document analysis.
2) Categorization: Grouping the data based on key themes: (a) instructional strategies, (b) the role of teachers, (c) evaluation systems, and (d) supporting policies.
3) Conclusion drawing: Conducted inductively by identifying patterns and relationships among the themes.

Data validity was ensured through source and method triangulation, as well as member checking with key informants to confirm the credibility of the researcher's interpretations.

D.   Research Instruments

The primary instrument in this study was the researcher, in accordance with the nature of qualitative research. The interview guidelines were developed based on a literature review and the conceptual framework concerning deep learning, differentiated instruction, and pesantren-based education.

3.   Result and Discussion
A.   Implementation Strategies

In the context of junior secondary schools (SMP) based in Islamic boarding schools (pondok pesantren), the implementation of deep learning and differentiated instruction strategies should be positioned as a strategic effort to integrate academic achievement with the development of religious character. The deep learning approach encourages the use of project-based learning, reflective discussions, and collaborative activities that enable students to construct knowledge through authentic and meaningful learning experiences (Barron & Darling-Hammond, 2008; Bell, 2010; Thomas, 2000).

Within the pesantren environment, this approach can be adapted through interdisciplinary projects, such as Islamic ethics-based entrepreneurship or scientific inquiries that incorporate ayat-ayat kauniyah (verses related to natural phenomena) as the foundation for scientific exploration (Salsabila et al., 2022). This strategy fosters a synergy between intellectual competence and spiritual awareness within an integrated learning experience.

As an illustration, Figure 1 presents the perceived effectiveness levels reported by teachers regarding various instructional strategies implemented in pesantren-based SMPs. The data were obtained through a teacher perception survey on the effectiveness of these approaches in promoting student engagement and improving learning outcomes.
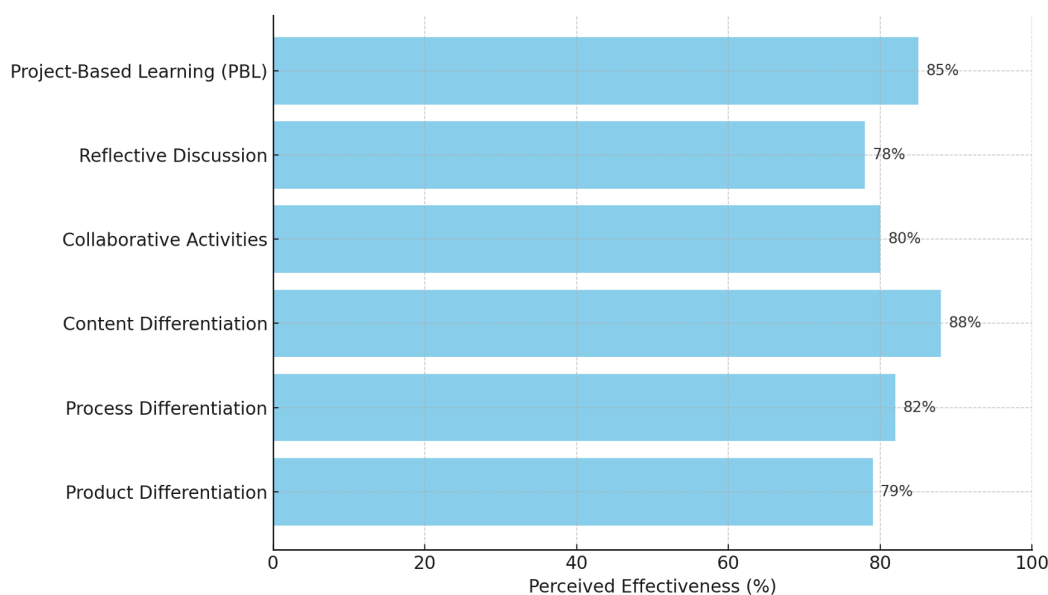

Figure 1. Teachers' Perception of the Effectiveness of Learning Strategies in Pesantren-Based Junior High Schools

Figure 1 indicates that content differentiation strategies (88%) and project-based learning (85%) received the highest effectiveness ratings, followed by collaborative activities (80%) and process differentiation (82%). Reflective discussions also showed positive outcomes (78%), while product differentiation (79%) was considered

moderately effective, though still requiring further strengthening in its implementation. These findings affirm that teachers recognize the importance of adaptive, contextual, and participatory approaches in improving the quality of learning within the pesantren environment.

Differentiated instruction becomes increasingly relevant given the heterogeneous characteristics of students in pesantren-based settings. This strategy emphasizes adapting the learning process to students' readiness, cognitive styles, and religious backgrounds (Heacox, 2002). Its application includes flexible grouping, learning contracts, and offering students choices in tasks and assessments (Tomlinson & Imbeau, 2010; Algozzine & Anderson, 2007), allowing teachers to more effectively respond to individual student needs.

However, the successful implementation of both deep learning and differentiated instruction requires strong managerial support, particularly in terms of scheduling, teacher-student ratios, and ongoing professional development. As noted by Efendy (2022) and Rigianti (2022), well-

designed strategies are unlikely to be effectively realized without institutional policy backing and solid collaboration among school administrators, pesantren caretakers, and the broader educational community.

B. The Role of Teachers and Professional Readiness

Teachers play a pivotal role in determining the success of implementing deep learning approaches and differentiated instruction. In the context of deep learning, teachers are not merely transmitters of knowledge but also serve as learning facilitators who design challenging and contextualized activities to foster deep understanding (Barron & Darling-Hammond, 2006). Teachers must encourage students to think critically, reflect on their understanding, and apply knowledge to real-life situations. Moreover, in the pesantren (Islamic boarding school) context, teachers are also expected to integrate Islamic values into the learning process to ensure a balance between cognitive achievement and the development of spiritual character (Efendy, 2022).
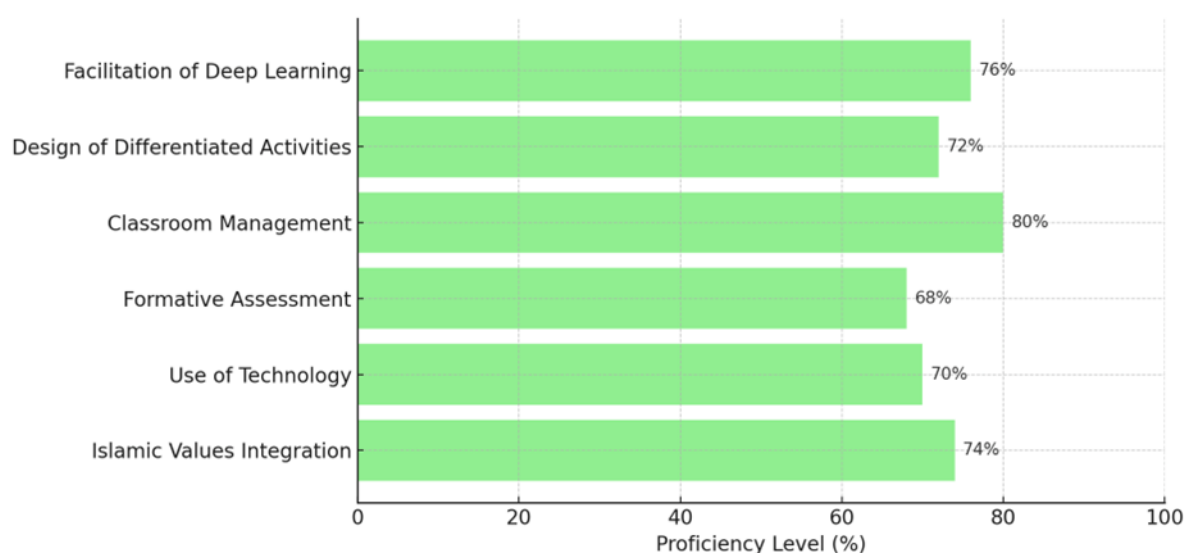

Figure 2. Teacher Competency Levels in Implementing Deep Learning and Differentiated Instruction

As shown in Figure 2, the highest competencies possessed by teachers are

Classroom Management (80%) and Facilitation of Deep Learning (76%).

However, their proficiency in Formative Assessment (68%) and Use of Technology (70%) remains relatively low. This indicates that while teachers are fairly well-prepared in terms of classroom management and general instructional approaches, they still require further training in the areas of assessment and the effective use of technology. Competence in Islamic Values Integration (74%) also underscores the importance of spiritual aspects as an integral part of professional readiness for teachers in pesantren-based schools.

In addition to competencies, teachers also face various challenges in implementing these innovative approaches. Figure 3 illustrates the main challenges reported by teachers in Islamic boarding school-based institutions.
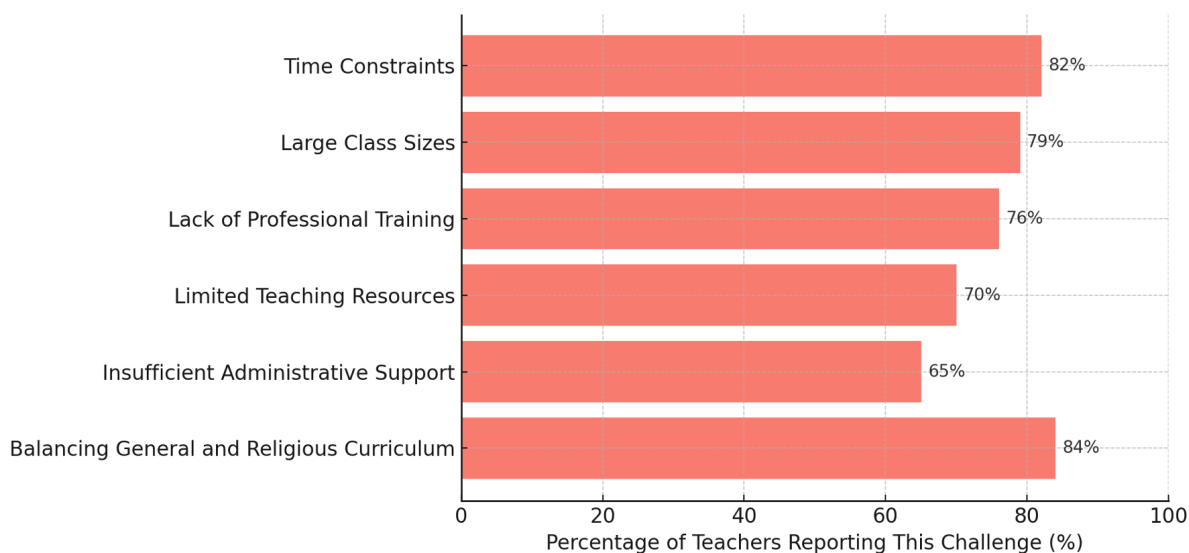

Figure 3. Challenges Faced by Teachers in Implementing Deep Learning and Differentiated Instruction

The results presented in Figure 3 indicate that Balancing the General and Religious Curriculum (84%) and Time Constraints (82%) are the two most significant challenges faced by teachers. Other challenges such as Large Class Sizes (79%) and Lack of Professional Training (76%) also pose substantial barriers. These findings suggest that time limitations, the complexity of the curriculum structure, and the lack of professional development support are critical factors hindering the effective implementation of deep learning and differentiated instruction.

Therefore, there is a pressing need for continuous professional development strategies for teachers, encompassing technical training, pedagogical mentoring, and institutional support from school management. The synergy between individual capacity building and structural reform is essential to achieving transformative and contextually relevant 21st-century learning.

C. Learning Evaluation

Evaluation is an integral element in the implementation of deep learning and differentiated instruction, particularly within Islamic boarding school-based educational institutions. In the deep learning approach, evaluation is not merely used to measure final outcomes, but also functions as a formative process that supports deep understanding, critical reflection, and the transfer of knowledge to real-life contexts (Black & Wiliam, 2010; Shepard, 2000; Torre-Neches et al., 2020). Project-based assessments, portfolios, and reflective journals have become increasingly relevant methods, as they encourage students to evaluate, integrate,

and communicate ideas independently and contextually.

Meanwhile, differentiated instruction requires an evaluation system that is responsive to the diverse needs of students. Teachers must be able to adapt the forms, instruments, and criteria of assessment to match each learner's profile (Tomlinson, 2001; Wormeli, 2006; Tierney & Charland, 2007). This approach reinforces the principle of inclusivity in assessment and allows students to demonstrate their achievements through a variety of evaluative formats aligned with their strengths and interests (Gold-Veerkamp et al., 2018; Ramdani et al., 2022).

Tabel 1. Types, Frequency, and Characteristics of Learning Evaluation Methods

Type of Evaluation	Usage Frequency (%)	Evaluation Characteristics
Written Test (Standardized)	90	Standardized, summative, focused on factual recall
Project-Based Assessment	68	Authentic tasks, real-world problem solving, interdisciplinary
Portfolio Assessment	55	Cumulative student work, growth over time, self-assessment
Reflective Journals	45	Self-reflection, personal growth, metacognitive awareness
Peer Evaluation	38	Peer feedback, collaboration, social learning
Observation-Based Rubric	62	Behavioral observation, rubric-based, holistic perspective

As shown in Table 1, conventional forms of evaluation such as written tests still dominate, with a usage frequency of 90%. Although these methods are easy to implement and standardized, they tend to assess only short-term memory and are limited in capturing conceptual understanding. In contrast, more constructive methods such as project-based assessment (68%) and portfolio assessment (55%) are increasingly being utilized to support higher-order thinking skills, although their implementation remains suboptimal. Reflective and collaborative forms of evaluation, such as reflective journals (45%) and peer evaluation (38%), are still rarely applied due to the greater demands on time, training, and planning.

To support this analysis, Figure 4 illustrates the relative contributions of various forms of assessment to the development of five key competencies in 21st-century learning.
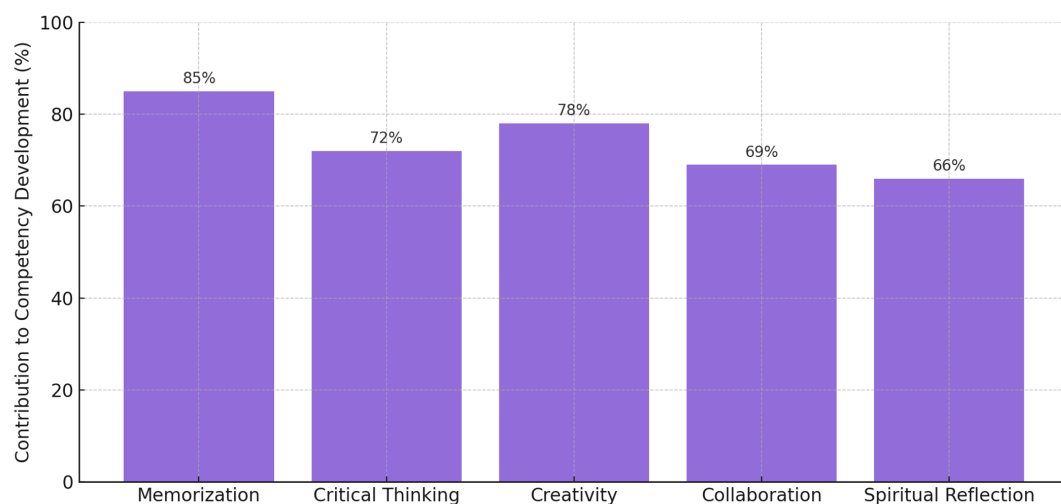
Figure 4. Evaluation Methods and Their Contribution to Key Competencies

The interpretation of Figure 4 reveals that standardized assessments are highly effective in developing memorization skills (85%), but their contributions to critical thinking, creativity, and collaboration are relatively limited. In contrast, project-based and portfolio assessments make significant contributions to the development of creativity (78%) and critical thinking (72%), while reflective journals play a notable role in fostering spiritual reflection (66%)—a competency highly relevant in the context of pesantren-based education.

Nevertheless, the implementation of formative and holistic evaluation still faces several challenges in practice. Time constraints due to the dual curriculum (general and religious), teachers' administrative burdens, and the lack of training on alternative assessments remain key obstacles that require special attention from school management and policymakers (Efendy, 2022; Abidin, 2022).

To address these challenges, schools must design integrated and contextual assessment systems that evaluate not only academic achievement but also students' affective and spiritual dimensions. Teachers should be empowered with diverse assessment tools and supported through continuous professional development and flexible evaluation policies. Only through a transformative and comprehensive evaluation approach can pesantren-based education produce learners who are intellectually excellent, possess strong character, and embody authentic religious values.

D. Policy Implementation

Although the deep learning approach and differentiated instruction hold great potential for enhancing the quality of education in pesantren-based junior high schools, national education policies have not yet fully aligned with these principles. Most regulations still emphasize the attainment of national academic standards and cognitive performance indicators, without providing sufficient flexibility for educational institutions to adapt instructional approaches based on local contexts and institutional characteristics (Liu & Guo, 2020).

Tabel 2. Alignment of National Policies with the Needs of Pesantren-Based Education

Policy Reference	Focus of Policy	Alignment with Deep Learning/Differentiation
UU No. 20 Tahun 2003 (Sisdiknas)	National education framework emphasizing academic outcomes	Low, Focus on content mastery and national standards
Permendikbud No. 37 Tahun 2018	Basic competency standards and assessment guidelines	Low, Rigid learning outcomes, limited flexibility
KMA No. 183 Tahun 2019	Curriculum structure for Islamic education	Medium, Supports religious integration but not pedagogical innovation
PP No. 55 Tahun 2007	Religious education governance in pesantren	Medium, Relevant for pesantren values, limited pedagogical scope
RPP Kurikulum Merdeka	Student-centered curriculum with flexibility	High, Promotes student agency, differentiation, project-based learning

Table 2 illustrates the extent to which current national policies accommodate the unique needs of pesantren-based educational institutions, particularly in the implementation of deep learning and differentiated instruction.

Based on Table 2, it can be concluded that policies such as Permendikbud No. 37 of 2018 and Law No. 20 of 2003 show a low level of alignment, as they remain overly focused on rigid learning outcome standards and provide limited space for contextualized learning approaches. Meanwhile, KMA No.

183 of 2019 and Government Regulation No. 55 of 2007 offer a framework for the integration of religious values but have not explicitly supported pedagogical innovation. On the other hand, the Merdeka Curriculum Lesson Plan (RPP) demonstrates a high level of alignment, as it allows for flexible

instruction, collaborative projects, and differentiated learning.

Recognizing the gap between policy and practice, there is a need for policy reforms that are adaptive and context-sensitive, enabling pesantren-based schools to more effectively implement 21st-century transformative learning.

Tabel 3. Strategic Policy Recommendations for Supporting Deep Learning and Differentiation in Pesantren-Based Schools

Policy Domain	Strategic Recommendation	Expected Impact
Teacher Professional Development	Provide contextualized training on deep learning and differentiated instruction	Improved teacher readiness and instructional quality
Curriculum Flexibility	Allow integration of academic and religious subjects with flexible learning paths	Enhanced relevance and meaning of learning for students
Assessment Reform	Incorporate authentic and formative assessment aligned with pesantren values	Balanced evaluation of cognitive, affective, and spiritual domains
Resource Allocation	Ensure equitable access to pedagogical materials and ICT support	More inclusive and effective learning environments
Institutional Autonomy	Empower schools with governance capacity tailored to pesantren context	Greater responsiveness and sustainability in implementation

Table 3 summarizes five strategic policy areas that need to be strengthened to support the implementation of transformative learning within pesantren-based educational environments, along with recommended actions and the expected impact.

As shown in Table 3, the key areas requiring attention include teacher professional development, curriculum flexibility, and assessment system reform. These three domains form the foundation for the implementation of holistic and contextual learning. Policy support for equitable resource allocation and the empowerment of pesantren's institutional autonomy are also essential prerequisites for the successful and sustainable implementation of transformative education.

Overall, national education policies must shift from a standardized, one-size-fits-all paradigm toward a more student-centered, flexible, and values-based approach. This transformation is crucial to ensure that pesantren-based institutions not only produce academically competent learners, but also

spiritually grounded individuals who are adaptive to change and capable of competing on a global scale without losing their Islamic identity.

4. Conclusion

The findings of this study indicate that the implementation of deep learning approaches and differentiated instruction in junior high schools (SMP) based on Islamic boarding schools (pesantren) makes a significant contribution to fostering meaningful, adaptive learning that emphasizes both spiritual character development and 21st-century competencies. Project-based learning strategies, reflective discussions, and collaborative activities have been shown to promote deeper knowledge construction, particularly when contextualized with Islamic values. Differentiated instruction further enhances this approach by providing flexibility in content, process, and assessment responding to the diverse readiness levels,

interests, and learning styles of students in the pesantren environment.

The success of implementation largely depends on teachers' professional readiness, which includes pedagogical competence, a deep understanding of Islamic values, and skills in managing formative assessment and reflective learning. Authentic and holistic evaluation is essential for assessing students' comprehensive development, encompassing cognitive, affective, and spiritual dimensions.

Key challenges include time constraints, the demands of a dual curriculum, and educational policies that have yet to fully accommodate these transformative appro-aches. Therefore, more adaptive and context-sensitive education policies are needed, including continuous professional develop-ment for teachers, curriculum flexibility, assessment system reform, and the empowerment of pesantren based institutions.

With the right policy support and sustained implementation, deep learning and differentiated instruction have the potential to become foundational pillars in advancing Islamic education that is excellent, holistic, and responsive to the demands of the 21st century.

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