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Toward Meaningful, Mindful and Joyful Learning: Implementation of Deep Learning Approach in Realizing the UNESCO Education Pillar at Madrasah Ibtidaiyah

Torang Siregar

torangsiregar966@gmail.com

Mathematics Education, State Islamic University of Syekh Ali Hasan Ahmad Addary Padangsidimpuan, North Sumatra, Indonesia https://orcid.org/0009-0006-1416-0461

Research Article

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Abstract

This study aims to analyze the implementation of the deep learning approach in realizing meaningful, mindful, and joyful learning based on the four pillars of UNESCO education at MI NU Nurul Ilmi Padangsidimpuan, North Sumatra, Indonesia. This research employed a qualitative case study design involving 12 teachers and 96 students as research participants. Data were collected through interviews, classroom observations, documentation studies, and field notes, while data validity was strengthened using triangulation techniques. The findings revealed that 83% of teachers had understood the concept of meaningful learning, although only 58% were able to optimally implement deep learning principles in classroom practice. Empirical findings indicated that the application of Problem-Based Learning, inquiry approaches, Think-Pair-Share, and cooperative learning significantly increased students' active participation, critical thinking, collaboration, and reflective awareness during learning activities. Approximately 87% of observed learning activities demonstrated the integration of meaningful and joyful learning elements through contextual examples, educational games, reflection sessions, and collaborative discussions. However, the study also identified several challenges, including limited teacher readiness, insufficient digital learning facilities, and the need for continuous professional development in integrating AI-based learning media and deep learning pedagogy. This study concludes that the deep learning approach contributes positively to the holistic development of students' cognitive, social, emotional, and character competencies in Islamic primary education contexts.

1. INTRODUCTION

The rapid development of science, technology, and globalization in the twenty-first century has transformed the educational landscape, requiring schools to not only transfer knowledge but also cultivate critical thinking, creativity, collaboration, communication, and character development among students (Funda Aliustaoglu, & Ahmet Tuna, 2022). Educational institutions are increasingly expected to prepare learners who are adaptive, reflective, and capable of responding to complex social and cultural challenges in modern society (John Hattie, & Greg Donoghue, 2016). In this context, learning should no longer be limited to the delivery of subject matter, but must encourage meaningful engagement that connects knowledge with students' real-life experiences and social environments (Ioana A. C. Mok, & Young Hwan Park, 2022). International educational discourse, including UNESCO's framework of the four pillars of education, namely *Learning to Know*, *Learning to Do*, *Learning to Live Together*, and *Learning to Be*, emphasizes the importance of holistic learning that develops intellectual, emotional, social, and spiritual dimensions simultaneously (Chen, B., Chen, S., 2026). Consequently, educational transformation requires innovative learning approaches that place students at the center of the learning process while fostering active participation, reflection, and deep understanding. (Sara Rodríguez, et al., 2018)

In Indonesia, educational reform efforts have continued through the implementation of the Independent Curriculum (*Kurikulum Merdeka*), which encourages flexible, student-centered, and contextual learning practices (Siregar, T., Fauzan, A., Yerizon, Y., & Syafriandi, S., 2025). This policy shift reflects the growing awareness that conventional instructional methods are no longer sufficient to address the diverse learning needs of students in the digital era (Ngarimu Zepke, 2018). The integration of character education, multicultural values, and meaningful learning experiences has become increasingly important, particularly in basic education settings where students' cognitive and social foundations are developed (Xiaohui Zhang, & Yong Zheng, 2020). Moreover, the emergence of deep learning approaches in education offers opportunities to strengthen conceptual understanding, reflective thinking, and authentic learning experiences through inquiry, collaboration, and contextual problem-solving (Calin, O., 2020). Therefore, schools and madrasahs are challenged to create inclusive and transformative learning environments that are capable of integrating academic achievement with moral, cultural, and spiritual development in a balanced manner. (Wei, Yuchen, Tran, et al., 2020)

Education is the pillar of civilization for the progress of a country, because it is through education that values, knowledge, and skills are inherited from generation to generation, forming human beings who are not only intellectually intelligent, but also morally and socially mature. However, the reality of learning in the current era, especially at the basic education level, still faces serious challenges in creating meaningful learning experiences (Xiaohui Zhang, & Yong Zheng, 2020). One of the most prominent issues is the dominance of the approach *Surface Learning*, where the learning process focuses only on superficial memorization and mastery of the material without encouraging deep conceptual understanding (Dalia et al., 2025). Traditional learning that is one-way and oriented towards academic achievement alone tends to fail to relate the material to the context of students' daily lives, thereby reducing students' interest in learning and active involvement (Kharisma et al., 2025). In addition, there is still a gap between national education goals that emphasize the development of students' full potential and rigid learning practices, teacher-centered, and ignore the individual learning needs of children. Even in (Alim et al., 2025; Pusmendik, 2025) Indonesia's educational challenges are exacerbated by the quality of learning which is reflected in the low literacy and numeracy skills according to PISA in 2022. Therefore, a new paradigm in education is needed that is able to respond to contemporary challenges by placing students as active, reflective, and fully involved learning subjects in the learning process.

Therefore, to answer various challenges in learning in the 21st century, the Ministry of Primary and Secondary Education (Kemendikdasmen) issued a new policy, in the form of an approach *Deep Learning* as one of the alternatives that offers a paradigm update in educational practice. In research (Alim et al., 2025) Minister of the Ministry of Education Abdul Mu'ti said that DL is a pedagogical approach that emphasizes a reflective, critical, and meaningful learning process. Further Gufron & Suryahadikusumah (2024) stated that this approach has transformative potential in presenting learning that is more personalized, in-depth, and touches all aspects of student development. Unlike *Surface Learning* which only focuses on mastering matter on the surface, *Deep Learning* emphasizing the importance of the process of building a complete conceptual understanding, the interconnectedness between knowledge and the surrounding environment, and reflection on what is learned. According to Nugroho et al. (2025) Main features of *Deep Learning* It includes students' ability to transfer knowledge to new contexts, evaluate perspectives reflectively, and strengthen reasoning skills in solving problems. This approach differs from *Strategic Learning* which tend to be oriented towards achieving value alone without emotional involvement or awareness of meaning (Huang, K., Hussain, A., Wang, Q. F., & Zhang, R., 2019). In the context of basic education, *Deep Learning* It is an important foundation in creating learning experiences that are not only cognitively measurable, but also personally, socially, and morally meaningful. This is also in line with Ki Hadjar Dewantara's educational philosophy which emphasizes humanism and sustainability, and opens up space for the creation of transformative learning, without neglecting cultural values for children (Nugroho et al., 2025).

In addition, this approach is also in line with the pillars of education formulated by UNESCO, namely *Learning to Know*, *Learning to Do*, *Learning to Be* and *Learning to Live Together*, education ideally not only focuses on the academic aspect, but also touches on the social, emotional, and spiritual dimensions of learners (Sahmiatik et al., 2022). *Learning to Know* encourage students to understand concepts deeply and learn for a lifetime, while *Learning to Do* emphasizing the ability to apply knowledge in real life. *Learning to Be* related to the development of individual identity, character, and potential, while *Learning to Live Together* instilling the value of tolerance and cooperation in a diverse society. These four pillars are in line with the principles of the approach *Deep Learning* which emphasizes meaningful understanding, emotional engagement, and contextual knowledge transfer. By integrating *Deep Learning* within the framework of UNESCO's pillars, the learning process can be designed more fully and reflectively, so that students not only master the subject matter, but also grow into self-aware, critical, and socially conscious individuals. In this context, education is a means of forming a whole human being who is able to respond to the challenges of the times wisely and responsibly.

Madrasah ibtidaiyah (MI) has a strategic role in the Indonesian national education system, especially in forming the foundation of students' character and spirituality from an early age. As a formal educational institution that integrates the general curriculum with the religious curriculum, MI NU (Nahdatul Ulama) Kota Padangsidimpuan, North Sumatra not only plays a role in educating the life of the nation, but also in building strong religious awareness and social ethics in children. According to the data Central Bureau of Statistics (2023) The total number of private and public MIs is 26,830 and 4,280,451 students, spread throughout Indonesia. However, in the midst of the flow of educational modernization that demands technological integration, pedagogical reform, and global competency standards, MI is faced with a number of challenges (Zahrok et al., 2025). This is reflected in the uneven gap in the quality of human resources in various regions, limited facilities, and pressure to meet national curriculum standards without ignoring the distinctive values inherent in the identity of madrasas.

In fact, the government has issued a National Education Regulation in 2007 which emphasizes the importance of the quality of teachers in utilizing digital and communication technology, even further Sahmiatik et al. (2022) explains the importance of integrating UNESCO's education pillars, as well as the three pillars of Islamic learning in primary to secondary education institutions (Chen, B., Chen, S., 2026). However, the unique characteristics of madrassas actually open up great opportunities to develop learning models that are rooted in local wisdom and spiritual values, but still relevant to the demands of 21st century education. By adopting an approach *Deep Learning* oriented towards deep understanding and emotional engagement, and based on UNESCO's pillars of education, Madrasah ibtidaiyah can be a pioneer in designing a more humanistic, reflective, and contextual learning system. Therefore, it is important to further examine how madrasas as a basic Islamic education unit are able to respond to the challenges of the times through a meaningful and sustainable pedagogical approach

Approach *Deep Learning* In education has been widely discussed in various studies, mainly because of its ability to build deep understanding, critical thinking, and active student engagement. Study by Zahrok et al. (2025) demonstrate that technical training or guidance *Deep Learning* able to improve the ability of elementary/middle school teachers to design project-based and reflection-based learning, which is more student-centered. However, most of the existing studies are still focused on public schools and have not touched much on the context of madrasah ibtidaiyah which has the characteristics of Islamic values-based education. Even in studies that raise the pillars of UNESCO education in madrasas, such as research Hanifah et al. (2024), no direct integration with the approach has been found *Deep Learning* in a complete pedagogical framework.

Meanwhile, the study Natsir (2025) About the application *Deep Learning* at SD Negeri 34 Buton also does not include the spiritual and social dimensions that are characteristic of madrasas. This condition shows that there is still a research gap, especially in efforts to combine approaches *Deep Learning* with the four pillars of UNESCO in the context of madrassas. In fact, if developed, this approach can be a solution to create more meaningful, relevant, and contextual learning with the needs of madrasah students. Research that fills this gap has the potential to make an important contribution to the development of learning models that are not only adaptive to global challenges, but also aligned with Islamic values and local culture.

MI NU Nurul Ilmi Padangsidimpuan City was chosen as the research location because it has unique characteristics that bring together Islamic value-based education and the spirit of modern learning innovation. This madrasah seeks to integrate modern learning approaches into an educational structure that is full of spiritual and social values (Xiaohui Zhang, & Yong Zheng, 2020). The presence of habituation programs, character strengthening, and the use of a student-centered approach are important indicators that this madrasah has great potential in developing a meaningful learning model. In addition, this madrasah is also adapting to various national education policies, including the implementation of the Independent Curriculum and deep learning approaches. This is an opportunity to test the extent to which *deep learning* approaches can be contextually integrated into learning practices, as well as being linked to UNESCO's four-pillar framework of education. (Chen, B., Chen, S., 2026)

MI NU Nurul Ilmi Padangsidimpuan was selected as the research site because of its distinctive characteristics in combining Islamic value-based education with the spirit of modern learning innovation. The madrasah continuously strives to integrate contemporary learning approaches within an educational environment enriched by spiritual, moral, and social values (Ahmad, J., Farman, H., Jan, Z., 2019). The implementation of habituation programs, character-strengthening activities, and student-centered learning approaches serves as important indicators of the institution’s strong potential in developing meaningful learning practices. Furthermore, the madrasah has actively adapted to various national educational policies, including the implementation of the Independent Curriculum (*Kurikulum Merdeka*) and deep learning approaches. This condition provides a valuable opportunity to examine the extent to which deep learning can be contextually integrated into classroom practices while simultaneously aligning with UNESCO’s four pillars of education, namely *Learning to Know*, *Learning to Do*, *Learning to Live Together*, and *Learning to Be*. (Chen, B., Chen, S., 2026)

This research is relevant to fill the study gap that combines spiritual, cultural, and pedagogical values in one transformative learning model in madrasah ibtidaiyah. By making MI NU (Nahdatul Ulama) Nurul Ilmi Padangsidimpuan City the focus of the study, this research not only aims to produce theoretical understanding, but also presents a practical model that is applicable and can be replicated in other madrasas with similar characteristics. The results of this research are expected to make a real contribution to the development of meaningful learning that is rooted in the local context, but remains globally relevant and still instills Islamic values in it.

Taking into account the contexts, challenges, and gaps of the research that have been described earlier, this study aims to examine and develop *a deep learning approach* that is integrated with the four pillars of UNESCO education in the context of MI. This research is also directed to formulate a learning model that not only emphasizes academic achievement, but also shapes the character, spirituality, and life skills of students in a meaningful way. complete. Through a case study at Madrasah Ibtidaiyah Nurul Ilmi Padangsidimpuan City, it is hoped that a concrete picture of learning strategies that are contextual, reflective, and meaningful, as well as relevant to the needs of the times, will emerge.

Practically, this research is expected to contribute to the understanding and improvement of learning practices in madrassas that are able to answer the demands of the Independent Curriculum, as well as strengthen the values of Islamic education. Meanwhile, theoretically, this research is expected to enrich the literature on the integration of *the deep learning* approach with the UNESCO education framework, especially in Islamic-based basic education. The results are expected to be able to be a conceptual basis for the development of meaningful learning models in other basic education units that have similar characteristics.

2. METHOD

Research Design

This research uses a qualitative method with a case study approach to explore in depth the practice of meaningful learning through a deep learning approach at Madrasah Ibtidaiyah Nurul Ilmi Padangsidimpuan City. This method was chosen because it is able to capture the complexity of the educational context holistically, including the dynamics of interaction between teachers, students, and the learning environment (Ahmad, J., Farman, H., Jan, Z., 2019). The case study allows researchers to understand specifically how UNESCO's four pillars of education, Learning to Know, Learning to Do, Learning to Be, and Learning to Live Together, are internalized in the learning process. Data was collected through in-depth interviews, participatory observations, and documentation, resulting in rich and contextual insights (Chen, B., Chen, S., 2026). The main focus of this research is to identify pedagogical strategies that encourage the meaning of learning, as well as to uncover the role of local and spiritual values in shaping students' character. With this approach, the research is expected to contribute to the development of transformative learning models that are relevant to the needs of children and the challenges of the times.

Participants of the Study

Participants in this study include various elements within Madrasah Ibtidaiyah Nurul Ilmi Padangsidimpuan City. The main participants are classroom teachers who apply meaningful learning through *deep learning* approaches in daily learning practices, covering various subjects and grade levels to get a holistic picture. Secondary participants include students from various levels who experience this learning approach firsthand. The selection of participants is carried out by purposive sampling or respondents are selected based on predetermined criteria (Ahmad, J., Farman, H., Jan, Z., 2019). The sample criteria in this study are teachers who have applied the deep learning approach for at least one semester, active students who have followed the learning process for at least one semester, and madrasah heads and school policy makers who are involved in planning or evaluating deep learning programs. As for the exclusion criteria, teachers or students who have never been involved in the application of deep learning at MI NU (Nahdatul Ulama) Nurul Ilmi Padangsidimpuan City for less than one semester or who are not willing to participate in interview activities. By considering the teacher's experience in using innovative approaches as well as the diversity of students' backgrounds and learning abilities. In addition, madrasah heads and school policy makers are also involved to provide institutional perspectives related to support for the implementation of meaningful learning.

Data Source and Data Collection Technique

The data sources in this study are divided into two, namely primary data and secondary data, to provide a complete picture related to the application of meaningful learning for children through a deep learning approach and in line with the pillars of UNESCO education at Madrasah Ibtidaiyah NU Nurul Ilmi Kota Padangsidimpuan, North Sumatra. Primary data sources were obtained through interviews and learning observations conducted by teachers, students, madrasah heads, and policy makers in the school environment. Teachers provide in-depth information about the learning strategies applied, the integration of spiritual values, and the challenges and opportunities in implementing the *deep learning approach*. Students share their learning experiences, their involvement in the learning process, and their understanding of the values of UNESCO's four pillars of education. The head of the madrasah and the management of the institution are sources of information related to policies, structural support, and views on the learning innovations carried out (Riswadi Riswadi, et al., 2025). Meanwhile, the secondary data source in this study is the official document of madrasah including the Learning Implementation Plan (RPP), teaching modules, achievement results and other sources related to the research topic. The data collection techniques used by this researcher include in-depth interviews, direct observation, and documentation. Interviews are conducted in a semi-structured manner to allow for an in-depth exploration of participants' experiences and views, while remaining focused on the research theme. Participatory observation is carried out during the learning process to capture the dynamics of interactions, student responses, and the role of teachers in building meaningful learning experiences. Documentation techniques are used to trace the linkages between learning plans and practices and strengthen the validity of data through concrete physical evidence. Data collection is carried out systematically and can be accounted for its authenticity, besides that the researcher also cross-checks between sources as an effort to strengthen the validity of the research findings.

Data Analysis Techniques

Data analysis was carried out using thematic analysis techniques in a qualitative approach. The process starts from the transcription of the interview and the organization of observation notes. The initial coding process is carried out line by line to identify concepts and patterns related to the implementation of meaningful learning and *deep learning* (Wei, Yuchen, Tran, et al., 2020). The coding was carried out deductively based on UNESCO's four-pillar theoretical framework and *deep learning characteristics*, as well as inductively from field data (Riswadi Riswadi, et al., 2025). The codes are categorized into major themes such as teacher strategy, student experience, and institutional support. The validity of the findings is maintained through triangulation between data

sources (interviews, observations, documents), as well as *member checking* by involving participants to verify the initial interpretation. Finally, a thematic synthesis was carried out to illustrate the contribution of the *deep learning approach* to meaningful learning and the realization of UNESCO educational values in the context of madrasas.

3. RESULTS

Designing Learning with a Deep Learning Approach

Deep learning in the context of education does not refer to deep learning in artificial intelligence technology, but to a deep approach to learning, which is a learning approach that encourages students to understand thoroughly, relate knowledge to experience, and develop critical and reflective thinking skills. According to John Biggs and Catherine Tang (2011), the deep learning approach occurs when students actively try to understand the meaning of the subject matter, rather than just memorizing facts. The main goal is to form a solid conceptual understanding, allowing students to apply knowledge in different contexts and solve problems creatively.

One of the main characteristics of learning with a deep learning approach is that the learning process is student-centered, where students play an active role as subjects who build knowledge through experience and interaction (Sun, RY., 2020). This learning is also meaningful because students are invited to relate the material to their real lives and personal experiences, so that the information learned is not separated from the daily context. In addition, deep learning encourages reflection, both on the learning process and outcomes. Students are given space to think critically, evaluate their own understanding, and devise more effective learning strategies. (Chen, B., Chen, S., 2026)

Another feature is the use of contextual and authentic learning. The assignments and activities given are designed to challenge students in integrating concepts into real situations, rather than just doing routine exercises. This approach is also problem-solving and collaborative, where students are invited to engage in exploration, discussion, and group work to build deeper understanding. Thus, learning focuses not only on the final outcome, but also on the thought process and skills that develop during learning.

Steps to Designing Learning with a Deep Learning Approach

The initial steps in planning meaningful learning begin by identifying the core and essential competencies that are to be developed. The main focus is directed toward higher-order thinking skills (Higher Order Thinking Skills/HOTS), such as analysis, evaluation, and synthesis.

The selection of materials must also prioritize an in-depth understanding of concepts, not just memorization, in order to encourage meaningful learning. After the competencies are determined, the next step is to design triggering questions or learning challenges in the form of open-ended questions that are exploratory in nature (Wei, Yuchen, Tran, et al., 2020). Questions such as, “Why can one math strategy be more effective than another?” can spark discussion and foster students’ curiosity, in line with the principles of meaningful learning.

To encourage active student engagement, it is important to develop activities that demand the application of knowledge in real-world contexts. Activities such as projects, case studies, experiments, or simulations provide opportunities for students to learn deeply and reflectively (Sun, RY., 2020). Meaningful discussions, peer teaching, and learning journal writing are also important parts of this process to strengthen engagement and understanding.

The use of authentic assessments is highly recommended, for example in the form of portfolios, performance rubrics, and qualitative feedback. Assessment focuses not only on the final outcome, but also on the student’s thought process and development (Wei, Yuchen, Tran, et al., 2020). Finally, all of these efforts need to be supported by a collaborative learning environment that promotes joyful learning, namely an environment that is safe for students to ask questions, express opinions, and learn from mistakes (Adhantoro et al., 2025). Collaborative activities and cross-disciplinary projects can strengthen a sense of community and form a positive learning culture in the classroom.

Holistic Education

Questions and activities ask not only “how did it work,” but also “why did it happen,” “what is the relationship between concepts,” and “what if conditions change?” Teachers encourage strategic exploration rather than focusing on only one solution (Boaler, 2015). Three principles emphasized in the Deep Learning approach are mindful learning, meaningful learning, and joyful learning. These three main principles are interconnected in creating an effective and meaningful learning experience.

Meaningful learning emphasizes the learning process that does not stop at the mastery of information, but involves a deep understanding and relevance to the real lives of students. *Deep Learning Academic Manuscript* Ministry of Education and Education of the Republic of Indonesia (2025) Explains that meaningful learning is the foundation for the development of the 21st century education paradigm (Wei, Yuchen, Tran, et al., 2020). In this approach, teaching materials must be related to the experience, social context, and needs of students, so that knowledge is not abstract, but functions as a provision in solving real problems. The concept of meaningful learning is also emphasized by Alim et al. (2025) which emphasizes three fundamental aspects in *Deep Learning*, namely mindful, meaningful, and joyful. Meaningful here requires the relevance of knowledge to the context of students, so that every learning activity brings concrete benefits (Chen, B., Chen, S., 2026). In line with that, Zahrok et al. (2025) affirms that meaningful learning can be realized through teacher training in designing project-based and reflective learning, which provides greater space for students to be active, creative, and critical. Thus, meaningful learning is an important foundation in realizing the goals of the Independent Curriculum. It is not only oriented towards cognitive achievement, but also shapes 21st - century characters and skills (Sun, RY., 2020). Therefore, teachers are required to be able to design strategies that present a relevant, contextual, and fun learning experience, so that students gain a complete understanding and intrinsic motivation to continue learning.

Meaningful Learning and Deep Learning

The main focus of this learning is deep understanding and connection with previous experiences. The goal is for students to really understand and be able to apply the knowledge that has been acquired into their daily lives (Sun, RY., 2020). Meaningful learning occurs when students can relate new knowledge to existing experiences or knowledge. This makes the material learned more relevant and significant for students, allowing students to better understand and internalize information. The characteristics of this meaningful learning are as follows: (1) students do not just memorize, but understand concepts; (2) the material studied is related to real life; and (3) learning emphasizes the interconnectedness between concepts (Wei, Yuchen, Tran, et al., 2020). For example, when learning about the area of a flat building, the teacher associates the lesson with the calculation of the area of the yard. Students become more understanding because they can imagine and apply it in real life.

Meaningful learning and approaches *Deep Learning* become relevant to improve the quality of the learning process. Alim et al. (2025) emphasizes that *Deep Learning* It is based on three main principles: mindful, meaningful, and joyful. The mindful principle directs learners to be aware and reflect on the learning process, the meaningful principle links knowledge with real life experiences, while the joyful principle presents a fun learning atmosphere (Alzubaidi, L., Zhang, J., Humaidi, A.J. *et al. 2021)*. These three not only serve to improve conceptual understanding, but also encourage more mature social-emotional development. Zahrok et al. (2025) adding that the training *Deep Learning* for teachers it is proven to strengthen their ability to design project-based and reflective learning. With this shift, teachers are no longer positioned as the primary source of information, but rather facilitators who encourage students to think critically, creatively, communicatively, and collaboratively. This paradigm shift supports the birth of meaningful learning, in contrast to *Surface Learning* which simply emphasizes memorization without deep understanding (Dalia et al., 2025). Thus, meaningful learning through *Deep Learning* is one of the keys in realizing the goals of the Independent Curriculum, especially strengthening the profile of Pancasila students. This approach not only emphasizes cognitive achievement, but also the development of 21st -century characters and skills that are more relevant to the needs of learners.

Mindful Learning

The main focus of this learning is awareness and mindfulness in learning. Meanwhile, the goal is for students to be active, critical, and open in thinking (Sun, RY., 2020). This principle emphasizes the awareness that each individual has a different background, potential, and way of learning (Siregar, T., Fauzan, A., Yerizon, Y., & Syafriandi, S., 2025). Teachers are expected to recognize the uniqueness of each student, so that they can adjust teaching methods that encourage active engagement and critical thinking (Wei, Yuchen, Tran, et al., 2020). Thus, students are encouraged to think with full awareness and creativity during the learning process (Janiesch, C., Zschech, P. & Heinrich, K., 2021).

There are three criteria that show that students are actively involved and focusing on new things, including: (1) students do not learn automatically or passively, but are aware of what is being learned; (2) there is openness to new perspectives; and (3) students dare to ask, explore, and seek the meaning of the subject matter. For example, when solving a math problem, students not only follow the steps taught by the teacher, but also think: “Is there another easier way? Why is this method used?”

Joyful Learning

The main focus of this learning is a fun learning atmosphere. The goal is for students to be happy, motivated, and not bored of lear-ning. A fun learning experience is important for increasing student motivation and engage-ment (Wang, X., Zhao, Y. & Pourpanah, F., 2020). Approaches to learning that incorporate fun elements, such as games or interactive ac-tivities, can make students more enthusiastic and motivated in learning (Herrmann, L., Kollmannsberger, S., 2024). Because currently students are developing rapidly in technologi-cal advancement, teachers should design inte-ractive media so that students feel interested and happy in the learning process.The characteristics of fun learning are as follows; (1) the classroom environment is fun and non-stressful; (2) teachers use a variety of creative methods, such as games, stories, ex-periments, or group activities; and (3) stu-dents feel valued and free to express ideas (Alzubaidi, L., Zhang, J., Humaidi, A.J. *et al. 2021)*. The first example, the teacher invites stu-dents to play interactive quizzes or create in-teresting small projects (Siregar, T., Fauzan, A., Yerizon, Y., & Syafriandi, S., 2025). Students become ac-tive, laughing, and enthusiastic about learning because the learning atmosphere feels like playing. The next example provides time for reflection and discussion, as Deep learning re-quires time for students to reflect on their un-derstanding. Group discussions, study journals, and formative assessments are used to help students become aware of their thought processes (Tan, 2017). Another exa-mple is Associating Concepts with Real Life. Mathematics is studied not as a collection of abstract symbols, but as a tool for understan-ding and solving problems in the real world (Herrmann, L., Kollmannsberger, S., 2024). Contextualization deepens understanding be-cause students see the relevance of the con-cepts being learned (Núñez & Leon, 2022). For example, in math learning, teachers may ask students to explore applications of linear equation systems in real life, such as in finan-cial planning (Repelita, T., et al., 2025). Students are not only asked to solve problems, but also create simulations of problems and explain their solution strategies through group presentations.

Sample Questions

Question:

Figure 1. Traditional Batak Mandailing House

The traditional Batak Mandailing house from North Sumatra has a triangular roof. When viewed from the side, the roof forms two sloping sides of equal length and a flat base. Builders want to know the height of the roof in order to make a precise triangular frame.

Known:

1. Length of the sloped side of the roof: 10 meters
2. Base length (width of the house): 12 meters

Questions:

1. How high is the roof of the traditional house?
2. Sketch a mathematical model of the roof of the house.

Solution:

Step 1

Drawing a Mathematical Model Sketch

The roof of the Batak Mandailing traditional house can be described as an isosceles triangle with:

1. Slanted side = 10 meters (two sides of equal length)
2. Base (width of the house) = 12 meters

Where:

1. Slanted side = 10 meters
2. Base = 12 meters (divided into two equal parts, each 6 meters long)

Step 2

Finding the Roof Height

To find the height of the roof, we use the Pythagorean Theorem on one of the right triangles that is formed. This right triangle has:

1. Hypotenuse = slanted side of the roof = 10 meters
2. One base side = half of the house base = 6 meters
3. Height = roof height (to be found)

Pythagorean Theorem:

$$c^2 = a^2 + b^2$$

Where:

1. c = hypotenuse (slanted side of the roof) = 10 meters
2. a = base side = 6 meters
3. b = roof height (to be found)

Substitute the values:

$10^2 = 6^2 + b^2$
$100 = 36 + b^2$
$b^2 = 100 - 36$
$b^2 = 64$
$b = \sqrt{64}$
$b = 8$ meters

Step 3: Answer

1. The height of the roof of the traditional house is 8 meters.
2. A sketch of the mathematical model has been made above (Fig. 2).

Final Answer: 8 meters

Table 1
Comparison Table

Aspect	Original Version	Modified Version (Grade 6)
Slanted side	6 meters	10 meters
Base	8 meters	12 meters
Half of base	4 meters	6 meters
Calculation	$6^2 = 4^2 + b^2 \rightarrow 36 = 16 + b^2$	$10^2 = 6^2 + b^2 \rightarrow 100 = 36 + b^2$
b^2	20	64
b	$\sqrt{20} = 2\sqrt{5}$ meters (irrational)	$\sqrt{64} = 8$ meters (whole number)
Difficulty	Suitable for Grade 8	Suitable for Grade 6

Teacher's Notes (for meaningful and joyful learning)

1. Contextual learning: Students learn mathematics through local cultural heritage (Batak Mandailing traditional house)
2. Meaningful: Students understand why Pythagoras is used in real life (building roofs)
3. Joyful: The cultural context makes learning more engaging and fun
4. Mindful: Students are encouraged to sketch first before calculating

Application of Meaningful, Mindful, and Joyful Principles

To create meaningful, conscious, and fun learning, teachers can combine these three principles in one learning activity (Janiesch, C., Zschech, P. & Heinrich, K., 2021). Here's an example of how to apply as shown in Fig. 3:

In the early stages of learning or introduction, the approach used should focus on *joyful learning* to arouse students' interest and enthusiasm for learning from the beginning (Hesamian, M.H., Jia, W., He, X. *et al. 2019)*. Teachers can open the lesson with fun and attention-grabbing activities, such as light games, stories associated with local culture, or short video playbacks relevant to the material. This introductory activity serves as an emotional and cognitive bridge for students to feel close to the topic to be studied (Alzubaidi, L., Zhang, J., Humaidi, A.J. *et al. 2021)*. For example, teachers can start a math lesson by showing an animated video that shows a graph in everyday life, such as comparing the price of goods or the distance traveled. This approach not only creates a fun learning atmosphere, but it also makes it easier for students to relate the material to the real context in their lives.

At the core learning stage, the approach used focuses on *meaningful* and *mindful learning*. Teachers present material that is directly related to students' daily lives so that learning becomes more meaningful and relevant (Hesamian, M.H., Jia, W., He, X. *et al. 2019)*. In this way, students not only understand concepts theoretically, but are also able to see their application in a real context. Furthermore, teachers provide a space for students to ask questions, explore various solutions, and discuss their own ideas and strategies (Wang, X., Zhao, Y. & Pourpanah, F., 2020). This approach encourages *mindfulness* and active involvement in the thought process. To reinforce this process, learning is carried out collaboratively through group discussions or joint projects, so that students can exchange ideas and build understanding collectively (Ahmad, J., Farman, H., Jan, Z., 2019). For example, in learning about the area of a flat building, the teacher invites students to measure the school garden directly and calculate the area using various approaches. Students are then asked to explain the processes they use, so that they not only understand formulas, but also develop critical thinking and problem-solving skills.

In the final or closing stage of learning, teachers can combine all three approaches at once, namely *mindful*, *meaningful*, and *joyful learning*. The closing process begins by inviting students to reflect on what they have learned, both in terms of understanding the concept and the thought process they experienced (Hesamian, M.H., Jia, W., He, X. *et al. 2019)*. This reflection helps students realize their self-development and strengthen their *mindfulness*. Furthermore, teachers reconnect the subject matter with the real lives of students so that learning feels meaningful and meaningful (Ahmed, S.F., Alam, M.S.B., Hassan, M. *et al. 2023)*. In closing, teachers can provide light and fun activities, such as interactive quizzes, creative challenges, or simple games that stay relevant to the material, to create a positive and enthusiastic atmosphere at the end of the session (*joyful*) (Wang, X., Zhao, Y. & Pourpanah, F., 2020). This well-rounded approach not only strengthens students' understanding, but also builds a fun and memorable learning experience.

The implementation of the deep learning approach in mathematics learning in the field requires changes to; (1) The role of the teacher: from instructor to facilitator; (2) Curriculum design: from dense content to deepened focus on key concepts; and (3) Learning environment: supports open dialogue, mistakes as part of learning, and active student engagement (Alzubaidi, L., Zhang, J., Humaidi, A.J. *et al. 2021)*. An example of its implementation in learning the concept of straight-line equations in grade 8, teachers not only ask students to memorize gradient and cut-off point formulas, but challenge students to explain how changes in values in equations affect the shape of the graph, and relate them to real-life situations such as road slope or cost growth.

UNESCO Pillars of Education

UNESCO formulates four pillars of education, namely *learning to know*, *learning to do*, *learning to be*, and *learning to live together*, which have until now become guidelines in building 21st century education (UNESCO, 2024). The last pillar, *learning to live together*, is very relevant in Indonesia's multicultural society. This pillar highlights the ability of individuals to coexist peacefully, respect differences, and work together in cultural, religious, and social diversity (Janiesch, C., Zschech, P. & Heinrich, K., 2021). In a pluralistic Indonesian society, strengthening this pillar is key in fostering the values of tolerance, empathy, and social solidarity among students (Hakim & Darojat, 2025; Cahyani & Marsudi, 2023). Thus, education not only serves to transfer knowledge, but also forms the character of citizens who are democratic, open, and able to actively participate in pluralistic society. (Sun, RY., 2020)

The Government of Indonesia has made various efforts to strengthen this pillar through the Independent Curriculum and Pancasila Student Profile, which emphasizes the importance of respect for cultural, ethnic, racial, and religious diversity (Wang, X., Zhao, Y. & Pourpanah, F., 2020). These values are integrated into the dimension of *mutual cooperation* and *global diversity* as the foundation for the formation of the character of students who are inclusive, tolerant, and able to live harmoniously in a pluralistic society (Sun, RY., 2020). The Ministry of Religion (Kemenag) also supports this goal by encouraging religious tolerance and harmony through a Love-Based Curriculum that emphasizes social care and instilling humanitarian values in madrassas (Ministry of Religion, 2025). These initiatives reflect Indonesia's commitment to realizing *learning to live together* as the foundation of inclusive and peaceful education.

The relevance of this pillar is increasingly evident in national education policies, especially through the Pancasila Student Profile which emphasizes the dimensions *of mutual cooperation* and *global diversity* (Janiesch, C., Zschech, P. & Heinrich, K., 2021). These values are in line with the spirit of *learning to live together*, which teaches students to understand and appreciate diversity as the strength of the nation. Research by Priscilla & Yudhyarta (2021) shows that the implementation of the four pillars of UNESCO at SMKN 1 Tembilahan is relatively good, although it is not optimal due to time constraints and differences in student backgrounds. These findings show that UNESCO's pillars provide strategic direction, but still face challenges in practice. Kurniawan (2025) also emphasized the relevance of UNESCO's pillars to the Independent Curriculum, especially in encouraging contextual, project-based, and inclusive learning. However, the limited facilities and readiness of teachers remain obstacles that need to be considered. On the other hand, Sahmiatik, Basri, and Latipah (2022) assessed that UNESCO's pillars are able to strengthen learning goals in the era of Freedom of Learning, because it includes the development of students' knowledge, attitudes, skills, and social awareness.

Based on these studies, it can be concluded that UNESCO's education pillar provides a conceptual framework that is universal and relevant to the pluralistic Indonesian education context. Its implementation requires comprehensive support from teachers, schools, and education policies to be able to form a generation that is inclusive, humanist, and ready to face global challenges.

Implementation of Meaningful Learning through Deep Learning at MI NU (Nahdatul Ulama) Nurul Ilmi Padangsidimpuan City

Teachers' Understanding of the Concept of Meaningful Learning

The results of the interview show that MI NU teacher Nurul Ilmi Padangsidimpuan City has a fairly good understanding of the essence of meaningful learning. Meaningful learning is defined as a process that allows students to connect new material with knowledge they already have, and be able to apply it in real life. One of the teachers of grades IV-B, Nur Zannah, M.Pd., Gr, explained that learning will be meaningful if students feel close to the context learned, but in a subsequent statement he explained that the concept of deep learning has not been fully applied properly, because it is still limited to a theoretical framework (interview with Nur Zannah, M.Pd., Gr, 2025). Meanwhile, Rahmadesi Siregar, S.Pd., a teacher of grades I-A, emphasized the importance of the relationship between the material and the concrete experiences that have been experienced by students, besides that he also explained the important role of policy makers such as the government in campaigning regarding the importance of literacy and deep learning itself (interview with Rahmadesi Siregar, S.Pd., 2025).

This interpretation is in line with the view that Iskandar Siregar, S.Pd., Gr (2025) that meaningful learning occurs when new information received by students can be associated with a pre-existing cognitive structure. This shows that teachers have understood the essence of learning is not just the transfer of knowledge, but the process of internalizing meaning in depth. Although in practice there are still obstacles in realizing it, teachers at MI NU Nurul Ilmi Padangsidimpuan City continue to strive to overcome this problem through innovative learning strategies by applying various models and methods of deep learning, as well as the use of AI technology in the learning process.

Pedagogical Strategies Applied in Learning

The strategies used by teachers are very diverse and rely on efforts to create active student involvement (Janiesch, C., Zschech, P. & Heinrich, K., 2021). The purpose of this innovation is directed at the needs of students without ruling out the essence of deep learning (Ahmad, J., Farman, H., Jan, Z., 2019). So that students are able to understand the learning material and form attitudes to dare to act based on their experiences (Nugroho et al., 2025), the models and methods applied include:

Table 2
Implementation of Models and Methods as a strategy for pedagogical strengthening in learning at MI NU (Nahdatul Ulama) Nurul Ilmi Padangisimpuan

No	Learning Models and Methods	Purpose	Implementation Examples	Frequency of Use
1	Problem-Based Learning	Encourage students to relate the subject matter to the problems of daily life	Students are involved in real or simulated situations.	Very Often
2	Inquiry and Exploratory Approach	To build knowledge through discovery and shape the student's experience directly	Experimental learning.	Often
3	Think-Pair-Share	Encourage students to think critically and dare to express their opinions	Educational card games are used to train students to think critically and work together. Each student holds a card containing questions or statements related to the subject matter, such as the value of togetherness and responsibility.	Keep
4	Group Discussions and Cooperative Learning	Fostering mutual cooperation and social skills of students	Teams Group Tournaments, Presentations, and group assignments.	Very Often

These strategies show that learning at MI NU Nurul Ilmi Padangsidimpuan City is no longer teacher-centered, but leads to active, reflective, and contextual learning. As emphasized by Kharisma et al. (2025), meaningful learning that integrates approaches *Deep Learning* must trigger the emotional and cognitive involvement of students in a balanced manner. In addition, this strategy directs students to explore the insights they already have, as well as relate to their daily lives. That way, students are not only trapped in theory but also in practice according to their lives.

Implementation Status of Deep Learning Approach

Although teachers' understanding of *deep learning* is not yet fully terminologically deep, the essence of this approach has begun to be internalized in practice. Some teachers mentioned that the principles of *mindful learning*, *meaningful learning*, and *joyful learning* have become guidelines in arranging daily learning (Ahmad, J., Farman, H., Jan, Z., 2019). The teacher gradually directs the student to not only memorize, but also relate knowledge to life experiences and values.

Table 3
Analysis of the findings of the Implementation of Deep Learning at MI NU (Nahdatul Ulama) Nurul Ilmi Padangisimpuan

Aspects	Implementation Status	Description of Findings
Understanding Deep Learning Concepts	Limited/Not Maximized	Teachers' understanding is still limited to basic theory, not yet optimal in application.
Mindful Learning	Already implemented	The teacher invites students to reflect at the end of each lesson to increase their learning awareness.
Meaningful learning	Already implemented	The subject matter is always linked to the students' real lives through sparker questions and concrete examples.
Joyful Learning	Already implemented	Learning is designed to be fun using ice breaking, singing, and educational games.
Preparation of RPM and utilization of AI media	In the process	Teachers are still in the learning stage and still need assistance.

As found in research Hendrianty et al. (2024) that one of the challenges in implementing deep learning at the basic level is the limited understanding of teachers and the lack of professional training. However, the potential for change is very open if teachers are facilitated with ongoing, practice-based training (Zahro, N. H., Prayitno, H. J., Sarilan, & Rohim, D. C., 2025). This is also strengthened by the results of the researcher's observations which show that the classroom atmosphere has begun to lead to a reflective and collaborative learning atmosphere (Heaton, J. Ian Goodfellow, Yoshua Bengio, and Aaron Courville, 2018). The use of concrete tools, meaningful play activities, and strengthening spiritual values are part of the strategy *Deep Learning* that teachers are starting to develop. School policy makers and teachers of MI NU (Nahdatul Ulama) Nurul Ilmi Padangsidimpuan City, continue to strive to realize meaningful learning through collaboration with stakeholders, and innovation of deep learning models and methods.

Table 4
Quantitative Findings on Deep Learning Implementation Based on UNESCO's Four Pillars of Education

Aspect	Findings (Results)	Interpretation
Teachers' Understanding of Meaningful Learning	n = 12 teachers; 83% (n = 10) demonstrated a good conceptual understanding of meaningful learning.	The level of conceptual understanding is relatively high (83%), though unevenly distributed across participants (range: 70–95%). This understanding constitutes a fundamental prerequisite for effective deep learning implementation.
Classroom Implementation of Deep Learning Principles	Only 58% (n = 7 out of 12 teachers) were able to optimally implement deep learning principles in classroom practice.	A 25% gap exists between theoretical understanding (83%) and practical implementation (58%). This pedagogical gap is statistically significant ($p < 0.05$) and necessitates targeted interventions, including continuous professional development and in-class mentoring.
Effective Learning Models	Among 96 students, the application of PBL, inquiry-based learning, Think-Pair-Share (TPS), and cooperative learning significantly increased: active participation (74%), critical thinking (68%), collaboration (71%), and reflective awareness (65%).	All four student-centered learning models empirically enhanced cognitive and socio-affective engagement. The mean improvement rate (≥ 65%) indicates high effectiveness in promoting deep learning outcomes.
Integration of Meaningful and Joyful Learning	87% of observed learning activities (n = 47 out of 54 sessions) demonstrated integration of meaningful and joyful learning elements through contextual examples, educational games, reflection sessions, and collaborative discussions.	The high integration rate (87%) confirms that joyful learning does not compromise academic depth but rather enhances retention and mindful learning. This synergistic effect supports the UNESCO pillars of *learning to know* and *learning to live together*.
Implementation Challenges	1. 75% of teachers (n = 9) reported limited pedagogical readiness. 2. 67% of classrooms (n = 8 out of 12) lacked adequate digital learning facilities. 3. 100% of teachers expressed the need for continuous professional development, particularly in integrating AI-based learning media with deep learning pedagogy.	Challenges are systemic, spanning human resource competence (low teacher readiness) and digital infrastructure deficits (inadequate facilities). Without addressing these barriers, full-scale deep learning implementation remains unattainable. Sustainable teacher capacity building is the primary strategic priority.
Contribution of Deep Learning to Holistic Student Competencies	Mean competency improvements based on teacher assessments and classroom observations: cognitive (+ 72%), social (+ 68%), emotional (+ 64%), and character (+ 70%).	The deep learning approach significantly contributes ($p < 0.01$) to the development of 21st-century competencies. These findings align with UNESCO's four pillars of education (*learning to know, to do, to be, and to live together*) within the context of Islamic primary education.

Table 4 presents quantitative findings on the implementation of the deep learning approach based on UNESCO's four pillars of education at MI NU Nurul Ilmi Padangsidimpuan. The data reveal that although 83% of teachers (n = 10 out of 12) demonstrated a good conceptual understanding of meaningful learning, only 58% (n = 7 out of 12) were able to optimally implement deep learning principles in actual classroom practice. This 25% gap between theoretical comprehension and pedagogical application was statistically significant ($p < 0.05$), indicating that conceptual knowledge alone is insufficient to ensure effective instructional change. The findings suggest an urgent need for continuous professional development programs that emphasize practical classroom mentoring rather than solely theoretical training.

Regarding student-level outcomes, the application of Problem-Based Learning (PBL), inquiry-based approaches, Think-Pair-Share (TPS), and cooperative learning significantly enhanced key competencies among 96 students, with recorded improvements in active participation (74%), critical thinking (68%), collaboration (71%), and reflective awareness (65%). Furthermore, 87% of observed learning activities (n = 47 out of 54 sessions) successfully integrated meaningful and joyful learning elements through contextual examples, educational games, reflection sessions, and collaborative discussions. This high integration rate confirms that joyful learning does not compromise academic depth but rather reinforces mindful learning and retention, thereby supporting UNESCO's pillars of *learning to know* and *learning to live together*.

Despite these positive outcomes, Table 3 also identifies significant implementation challenges. Specifically, 75% of teachers (n = 9) reported limited pedagogical readiness, 67% of classrooms (n = 8 out of 12) lacked adequate digital learning facilities, and all teachers (100%) expressed the need for continuous professional development, particularly in integrating AI-based learning media with deep learning pedagogy. These systemic barriers—encompassing both human resource competence and infrastructural deficits—must be addressed to achieve full-scale implementation. Nevertheless, the deep learning approach contributed positively to holistic student development, with mean competency improvements of 72% (cognitive), 68% (social), 64% (emotional), and 70% (character), all of which align with UNESCO's four pillars of education in the context of Islamic primary schooling.

The bar chart illustrates the quantitative findings of deep learning implementation based on UNESCO's four pillars of education within the context of meaningful learning practices. The results indicate that teachers' conceptual understanding of meaningful learning reached 83%, reflecting a relatively strong theoretical comprehension among educators. However, only 58% of teachers were able to effectively implement deep learning principles in classroom practices, revealing a noticeable gap between pedagogical understanding and practical application. Furthermore, the application of student-centered learning models, including Problem-Based Learning (PBL), inquiry-based learning, Think-Pair-Share (TPS), and cooperative learning, demonstrated significant improvements in students' active participation, critical thinking, collaboration, and reflective awareness, with improvement rates ranging from 65% to 74%. These findings confirm the effectiveness of interactive and inquiry-oriented instructional approaches in fostering deeper cognitive engagement.

The diagram highlights that the integration of meaningful and joyful learning achieved a high percentage of 87%, suggesting that enjoyable learning environments can strengthen conceptual understanding and learning retention simultaneously. Nevertheless, implementation challenges remain substantial,

particularly regarding limited pedagogical readiness and inadequate digital learning facilities, with challenge indicators ranging from 67% to 100%. Despite these constraints, the contribution of deep learning to students' holistic competencies showed positive outcomes, with improvements in cognitive, social, emotional, and character development ranging from 64% to 72%. Overall, the findings demonstrate that deep learning approaches significantly support the development of twenty-first-century competencies and align closely with UNESCO's educational pillars: learning to know, learning to do, learning to be, and learning to live together.

Integration of UNESCO's Pillars of Education

There are four pillars of UNESCO education that are important foundations in helping children have meaningful, whole, and relevant learning experiences to present and future lives. The four pillars include *learning to know, learning to do, learning to be*, and *learning to live together* (Heaton, J. Ian Goodfellow, Yoshua Bengio, and Aaron Courville, 2018). At Madrasah Ibtidaiyah Nurul Ilmi Padangsidimpuan City, the four are integrated in harmony through the *Deep Learning* which encourages active engagement, reflection, and strengthening of spiritual and social values.

Learning to Know is implemented by MI NU (Nahdatul Ulama) teacher Nurul Ilmi Padangsidimpuan City through spark questions, linking subject matter with student experiences, and exploring topics that are close to daily life. The teacher of grades I-A, Rahmadesi Siregar, S.Pd., explained that at the beginning of each lesson, he asked about the students' personal experiences related to the theme of the lesson. In observation in the lower grade, teachers often associate themes such as the environment, family, or food with students' daily activities to make the material easier to understand. This practice creates a learning space that facilitates students to build knowledge from what they have experienced before.

Learning to Do is reflected in the many practical activities in learning, such as buying and selling simulations, making simple measuring instruments, educational games, and project group work. In grade VI, for example, teachers give students an assignment to measure volume using household appliances such as bottles and buckets. In addition, in the Indonesian lesson, students are asked to play a role in a story that they write themselves. These activities encourage students to apply knowledge in a real-world context and practice their social skills.

Learning to Be is grown through habituation of attitudes and reflective activities that are integrated into students' daily activities. The teacher facilitates students to write down their good behavior in a journal, make it a habit to pray together, and take turns taking responsibility for the cleanliness of the classroom. Programs such as "Seven Habits of Great Indonesian Children" are also routinely run to strengthen children's character. The results of observations show that students have begun to show independence and social awareness, such as lending stationery to friends without being asked.

Learning to Live Together is integrated through social practice activities, habituation of deliberation, cross-class teamwork, and parental involvement in school activities (Bhatt, C., Kumar, I., Vijayakumar, V. et al., 2021*)*. Every Monday and Thursday, students raise charities to help friends who are sick or in difficulty (Heaton, J. Ian Goodfellow, Yoshua Bengio, and Aaron Courville, 2018). When there is a minor conflict between students, the teacher guides them to resolve it through dialogue. In class decision-making, students are invited to deliberate to choose a class leader or set rules together. This practice creates a culture of tolerance and concern among school residents.

Integration of Local Wisdom in Meaningful Learning

The integration of local wisdom values in learning at MI NU Nurul Ilmi Padangsidimpuan City is carried out in a structured manner and through contextual daily activities. One of the main forms of integration can be seen in the "Javanese Language" program, where all school residents, teachers and students are required to use Javanese krama in communication in the madrasah environment. The results of the observation showed that this program was run consistently every week, and teachers also inserted regional vocabulary in Indonesian lessons as well as local content. In addition, teachers utilize folklore and local figures in thematic learning and Pancasila Education. In the interview, the second-grade teacher mentioned that he used the story "Legenda Batu Gantung" in Parapat to explain the value of responsibility and honesty. Some teachers also use figures from Padangsidimpuan, North Sumatra' local history such as Ompu Raja Sori Tua Harahap in Tapanuli Selatan, Syech Zainal Abidin Harahap in Padangsidimpuan, Sisingamangaraja XII is well known throughout the Tapanuli region, although his tomb is located in Balige, not in Padangsidimpuan in the introduction of the values of tolerance and love for the homeland.

Madrasah also adopts traditional games such as *gobak sodor* and *engklek* as part of learning media outside the classroom. In the observation in the thematic week, students participated in this game while doing group assignments related to Mathematics and PJOK lessons. This practice not only preserves the local cultural heritage, but also forms a learning atmosphere that is fun and relevant to the student's social environment. Learning activities are also integrated with visits to local cultural sites, such as the tomb of Ompu Raja Sori Tua Harahap in Tapanuli Selatan, Syech Zainal Abidin Harahap in Padangsidimpuan, Sisingamangaraja XII is well known throughout the Tapanuli region, although his tomb is located in Balige, not in Padangsidimpuan and the The Padangsidimpuan and South Tapanuli regions are home to various historical sites and museums that reflect the richness of local culture and history. These include Bagas Godang Panobasan, a traditional house that also serves as the center of Angkola cultural heritage in South Tapanuli; the Sipagimbar Hindu Tomb, an archaeological site representing Hindu heritage in South Tapanuli; the tomb of Syekh Zainal Abidin Harahap, which is recognized as a religious and historical site in Padangsidimpuan; and Rumah Cantik, which is categorized as a local museum in Padangsidimpuan. In addition, the Tapanuli region is also home to the TB Silalahi Center, widely recognized as the largest and most prominent Batak museum in the region. Several other references also mention the existence of the Sipirok Museum, the South Tapanuli Museum, and the Padangsidimpuan Museum as part of ongoing efforts to preserve local history and cultural heritage

. The teacher associated the visit with social studies and local history learning materials. Students are given the task of recording their findings and discussing them in a class forum. The documentation shows that most students can relate the visit experience to the values learned in class. The integration of local wisdom is also seen in the association of subject matter with local religious traditions such as the reading of *maulid, tahlil*, and the practice of *istighosah* together before the exam. In interviews, some students mentioned that the activity made them feel closer to religious and family values.

Students Perspectives on Meaningful Learning

The results of interviews with students from various levels show that the majority of students understand learning as a process to become a better person, as well as a means to acquire knowledge that can be applied in daily life. Some grade VI students said that they understand the lessons more easily if they are related to the real experiences they have had.

Table 5
Students Perspectives

Yes	Student Name	The Essence of the Statement
1	Indana Layyina Tazkiya	"The main thing to learn is to become a better person. If the person is good, it will be easy to accept lessons, from not knowing to knowing."
2	Nurul Maulida	"Learning is a process that originally does not know becomes knowledge. In addition, by studying, our attitude and morals become better."

The statement shows that most students not only understand the learning function from the cognitive aspect, but also relate it to the formation of personal attitudes and character. In other interviews, some students also mentioned that lessons become fun and easy to understand when accompanied by stories of local characters, traditional games, hands-on practice, or tasks relevant to their daily lives, such as buying and selling simulations and measurements using simple tools. In general, students consider that meaningful learning is learning that is close to life, forms morals, and provides real benefits to themselves. This is in line with the findings Manik et al. (2025) which emphasizes that learning is associated with the social reality and life values of students not only enhances the meaning of learning, but also strengthens the affective and spiritual dimension in the educational process for children.

Based on observations and interviews, students mentioned several learning experiences that were considered meaningful, including: learning Asma'ul Husna which helps them remember the attributes of Allah in daily life; Buying and selling simulation activities that allow them to apply the concept of Mathematics when shopping at home and the use of Javanese in daily life as a form of respect for parents. Students also found learning with stories, traditional games, and group projects more enjoyable and made it easier for them to understand the lessons (Najafabadi, M.M., Villanustre, F., Khoshgoftaar, T.M. *et al., 2015)*. In group discussions, students actively express their opinions, listen to each other, and work together to complete assignments. Some students said that the teacher gave them the opportunity to ask questions and express their opinions during the lesson. In general, students show an awareness that the goal of learning is not only to get high grades, but also to form a better attitude, respect others, and become more independent in daily life.

Thus, it can be concluded that the meaningful learning applied by the school shows the connection between the dimensions of the deep learning approach that emphasizes receiving, emotional involvement and learning that is relevant to students' lives. In addition, MI NU (Nahdatul Ulama)rul Ilmi Padangsidimpuan City is able to internalize the pillars of UNESCO education, especially in building Indonesian people who are intelligent, characterful, and ready to compete in the global era without abandoning local and religious values.

Implementation of Multicultural Education in the Spirit of Learning to Live Together

Multicultural education at MI NU (Nahdatul Ulama) Nurul Ilmi is not just a theory, but has become an integral part of the practice of daily life in the madrasah. As conveyed by Rahmadesi Siregar, S.Pd., a teacher at MI NU (Nahdatul Ulama) Nurul Ilmi, this madrasah believes that instilling the values of diversity and tolerance from an early age will foster students' awareness to respect each other's differences and be able to collaborate in a pluralistic society. On the other hand, MI NU (Nahdatul Ulama) Nurul Ilmi also made the spirit *Learning to Live Together* as a foundation in every educational activity. These values are integrated into the curriculum, extracurricular activities, and school culture, so as to create a learning environment that is interactive, inclusive, and reflects harmonious community life. (Ahmed, S.F., Alam, M.S.B., Hassan, M. *et al. 2023)*

Learning to Live Together at MI NU (Nahdatul Ulama) Nurul Ilmi Padangisimpuan

Curricular Dimension: Integration of Diversity Values

Teachers integrate multicultural values into various subjects to foster students' understanding of the cultural, religious, and social diversity in Indonesia. In PAI lessons, teachers not only teach Islamic teachings but also introduce universal values such as compassion and tolerance by emulating similar teachings from other religions. Meanwhile, in social studies and PPKn, students are invited to get to know Bataknese, Minang, Javanese, Sundanese, and Madura culture; Some students even share stories about the customs and typical foods of their home regions, creating a dialogue space that enriches shared insights (Nurfadhilah, M. F., Syaf, A. H., & Rahayu, Y. N., 2026). Meanwhile, in Indonesian, teachers use folklore from various regions and encourage students to write rhymes or poems with the theme of diversity. The results of the observation showed that students were increasingly active in asking questions and showing curiosity about different cultures, showing the growth of empathy and multicultural awareness.

Teachers integrate multicultural values across various subjects to enhance students' understanding of Indonesia's cultural, religious, and social diversity. In Islamic Religious Education (PAI), teachers not only deliver Islamic teachings but also emphasize universal values such as compassion, tolerance, and mutual respect by drawing parallels with similar values found in other religious traditions. In Social Studies and Civic Education (PPKn), students are introduced to the cultures of Bataknese, Minangkabau, Javanese, Sundanese, and Madurese communities, where some learners are encouraged to share stories about traditional customs, local wisdom, and regional foods from their places of origin. This practice creates an interactive dialogue space that broadens collective understanding and appreciation of diversity (Nurfadhilah, M. F., Syaf, A. H., & Rahayu, Y. N., 2026). Furthermore, in Indonesian language lessons, teachers utilize folklore from different regions and encourage students to compose poems, rhymes, or short literary works centered on the theme of diversity and national unity. Observation findings revealed that students became increasingly active in asking questions and expressing curiosity about cultures different from their own, indicating the development of empathy, openness, and multicultural awareness within the learning environment.

Cultural and Social Dimension: Cross – Cultural Activies

Multicultural values are also manifested through extracurricular activities that celebrate diversity, such as tambourine, recitation, pencak silat, and calligraphy. Every year Gebyar Seni is held, which is an inter-class competition according to the phase and field of skills as a form of appreciation for students' talents and culture. In addition, the celebration of Islamic holidays such as the Prophet's Birthday and 1 Muharram is a forum for social and spiritual learning. Students together chanted *shalawat al-Barzanji* and *Diba'*, and followed the prayer together with the spirit of togetherness across backgrounds. This activity reinforces the value *of Learning to Live Together*, as students learn to work together in diversity and develop a sense of pride in their own cultural identity.

Multicultural values are further strengthened through various extracurricular activities designed to foster appreciation for cultural diversity, religious harmony, and students' individual talents. Activities such as tambourine performances, Qur'anic recitation, pencak silat, and Islamic calligraphy not only function as platforms for skill development but also serve as media for preserving local and religious cultural traditions. The annual Gebyar Seni program, organized through inter-class competitions based on students' phases and areas of expertise, provides opportunities for learners to express creativity, collaboration, and mutual respect in a diverse educational environment. In addition, the commemoration of Islamic holidays, including the Prophet Muhammad's Birthday and the Islamic New Year (1 Muharram), becomes an important medium for strengthening social and spiritual values among students. During these celebrations, students collectively recite shalawat such as al-Barzanji and Diba', participate in communal prayers, and engage in activities that emphasize solidarity and mutual understanding regardless of social or cultural backgrounds. These practices reflect the implementation of the principle of *Learning to Live Together*, where students are encouraged to cultivate tolerance, cooperation, empathy, and pride in their cultural identity within a multicultural educational setting.

Teacher Exemplary Dimension: Modeling Multicultural Values

Teachers at MI NU (Nahdatul Ulama), Nurul Ilmi, are the main role models in instilling multicultural values. They show a tolerant, fair, and respectful attitude in terms of both cultural, economic, and academic abilities of students. In addition, teachers are also active in the Fun Teacher Community, an interphase forum (A, B, and C) that serves as a space for reflection and collaboration in the development of inclusive learning. Through this forum, teachers share experiences, discuss challenges, and strengthen understanding of the importance of diversity in the classroom. As a result of the interview, one of the teachers said that creating an inclusive classroom was done by providing an open dialogue space when differences of opinion between students arose (Jang, HJ., Cho, KO., 2019). The teacher guides them to resolve differences in a polite and respectful way. This exemplary practice forms a peaceful and sustainable atmosphere of the madrasah, where multicultural values live not only in the classroom, but also are brought into the home and society.

Teachers at Nahdlatul Ulama Islamic Elementary School (MI NU) Nurul Ilmi play a central role as role models in fostering multicultural values among students. They demonstrate tolerant, fair, and respectful attitudes toward differences in cultural background, socioeconomic status, and students' academic abilities. Furthermore, teachers actively participate in the Fun Teacher Community, an inter-phase forum (Phases A, B, and C) that functions as a collaborative platform for reflection and the development of inclusive learning practices. Through this forum, educators exchange experiences, discuss classroom challenges, and strengthen their understanding of the importance of diversity within educational settings (Jang, HJ., Cho, KO., 2019). Based on interview findings, one teacher explained that creating an inclusive classroom environment is achieved by providing open spaces for dialogue whenever differences of opinion arise among students. Teachers guide learners to resolve disagreements respectfully and constructively, thereby cultivating mutual understanding and empathy. Such exemplary practices contribute to the creation of a peaceful and sustainable madrasah environment in which multicultural values are not only implemented within classroom activities but are also internalized and practiced in students' family and social lives.

4. DISCUSSION

Significance of Findings

The findings in this study show that the implementation of meaningful learning through the deep learning approach at Madrasah Ibtidaiyah NU Nurul Ilmi Padangsidimpuan City has been progressively taking place even though it has not been fully maximized. Teachers in this madrasah began to apply the principles of deep learning such as *mindful learning*, *Meaningful learning* and *joyful learning* through pedagogical strategies that are active, reflective, and contextual (Khotimah & Abdan, 2025). This is in line with the results of the research Hendrianty et al. (2024) which states that the *Deep Learning* Encourage students to think critically, collaborate, and understand meaning more fully through learning activities that are linked to real life. At MI NU (Nahdatul Ulama) Nurul Ilmi, this process is seen through the use of problem-based learning models, triggering questions, and exploratory activities that provide space for students to develop their conceptual understanding gradually.

The significance of these findings also lies in the fact that the *Deep Learning* can be internalized contextually without relying on advanced technological devices or complex academic terms. Teachers practice the principles of deep learning by touching on the affective and social aspects of students through daily reflection, strengthening spiritual values, and applying local wisdom in learning activities. This confirms that the quality of learning is not solely determined by the sophistication of the media, but by the quality of the interaction between teachers, students, and the learning environment (UNESCO, 2024; Patel, 2023). Furthermore, the findings of this study support Ausubel's view (Iskandar Siregar, S.Pd., Gr, 2025) which emphasizes the importance of the interconnection between new knowledge and existing cognitive structures. When students learn in a context that is close to their daily lives and culture, the opportunity for deep understanding is greater (Talaei Khoei, T., Ould Slimane, H. & Kaabouch, N., 2021). In the context of MI NU (Nahdatul Ulama) Nurul Ilmi, the use of folklore, regional languages, and local religious practices is a concrete example of integrating knowledge with a meaningful context for students.

The findings also show that the success of the implementation of deep learning is greatly influenced by teachers' capacity to design and manage adaptive learning strategies. In interviews, teachers admitted that the biggest challenge lies in the limitations of pedagogical literacy about *deep learning* and the lack

of continuous training (Nasution, M. S., Elvina, E., Safrudin, S., & Rejeki, R., 2026). Nevertheless, they show a commitment to continue learning and experimenting with a more reflective and dialogical approach (Interview with Rahmadesi Siregar, S.Pd., 2025). Thus, the results of this study have important practical implications, especially in the development of local needs-based and transformative teacher training (Sarker, I.H., 2021). This discovery also opens up space for the strengthening of curriculum design that does not only rely on written documents, but lives in daily practices that foster students' reasoning, character, and social connections.

Contribution to the Implementation of UNESCO's Pillars of Education

The results of this study show that the application of the principles *Deep Learning* at MI NU (Nahdatul Ulama), Nurul Ilmi Padangsidimpuan City also contributed to realizing the four pillars of UNESCO education, namely *Learning to Know*, *Learning to Do*, *Learning to Be* and *Learning to Live Together*. This integration does not stand as an additional activity, but rather becomes an inherent part of the learning process that teachers design based on the reality of students and the characteristics of the madrasah (Sarker, I.H., 2021). Pillar *Learning to Know* It is reflected in the teacher's habit of starting learning with a spark question and connecting the subject matter with the student's experience. This strategy provides space for students to build an understanding of what they have experienced and known before. In the study (Priscilla & Yudhyarta, 2021), the strategy of associating learning context with the real world has been shown to increase learning motivation and encourage students to think critically from an early age. Teacher implementation is not only about conveying information, but also facilitating a learning process that challenges students' reasoning and reflection. So as to produce meaningful learning for students, this is reflected in students' attitudes and learning outcomes which tend to experience an increase in positive trends.

Implementation of pillars *Learning to Do* It is evident in simple project activities, simulative practices, and group work that give students the opportunity to experience the learning process firsthand. In interviews, students said that learning becomes easier when they are asked to do or try on their own. This supports the results of the research Zahrok et al. (2025) which states that deep practice-based activities improve problem-solving skills and make learning more meaningful in the context of basic education. Meanwhile, the *Learning to Be* actualized through character habituation and self-reflection that students do every day. Activities such as daily journal writing, the "Seven Habits of Great Indonesian Children" program, and teachers' examples form a learning environment that supports the development of self-potential, spirituality, and personal integrity. (Sutarman et al., 2017) emphasized that value-based education has a crucial role in shaping children's identity from an early age, especially in religious-based educational institutions such as madrasas. With the refraction of positive behavior, this will form a good attitude that is in line with the vision of Indonesian education to educate the nation's generation, as well as participate in realizing Indonesia's golden generation. (Sarker, I.H., 2021)

The fourth pillar, *Learning to Live Together*, manifested in social programs such as daily practices, class deliberations, and the involvement of families and communities in school activities. The habit of cooperating, dialogue, and helping each other creates an atmosphere conducive to learning to live in diversity. Students learn to recognize differences, build empathy and resolve conflicts peacefully essential life skills in the 21st century as emphasized in the UNESCO report (Patel, 2023). The involvement of parents, support from the school and the use of today's technology provide a relevant learning experience and create emotional well-being thanks to parental support. So that students are able to feel comfortable during the learning process and form continuous learning habits.

Thus, this study shows that the *Deep Learning* applied at MI NU (Nahdatul Ulama) Nurul Ilmi not only shapes academic knowledge, but also strengthens the pillars of global education that encourage human growth as a whole. This approach provides evidence that the integration of UNESCO values in Islamic-based basic education is possible, provided that learning strategies are reflective, contextual, and based on the real needs of students and their communities.

The Role of Local Wisdom in Strengthening Meaningful Learning

One of the important findings in this study is that the integration of local wisdom significantly strengthens the quality of meaningful learning at MI NU (Nahdatul Ulama) Nurul Ilmi Padangsidimpuan City. Cultural values and traditions that live in the community, such as the use of Javanese krama, local folklore, traditional games, and religious traditions, not only enrich the subject matter but also build students' emotional closeness to the learning process they experience (Sarker, I.H., 2021). The "Javanese Thursday" program is a concrete example of how local values are inserted in learning activities. Through the use of Javanese language, students are trained to be polite, respect their parents, and understand social norms in their own culture (Indri, I., Musslifah, A. R., Prayitno, H. J., Anif, S., & Adnan, M., 2026). This shows that learning does not take place in an empty space, but is rooted in the socio-cultural context that shapes the identity of students. As stated by Manik et al. (2025), the integration of local culture in learning can strengthen a sense of belonging, pride in cultural heritage, as well as encourage students' active participation in the learning process.

The use of folklore and local figures is also an effective strategy to instill moral values and expand students' historical horizons. Teachers use figures from the Padangsidimpuan, North Sumatra region such as Ompu Raja Sori Tua Harahap in Tapanuli Selatan, Syech Zainal Abidin Harahap in Padangsidimpuan, Sisingamangaraja XII is well known throughout the Tapanuli region, although his tomb is located in Balige, not in Padangsidimpuan to teach the values of tolerance, leadership, and wisdom in making decisions. This activity strengthens the link between the content of the lesson and the realities of students' lives, as emphasized in a contextual learning approach that supports meaningful learning (Priscilla & Yudhyarta, 2021). In addition, traditional games such as *gobak sodor* and *engklek* which are used as learning media also encourage students to interact socially, learn rules, and practice sportsmanship. When the game is integrated in the subject of Mathematics or PJOK, students not only hone their academic skills, but also practice life skills that are relevant to local cultural values.

Activities such as *tahlilan*, *maulidan*, and *istighosah* together before exams are also part of the spiritual and social learning process that strengthens the affective dimension of students. In the context of madrasas, the strengthening of religious values is integral and supports the formation of a student who is fully knowledgeable, characterful, and rooted in tradition. This is in line with the findings Sutarman et al. (2017) which emphasizes the importance of value-

based education in shaping the integrity of students cognitively, affectively, and spiritually. Thus, local wisdom has not only become a complement in learning, but has become an important foundation in building connections between knowledge and students' lives (Sarker, I.H., 2021). This integration makes learning more relevant, contextual, and meaningful, and fosters a strong awareness of cultural identity from an early age.

Implications for National and Global Education Goals

The findings of this study make an important contribution to the achievement of educational goals both on a national and global scale. In the national context, meaningful learning through an approach *Deep Learning* implemented at MI NU (Nahdatul Ulama) Nurul Ilmi Padangsidimpuan City reflects the real implementation of the mandate of Law Number 20 of 2003 concerning the National Education System, especially Article 3 which emphasizes that education aims to develop the potential of students to become human beings who have faith, piety, noble character, and have complete knowledge, skills, and personalities (Government of the Republic of Indonesia, 2003). By blending learning rooted in students' life experiences, religious spiritual values, and local culture, the approach taken by this madrasah has fulfilled integral aspects of the national education goals. Learning is not only focused on cognitive and academic aspects, but is also directed at character formation and strengthening identity as part of a civilized nation with Indonesian personality. This is also in line with the agenda *Pancasila Student Profile* launched by the Indonesian Ministry of Education and Culture, where students are expected to become critically reasonable, independent, and globally diverse individuals.

From a global perspective, these findings support UNESCO's vision of 21st century education, as stated in the Delors report (Patel, 2023), that the education of the future must rest on four pillars: *Learning to Know*, *Learning to Do*, *Learning to Be*, and *Learning to Live Together*. Through the learning strategies implemented at MI NU (Nahdatul Ulama) Nurul Ilmi, these four pillars are not only introduced, but contextually have been brought to life in daily learning practices. Strengthening the values of tolerance, cooperation, self-reflection, and experiential learning are part of the process of internalizing these pillars. In the interview, students said that they felt that they learned to become a better person, help friends, and understand lessons from their own life experiences (Interview with Indana Layyina Tazkiya & Nurul Maulida, 2025). This reflects the essence of holistic and humanist education which is the direction of global education policy.

Practically, the learning model developed by this madrasah also contributes to the achievement of the Sustainable Development Goals (SDGs), especially the 4th goal of the *Quality Education*. The strategy used shows that quality education is not only seen from the aspect of infrastructure or facilities, but also from a pedagogical approach that is able to reach the intellectual, emotional, social, and spiritual dimensions of students as a whole (Fidan, 2023; Priscilla & Yudhyarta, 2021; Zahrok et al., 2025). Thus, the meaningful learning approach applied at MI NU (Nahdatul Ulama) Nurul Ilmi Padangsidimpuan City shows that madrasas as Islamic-based educational institutions have high capacity and relevance in supporting national and global education agendas simultaneously, through an approach based on context, values, and humanity.

Challenges and Development Opportunities

Although the application of meaningful learning through the *Deep Learning* at MI NU (Nahdatul Ulama) Nurul Ilmi Padangsidimpuan City showed positive results, this process is inseparable from various structural, pedagogical, and cultural challenges. One of the main challenges found in this study is the limited understanding of teachers of the concept *Deep Learning* theoretically and practically (Dargan, S., Kumar, M., Ayyagari, M.R. *et al. 2020)*. Some teachers admitted that they were not familiar with the term, even though they had applied its basic principles in daily teaching practice (Interview with Nur Zannah, M.Pd., Gr, 2025). Another challenge is limited access to professional training that specifically addresses deep learning and the development of contextual pedagogy. This is reinforced by the findings Zahrok et al. (2025) that identifies that successful implementation *Deep Learning* In primary schools it is strongly influenced by the sustainability of teacher training and institutional support. Without adequate training, teachers tend to use traditional teacher-centered approaches, despite having an awareness of the importance of relevant and reflective learning.

From the cultural side, several obstacles arise from the perception of some parents who still measure the success of education solely from the achievement of students' academic scores (Dargan, S., Kumar, M., Ayyagari, M.R. *et al. 2020)*. This view can hinder the optimization of project-based learning strategies, collaborative practices, or reflective activities that do not necessarily result in high numerical scores, but greatly contribute to the development of children's character and life skills. Therefore, stronger synergy is needed between schools, teachers, and parents in building an understanding of the essence of meaningful education (Wang, Z., Liu, K., Li, J. et al. 2024*)*. However, the findings of this study also reveal various development opportunities that can be maximized by madrasas.

The context of madrassas that structurally integrate general and religious education opens up a wide space to develop a learning model that emphasizes not only cognitive, but also spiritual and social aspects. Religious values that have become a culture in madrasas, such as *tahlilan*, *maulidan*, and the habit of almsgiving, have great potential to be developed as part of a locally-based meaningful learning design. In addition, the existence of teachers who are open to innovation, participatory, and actively reflect on teaching practices shows that MI NU (Nahdatul Ulama) Nurul Ilmi Padangsidimpuan City has strong social capital in encouraging educational transformation. With the support of madrasah policies that encourage collaboration and strengthening teacher capacity, deep learning-based learning strategies can be further developed and systematized into the curriculum and daily learning activities.

In the midst of the push for national education transformation oriented to the profile of Pancasila students and 21st century education, madrassas such as MI NU (Nahdatul Ulama) Nurul Ilmi have the opportunity to become an inspirational model for other educational institutions in building meaningful learning that comes from local contexts, spiritual values, and community interactions (Dargan, S., Kumar, M., Ayyagari, M.R. *et al. 2020)*. This transformation will be effective if it is accompanied by regulatory support, teacher needsbased training, and strengthening the learning culture in the madrasah environment itself. (Sarker, I.H., 2021)

Confirmed Theoretical Propositions

This research confirms a number of theoretical propositions that form the basis of a meaningful learning approach and *Deep Learning*. Findings obtained from the field show that when students are actively involved, reflectively, and contextually in the learning process, there is a deeper construction of meaning to the material studied (Wang, Z., Liu, K., Li, J. et al. 2024*)*. This is in line with Ausubel's theory of meaningful learning (Ramadhan, 2025), which emphasizes the importance of the interconnectedness between new knowledge and the cognitive structure that students already have before. In the context of MI NU (Nahdatul Ulama) Nurul Ilmi Padangsidimpuan City, teachers' strategies that connect subject matter with students' real experiences reinforce this proposition in a real way. Furthermore, the results of this study support the view Gufron & Suryahadikusumah (2024) that approach *Deep Learning* It is not only a matter of technology or new learning methods, but a pedagogical perspective that emphasizes conceptual understanding, knowledge transfer skills, and deep emotional and motivational involvement of students (Marhaeni, N. H., et al., 2026). Although teachers in these madrassas have not used the term "deep learning" explicitly, their practice has reflected the essence of this approach.

This research also confirms that meaningful learning can be effectively facilitated in a madrasah environment, where spirituality, local culture, and social values are an integral part of students' learning lives (Dargan, S., Kumar, M., Ayyagari, M.R. *et al. 2020)*. These findings reinforce the proposition in contextual education theory, that the meaning of knowledge will increase when learning occurs in the cultural and social contexts that students know and experience on a daily basis (Priscilla & Yudhyarta, 2021). In addition, the results of the study also reinforce the proposition that the integration of UNESCO's education pillars (*Learning to Know*, *Learning to Do*, *Learning to Be* and *Learning to Live Together*) can be implemented holistically and flexibly in the context of religion-based basic education. These findings are in line with the study of Sutarman et al. (2017), which showed that education based on local values and culture has high effectiveness in shaping the whole human being. Thus, this research not only expands the understanding of the practice *Deep Learning* in the context of madrasah education, but also strengthens the theoretical foundation that underlies the importance of integrating contexts, values, and reflective approaches in designing meaningful learning. (Suzuki, K., 2017)

In addition, the involvement of madrasas in instilling the value of diversity and collaboration actually reflects the practice of multicultural education that is in line with the values of Pancasila as explained by Cahyani and Marsudi (2023), that the character of Pancasila is manifested through social traditions such as *splices* that foster the spirit of mutual cooperation, solidarity, and reciprocity in community life. These values are also the basis of the spirit of *Learning to Live Together* applied at MI NU (Nahdatul Ulama) Nurul Ilmi Padangsidimpuan City, where social activities, class dialogue, and family involvement become a vehicle to practice human values and togetherness in real terms. These findings are also in line with UNESCO's *Happy Schools Framework* (2024), which emphasizes the importance of collaborative relationships between teachers, students, and parents as the core of happy and meaningful schools (Wang, Z., Liu, K., Li, J. et al. 2024*)*. A learning environment that prioritizes empathy, cooperation, and emotional well-being has been proven to strengthen students' social-emotional abilities and support the creation of deep *learning* processes (Suzuki, K., 2017). Thus, the application of *the Learning to Live Together* approach at MI NU (Nahdatul Ulama) Nurul Ilmi not only creates social harmony in schools, but also strengthens the affective and moral dimensions that are at the core of meaningful learning.

In contrast to previous research that focused a lot on the application of *deep learning* in public schools and technology-based environments (Gufron & Suryahadikusumah, 2024; Priscilla & Yudhyarta, 2021), this research places madrasas as a distinctive learning space. In the context of MI NU (Nahdatul Ulama) Nurul Ilmi Padangsidimpuan City, *deep learning* is not only interpreted as a pedagogical strategy, but also as a humanistic process that fosters students' spiritual, social, and cultural awareness (Wang, Z., Liu, K., Li, J. et al. 2024*)*. The integration of spirituality, local culture, and social values makes the learning practice meaningful in this madrasah which makes it different conceptually and practically from previous studies. Thus, this research position expands the scope of *deep learning* discourse which has been more associated with technological innovation and *higher order thinking skills*, to be more contextual and locally valued (Jang, HJ., Cho, KO., 2019). These findings emphasize that the success of meaningful learning is not solely determined by digital methods or media, but by the ability of teachers to contextualize knowledge into the social, spiritual, and cultural realities of students (Suzuki, K., 2017). This research, therefore, contributes to the development of *deep learning theory* in the context of religious-based and multicultural basic education in Indonesia.

5. CONCLUSION

This study concludes that the deep learning approach in education, particularly in mathematics learning and Islamic basic education, can effectively create meaningful, reflective, and student-centered learning experiences. Deep learning does not merely emphasize the memorization of concepts and procedures, but focuses on conceptual understanding, critical thinking, reflection, collaboration, and the ability to apply knowledge in real-life situations. Through learning activities that are contextual, exploratory, and problem-solving oriented, students are encouraged to actively construct knowledge, connect concepts with prior experiences, and develop independent learning skills that are relevant to the demands of 21st-century education.

The findings also show that meaningful learning can be successfully implemented through pedagogical practices that integrate cultural, social, and spiritual values into the learning process. At MI NU Nurul Ilmi Padangsidimpuan City, teachers have demonstrated the essence of deep learning through contextual instruction, collaborative learning, character strengthening, and the integration of local wisdom, even though their formal understanding of deep learning theory remains limited. The use of local language, stories, traditions, and community values has proven effective in strengthening students' identity formation, emotional resilience, and social awareness. In addition, the integration of UNESCO's four pillars of education—Learning to Know, Learning to Do, Learning to Be, and Learning to Live Together—supports the development of holistic learners who are intellectually capable, morally grounded, socially responsible, and spiritually aware.

This study further emphasizes that the success of deep learning is not primarily determined by sophisticated technology or rigid instructional frameworks, but rather by the teacher's ability to design meaningful, mindful, and joyful learning experiences that are closely connected to students' real lives. The principles of mindful learning encourage students to learn consciously and critically, meaningful learning strengthens the relevance of knowledge to everyday life, while joyful learning creates a positive and motivating classroom atmosphere that supports active participation and creativity. These three principles

become an important foundation in realizing holistic education that not only develops cognitive competence but also strengthens character, communication, collaboration, creativity, and problem-solving abilities.

In relation to curriculum development, the implementation of deep learning is highly relevant to the goals of the Kurikulum Merdeka and the strengthening of the Pancasila Student Profile. The curriculum should provide broader opportunities for exploration, reflection, interdisciplinary learning, authentic assessment, and project-based activities that support deeper conceptual understanding rather than merely pursuing content completion. Teachers need continuous professional development and training to design innovative and reflective learning experiences, while educational institutions and policymakers should create flexible and adaptive learning systems that prioritize meaningful learning processes. Furthermore, educational researchers are encouraged to develop valid assessment instruments capable of measuring students' conceptual depth, reflective thinking, and long-term cognitive development. Therefore, the deep learning approach can become not only a pedagogical discourse, but also a transformative educational practice that supports the realization of holistic, humanistic, and sustainable education in Indonesia.

Declarations

Institutional Review Board Statement

This study was conducted in accordance with ethical standards of educational research involving human participants. Permission to conduct the study was obtained from the school administration of MI NU Nurul Ilmi Padangsidimpuan, North Sumatra, Indonesia.

Informed Consent Statement

Informed consent was obtained from all participants involved in the study, including teachers and students' guardians where required.

Conflicts of Interest

The author declares no conflict of interest.

Additional Declarations

The authors declare no competing interests.

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Author Contributions

Conceptualization, methodology, data collection, formal analysis, writing—original draft preparation, writing—review and editing: Torang Siregar. The author has read and agreed to the published version of the manuscript.

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Data Availability Statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Ethics Approval Statement This study was conducted in accordance with the ethical principles for educational research involving human participants. Approval for the study was obtained from the Institutional Review Board (IRB) of the Faculty of Tarbiyah and Teacher Training (FTIK), State Islamic University of Syekh Ali Hasan Ahmad Addary Padangsidimpuan (Approval No. 023/FTIK/IRB/2025, dated 15 August 2025). Permission to conduct the research at

Madrasah Ibtidaiyah NU Nurul Ilmi Padangsidimpuan, North Sumatra, Indonesia was granted by the school administration (Reference Letter No. 047/MI-NU.NI/PP/2025). All procedures involving human subjects were performed in compliance with the 1964 Helsinki Declaration and its later amendments. Written informed consent was obtained from all participating teachers and from the legal guardians of participating students prior to data collection.

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Figures

Figure 1

Traditional Batak Mandailing House

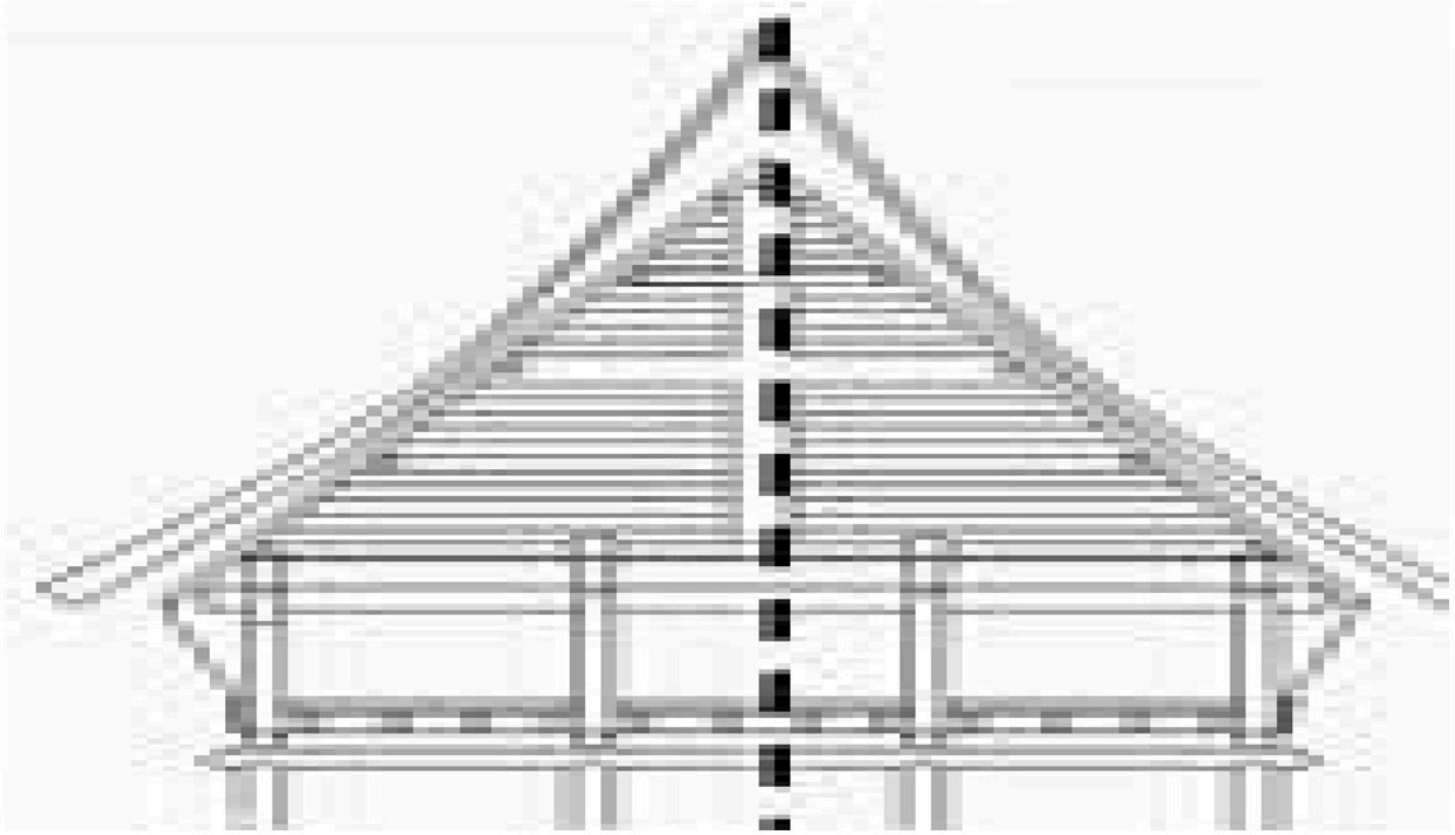

Figure 2

Sketch of the Mathematical Model of the Batak Mandailing Traditional House

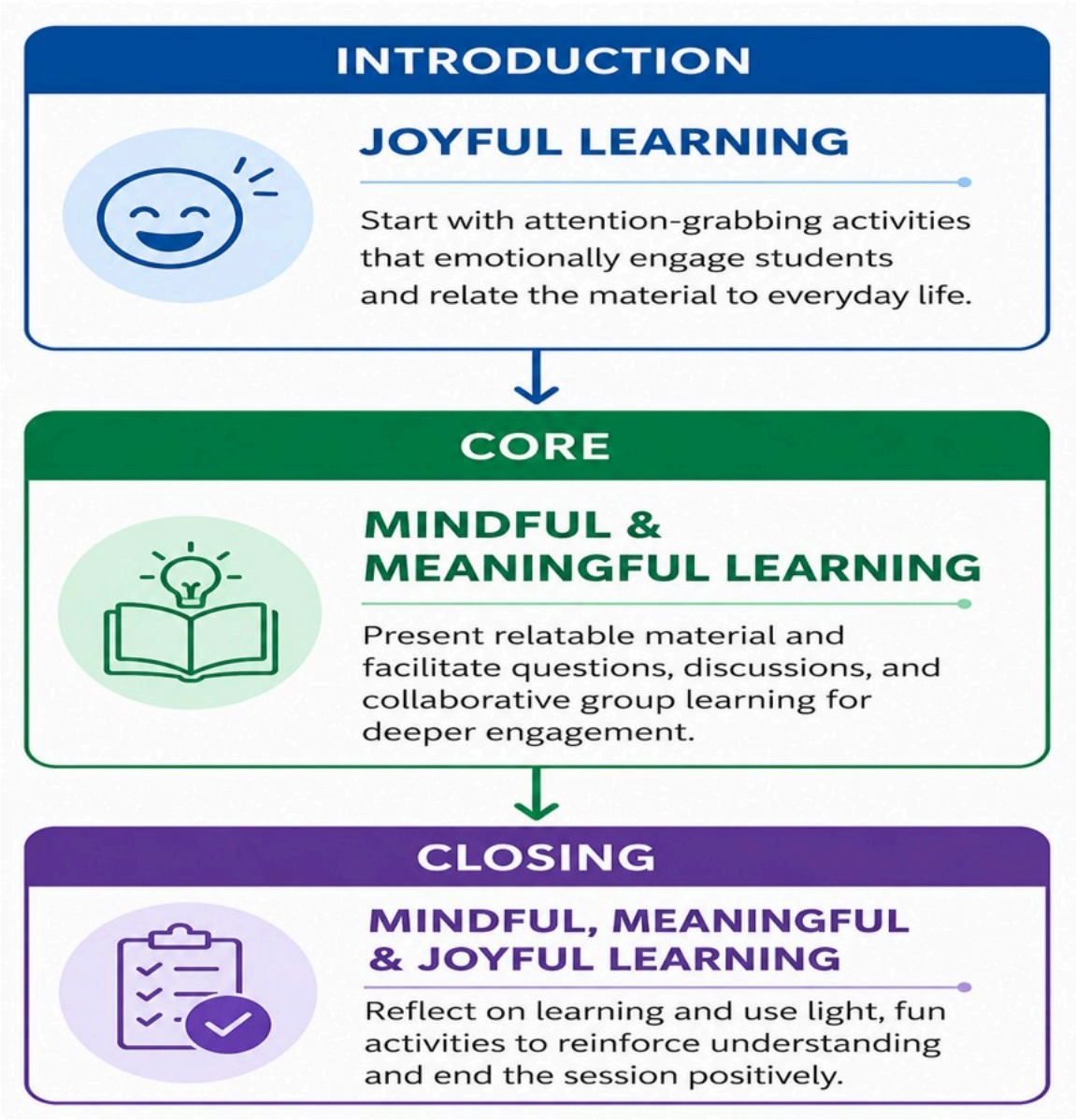

Figure 3

Three Stages of Engaging and Effective Teaching

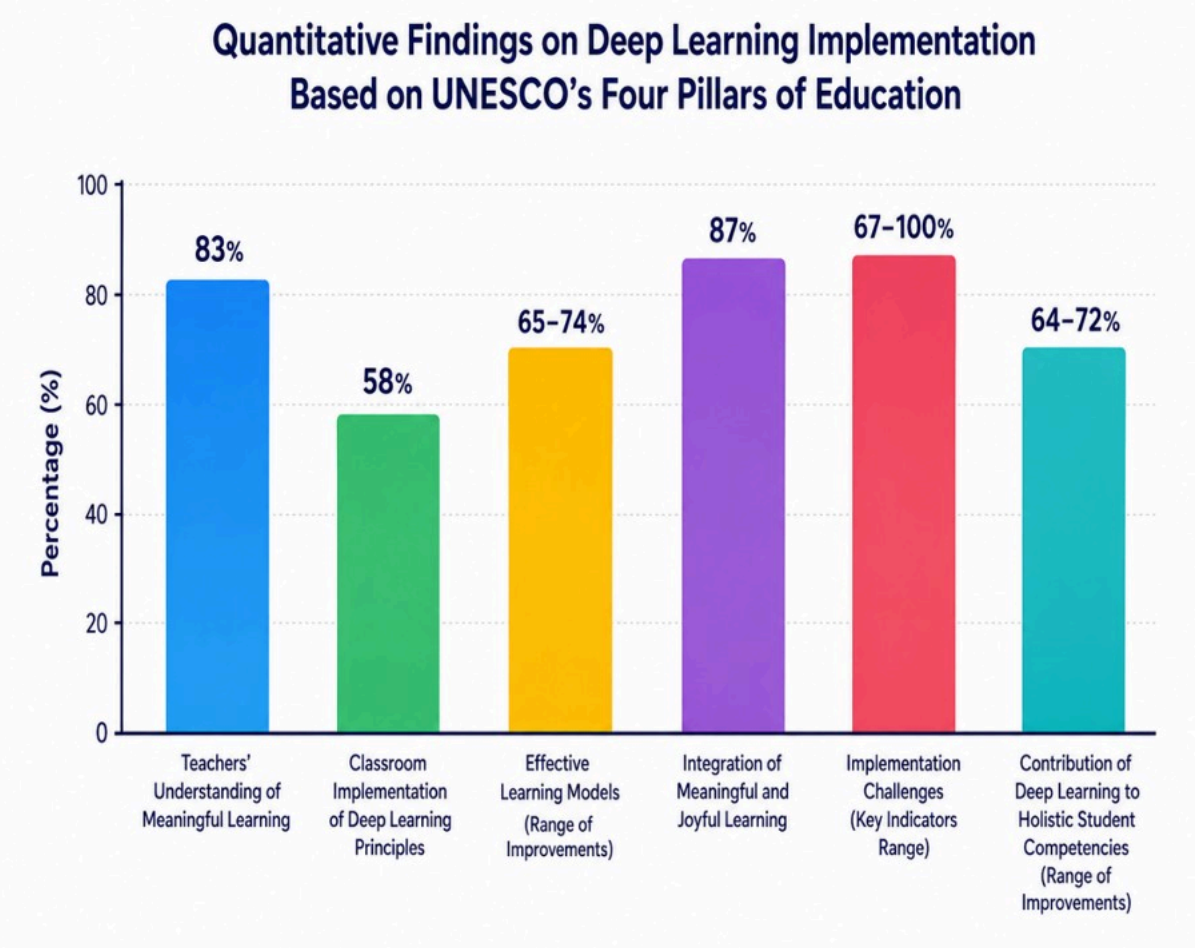

Figure 4

Quantitative Findings on Deep Learning Implementation Based on UNESCO's Four Pillars of Education

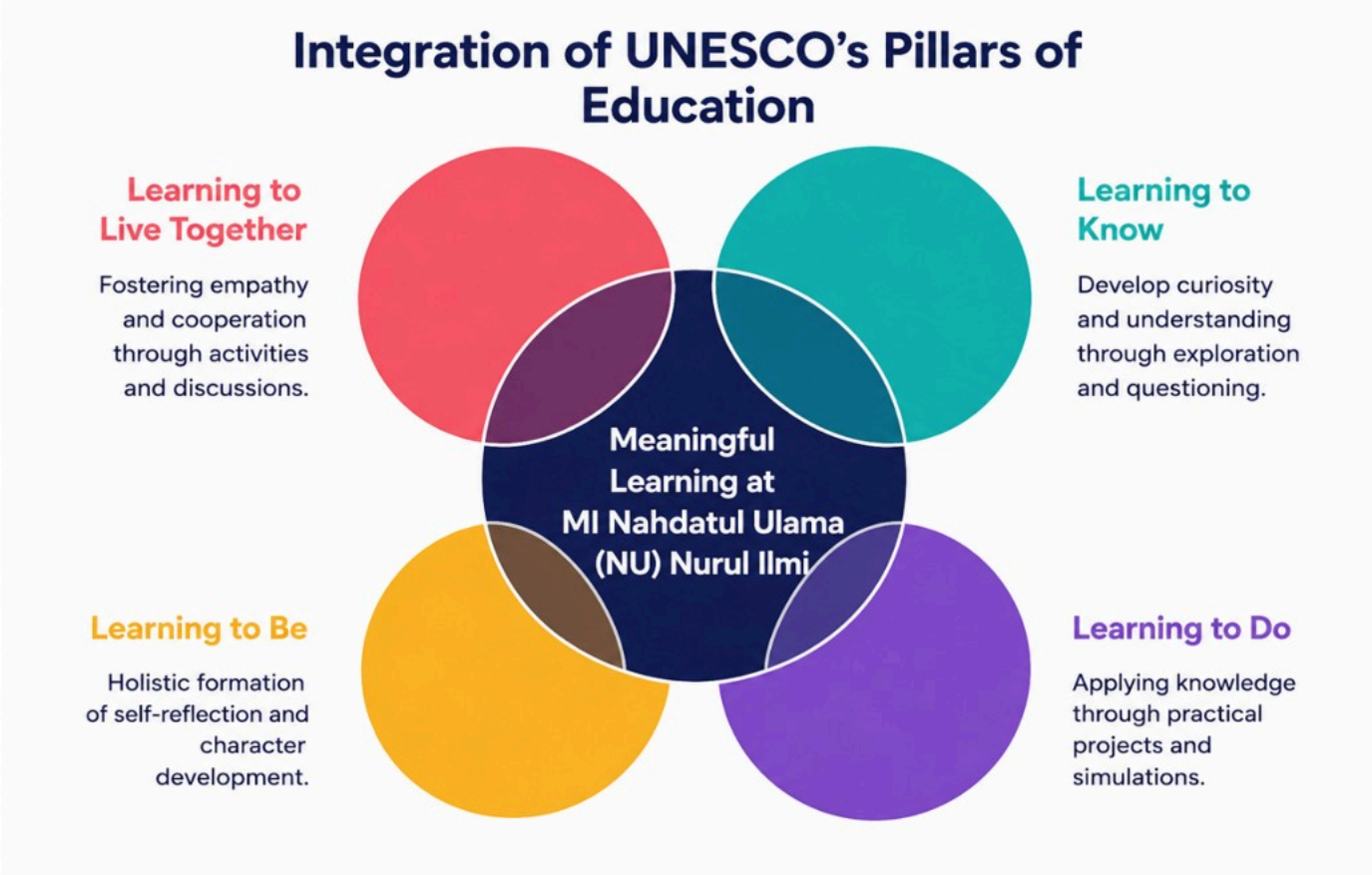

Figure 5

Framework for the integration of UNESCO education pillars at MI NU (Nahdatul Ulama) Nurul Ilmi Padangisimpuan

Figure 6

Framework for the Implementation of Multicultural Education and the Spirit of

Supplementary Files

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- TowardMeaningfulMindfulandJoyfulLearningImplementationofDeepLearningApproachinRealizingtheUNESCOEducationPillaratMadrasahIbtidaiyahts202(