

Design and Implementation of the PAI Cerdas Model: A Differentiated Deep Learning-Based Approach to Support SDG 4 in Indonesian Junior High Schools

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Abstract

This study explores the implementation of differentiated instruction based on a deep learning approach in Islamic Religious Education (PAI) and develops an innovative learning model that responds to student diversity in junior high schools in Indonesia. A qualitative multiple-case study was conducted across three junior high schools in East Java (SMP Muhammadiyah 08 Batu, SMPN 30 Malang, and SMPN 1 Lawang), with data collected through participatory observation, in-depth interviews, and document analysis. Data were analyzed using Miles, Huberman, and Saldaña's interactive model. Findings indicate that differentiated deep learning in PAI occurs through three interconnected stages: planning (diagnostic assessments and learning style mapping), implementation (content, process, and product differentiation via digital media, group work, simulations, and projects), and evaluation (formative and summative assessments with ongoing monitoring by school leaders). Co-curricular programs, such as Sunday School, Student Exchange, and the Golden Habit (Gobit) initiative, further reinforce reflective and experiential learning. The study introduces the PAI CERDAS model, which identifies five dimensions (Cheerful, Empathetic, Rational, Deep, and Aware) that enhance student engagement, reflective thinking, and positive behavioral change, as evidenced by student participation and feedback. Ultimately, this research advances innovative Islamic pedagogical practices and provides a clear framework for student-centered, reflective PAI learning aligned with Sustainable Development Goal 4.

Keywords: *Differentiated instruction, Islamic Religious Education, Deep learning, Learning model.*

Introduction

Effective learning models are an important foundation for achieving the Sustainable Development Goals (SDGs) (Holst et al., 2024; Rejekiningsih et al., 2025). The pursuit of SDG 4, which focuses on quality education, depends heavily on educational practices that are both inclusive and responsive to all learners' needs. Differentiated instruction aligns closely with this goal, as it embodies the principle of "teaching at the right level" to address diverse student backgrounds and abilities. In this context, differentiated instruction is a strategic approach that promotes active

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engagement and personalized learning experiences characterized by flexible materials (Maisyaroh et al., 2024; Salido et al., 2025), diverse methods (Taş & Minaz, 2024), life skills development (Razali et al., 2024), and adaptation to student characteristics. However, the effectiveness of differentiated instruction in achieving the aims of SDG 4 is maximized when it is supported by a deep learning approach. Deep learning not only facilitates knowledge transfer but also encourages students to develop critical thinking, internalize core values, and construct personal meaning from their experiences (Sandra, 2021; Sun et al., 2024; Tahiri et al., 2017; Yoon et al., 2024). Thus, differentiated instruction provides the pathway for inclusive and personalized pedagogy, while deep learning ensures that this pedagogy leads to meaningful and lasting learning outcomes. These two approaches together serve as central pillars for advancing SDG 4 by ensuring quality, equity, and relevance in education. In addition, effective learning based on these principles contributes to broader educational goals, including the development of human resources (Martínez-Mireles et al., 2025), as emphasized in the fourth *Asta Cita* of the Indonesian government.

The discourse surrounding SDG 4, “Quality Education,” has been explored through various multidisciplinary approaches (Makena, 2025; Nkosi, 2024; Schulz et al., 2022) within effective learning practices (Lai & Peng, 2020). Similarly, the differentiated instruction approach has been studied by scholars, ranging from its legal foundations and implementation (Sarnoto, 2024; Sofiana et al., 2024) to its evaluation and implications for improving educational quality (Astria & Kusuma, 2023; Mkhize & Ndwandwe, 2024). Despite these significant contributions, existing literature has largely focused on general educational settings or core academic subjects, leaving a distinct gap regarding the integration of differentiated instruction within Islamic Religious Education (*Pendidikan Agama Islam* or PAI in *Bahasa Indonesia*), particularly when linked to deep learning principles and their connection to SDG 4. There is a notable scarcity of empirical studies that systematically investigate how differentiated instruction strategies can be adapted and implemented in PAI classrooms to foster deep learning outcomes that advance SDG 4. Most previous research does not analyze the unique pedagogical needs and challenges inherent to PAI, a subject that holds dual responsibilities: providing religious knowledge and developing students' character and morals through the learning process. Amid the challenges of globalization and efforts to achieve the SDGs, PAI has the potential to offer a deep understanding of religious values and to encourage students to apply Islamic teachings in their daily lives. Nevertheless, its implementation continues to face challenges in delivering relevant and engaging material to all

students, regardless of their backgrounds and abilities. By systematically addressing these unexplored intersections (differentiated instruction, deep learning, and SDG 4 within the specific context of PAI) this study aims to fill a critical gap in the current literature and advance both educational theory and practice.

The reality of PAI teaching in junior schools often falls into a normative and monotonous approach, neglecting the diverse characteristics of students. This creates a gap between the religious values taught and students' ability to internalize and actualize those values in their daily lives (Mardiana & Supriyatno, 2021; Sarnoto, 2024). Against this backdrop, an innovative and contextual PAI learning model capable of bridging spirituality and modern pedagogy is urgently needed (Dista et al., 2024; Hasanah et al., 2022; Tohirin & Mardiana, 2025).

Initial field observations and informal discussions with PAI teachers in junior high schools indicated recurring challenges in addressing students' diverse learning needs, particularly in selecting instructional strategies that support meaningful and reflective engagement with PAI content. The study is primarily concerned with improving the pedagogical quality of PAI learning in ways that are consistent with the broader aspiration of SDG 4 for inclusive and quality education.

The 2024 UN Secretary-General's report reinforced the urgency of this study, revealing that only 17% of SDG indicators show progress, with SDG 4 among the slowest (Guterres, 2024; United Nations, 2020). Therefore, this study addresses the research question: "How is differentiated instruction combined with a deep learning approach in Indonesian junior high school PAI classrooms, and how can these practices be synthesized into a conceptual PAI CERDAS learning model?" The research objective lies in the design and construction of a PAI learning model based on a deep learning approach to support differentiated learning and contribute to the broader aims of SDG 4 in junior high schools in Indonesia, as well as in identifying the methodological implications of the learning model.

This research contributes to the literature in two ways. First, it provides empirical evidence on how differentiated learning and pedagogical deep learning approaches are practiced in Islamic Religious Education (PAI) classrooms at the junior high school level, a context that has received little attention in previous studies. Second, it synthesizes these field-based practices into the PAI CERDAS model, a conceptual framework that integrates the cognitive, affective, and reflective dimensions of Islamic learning in a student-responsive manner.

Review of Literature

This literature review explores how integrating differentiated instruction in Islamic Religious Education (PAI) creates a unique, holistic framework for fostering inclusive, meaningful, and value-driven learning experiences. To guide readers through the discussion, the following subsections each examine a core component in relation to the research question: first, differentiated instruction is explored as a strategy that addresses student diversity and inclusivity; second, the deep learning approach is examined as a means to foster critical thinking and meaningful understanding; third, the *tadabbur* model is discussed as a reflective method that connects religious values to students' affective and spiritual development. The literature review then synthesizes these perspectives to clarify their integration within PAI and their relevance to the creation of a holistic instructional framework.

Differentiated Instruction Concept

Differentiated instruction is defined as a pedagogical strategy that makes the diversity of students (learning readiness, cognitive profile, and interests) the basis for determining the content, process, and learning products teachers use (Gheyssens et al., 2022; Mokhampanyane, 2024; Mokotjo, 2024; Velandia-Rodriguez et al., 2025). This concept was developed based on Tomlinson's principles and is supported through its implementation at various levels and educational contexts (Krishan & Al-rsa'i, 2023). Previous research has revealed that differentiated instruction has the potential to be an effective strategy to encourage the achievement of the Pancasila student profile as Hasanah's (2022) research through creativity and teacher quality improvement (Hasanah et al., 2023; Irnidayanti & Fadhilah, 2023), as well as the opportunity to create inclusive education (Asriadi et al., 2023; Foo, 2024).

In reality, the potential of differentiated instruction strategies has been implemented in elementary school (Dista et al., 2024) and higher education (Ni'mah, 2024). The underlying reason for the emergence of this strategy is the diverse potential, needs, and learning abilities possessed by students. Masykur et al. (2024) have examined differentiated learning models in general and through the use of technology to support adaptive learning (Hu, 2024). However, few studies specifically examine it in Islamic Religious Education (PAI) learning, especially at the secondary school level. The main characteristics of differentiated instruction include: (1) responsiveness to students' readiness levels, interests, and learning profiles; (2) adaptation of content, process, product, and, when relevant, learning environment; (3) flexible grouping and varied instructional

pathways; and (4) on going assessment to inform instructional adjustment. In this sense, differentiated instruction is not a single teaching method, but a responsive pedagogical approach that enables teachers to design learning experiences according to student diversity.

Deep Learning Approach

In the educational landscape, the concept of deep learning was first introduced in 1976 by F. Marton and R. Saijo (Pan et al., 2023). They distinguished between two learning approaches: Deep Approach (DA), which emphasizes meaningful understanding, and the Surface Approach (SA), which focuses on memorization (Li et al., 2022). Further development by Biggs categorized learning styles into surface learning and deep learning, which emphasizes critical thinking, connecting ideas and concepts, creative problem solving, and the application of knowledge in new contexts (Duan, 2022; Winje & Løndal, 2020). A distinctive characteristic of deep learning is the selection of different learning methods tailored to the characteristics of the tasks students receive, resulting in diverse learning outcomes (Grauerholz, 2001; Jamil & Bhuiyan, 2021). Furthermore, researchers have also explored conceptual models (Han et al., 2024), fundamental characteristics (Hammadi et al., 2023), influencing factors (Jamil & Bhuiyan, 2021), and the implications of deep learning within research frameworks surrounding the topic (Smith & Colby, 2010). Interestingly, in recent decades, deep learning has undergone methodological developments within the established framework of social constructivism (Perrotta & Selwyn, 2020). Taken together, the evolution of deep learning highlights its practical implication for today's classrooms: teachers should design learning environments that go beyond rote memorization and instead foster critical thinking, meaningful connections, and adaptable problem-solving among students.

In this study, the term "deep learning" refers to the pedagogical concept in educational research, not to artificial intelligence or neural-network-based machine learning. It is understood as an approach to learning that emphasizes meaningful understanding, critical reflection, conceptual connection, and the application of knowledge in new contexts, rather than memorization alone. Following Marton and Säljö (1976) and further developed by Biggs (1987), deep learning in this article is used to describe how students engage with PAI content in reflective, analytical, and value-oriented ways (for example, classroom deep learning, not neural networks). This concept is different from "deep learning" in computer science, which refers to machine learning algorithms.

***Tadabbur* Model (Reflective-Contemplative) in PAI Learning**

In the context of Islamic Religious Education (PAI), the learning model is not only determined by pedagogical aspects but also by Islamic values and religious ethical principles that prioritize good manners and noble morals (Adibah et al., 2019; Azhar et al., 2025; Hermawan et al., 2025). One manifestation of this model is an integrative thematic approach that incorporates Islamic values into general subjects to foster students' spiritual awareness, primarily through a multimodal approach that combines lectures, discussions, and interactive direct interactive experiences (Abdul-Jabbar & Makki, 2024). *Tadabbur* is not only cognitive understanding, but also a deep appreciation that involves the heart and awareness of values. To illustrate, one classroom practice that operationalizes affective development through *tadabbur* is guided reflective journaling, where students are encouraged to write about how specific Quranic verses or religious lessons relate to their personal experiences or ethical decision-making. This activity allows learners to connect knowledge with inner reflection and helps translate abstract values into concrete attitudes and behaviours. This principle can serve as the basis and conceptual framework for developing learning methods that fully integrate the cognitive and affective dimensions (Masturin, 2025).

Integrating Differentiated Instruction, Deep Learning, and *Tadabbur* in PAI Learning

Differentiated instruction, deep learning, and *tadabbur* provide complementary perspectives for developing meaningful learning in Islamic Religious Education (PAI). Differentiated instruction emphasizes adapting learning content, processes, and products to accommodate students' diverse readiness levels, interests, and learning profiles (Tomlinson, 2001; Tomlinson & McTighe, 2006). The integration of differentiated instruction and pedagogical deep learning in this study is also consistent with constructivist and social constructivist views of learning. From this perspective, students do not passively receive knowledge; rather, they actively construct understanding through interaction, reflection, prior experience, and social engagement. This theoretical orientation is relevant to PAI because religious learning is not limited to transmitting doctrinal content, but also involves interpretation, meaning-making, and the internalization of values in social and personal life.

In addition to teacher-led adaptations, effective differentiation increasingly involves students as active partners in the learning process, for example by inviting them to co-plan aspects of tasks or select learning modalities that best reflect their strengths and interests. This collaboration not only promotes student agency but also aligns differentiation with the constructivist spirit of deep

learning. Meanwhile, the deep learning approach in educational sciences focuses on meaningful understanding, critical thinking, and the ability to connect knowledge across contexts rather than merely memorizing information. In the context of PAI, these approaches enable teachers to design learning experiences that are inclusive, student-centered, and encourage deeper engagement with religious knowledge.

Within Islamic educational traditions, the concept of *tadabbur* enriches this pedagogical perspective by emphasizing reflection and contemplation on the meaning of religious teachings and their relevance to everyday life. When integrated with differentiated instruction and deep learning, *tadabbur* supports the development of students' cognitive, affective, and spiritual dimensions simultaneously. This integration provides a theoretical foundation for constructing a holistic learning framework that promotes meaningful understanding, internalization of values, and character formation. Based on this conceptual synthesis, this study proposes the PAI CERDAS model as a framework for implementing differentiated deep learning in PAI learning to support inclusive, high-quality education aligned with the objectives of SDG 4.

Methods

Research Design

This study employed a qualitative multiple-case study design to explore the implementation of differentiated, deep-learning-based PAI instruction and to derive a conceptual model of the PAI CERDAS. A case study approach was chosen because it allows an in-depth understanding of complex educational practices within real-life contexts (Yin, 2017). The multiple case studies used in this research positions each of the three junior high schools as separate cases with distinct institutional contexts and Islamic Religious Education (PAI) teaching practices. The researchers applied the same data collection procedures (participant observation, in-depth interviews, and document analysis) to each case to ensure comparability across the research locations. The researchers first analyzed each school individually to identify its specific practices in planning, implementing, and evaluating differentiated deep learning in PAI. A cross-case analysis was then conducted to compare recurring patterns, similarities, and contextual differences across the three schools. These cross-case findings were then synthesized to formulate the PAI CERDAS model.

Research Sites and Participants

The research sites were three junior high schools in East Java, Indonesia: SMP Muhammadiyah 08 Batu, SMPN 30 Malang, and SMPN 1 Lawang. These schools were selected purposively based on the following criteria: (1) experience implementing differentiated learning; (2) Minimum teaching experience; (3) Involvement in curriculum planning. Participants were selected using purposive sampling to ensure that the informants had direct experience with the implementation of differentiated PAI instruction. The participants included school principals, vice principals for curriculum, PAI teachers, and eighth-grade students who were actively involved in the learning process.

Data Collection

Data collection was conducted over a four-month period (April-July 2025) through three techniques: participatory observation, in-depth interviews, and document analysis. Participatory observation was conducted in Islamic Religious Education (PAI) classes at three schools participating in this research. The observations were conducted to examine classroom interactions, differentiated learning practices, and student engagement in each in-depth learning activity. Researchers conducted observations for approximately 90 minutes per session and repeated them in different classes.

In-depth interviews were conducted with twelve informants, including the principal, vice principal for curriculum, Islamic Religious Education (PAI) teachers, and eighth-grade students. The interview protocol used a semi-structured approach to explore students' experiences and perceptions regarding the implementation of differentiated in-depth learning in their Islamic Religious Education (PAI) lessons. Interviews lasted 30-60 minutes each and were audio-recorded with the participants' consent.

Data Analysis

Meanwhile, document analysis includes learning plans, school programs, curriculum documents, and student learning outputs produced through differentiated PAI (Competency-Based Learning) teaching. Table 1 presents the data of the informants in this study.

Table 1
Research Informants

No.	Initial	Status	Sex
1.	WA	School Principals of SMPM 08	Male
2.	NA	School Principals of SMPN 1	Male
3.	SY	School Principals of SMPN 30	Female
4.	SL	Vice School Principals of SMPM 08	Female
5.	YK	Vice School Principals of SMPN 1	Male
6.	RS	Vice School Principals of SMPN 30	Male
7.	LZ	PAI Teacher of SMPM 08	Female
8.	HN	PAI Teacher of SMPN 1	Male
9.	CL	PAI Teacher of SMPN 30	Female
10.	A	Eighth-grade Student	Male
11.	B	Eighth-grade Student	Female
12.	C	Eighth-grade Student	Female

Furthermore, the data were analyzed through a combination of within-case and cross-case thematic analysis. *First*, during data collection, data from each school were analysed separately to identify patterns related to the planning, implementation, and evaluation of differentiated PAI learning based on a pedagogical deep learning approach. Interview transcripts, observation notes, and documents were coded and organized into preliminary themes within each case. In the *second* (data condensation) stage, the researchers conducted a cross-case comparison to identify recurring themes, similarities, and contextual differences across the three schools. In the *third* (data presentation) stage, the categorized data were organized into a thematic matrix to identify patterns across the three schools. Finally, during the conclusion-drawing stage, the researchers interpreted the emerging themes to formulate the conceptual structure of the CERDAS PAI learning model. The procedures of data condensation, data display, and conclusion drawing proposed by Miles, Huberman, and Saldaña (2014) were used as analytic steps to support this thematic synthesis. The final stage involved formulating the conceptual structure of the PAI CERDAS model from the recurring cross-case findings.

In analytical terms, the process involved both within-case and cross-case analysis. Each school was first examined as an individual case to identify its distinctive practices and findings. The researchers then compared the three cases to identify recurring themes and contextual variations, and this cross-case synthesis informed the final construction of the PAI CERDAS model.

Figure 1 shows the interactive relationship between the four stages of research data analysis.

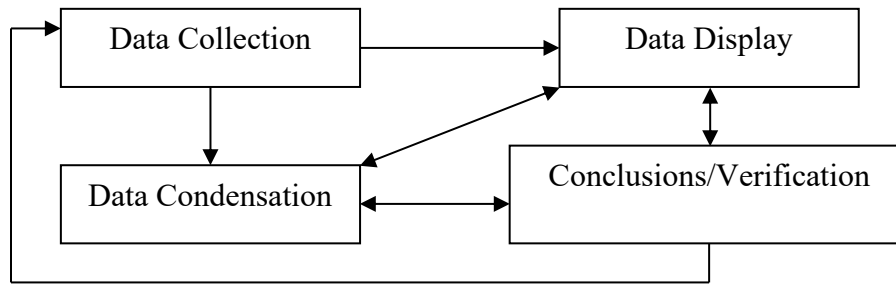


Figure 1: Interactive Model Data Analysis

Trustworthiness

To ensure the trustworthiness of the findings, several validation strategies were applied, including data triangulation, member checking, and expert validation. Data triangulation was achieved by comparing information obtained from observations, interviews, and documents. Member checking was conducted by sharing the interview summaries with selected participants to confirm the accuracy of the interpretations. In addition, the emerging model was discussed with educational experts to ensure its conceptual consistency.

Results

The results are presented as cross-case empirical themes rather than sequential development stages. Across the three schools, the researchers identified recurring patterns in four areas: planning, classroom implementation, evaluation and learning outcomes, and co-curricular reinforcement of reflective PAI learning. These themes subsequently informed the formulation of the PAI CERDAS conceptual model.

Planning Stage of Differentiated Deep Learning

Findings from the three junior high schools indicate that the implementation of differentiated PAI learning based on a deep learning approach begins with a systematic planning process. This planning stage primarily involves identifying students' learning characteristics and readiness levels.

The planning of differentiated PAI learning at SMP Muhammadiyah 08 Batu began with a needs assessment in the form of an online survey to map students' learning styles. Diagnostic tests were conducted by homeroom teachers and PAI teachers to obtain data that serve as the basis for

developing teaching modules and learning strategies aligned with the national curriculum and student learning characteristics. One school leader explained:

“Before implementing differentiated instruction, we conduct diagnostic assessments to understand students’ learning styles and readiness levels.” (WA, interview, July 23, 2025)

Similarly, SMPN 30 Malang implemented a comprehensive student mapping process involving professional academic counsellors. Document analysis revealed that this process included psychological assessments and consultations to identify students’ potential and learning preferences. The school principal emphasized that collaboration with professional institutions helped strengthen the quality of instructional planning:

“We involve external professionals to map students’ potential so that teachers can design more appropriate learning strategies.” (SY, interview, July 26, 2025)

A comparable approach was observed at SMPN 1 Lawang, where needs assessments were conducted through integrated consultations involving teachers, students, and parents. These consultations were carried out through parenting workshops and academic counselling sessions at the beginning of each semester. According to the vice principal for curriculum, this approach ensured that learning strategies were aligned with students’ academic potential and personal characteristics (YK, interview, July 27, 2025).

Across the three schools, these planning practices demonstrate a strong commitment to student-centered learning and provide the foundation for implementing differentiated deep learning in PAI instruction.

Implementation of Differentiated Deep Learning

At the school implementation level, the deep learning approach encompasses processes carried out within the education system that enable students to engage in critical thinking, contextualize ideas, and interpret their learning experiences. This process fundamentally elaborates educational methodology through constructive perspectives and new values. In practical terms, deep learning is manifested through differentiated instruction in the classroom -an approach observed by researchers in these junior high schools.

Classroom observations across the three schools also revealed that differentiated instruction was implemented through variations in content, learning processes, and learning products. During the implementation, teachers apply content differentiation using digital media such as PowerPoint

presentations, e-books, and educational videos. Teachers used these materials to present Islamic values in ways that were accessible to students with different learning preferences.

Process differentiation was implemented through interactive learning strategies, such as group discussions, simulations, and case-based studies. During classroom observations, students were often grouped by readiness levels and assigned tasks of varying complexity.

Meanwhile, product differentiation was reflected in the variety of assignments offered to students. For example, students were allowed to choose between producing video presentations, writing reflective essays, or designing thematic posters on Islamic values. This approach provides students with the freedom to choose learning methods that align with their styles and interests. One PAI teacher described the rationale behind this approach:

“Students have different learning speeds. Through differentiated tasks, they can explore Islamic values more deeply and relate them to their daily lives.” (HN, interview, July 15, 2025)

Uniquely, SMPN 1 Lawang implemented differentiated instruction through a more specific pattern. Observations showed that the needs assessment at the beginning of the semester was conducted using an integrated approach involving the school, students, and parents through parenting workshops and consultation sessions. This step was taken to ensure the effectiveness and accuracy of the school’s targeted outcomes -namely, aligning students’ academic potential and characteristics with actual conditions. This was revealed by informant YK and cross-verified by the researchers through informant’s statement (C, interview, July 27, 2025).

Findings from these three junior high schools indicate that student-centered learning principles are already in place, despite challenges such as limited resources and the need for further teacher training. Furthermore, the school curricula at these three junior high schools are designed with active student involvement in mind, and teachers are positioned as facilitators in the ongoing deep learning process.

Researchers also observed that the learning environments in these three junior high schools were both inclusive and interactive. This was evident in students' active engagement in discussions, asking questions, and exploring alternative ways of thinking. Teachers provided sufficient space for open dialogue and accommodated diverse student perspectives in solving contextual problems. These efforts reflect an approach that positions students as active participants in the learning process.

Evaluation and Learning Outcomes

The evaluation process in the three schools was conducted through a combination of formative, summative, and final project assessments. Teachers regularly assessed students' understanding through classroom quizzes, reflective assignments, and project-based evaluations.

In addition to classroom-level assessment, school leaders also monitored the implementation of differentiated instruction. Observational data indicated that school principals periodically reviewed teaching practices and provided feedback to ensure the consistency of deep learning strategies. These monitoring mechanisms ensured that differentiated learning practices were implemented systematically and aligned with the schools' broader educational objectives.

Researchers observed a similar trend at SMPN 30 Malang. This school conducted a needs assessment involving professional external partners -academic counselors- to map students' potential and learning styles. Document studies revealed a holistic mapping process that targets not only students (through assessments of potential and learning styles) but also encouraging active parental involvement through parenting programs. This aligns with the school principal's statement (SY, interview, July 26, 2025) that involving professional institutions is a strategic step the school is taking to maximize the quality of its educational process.

Co-curricular Programs Supporting Deep Learning

In addition to classroom instruction, researchers identified several co-curricular programs that reinforced deep learning practices. One notable initiative was the "Sunday School" program implemented at SMP Muhammadiyah 08 Batu. This weekly program consisted of four main activities: congregational dawn prayer, Islamic study sessions, communal breakfast, and physical exercise. Document analysis indicated that these activities were designed to strengthen students' reflective learning and character formation.

Another program identified in the study was the "Student Exchange Program", which enabled students to participate in international academic collaborations. According to one school administrator:

"Our school collaborates with international educational institutions to broaden students' learning experiences." (RS, interview, July 26, 2025)

Interestingly, this program goes beyond implementing collaboration between educational institutions; it also provides students with learning experiences within a new environment and community. Students who participated in this program reported engaging in various learning

activities, including classroom collaboration with peers from other countries, outdoor learning experiences, and leadership training (B & C, interview, July 26, 2025).

In addition, schools implemented the Golden Habit (Gobit) Program, which involved parents in monitoring students' religious practices at home. According to one PAI teacher, this initiative strengthened communication between schools and families while encouraging students to practice Islamic values in their daily lives (CL, interview, July 28, 2025).

Finally, technology-based training programs were also provided for teachers and students. Teachers received training in the use of digital tools such as Scribo AI to assess student assignments, while students participated in introductory programming workshops using Scratch (LZ, interview, July 15, 2025). initiatives demonstrate how schools integrate classroom learning with real-world experiences, enabling students to develop cognitive, affective, and psychomotor competencies holistically.

In this context, classroom observations showed that teachers grouped students by readiness levels, allowing them to work on different tasks during the same lesson. These co-curricular activities (Student Exchange, Gobit, Sunday School, and IT training) implemented at SMP Muhammadiyah 08 Batu, SMPN 30 Malang, and SMPN 1 Lawang have become a reflective and contemplative foundation for students' learning processes. One PAI teacher explained that differentiated learning helped students better understand religious concepts:

“Our students have different learning competencies. Through differentiated tasks, they can explore Islamic values more deeply and relate them to their daily lives.” (HN, interview, July 15, 2025).

These activities help contextualize classroom learning in real-life experiences. Schools are therefore able to develop students' full potential (cognitive, affective, and psychomotor) in an integrated and holistic manner.

Discussion

Interpretation of Differentiated Deep Learning Practices

These interpretations are based on a cross-case comparison of findings from the three participating schools, each of which was first analysed as an individual case. The main findings of this study indicate that differentiated PAI learning was systematically applied in the three junior high schools (SMP Muhammadiyah 08 Batu, SMPN 30 Malang, and SMPN 1 Lawang). Schools were selected purposively to reflect diverse educational settings and student demographics. Criteria included

their use of innovative teaching, varied resources, institutional backgrounds, and willingness to participate. This sample captured a range of contexts for differentiated PAI instruction. The research established that differentiated learning was carried out in coordinated stages: planning, implementation, and evaluation. These aligned with Tomlinson's (2021) principles and involved teachers adapting content, learning processes, and products to students' readiness and learning profiles. The key finding is that all three schools consistently employed these stages to tailor learning effectively.

In planning, teachers diagnosed students' needs and learning profiles. These results guided them in designing strategies and teaching modules that matched the national curriculum and students' characteristics. This supported inclusive, quality education as stated in SDG 4.

In implementation, classroom observations showed teachers using group discussions, simulations, case studies, and project-based learning. These methods helped students actively construct knowledge rather than just receive information. This aligns with previous studies: students achieve deep learning through reflective, contextual tasks (Preston et al., 2025; Wu, 2024).

For evaluation, schools used formative and summative assessments, such as classroom exams, reflective assignments, and project-based evaluations. These helped teachers track progress and foster internalization of Islamic values. Schools boosted deep learning through programs such as Sunday School, Student Exchange, and the Golden Habit (Gobit) initiative. These activities gave students hands-on experience applying Islamic values, strengthening cognitive, affective, and behavioral skills.

Thematic Synthesis of Deep Learning and *Tadabbur* Practices

Thematic analysis of interviews, observations, and school documents identified clear patterns of effective deep learning within differentiated PAI instruction. The key findings show students' positive emotional engagement, improved collaboration and social awareness, critical reasoning, and deep conceptual understanding, along with the integration of spiritual reflection.

First, students showed positive emotional engagement when teachers used flexible methods and allowed them to choose learning materials. This was evident in project assignments and group discussions, where students showed enthusiasm and active participation. In Islamic education, this approach fosters spiritual awareness and internalization of values, rather than just knowledge transfer (Mufti et al., 2024). The model covers three aspects: knowing (understanding), doing (practicing), and being (living by the teachings) (Mardiana et al., 2020). *Second*, collaborative

learning-built empathy and social awareness. Activities like Student Exchange and group projects let students interact with peers, share perspectives, and grow sensitive to others.

Third, class discussions and reflective work improved students' critical reasoning. Teachers pushed students to analyze Islamic teachings and discuss social issues in context. And *fourth*, learning activities built deep conceptual understanding. Reflective discussions and project tasks helped students connect religious concepts to their own experiences.

Spiritual reflection activities were part of classroom and co-curricular programs. These developed the students' spiritual awareness. Activities included congregational prayer, reflective discussions, and character-building programs. Students applied Islamic teachings in daily lives. This activity is both contemplative and foundational to learning. It promotes reflection, analysis, and multidimensional engagement (Putranti et al., 2024; Roushiell France London, 2022; Samsudi et al., 2024; Sukmawati et al., 2023). In several activities, teachers helped students find meaning in the material and connect it to daily life.

These thematic findings demonstrate that differentiated deep learning in PAI education promotes both academic learning and holistic student development. The central finding is that a systematic synthesis of coded interview transcripts, classroom observations, and documents revealed recurring themes of differentiation and deep learning, validated through alignment with theoretical frameworks. The final model components were based on repeated evidence, observed significance, and their relevance to both educational theory and Islamic education practice. Table 2 shows the connections among field evidence, thematic analysis, and the model's core dimensions.

Table 2

Empirical Foundation of the PAI CERDAS Model

Empirical Evidence from the Field	Thematic Interpretation	Dimension of the PAI CERDAS Model
Students actively participated in discussions, simulations, and project-based learning activities during differentiated instruction in PAI classes.	Positive emotional engagement and active participation in learning processes.	Cheerful
Collaborative learning activities and programs such as Student Exchange encouraged students to interact with peers from diverse backgrounds and develop mutual understanding.	Development of empathy, social sensitivity, and collaborative attitudes.	Empathetic
Classroom discussions and reflective learning activities encouraged students to analyze Islamic teachings and relate them to contemporary social contexts.	Strengthening students' critical reasoning and analytical thinking.	Rational

Reflective learning approaches, including project assignments and contextual learning tasks, enabled students to explore Islamic values in meaningful ways.	Deep conceptual understanding and reflective learning processes.	Deep
Spiritual reflection activities embedded in programs such as Sunday School and the Golden Habit (Gobit) initiative encouraged students to internalize religious values in everyday life	Development of spiritual awareness and value internalization.	Aware

Based on these findings, researchers developed the PAI CERDAS model. This model integrates differentiated instruction, deep learning, and reflective practices in Islamic education. To validate the model, the researchers assessed its theoretical coherence by comparing its components with established frameworks. They also sought feedback from educational practitioners and experts in Islamic education. Large-scale empirical testing was beyond the scope of this study. However, preliminary feedback from teachers and school leaders indicated that the model was feasible and aligned with observed improvements in student engagement and learning outcomes. A systematic synthesis of diverse data sources further reinforced the model's robustness and relevance across contexts.

Development of the PAI CERDAS Model

This study proposes the PAI CERDAS learning framework, grounded in an empirical and theoretical synthesis. The model was developed through an iterative process based on the study's main empirical findings: first, systematic analysis of differentiated PAI learning in three schools through interviews, observations, and documents. Second, thematic analysis identified specific patterns of effective deep learning in Islamic education. Third, the synthesis of these findings resulted in a conceptual model that integrates differentiated instruction, deep learning, and reflective practices. The central finding is that these steps together informed the model design.

CERDAS stands for five key aspects of holistic PAI learning. *Cheerful* is emotional engagement that drives active learning. *Empathetic* is building empathy and social awareness through teamwork. *Rational* is developing critical reasoning about Islamic teachings and issues. *Deep* is gaining conceptual understanding through reflection. *Aware* is building spiritual awareness and living Islamic values.

These dimensions capture the holistic learning process in the three schools, integrating differentiated and deep learning with reflective and experiential activities. The PAI CERDAS model unites classroom instruction and co-curricular programs. Sunday School, Student

Exchange, and Golden Habit give students hands-on experience in applying Islamic values and in building social and cognitive skills. The visual representation of the PAI CERDAS model is provided in Figure 2 (see Figure 2 in the appendix). As shown in the Figure 2, the model integrates differentiated instruction, deep learning, and reflective Islamic learning practices to support students' cognitive, affective, and psychomotor development in line with SDG 4.

This study has some limitations. Research was conducted in three schools in one region, which may limit the generalizability of the findings. Data came mainly from qualitative methods (interviews, observation, and document analysis) with no large-scale quantitative data. Model effectiveness was assessed using early teacher and leader feedback rather than long-term studies. Future research could build on this work by employing larger, more diverse samples across different regions and school types. Longitudinal studies and mixed-methods approaches could help evaluate the long-term impact and wider applicability of the PAI CERDAS model on student achievement and character development. Further investigation into specific components of the model, as well as its integration into existing curricula, would also provide deeper insights into effective practices for Islamic education. This study's key finding, the PAI CERDAS model, is presented in Figure 2.

Conclusion

This study shows that systematic, differentiated PAI learning supports students' holistic development. It is structured around planning, implementation, and evaluation. Diagnostic assessments and learning style mapping inform planning. Differentiated content, process, and product underpin implementation. Co-curricular programs reinforce contextual and reflective learning. These integrated practices target cognitive, affective, and behavioral growth. This demonstrates PAI's capacity to nurture the whole student.

Building on these findings, this study introduces the PAI CERDAS model (a differentiated, deep-learning framework for Islamic Religious Education). In practice, teachers use the model's five core dimensions (Cheerful, Empathetic, Rational, Deep, Aware) as guides to adapt lessons and activities to students' needs, encouraging reflective discussions and tailored assignments. This application makes learning meaningful and character-driven while fostering social awareness. By connecting differentiated instruction with reflective learning inspired by *tadabbur*, the model bridges academic learning and internalized values.

This research advances innovative Islamic education. It shows how differentiated instruction and deep learning help achieve SDG 4 for quality and inclusion. The PAI CERDAS model gives teachers a practical framework for student-centered, reflective PAI learning. Future research should test this model in more contexts and with different methods.

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References

- Abdul-Jabbar, W. K., & Makki, Y. (2024). Integrating Intercultural Philosophy into the High School Curriculum: Toward a Deliberative Pedagogy of Tadabbur in Diasporic Muslim Education. *Religions*, 15(2), 1–13. <https://doi.org/10.3390/rel15020189>
- Adibah, S. M., Mohd Nizah, M. A., & Norawavi, A. N. (2019). The Concept of Islamic Education: Teacher-Student Adab. *Sains Insani*, 4(1), 61–67. <https://doi.org/10.33102/jsi2019.4.1.09>
- Asriadi, M., Hadi, S., Istiyono, E., & Retnawati, H. (2023). Does differentiated instruction affect learning outcome? Systematic review and meta-analysis. *Journal of Pedagogical Research*, 7(5), 18–33. <https://doi.org/10.33902/JPR.202322021>
- Astria, R., & Kusuma, A. B. (2023). Analisis Pembelajaran Berdiferensiasi Untuk Meningkatkan Kemampuan Berpikir Kreatif Matematis. *Proximal: Jurnal Penelitian Matematika Dan Pendidikan Matematika*, 6(2), 112–119. <https://doi.org/10.30605/proximal.v6i2.2647>
- Azhar, A., Usman, J., Muhajir, M., & Zuaidar, Z. (2025). Integrating Prophetic Metaphors into the Development of Islamic Education Curriculum. *Journal of Curriculum Studies Research*, 7(2), 296–317. <https://doi.org/10.46303/jcsr.2025.22>
- Dista, D. X., Hermita, N., & Triani, R. A. (2024). The Influence of Differentiated Learning in Elementary Schools. *Journal of Education Research*, 5(2), 994–999.

<https://doi.org/https://doi.org/10.37985/jer.v5i2.964>

- Duan, Y. (2022). Mathematics Deep Learning Teaching Based on Analytic Hierarchy Process. *Mathematical Problems in Engineering*, 2022, 1–10. <https://doi.org/10.1155/2022/3070791>
- Foo, S. Y. (2024). Investigating gifted students' higher-order thinking skills in a differentiated learning environment: A case study. *Gifted Education International*, 41(2), 236–259. <https://doi.org/https://doi.org/10.1177/02614294241305766>
- Gheysens, E., Coubergs, C., Griful-Freixenet, J., Engels, N., & Struyven, K. (2022). Differentiated instruction: the diversity of teachers' philosophy and praxis to adapt teaching to students' interests, readiness and learning profiles. *International Journal of Inclusive Education*, 26(14), 1383–1400. <https://doi.org/https://doi.org/10.1080/13603116.2020.1812739>
- Grauerholz, L. (2001). Teaching Holistically to Achieve Deep Learning. *College Teaching*, 49(2), 44–50. <https://doi.org/https://doi.org/10.1080/87567550109595845>
- Guterres, A. (2024). The Sustainable Development Goals (SDGS) 2024. In *The Sustainable Development Goals (SDGS) 2024*. <https://doi.org/10.4324/9780429282348-52>
- Hammadi, S. S., Majeed, B. H., & Hassan, A. K. (2023). Impact of Deep Learning Strategy in Mathematics Achievement and Practical Intelligence among High School Students. *International Journal of Emerging Technologies in Learning*, 18(6), 42–52. <https://doi.org/10.3991/ijet.v18i06.38615>
- Han, T., Huang, L., & Hao, L. (2024). Correction: Changing Trajectories and Formation Mechanism of Deep Learning Approach: A Longitudinal Study of the Undergraduate Experience in the Educational Interface. *Asia-Pacific Education Researcher*, 33(3), 647. <https://doi.org/10.1007/s40299-023-00763-9>
- Hasanah, E., Al Ghazy, M. I., Suyatno, S., Maryani, I., & Mohd Yusoff, M. Z. (2023). Unlocking Classroom Potential: Exploring the Mediating Role of Teacher Mindset on Embracing Differentiated Instruction. *International Journal of Learning, Teaching and Educational Research*, 22(10), 433–452. <https://doi.org/10.26803/ijlter.22.10.24>
- Hasanah, E., Suyatno, S., Maryani, I., Badar, M. I. Al, Fitria, Y., & Patmasari, L. (2022). Conceptual Model of Differentiated-Instruction (DI) Based on Teachers' Experiences in Indonesia. *Education Sciences*, 12(10). <https://doi.org/10.3390/educsci12100650>
- Hermawan, W., Supriyadi, T. & Kurniawan, C.S. (2025). Designing a Pedagogical Model for Islamic Legal Literacy and Religious Moderation in Contemporary Digital Contexts. *Journal of Social Studies Education Research*, 16(3), 209–237. <https://jsser.org/index.php/jsser/article/view/6582/747>
- Holst, J., Singer-Brodowski, M., Brock, A., & de Haan, G. (2024). Monitoring SDG 4.7: Assessing

- Education for Sustainable Development in policies, curricula, training of educators and student assessment (input-indicator). *Sustainable Development*, 32(4), 3908–3923. <https://doi.org/10.1002/sd.2865>
- Hu, L. (2024). Utilization of differentiated instruction in K-12 classrooms: a systematic literature review (2000–2022). *Asia Pacific Education Review*, 25, 507–525. <https://doi.org/https://doi.org/10.1007/s12564-024-09931-y>
- Irnidayanti, Y., & Fadhilah, N. (2023). Teaching quality in Indonesia: What needs to be improved? In *Effective Teaching Around the World: Theoretical, Empirical, Methodological and Practical Insights*. Springer International Publishing. https://doi.org/10.1007/978-3-031-31678-4_10
- Jamil, M. G., & Bhuiyan, Z. (2021). Deep learning elements in maritime simulation programmes: a pedagogical exploration of learner experiences. *International Journal of Educational Technology in Higher Education*, 18(1), 1–22. <https://doi.org/10.1186/s41239-021-00255-0>
- Krishan, I. Q., & Al-rsa'i, M. S. (2023). The Effect of Technology-Oriented Differentiated Instruction on Motivation to learn Science. *International Journal of Instruction*, 16(1), 961–982. <https://doi.org/10.29333/iji.2023.16153a>
- Lai, Y. C., & Peng, L. H. (2020). Effective teaching and activities of excellent teachers for the sustainable development of higher design education. *Sustainability (Switzerland)*, 12(1), 1–27. <https://doi.org/10.3390/su12010028>
- Li, B., Burke, J., & Plunkett, M. (2022). Deep or surface learning? Perceptions of Chinese international and local students in Australian universities. *Issues in Educational Research*, 32(1), 149–181. <http://www.iier.org.au/iier32/li.pdf>
- Maisyaroh, M., Wiyono, B. B., Chusniyah, T., Adha, M. A., Valdez, A. V., & Lesmana, I. (2024). Existence of independent learning curriculum and portrait of ideal curriculum management in laboratory schools. *Journal of Education and Learning (EduLearn)*, 18(4), 1187–1196. <https://doi.org/10.11591/edulearn.v18i4.21729>
- Makena, B. (2025). Congested Lectures: A Case for Educational Quality. *Journal of Culture and Values in Education*, 8(1), 151–165. <https://doi.org/10.46303/jcve.2025.9>
- Mardiana, D., Razaq, A. R., & Umiarso, U. (2020). Development of Islamic Education: The Multidisciplinary, Interdisciplinary and Transdisciplinary Approaches. *Al-Hayat: Journal of Islamic Education*, 4(1), 58–68. <https://doi.org/10.35723/ajie.v4i1.97>
- Mardiana, D., & Supriyatno, T. (2021). The Effectiveness of Pedagogical Innovation of Islamic Education Learning (PAI) During Covid-19 A Case Study of Senior High School in Malang-East Java. *Advances in Social Science, Education and Humanities Research*, 529(ICONETOS 2020), 477–482. <https://doi.org/https://dx.doi.org/10.2991/assehr.k.210421.069>

- Martínez-Mireles, J. R., García-Márquez, M. A., Cornejo, A. A., & Rodríguez-Flores, J. (2025). Global case studies: Successful examples of smart education implementation. In J. Ruiz-Vanoye & O. Díaz-Parra (Eds.), *Revolutionizing Pedagogy Through Smart Education* (pp. 297–320). IGI Global. <https://doi.org/10.4018/979-8-3693-7793-2.ch014>
- Masturin. (2025). Religious Education in Agricultural Environments: Integrating Islamic Teachings and Agricultural Practices for Holistic Student Development. *Religious Education*, 120(1), 58–75. <https://doi.org/https://doi.org/10.1080/00344087.2024.2426318>
- Masykur, Latifa, A., & Ammade, S. (2024). Improving the English Language Achievement of SMP Negeri 4 Polewali by Integrating E-modul as a Media and Differentiated Learning as the Approach. *Journal of English Language Teaching and Applied Linguistics*, 6(1), 22–42. <https://doi.org/10.32996/jeltal.2024.6.1.4>
- Miles, M. B., Huberman, A. M., & Saldana, J. (2014). *Qualitative Data Analysis A Methods Sourcebook* (3rd ed.). SAGE Publications.
- Mkhize, T., & Ndwandwe, N. (2024). Swimming Against the Tide: Resource Mobilization and its Implications for Rural Schools of South Africa. *Research in Educational Policy and Management*, 6(2), 363-392. <https://doi.org/10.46303/repam.2024.40>
- Mokhampanyane, M. (2024). Teachers' Capabilities in Implementing Inclusive Education: A South African Perspective. *Research in Social Sciences and Technology*, 9(3), 11-25. <https://doi.org/10.46303/ressat.2024.44>
- Mokotjo, L. (2024). Fostering Inclusivity: A Critical Emancipatory Approach to Dyscalculia in Primary School Mathematics. *Research in Educational Policy and Management*, 6(2), 194-208. <https://doi.org/10.46303/repam.2024.31>
- Mufti, Z. A., Syafruddin, Rehani, Yusmanila, & Zuzano, F. (2024). Transformasi Pembelajaran Al-Qur'an dan Hadis dalam Pendidikan Agama Islam untuk Menghadapi Revolusi Industri 5.0. *Mauriduna: Journal of Islamic Studies*, 5(5), 1584–1600. <https://doi.org/10.37274/mauriduna.v5i2.1248>
- Nkosi, N. (2024). Breaking Barriers and Building Bridges: Unveiling the Enablers of Women School Leaders to Overcome Gender Inequality in KwaZulu-Natal, South Africa. *Research in Educational Policy and Management*, 6(2), 436-453. <https://doi.org/10.46303/repam.2024.43>
- Ni'mah, N. (2024). The Effect of Differentiated Learning on Student Learning Outcomes in Elementary Mathematics Learning Courses at Universitas Muhammadiyah Palangkaraya. *Pedagogik Jurnal Pendidikan*, 19(1), 53–59. <https://doi.org/https://doi.org/10.33084/pedagogik.v19i1.6951>
- Pan, Q., Zhou, J., Yang, D., Shi, D., Wang, D., Chen, X., & Liu, J. (2023). Mapping Knowledge Domain Analysis in Deep Learning Research of Global Education. *Sustainability*

- (Switzerland), 15(4), 1–22. <https://doi.org/10.3390/su15043097>
- Perrotta, C., & Selwyn, N. (2020). Deep learning goes to school: toward a relational understanding of AI in education. *Learning, Media and Technology*, 45(3), 251–269. <https://doi.org/10.1080/17439884.2020.1686017>
- Preston, M., Subban, P., Suprayogi, M. N., Liyani, A. N., & Ratri, A. P. P. (2025). Differentiated instruction in higher education: the experience and perceptions of five academics. *Journal of Education and Learning*, 19(3), 1295–1306. <https://doi.org/10.11591/edulearn.v19i3.21760>
- Putranti, N. A., Nur, M., & Maksum, R. (2024). Implementation of Differentiated Learning Methods in Increasing Student Learning Motivation at SMPN 23 Surakarta. *Jurnal Kependidikan*, 13(1), 947–952. <https://doi.org/https://doi.org/10.58230/27454312.521>
- Razali, Blegur, J., Ma'mun, A., Berliana, Mahendra, A., Juliantine, T., Lubis, A. E., Prasetyo, R., & Tlonaen, Z. A. (2024). Physical education teachers' experiences in promoting life skills using differentiated instruction. *Retos*, 57, 641–654. <https://doi.org/10.47197/retos.v57.106167>
- Rejekiningsih, T., Sumaryati, S., Sari, D., Ariana, Y., & Qodr, T. (2025). Designing a Bullying-Free School to Foster a Safe Environment Based on Sustainable Development Goals: A Mixed Methods Approach. *Journal of Curriculum Studies Research*, 7(2), 373–393. <https://doi.org/10.46303/jcsr.2025.26>
- Roushiell France London. (2022). Using Differentiated Learning Activities to Improve Student's Grammatical Competence. *East Asian Journal of Multidisciplinary Research*, 1(6), 1017–1032. <https://doi.org/10.55927/eajmr.v1i6.696>
- Salido, A., Syarif, I., Suparjan, S., Wana, P. R., Sitepu, M. S., & Melisa, R. (2025). Mapping the Landscape of Critical Thinking Skills in Higher Education in the AI Era: A Bibliometric and Systematic Literature Review. *Journal of Culture and Values in Education*, 8(2), 139–164. <https://doi.org/10.46303/jcve.2025.23>
- Samsudi, Suprptono, E., Utanto, Y., Rohman, S., & Djafar, T. (2024). Unraveling the Merdeka Curriculum: Exploring Differentiated Instruction'S Impact on Student Learning. *Jurnal Ilmiah Peuradeun*, 12(2), 517–538. <https://doi.org/10.26811/peuradeun.v12i2.1131>
- Sandra, N. K. (2021). Differentiated Curriculum and Instruction for Advanced and Gifted Learners. In *Differentiated Curriculum and Instruction for Advanced and Gifted Learners* (1st Editio). Routledge. <https://doi.org/https://doi.org/10.4324/9781003111443>
- Sarnoto, A. Z. (2024). Pembelajaran Berdiferensiasi dalam Kurikulum Merdeka. *Journal on Education*, 1(3), 15928–15939. <https://doi.org/https://doi.org/10.31004/joe.v6i3.5470>
- Schulz, A., Patka, A. E., Shriver, C., Seleb, B., Zhang, M., Jadali, N., Greiner, C. D., Hu, D., & Moore, R. (2022). A Foundational Design Experience in Conservation Technology: A Multi-

Disciplinary Approach to meeting Sustainable Development Goals. *ASEE Annual Conference and Exposition, Conference Proceedings*, 182495.

Smith, T. W., & Colby, S. A. (2010). Teaching for Deep Learning. *The Clearing House: A Journal of Educational Strategies*, 80(5), 205–210. <https://doi.org/https://doi.org/10.3200/TCHS.80.5.205-210>

Sofiana, N., Andriyani, S., Shofiyuddin, M., Mubarak, H., & Candraloka, O. R. (2024). The implementation of differentiated learning in ELT: Indonesian teachers' readiness. *Forum for Linguistic Studies*, 6(2), 1–17. <https://doi.org/10.59400/fls.v6i2.1178>

Sukmawati, I., Prajoko, S., & Alamsyah, M. R. N. (2023). The response of biology education program students to differentiated learning as the implementation of independent learning that supports creativity. *Electronic Physics Informatics International Conference (EPIIC) 2023*. <https://doi.org/https://doi.org/10.1063/5.0212217>

Sun, W., Qin, M., & Yin, Z. (2024). Exploring Educational Transformation and Innovation Pathways in the Era of Artificial Intelligence. *Proceeding of the 2024 International Conference on Artificial Intelligence and Future Education (AIFE '24)*, 338–346. <https://doi.org/https://doi.org/10.1145/3708394.3708452>

Tahiri, J. S., Bennani, S., & Idrissi, M. K. (2017). diffMOOC: Differentiated learning paths through the use of differentiated instruction within MOOC. *International Journal of Emerging Technologies in Learning*, 12(3), 197–218. <https://doi.org/10.3991/ijet.v12i03.6527>

Taş, H., & Minaz, M. B. (2024). The Effects of Learning Style-Based Differentiated Instructional Activities on Academic Achievement and Learning Retention in the Social Studies Course. *SAGE Open*, 14(2), 1–14. <https://doi.org/10.1177/21582440241249290>

Tohirin, T., & Mardiana, D. (2025). The Role of Counselors and University Students' Adversity Quotient in Enhancing Islamic Education (PAI) Online Learning: Insights from the COVID-19 Experience. *Educational Process: International Journal*, 14, 1–14. <https://doi.org/10.22521/edupij.2025.14.30>

Tomlinson, C. A. (2001). *How to Differentiate Instruction in Mixed-Ability Classrooms* (2nd ed.). ASCD.

Tomlinson, C. A. (2021). Differentiated instruction in rural school contexts. In *Gifted Education in Rural Schools: Developing Place-Based Interventions* (pp. 79–90). Taylor and Francis. <https://doi.org/10.4324/9781003017004-11>

Tomlinson, C. A., & McTighe, J. (2006). *Integrating Differentiated Instruction and Understanding by Design*. ASCD.

United Nations. (2020). Global indicator framework for the Sustainable Development Goals and

- targets of the 2030 Agenda for Sustainable Development. *Work of the Statistical Commission Pertaining to the 2030 Agenda for Sustainable Development*, 1–21. [https://unstats.un.org/sdgs/indicators/Global Indicator Framework after 2019 refinement_Eng.pdf%0Ahttps://unstats.un.org/sdgs/indicators/Global Indicator Framework_A.RES.71.313 Annex.pdf](https://unstats.un.org/sdgs/indicators/Global_Indicator_Framework_after_2019_refinement_Eng.pdf%0Ahttps://unstats.un.org/sdgs/indicators/Global_Indicator_Framework_A.RES.71.313_Annex.pdf)
- Velandia-Rodriguez, C.A., Chiappe, A. & Sagredo, A. V. (2025). From Uniformity to Uniqueness: Personalized Learning Through Artificial Intelligence. *Journal of Social Studies Education Research*, 16(2), 169-196. <https://jsser.org/index.php/jsser/article/view/6415/732>
- Winje, Ø., & Løndal, K. (2020). Bringing deep learning to the surface: A systematic mapping review of 48 years of research in primary and secondary education. *Nordic Journal of Comparative and International Education*, 4(2), 25–41. <https://doi.org/10.7577/njcie.3798>
- Wu, X.-Y. (2024). Exploring the impact of blended collaborative learning on deep learning outcomes: a structural equation modeling approach. *Education and Information Technologies*, 30(8), 11185–11221. <https://doi.org/https://doi.org/10.1007/s10639-024-13202-z>
- Yin, R. K. (2017). *Case Study Research and Application: Design and Methods*. SAGE Publications.
- Yoon, H. Y., Kang, S., & Kim, S. (2024). A non-verbal teaching behaviour analysis for improving pointing out gestures: The case of asynchronous video lecture analysis using deep learning. *Journal of Computer Assisted Learning*, 40(3), 1006–1018. <https://doi.org/10.1111/jcal.12933>

Figure 2: Visual Representation of the PAI CERDAS Model

Note: The model was developed from cross-case thematic synthesis of observations, interviews, and document analysis across the three participating schools

