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Influence Deep Learning Approach Framework Merdeka Curriculum towards Realization of Character Education Students at Amanah Nusantara High School

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Abstract

This study aims to analyze the influence of implementing a deep learning approach within the Merdeka Curriculum framework on the character development of students at Amanah Nusantara High School. The urgency of this research arises from the growing national demand for educational practices that not only strengthen students' cognitive mastery but also cultivate character values aligned with the Profile of Pancasila Students an area where empirical evidence remains limited, particularly in digital era learning contexts. This study employs a mixed-methods design using a one-group pretest–posttest model. The research participants consist of 29 eleventh-grade students and two Sociology teachers. Quantitative data were collected through a character education questionnaire encompassing responsibility, honesty, care, social awareness, and work ethic, while qualitative data were obtained through in-depth interviews and observations of classroom activities. Descriptive analysis indicates an improvement in the mean character education score from 72.3 (SD = 8.9) in the pretest to 78.9 (SD = 7.4) in the posttest. The Shapiro–Wilk test confirmed normal data distribution ($p > 0.05$), and a paired-samples t-test showed a significant increase, $t(28) = 4.12$, $p = 0.0003$, with a medium-to-large effect size (Cohen's $d = 0.76$). Qualitative findings further reveal that the deep learning approach enhances student participation, moral value reflection, and collaborative work, especially during activity-based learning. However, several challenges emerged, including time limitations and the absence of comprehensive character assessment instruments. Overall, the findings confirm that the deep learning approach is effective in cultivating students' character through reflective, collaborative, and project-based activities aligned with the principles of the Merdeka Curriculum and the Pancasila Student Profile. The study highlights an urgent need for systematic teacher training and the development of character assessment frameworks to support sustainable deep learning practices in Indonesian schools.

Keywords: *Deep Learning Approach, Character Education, Pancasila Students, High school*

Introduction

Character education has become a foundational element in Indonesia's ongoing educational reform, particularly following the implementation of the Merdeka Curriculum, which positions the Profil Pelajar Pancasila at the core of the national educational philosophy (Wulandari et al., 2025). This curriculum asserts that education should extend beyond academic achievement to include the development of ethical values, social consciousness, and moral responsibility. In this context, learning is conceptualized as a meaningful and transformative process that equips

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students to address complex social, cultural, and technological challenges. Consequently, students must develop the ability to think critically, act responsibly, and exhibit empathy and integrity in their interactions with others (Daniel et al., 2024). The urgency of character education has become increasingly evident in the digital era, where learners are continuously exposed to information, ideologies, and global cultural influences that may contradict local values and national identity.

Teachers, therefore, face rising expectations to foster not only academic competence but also students' character development through intentional and well-designed learning experiences (Hastasasi et al., 2022). The Merdeka Curriculum aims to address these educational needs by fostering adaptive, flexible, and student-centered learning approaches. It emphasizes six core dimensions of the Profil Pelajar Pancasila: faith and noble character, global diversity, cooperation, independence, critical reasoning, and creativity, which serve as guiding principles for comprehensive student development (Lubis, 2023). These dimensions serve as both learning outcomes and moral foundations, aiming to cultivate well-rounded learners who can contribute to society. Achieving these objectives necessitates robust pedagogical strategies that integrate cognitive, affective, and behavioral aspects of learning (Hidayah et al., 2024). Among the available approaches, deep learning has emerged as particularly effective in fostering meaningful understanding, reflective thinking, and moral sensitivity in students.

In contrast to surface learning, which emphasizes memorization, deep learning promotes thorough exploration of concepts, integration of ideas across contexts, and critical reflection on personal and social significance (Biggs & Tang, 2011). Deep learning holds significant importance within the discipline of sociology. Sociological topics, including social interaction, inequality, cohesion, and conflict, demand more than theoretical comprehension. Students are expected to investigate how these phenomena manifest within their communities and to reflect on their societal responsibilities. Deep learning strategies, such as inquiry-based, project-based, design-based, and problem-based learning, prompt students to identify local issues, analyze them through sociological frameworks, assess their ethical dimensions, and develop solutions through collaborative efforts (Amir et al., 2023; Singh, 2019).

These approaches are closely aligned with the values of the Profil Pelajar Pancasila and facilitate the development of cooperation, creativity, and critical reasoning (Amir & Akhiruddin, 2023). Moreover, deep learning fosters moral reflection by encouraging students to critically examine their values, assess the consequences of their actions, and engage with diverse perspectives. This process facilitates character development and the formation of personal values (Akhiruddin & Amir, 2022). Although deep learning offers significant conceptual advantages, empirical research on its impact on students' character development in Indonesia, particularly at the secondary school level, remains limited. Existing studies predominantly address cognitive outcomes, such as academic achievement and critical thinking skills (Amir & Akhiruddin, 2023; Prihantoro et al., 2025; Prihantini et al., 2025).

Investigations into the influence of deep learning on character dimensions, including integrity, responsibility, empathy, honesty, and social awareness, are comparatively rare. Furthermore, there is limited understanding of how teachers interpret, adapt, and implement deep learning to support character development, despite their essential role as facilitators of learning and exemplars of value internalization (Kharismawati et al., 2025; Sukmawati et al., 2025). These research gaps underscore the necessity for empirical studies examining the operation of deep learning within the Merdeka Curriculum framework, its effects on students' character formation, and the challenges teachers face during implementation. This study

addresses a significant research gap by examining the implementation of deep learning in Sociology classes at Amanah Nusantara High School, an institution that integrates the Merdeka Curriculum and emphasizes character development alongside academic achievement. The research explores the impact of deep learning on students' responsibility, honesty, social empathy, work ethic, and collaborative behavior.

The study's primary contribution is its shift from focusing solely on cognitive learning outcomes to emphasizing character-oriented outcomes, thereby providing a more comprehensive understanding of deep learning in contemporary Indonesian education. Additionally, adopting a mixed-methods design enables the collection of both quantitative data on character indicators and qualitative insights from teacher observations and classroom interactions. The study also identifies practical challenges, including limited instructional time, inadequate assessment tools, and varying levels of teacher preparedness, which affect the sustainability of deep learning implementation.

This study has four primary objectives: (1) to analyze the impact of deep learning on students' character development, focusing on responsibility, honesty, social awareness, and work ethic; (2) to examine how deep learning activities promote moral reflection, collaborative engagement, and prosocial behavior; (3) to identify challenges teachers encounter when integrating deep learning into character education; and (4) to provide empirical recommendations for enhancing sustainable, character-oriented instructional practices aligned with the Profil Pelajar Pancasila. By pursuing these objectives, the research contributes to the national discourse on cultivating character, values, and social responsibility in Indonesian schools through pedagogical strategies that foster deeper, more reflective, and more collaborative learning.

Method

Study: use a quantitative approach with a one-group pretest–posttest design, with qualitative data from teacher interviews to strengthen results (triangulation). This design aims to evaluate changes in students' educational character before and after the implementation of the deep learning approach within the Merdeka Curriculum framework. The one-group pretest design is an effective method used in educational context studies that involve one group without a control (Shadish et al., 2005), Qualitative data enrich quantitative interpretation results by describing the process, challenges, and teachers' perceptions of implementation of deep learning-based instruction (Creswell & Creswell, 2018)

Population and Sample

The study population consisted of all students enrolled at Amanah Nusantara Senior High School during the 2024/2025 academic year. A total sampling strategy was adopted, whereby every individual who met the predetermined inclusion criteria was incorporated into the study. As a result, 29 Grade XI Sstudents were identified as the principal research participants, while two Sociology teachers were engaged as key informants during the interview phase. The application of a total sampling technique was warranted due to the relative homogeneity of participant characteristics and the limited number of classes implementing the deep learning approach within the institution. Prior to data collection, all participants were adequately informed about the study's aims, procedures, and ethical safeguards, after which they provided voluntary written consent. Strict adherence to informed consent protocols ensured the protection of participants' autonomy, confidentiality, and overall ethical rights throughout the research process.

Instrument and Procedure Study

Instrument main includes: (1) Character Education Questionnaire, containing 24 items on a 5 5-point Likert scale that measure five dimensions of character: integrity, responsibility, togetherness, discipline, and empathy. Questionnaire adapted from the instrument education character (Indrayati & Desiga, 2025) and validated through expert judgment as well as tested reliability with Cronbach's $\alpha > 0.7$. (2) Guidelines for a Semi-Structured Interview for two Sociology teachers, including aspects: implementation of deep learning, learning strategies, obstacles, and character change of students. Interview results were transcribed and analyzed thematically. Study ongoing for 8 weeks, consisting of the above: (1) Pretest (1st week): filling questionnaire character for measuring the condition at the beginning. (2) Implementation (weeks 2–7): learning based deep learning implemented during 12 meetings, including task authentic, problem-based learning, collaboration, reflection, and assessment-based value. (3) Posttest & Interview (week 8): filling in questionnaire review and interviewing teachers to evaluate changes and the implementation process.

Quantitative data are analyzed descriptively and inferentially. Normality test using Shapiro–Wilk, whereas difference pretest–posttest scores tested with: (1) Paired Sample t-Test (normal data), or (2) Wilcoxon Signed-Rank Test (non-normal data). The magnitude of the influence is counted using Cohen's d. Qualitative data were analyzed using thematic analysis to interpret patterns, experiences, and perceptions of teachers related to the implementation of deep learning.

Results and Discussion

This was held at Amanah Nusantara High School in the even semester of the 2024/2025 academic year. Subject study: 29 students in class XI and 2 subject teachers; lesson on Sociology; involved implementation of the deep learning approach in the context of a Merdeka curriculum. Research objectives. This is for testing the extent to which implementing deep learning can improve students' character, including responsibility, honesty, work ethic, and caring social behavior. The research process has been ongoing for four weeks. Intervention learning based deep learning implemented through five main stages: (1) orientation problem, social contextual, (2) idea exploration and reflection value, (3) exploration and analysis in-depth, (4) presentation solution-based mark character, and (5) reflection personal towards the learning process.

Analysis Descriptive

We conducted a detailed analysis of changes in general scores, student behaviors, student groups, and the use of deep learning before and after we put the program in place. The goal was to see how much things had changed and how students' thinking, motivation, and social learning had changed. By comparing data before and after the program, we found that students' educational growth and approach to deep learning improved. This provides evidence for understanding how learning changed in a social context. The analysis results are shown in Table

Table 1. *Analysis results descriptive*

Statistics	Pretest	Posttest
N	29	29
Mean (M)	72.3	78.9
Standard Deviation (SD)	8.9	7.4
Minimum	52	60
Maximum	88	92

The results showed a clear improvement in students' overall performance, with an average score increase of 6.6 points after using the deep learning approach. This increase highlights better learning experiences for students, especially in self-awareness, building values, social responsibility, and working well and fairly with others. The lower spread in posttest scores (SD = 7.4) means results were more similar among students. This pattern suggests that deep learning helps students grow both mentally and emotionally and evens out differences in learning for students from different backgrounds. Overall, the intervention helped students grow personally and lowered educational gaps in the group.

Normality Test

The Shapiro–Wilk test was used to assess the normality of pre-test and post-test score distributions. This assessment confirmed the assumptions required for parametric analyses. The test is suitable for small to medium sample sizes and detects deviations from normality. Using the Shapiro–Wilk test, we evaluated whether differences in student scores before and after implementing the deep learning approach could be analyzed with inferential methods that assume normality. This process enhances the validity and reliability of our statistical interpretation. Table 2 presents the results of the normality assessment.

Table 2. *Normality test results*

Variables	Shapiro–Wilk Statistics	Sig. (p)
Pretest	0.963	0.237
Posttest	0.972	0.411

The significance value obtained for the second group exceeded the conventional threshold of 0.05 ($p > 0.05$), indicating that the null hypothesis of normality could not be rejected. Therefore, the data were considered normally distributed. This finding confirms that the normality assumption required for parametric testing is met, thereby justifying the use of a paired-samples t-test to assess differences between pretest and posttest scores. Satisfying this assumption supports robust statistical inference and strengthens the credibility of subsequent analyses regarding the effectiveness of the deep learning intervention.

Hypothesis Test (Paired t-test)

A paired-sample t-test was conducted to evaluate the effect of the immersive learning approach on students' character education. This statistical procedure determined whether a significant difference existed between the pre-test and post-test mean scores, thereby assessing the extent to which the immersive learning strategy contributed to measurable improvements in students' moral awareness, social responsibility, and collaborative disposition. This method provides empirical evidence on the pedagogical effectiveness of immersive learning in fostering holistic character development in an educational context. The results of the hypothesis testing are presented in Table 3.

Table 3. *Hypothesis test results*

Statistics	Mark
t(28)	4.12
P	0.0003
Cohen's d	0.76

A p-value below the 0.05 threshold indicates a statistically significant difference between pretest and posttest scores, suggesting that the observed improvement is unlikely to have occurred by chance. Additionally, the computed Cohen's d of 0.76 indicates a medium effect size, suggesting a practically meaningful impact of the intervention. These results demonstrate

that implementing the deep learning approach produced a substantial positive effect on students' character education outcomes at Amanah Nusantara High School. The findings suggest that deep learning enhanced students' cognitive understanding and promoted growth in moral awareness, responsibility, and prosocial behavior, which are essential dimensions in sociological conceptions of holistic education.

Learning outcomes Student Before and after Intervention

Table 4 presents the learning outcome scores for Grade XI students at Amanah Nusantara High School, highlighting the mean differences between the pretest and posttest scores after implementing the deep learning approach. The results indicate consistent improvement in key character education indicators, including moral awareness, responsibility, and collaborative engagement.

Table 4. *Learning outcome scores student class XI of amanah nusantara high school*

No	Initial Name	Pretest Score	Posttest Score
1	FIG	68	80
2	DNF	70	84
3	HRS	60	72
4	NRM	74	86
5	AUL	66	80
6	MRF	62	78
7	SYL	71	83
8	HND	65	78
9	FDL	69	84
10	LST	73	85
11	AHM	64	77
12	RFL	58	72
13	ALF	72	85
14	SRY	67	80
15	NDI	63	75
16	RZN	75	88
17	BI	68	83
18	FZR	61	76
19	NHD	59	74
20	HLM	65	79
21	FAD	70	84
22	FNI	66	79
23	SRN	72	87
24	MNA	60	75
25	RDI	64	80
26	RZN	69	82
27	INA	71	85
28	VRA	62	77
29	YUD	68	81

Grade XI students at Amanah Nusantara High School had a mean pretest score of 66.4 (SD = 4.7). Their mean posttest score rose to 80.2 (SD = 4.1), showing a direct improvement of 13.8 points after using the deep learning approach. This increase shows that students understood and engaged more with the material after the intervention. The slight drop in standard deviation shows that students' results became more consistent, indicating higher overall achievement and reduced gaps in understanding.

Qualitative Results

In addition to the quantitative results, qualitative data obtained from in-depth interviews with two Sociology teachers further illuminate the module's impact on classroom practices. The analysis identified three overarching themes. First, teachers observed increased student participation accompanied by more frequent value-based reflections. Students were not only more engaged during discussions but also demonstrated a greater tendency to relate sociological concepts to moral dimensions such as empathy, responsibility, and social sensitivity. Second, the module was found to strengthen collaboration and interpersonal care within student groups. During project-based learning activities, students exhibited more equitable task distribution, stronger peer solidarity, greater respect for differing perspectives, and enhanced responsibility in completing collective assignments. Third, several implementation constraints emerged, including limited instructional time, the absence of comprehensive instruments for assessing character development, and the need for more advanced teacher training to design integrated character assessments within deep learning–oriented pedagogical frameworks. Collectively, these findings indicate that while the module effectively supports cognitive, social, and affective learning processes, its optimal implementation requires improved assessment tools and targeted professional development for teachers.

Discussion

The findings indicate that the deep learning approach results in significant improvements in students' character scores, thereby confirming its effectiveness in enhancing character education. This improvement suggests that deep learning does not merely transmit values at a conceptual level, but helps students internalize them through active learning experiences. By engaging students in inquiry, exploration, and reflective activities, the approach encourages learners to connect moral concepts with real-life situations, make reasoned judgments, and practice positive behaviors consistently. Consequently, deep learning strengthens the formation of character by promoting meaningful understanding, personal relevance, and sustained application of values in students' daily interactions.

This outcome aligns with the perspective that deep learning emphasizes understanding meaning over rote memorization, because it positions students as active constructors of values rather than passive recipients of moral messages. Through inquiry, learners critically examine ethical issues, compare perspectives, and justify their choices based on evidence and reasoning. Exploration then allows them to apply character concepts in authentic contexts such as collaborative projects, problem-solving tasks, and real-life scenarios so that values are practiced, not only discussed. Finally, reflection helps students evaluate their actions and their consequences, recognize personal strengths and weaknesses, and set intentions for improvement. Together, these processes support the internalization of character traits in a meaningful and enduring manner, as students develop both the cognitive understanding and the habitual behaviors needed to sustain positive character development over time (Santosa et al., 2021).

Processes such as inquiry, exploration, and reflection enable students to internalize character traits in a meaningful and enduring manner. These results reinforce the central argument that deep learning approaches enhance not only character scores but also affective and social learning outcomes. Demonstrate that fostering inter-conceptual connections benefits these outcomes (Hattie & Donoghue, 2016). Within the Merdeka Curriculum, deep learning supports the Pancasila Student Profile, which prioritizes faith, cooperation, and critical thinking,

and it also increases students' empathy and social awareness report that deep learning increases students' empathy and social awareness. This approach cultivates critical reflection and advances character development across cognitive, moral, and emotional domains (Nurlailah & Julkifli, 2025).

Teachers report that evaluating students' attitudes is more effective through group work and social projects because these settings make students' values visible in authentic interactions rather than in isolated, individual tasks (McLeod, 2025). In collaborative activities, attitudes such as responsibility, empathy, respect, fairness, and self-control appear naturally when students negotiate roles, respond to disagreement, share resources, and resolve conflicts. Social projects also provide real contexts for observing prosocial behavior how students listen to others' needs, contribute consistently, follow shared rules, and reflect on the impact of their actions on the community. This observation is consistent with theory that social interaction shapes both moral and cognitive development, since students learn norms, reasoning patterns, and ethical habits through dialogue, modeling, feedback, and participation in a shared environment.

As a result, group-based tasks offer richer evidence for attitude assessment because they capture not only what students say they value, but how they actually behave when working with others toward a common goal. Despite the positive outcomes observed in this study, several structural and pedagogical constraints were identified, particularly limited instructional time and the scarcity of robust character assessment instruments. Time constraints often force teachers to prioritize content coverage and completion of activities, leaving insufficient space for the core processes of deep learning extended inquiry, guided reflection, meaningful dialogue, and iterative improvement. When lessons are compressed, students may complete tasks procedurally without fully engaging in moral reasoning, perspective-taking, or self-regulation practices that typically emerge through sustained interaction and reflection. At the same time, the absence of strong, standardized character assessment tools reduces the consistency and credibility of evaluation.

Teachers may rely on informal impressions or short-term observations, which can be vulnerable to bias, overlook subtle progress, and fail to capture development across contexts (classroom, group work, and social projects). This combination ultimately restricts the optimal enactment of deep learning and diminishes the extent to which its benefits for character education can be fully realized. In line with this, the successful implementation of character-based deep learning necessitates a coordinated system of support that integrates teacher competence, curricular alignment, and an enabling educational environment. Teachers need targeted professional development to design learning experiences that explicitly connect academic content with character goals, facilitate reflective discussions, manage collaborative dynamics, and use assessment evidence to provide formative feedback. Curricular alignment is also essential so that character outcomes are not treated as "add-ons," but are embedded within learning objectives, learning activities, and performance tasks, supported by clear indicators and rubrics. Finally, an enabling environment such as supportive school leadership, adequate learning resources, protected time for collaboration and reflection, and a culture that values process over mere completion strengthens implementation fidelity.

When these elements work together, deep learning can function not only as an instructional strategy, but as a sustainable ecosystem for cultivating character through meaningful, consistent, and measurable student experiences (Khasanah et al., 2025). Interviews with teachers further revealed a critical need for specialized professional development focused on character-oriented evaluation techniques. Such techniques include the use of reflective learning

journals, structured peer assessments, and project-based evaluations all of which are essential for capturing students' moral reasoning, social sensitivity, and behavioral responsibility in authentic learning contexts.

Strengthening these forms of authentic assessment is strongly aligned with the philosophical and pedagogical principles of the Merdeka Curriculum, which emphasizes meaningful learning, moral agency, and the cultivation of students' holistic competencies. Overall, this study argues that the integration of deep learning within the framework of the Merdeka Curriculum significantly enhances character education among high school students. By enabling learners to connect sociological concepts with lived moral experiences, the deep learning approach facilitates more profound value internalization and reflective engagement. In doing so, it positions deep learning as a pedagogically effective and philosophically coherent strategy for advancing the aspirations of the Profil Pelajar Pancasila and strengthening the cultivation of character in Indonesian secondary education.

Conclusion

The findings of this study indicate that the deep learning approach has a substantial impact on students' character development. Quantitative analysis using paired-sample t-tests revealed a significant improvement between pre- and post-test results, with an average increase of 6.6 points. A Cohen's d value of 0.76 further indicates a medium-to-large effect size, confirming that deep learning effectively supports the meaningful internalization of character values and provides a strong foundation for character education. Improvements were particularly evident in responsibility, honesty, collaboration, and social awareness, as students became more actively engaged in discussions, demonstrated greater respect for their peers' perspectives, and showed heightened accountability in completing group tasks. Qualitative findings reinforced these observations, with teachers reporting notable growth in students' moral awareness, empathy, and prosocial behavior. Project-based learning and reflective activities contributed significantly to this affective and ethical development, suggesting that such approaches may further promote curriculum goals and foster more holistic learner development.

Despite these positive outcomes, several limitations emerged. Teachers experienced time constraints that restricted the depth of reflective activities and project implementation. Additionally, the absence of comprehensive character assessment instruments made it challenging to evaluate affective outcomes systematically. These limitations highlight the need for ongoing professional development for teachers and the establishment of clearer guidelines for character evaluation to ensure the sustainable integration of deep learning in classroom practice. Overall, the study demonstrates that deep learning extends beyond academic achievement; it integrates cognitive, affective, and moral dimensions, shaping students' ethical awareness and social responsibility through reflective value internalization and collaborative learning. Future research should explore scalable character assessment tools, examine the long-term effects of deep learning on students' moral development, and investigate how digital media supported deep learning can be adapted across diverse educational contexts to strengthen both academic and character outcomes.

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