



## DIRECT INSTRUCTION AND HIGHER-ORDER THINKING SKILLS: EVIDENCE FROM THE MERDEKA CURRICULUM IMPLEMENTATION

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### Abstract

This study reviews the effectiveness of Direct Instruction in enhancing Higher-Order Thinking Skills (HOTS) during the implementation of the Merdeka Curriculum in secondary schools in Pekanbaru. The research was conducted from August to December 2025 using a quantitative quasi-experimental design involving 128 students divided into experimental and control groups. The experimental group received Direct Instruction integrated with HOTS-oriented tasks, while the control group experienced conventional instruction. Data were collected through validated HOTS assessment instruments covering analysis, evaluation, and creation domains. Statistical analysis used independent-samples t-tests and effect-size analysis. The results showed that the experimental group achieved a significantly higher mean score ( $M = 84.67$ ,  $SD = 6.21$ ) than the control group ( $M = 76.14$ ,  $SD = 7.03$ ), with  $t(126) = 7.18$ ,  $p < .05$ , and a large effect size (Cohen's  $d = 0.87$ ). The evidence suggests that structured explanation, guided practice, and immediate feedback effectively support students' analytical reasoning and analytical problem-solving skills in the implementation of the Merdeka Curriculum. The findings also suggest that explicit instructional approaches remain compatible with Higher-Order Thinking Skills (HOTS)-oriented learning when combined with cognitively demanding activities and systematic instructional scaffolding.

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## Introduction

The implementation of the Merdeka Curriculum in Indonesia emphasizes student-centered learning, flexibility, creativity, and the development of Higher-Order Thinking Skills (HOTS). HOTS refers to students' ability to analyze, evaluate, and create based on Bloom's revised taxonomy. These competencies are increasingly considered essential for twenty-first-century education because they support critical thinking, problem-solving, and decision-making abilities in complex learning situations. Recent studies indicate that the Merdeka Curriculum strongly encourages the integration of HOTS-oriented instruction across subjects and educational levels (Musyaffa & Atno, 2025).

Regardless of these expectations, implementing HOTS in Indonesian classrooms continues to be challenging. Many schools continue to struggle to design learning activities and assessments that actually promote analytical and evaluative thinking. Research examining assessment alignment within the Merdeka Curriculum found that Lower-Order Thinking Skills (LOTS) still dominate classroom evaluations, while HOTS-oriented tasks remain limited (Bajo, 2025). In addition, teachers frequently report obstacles related to instructional strategies, limited pedagogical training, and students' inadequate basic understanding (Faradella et al., 2024; Buabeng & Amo-Darko, 2025; Dursun & Aykan, 2025). These conditions produce a gap between curriculum expectations and classroom realities.

Most recent studies on HOTS implementation within the Merdeka Curriculum have predominantly focused on inquiry learning, Project-Based Learning (PjBL), Problem-Based Learning (PBL), teaching materials, and textbook analysis (Musyaffa & Atno, 2025; Rahim et al., 2025; Safitri et al., 2025). Although these approaches are widely associated with student-centered learning, limited empirical attention has been given to the role of Direct Instruction in supporting HOTS development. This issue is important because teacher-centered approaches are frequently seen as incompatible with analytical thinking and creativity. Consequently, Direct Instruction is frequently underestimated in contemporary curriculum discourse despite evidence showing that explicit instruction can strengthen conceptual understanding and academic performance when implemented systematically (Mason & Otero, 2021; Mathews & Cohen, 2022; Al-Jarf, 2026).

This issue reflects an important theoretical debate in current education. While student-centered learning approaches are commonly considered more compatible with HOTS development, multiple cognitive learning perspectives argue that higher-level thinking also requires sufficient conceptual understanding, procedural understanding, and instructional scaffolding before students can independently engage in higher-order reasoning processes. Consequently, the relationship between Direct Instruction and HOTS development remains theoretically contested, particularly within curriculum frameworks that emphasize learner autonomy, such as the Merdeka Curriculum (Burhamzah et al., 2025; Febrianti, 2026).

Theoretically, Direct Instruction is grounded in explicit teaching principles proposed by Barak Rosenshine and related cognitive learning theories emphasizing structured explanation, guided practice, modeling, feedback, and mastery learning.

The approach assumes that students require clear conceptual foundations before engaging in higher-level reasoning. This perspective is consistent with Cognitive Demand Theory, which argues that well-structured instruction reduces unnecessary cognitive burden and allows learners to digest complex information more effectively. In the context of HOTS development, Direct Instruction does not simply involve rote memorization; rather, it can provide scaffolding that supports students in developing deeper analytical and evaluative thinking (Lo & Feng, 2020; Dignath & Veenman, 2021; Cekiso, 2025).

Several contemporary studies support this argument. Research on explicit instruction demonstrated that systematic teacher guidance supports students' academic achievement and long-term learning outcomes (Dimosthenous et al., 2020; Brink et al., 2021; Akintayo et al., 2024). Furthermore, studies within the Merdeka Curriculum context reveal that HOTS implementation needs not only active learning activities but also structured instructional guidance to help students understand complicated concepts and evaluation procedures (Nurdarmayanti et al., 2025; Salsabila et al., 2025; Putri & Akhsan, 2026). However, empirical quantitative evidence examining the effectiveness of Direct Instruction for HOTS improvement in Indonesian secondary schools remains limited, particularly during the implementation phase of the Merdeka Curriculum. Most previous studies within the HOTS literature have primarily emphasized inquiry learning, Project-Based Learning, or Problem-Based Learning, while comparatively little attention has been given to the role of explicit instructional guidance in supporting higher-level cognitive development. In addition, limited quasi-experimental evidence is available from Indonesian secondary education contexts on whether teacher-centered instructional approaches remain pedagogically effective amid contemporary curriculum reforms underscoring student autonomy and active learning.

Therefore, this investigation studies the effectiveness of Direct Instruction in improving students' HOTS within the implementation of the Merdeka Curriculum in secondary schools in Pekanbaru. The study adds to the current literature by presenting quantitative evidence regarding the compatibility of structured teacher-centered instruction with HOTS-oriented curriculum goals. In addition, this research presents practical consequences for teachers and decision-makers seeking balanced instructional approaches that support both basic understanding and higher-level cognitive development.

## Research Method

This study applied a quantitative, quasi-experimental design with a non-equivalent pretest-posttest control group. Quasi-experimental research is widely employed in educational studies because it enables researchers to examine causal relationships in natural classroom settings where random assignment is difficult to implement (Gopalan et al., 2020; Siedlecki, 2020; Ding, 2026). The design was selected to investigate the effectiveness of Direct Instruction in improving students' Higher-Order Thinking Skills (HOTS) during the implementation of the Merdeka Curriculum.

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The study was conducted from August to December 2025 in public secondary schools in Pekanbaru.

The study population consisted of Grade XI students enrolled in secondary schools implementing the Merdeka Curriculum. A purposive sampling technique was used to select two comparable classes with matching academic characteristics. The total sample comprised 128 students, divided into an experimental group ( $n = 64$ ) and a control group ( $n = 64$ ). The experimental group received Direct Instruction integrated with HOTS-oriented learning activities, while the control group received conventional instructional practices commonly applied in classroom learning. Previous studies have demonstrated that quasi-experimental methods are appropriate for examining HOTS interventions in educational contexts (Badolo et al., 2025; Sukmawati et al., 2025).

The implementation of Direct Instruction in this study followed several instructional stages, including orientation, explanation and modeling, guided practice, feedback, and independent practice. These stages were designed to support students' analytical reasoning and structured problem-solving processes. Research has shown that systematic teacher guidance and explicit instruction can benefit critical thinking and HOTS development when combined with cognitively demanding tasks (Maulidah et al., 2024; Hardiansyah et al., 2025).

Data were collected using HOTS assessment instruments developed based on the revised Bloom's Taxonomy covering analysis (C4), evaluation (C5), and creation (C6) domains. The instrument consisted of 20 essay and contextual problem-solving items validated by three educational experts. The validity test indicated that all items met acceptable validity criteria, with coefficients ranging from 0.71 to 0.89, while the reliability test using Cronbach's Alpha yielded a coefficient of 0.87, indicating high reliability. HOTS-oriented instruments are considered effective for measuring students' higher-level cognitive performance in contemporary academic research (Suryamiati et al., 2019; Novitra et al., 2026).

The research procedure began with administering a pretest to both groups to determine students' initial HOTS levels. Subsequently, the experimental group received Direct Instruction treatment for twelve weeks, whereas the control group participated in conventional learning activities. At the end of the intervention, both groups completed a posttest using the same HOTS assessment instrument. Data analysis was carried out using descriptive and inferential statistics through SPSS version 26. Normality and homogeneity tests were first performed as prerequisite analyses. Hypothesis testing employed an independent sample t-test to determine differences between groups at a significance level of .05. Effect size analysis using Cohen's  $d$  was also conducted to measure the magnitude of the treatment effect. Similar statistical procedures have been commonly utilized in HOTS-related quasi-experimental studies in education research (Arianto et al., 2025; Badolo et al., 2025).

## Results

### A. *Descriptive Analysis*

Descriptive statistics were carried out to examine the distribution of students' Higher-Order Thinking Skills (HOTS) scores in both the experimental and control groups before and after the implementation of Direct Instruction. The analysis included the mean, standard deviation, minimum, and maximum scores to comprehensively describe students' learning achievement. The descriptive statistics are presented in Table 1 below.

**Table 1. Descriptive Statistics of Pretest and Posttest Scores**

| Group        | Test     | N  | Mean (M) | SD   | Minimum | Maximum |
|--------------|----------|----|----------|------|---------|---------|
| Experimental | Pretest  | 64 | 61.28    | 7.42 | 48      | 74      |
| Experimental | Posttest | 64 | 84.67    | 6.21 | 71      | 96      |
| Control      | Pretest  | 64 | 60.91    | 7.18 | 47      | 73      |
| Control      | Posttest | 64 | 76.14    | 7.03 | 62      | 89      |

Table 1 shows that the pretest mean scores of the experimental group (M = 61.28, SD = 7.42) and the control group (M = 60.91, SD = 7.18) were relatively similar. This finding indicates that both groups had comparable initial HOTS abilities before the treatment was implemented. The small difference in the pretest scores suggests that the two groups started from nearly equivalent academic conditions.

After the intervention, the posttest results manifested noticeable differences between the groups. The experimental group achieved a higher mean score (M = 84.67, SD = 6.21) compared to the control group (M = 76.14, SD = 7.03). The increase in the experimental group's mean score indicates that Direct Instruction integrated with HOTS-oriented activities improved students' analytical and problem-solving competencies.

Furthermore, the experimental group demonstrated lower posttest score variability, as indicated by a smaller standard deviation. This result suggests that students in the experimental group achieved more consistent learning outcomes following the instructional treatment. Meanwhile, the control group showed relatively wider score dispersion, indicating greater variation in students' HOTS achievement.

Overall, the descriptive statistics indicate that students who received Direct Instruction experienced greater improvement in Higher-Order Thinking Skills than those who participated in conventional classroom instruction during the implementation of the Merdeka Curriculum. The descriptive statistics for the gain score are presented in Table 2 below.

**Table 2. Descriptive Statistics of HOTS Improvement (Gain Scores)**

| Group        | Mean Gain | SD   | Category |
|--------------|-----------|------|----------|
| Experimental | 23.39     | 5.12 | High     |
| Control      | 15.23     | 4.87 | Moderate |

Table 2 indicates that the experimental group obtained a higher mean gain score (M = 23.39, SD = 5.12) than the control group (M = 15.23, SD = 4.87). This result shows that students taught through Direct Instruction experienced greater improvement in

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HOTS performance during the learning process. The research shows that structured explanations, guided practice, and immediate feedback effectively support students in developing higher-level cognitive skills, including analysis, evaluation, and problem-solving.

Before conducting hypothesis testing, assumption tests were conducted to ensure the data met the requirements for parametric statistical analysis. The normality test used the Shapiro-Wilk test, and Levene's Test was applied to examine homogeneity of variance between the experimental and control groups. The results of the assumption testing are presented below.

**Table 3. Results of the Shapiro-Wilk Normality Test**

| Group        | Test     | Statistic | df | Sig.  | Interpretation |
|--------------|----------|-----------|----|-------|----------------|
| Experimental | Pretest  | 0.976     | 64 | 0.081 | Normal         |
| Experimental | Posttest | 0.981     | 64 | 0.116 | Normal         |
| Control      | Pretest  | 0.972     | 64 | 0.094 | Normal         |
| Control      | Posttest | 0.978     | 64 | 0.103 | Normal         |

Table 3 presents the results of the Shapiro-Wilk normality test for the pretest and posttest scores in both groups. The findings show that all significance values exceeded the .05 level. The experimental group obtained significance values of .081 and .116 for the pretest and posttest, respectively, while the control group obtained significance values of .094 and .103, respectively. Since all p-values were greater than 0.05, the data were considered normally distributed. Therefore, the assumption of normality for conducting parametric statistical analysis was fulfilled.

**Table 4. Results of Levene's Test for Homogeneity of Variance**

| Variable        | Levene Statistic | df1 | df2 | Sig.  | Interpretation |
|-----------------|------------------|-----|-----|-------|----------------|
| Pretest Scores  | 1.247            | 1   | 126 | 0.266 | Homogeneous    |
| Posttest Scores | 1.538            | 1   | 126 | 0.217 | Homogeneous    |

Table 4 shows the results of Levene's Test for homogeneity of variance. The significance value for the pretest scores was .266, while the posttest scores obtained a significance value of .217. Both values exceeded the .05 significance level, indicating that the variance between the experimental and control groups was homogeneous. Consequently, the assumption of homogeneity of variance was satisfied.

Overall, the results of the normality and homogeneity tests showed that the dataset met the assumptions required for parametric statistical procedures. Therefore, an independent-samples t-test could be appropriately conducted to examine differences in Higher-Order Thinking Skills (HOTS) achievement between students taught using Direct Instruction and those taught using conventional instructional methods during the implementation of the Merdeka Curriculum.

## **B. *t-Test Analysis***

After normality and homogeneity were established, an independent-samples t-test was conducted to examine whether there was a significant difference in Higher-Order Thinking Skills (HOTS) achievement between students taught using Direct Instruction and those taught using conventional instructional methods. The analysis emphasized on comparing the posttest scores of the experimental and control groups. The results of the independent samples t-test are presented in Table 5 below.

**Table 5. Results of the Independent Samples t-Test**

| Variable      | Group        | N  | Mean (M) | SD   | t    | df  | Sig. (2-tailed) |
|---------------|--------------|----|----------|------|------|-----|-----------------|
| HOTS Posttest | Experimental | 64 | 84.67    | 6.21 | 7.18 | 126 | < .05           |
| HOTS Posttest | Control      | 64 | 76.14    | 7.03 |      |     |                 |

Note. N=128,  $p < .05$ .

Table 5 shows that the experimental group achieved a higher mean posttest score ( $M = 84.67$ ,  $SD = 6.21$ ) than the control group ( $M = 76.14$ ,  $SD = 7.03$ ). The independent-samples t-test showed a statistically significant difference between the two groups,  $t(126) = 7.18$ ,  $p < .001$ . Since the significance value was lower than the .05 level, the null hypothesis ( $H_0$ ) was rejected.

This evidence indicates that students who received Direct Instruction integrated with HOTS-oriented learning activities achieved significantly higher HOTS performance than students who participated in conventional instructional practices. Students who received Direct Instruction integrated with HOTS-oriented learning activities demonstrated better analytical reasoning, evaluation, and advanced problem-solving skills than those who participated in conventional classroom instruction.

The results also suggest that structured explanation, explicit modeling, guided practice, and immediate feedback supported students' higher-level cognitive performance during the instructional intervention during the implementation of the Merdeka Curriculum. Although Direct Instruction is commonly categorized as a teacher-centered approach, the findings show that systematic instructional guidance can adequately support higher-level thinking processes when combined with HOTS-based learning tasks.

Furthermore, the relatively large difference in mean scores between the experimental and control groups indicates that Direct Instruction not only improved students' conceptual understanding but also augmented the consistency of learning achievement. Therefore, the findings deliver empirical evidence that Direct Instruction remains pedagogically relevant for supporting HOTS development within contemporary curriculum implementation contexts.

### C. *Effect Size Analysis*

In addition to hypothesis testing, effect size was assessed using Cohen's  $d$  to determine the magnitude of Direct Instruction's effect on students' Higher-Order Thinking Skills (HOTS). Effect size analysis is important because statistical significance alone does not fully explain the practical impact of an instructional intervention.

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Cohen's *d* was calculated by comparing the mean posttest scores of the experimental and control groups. The interpretation of Cohen's *d* follows the criteria proposed by Cohen, where 0.20 indicates a small effect, 0.50 indicates a medium effect, and 0.80 or higher indicates a large effect.

**Table 6. Results of Cohen's *d* Effect Size Analysis**

| Variable             | Experimental Mean | Control Mean | Pooled SD | Cohen's <i>d</i> | Interpretation |
|----------------------|-------------------|--------------|-----------|------------------|----------------|
| HOTS Posttest Scores | 84.67             | 76.14        | 6.63      | 0.87             | Large Effect   |

Table 6 shows that the experimental group obtained a higher mean posttest score ( $M = 84.67$ ) compared to the control group ( $M = 76.14$ ). The pooled standard deviation was 6.63, resulting in a Cohen's *d* value of 0.87. Based on Cohen's interpretation criteria, this value indicates a large effect size.

The findings show that the instructional treatment generated a substantial educational effect on students' Higher-Order Thinking Skills during the implementation of the Merdeka Curriculum. The large effect size suggests that the instructional treatment was the Cohen's *d* value of 0.87 indicates that the impact of Direct Instruction but also educationally meaningful. in improving students' analytical reasoning, evaluation, and problem-solving skills.

Furthermore, the effect size analysis shows that structured instructional procedures, including explicit explanation, guided practice, modeling, and immediate feedback, effectively supported students' cognitive skill development. The findings uphold the argument that structured instructional guidance can remain pedagogically relevant within contemporary curriculum frameworks when combined with HOTS-oriented learning activities.

Overall, the large Cohen's *d* value provides strong empirical evidence that The findings suggest that direct instruction was associated with higher HOTS achievement and may serve as a promising pedagogical approach for supporting cognitive development in secondary education contexts.

## Discussion

The findings of this study demonstrate that Direct Instruction significantly improved students' Higher-Order Thinking Skills (HOTS) during the implementation of the Merdeka Curriculum. The descriptive statistical analysis showed that the experimental group achieved higher posttest scores than the control group, indicating that students who received Direct Instruction integrated with HOTS-oriented activities experienced greater cognitive improvement. The independent-samples *t*-test further confirmed a statistically significant difference between the two groups,  $t(126) = 7.18$ ,  $p < .05$ , and Cohen's *d* indicated a large effect size ( $d = 0.87$ ), suggesting a substantial educational impact of the intervention on students' analytical reasoning, evaluation, and cognitive skills.

The results support cognitive learning theories, indicating that structured instructional guidance can facilitate deeper understanding and cognitive engagement. Direct Instruction provides students with explicit explanations, systematic modeling,

guided practice, and immediate feedback, which help learners organize and process information effectively before engaging in complex intellectual tasks. This finding is consistent with Cognitive Demand Theory, which argues that well-structured instruction reduces unnecessary cognitive burden and enables students to allocate cognitive resources toward higher-level thinking processes (Sweller et al., 2019). Within the context of HOTS development, students require sufficient conceptual understanding before they can successfully analyze, evaluate, and create solutions to contextual problems.

The findings may also indicate that students experiencing difficulties with complex thinking tasks benefit from structured cognitive scaffolding before engaging in independent analytical processes. In secondary education contexts, many learners may not yet possess sufficient prior knowledge or self-regulated learning capacity to independently construct higher-level reasoning in the absence of systematic instructional support. Consequently, Direct Instruction may function as an important transitional pedagogical approach that strengthens conceptual readiness before students engage in more autonomous inquiry-based learning activities.

The findings are consistent with previous studies showing the effectiveness of explicit and structured instruction in improving students' analytical thinking and problem-solving skills. Maulidah et al. (2024) found that Direct Instruction, when integrated with computationally-based thinking, significantly improved students' critical thinking performance, as systematic teacher guidance enabled learners to understand complex procedures more effectively. Similarly, Hardiansyah et al. (2025) reported that Direct Instruction positively influenced HOTS achievement when learning activities involved guided analytical tasks and structured feedback processes. These studies reinforce the present findings that teacher-centered instructional approaches can support higher-order cognitive development when implemented appropriately.

From a theoretical perspective, the results add to current discussions regarding the compatibility between explicit instruction and twenty-first-century learning competencies. The study suggests that HOTS development should not be viewed as exclusively dependent on fully student-centered pedagogies, but rather as a cognitive process that needs a balanced interaction among instructional guidance, conceptual scaffolding, and active learner engagement.

The present study also challenges the common assumption that Direct Instruction is incompatible with twenty-first-century learning demands. In many educational discussions, HOTS is frequently associated exclusively with student-centered approaches such as Problem-Based Learning (PBL), inquiry learning, or Project-Based Learning (PBL). However, the results show that structured, teacher-centered instruction can also meaningfully contribute to HOTS development.

The success of Direct Instruction in this study may be explained by its emphasis on pedagogical clarity, sequential learning stages, and continuous feedback, which helped students build strong conceptual foundations before engaging in higher-level cognitive activities. Gunawardena & Wilson (2021) similarly argued that explicit instruction remains highly effective when teachers provide systematic scaffolding that gradually supports students toward independent thinking.

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In implementing the Merdeka Curriculum, the evidence shows that HOTS development does not depend solely on fully student-centered instructional models. Instead, effective HOTS-oriented learning may involve a balanced instructional approach blending active cognitive involvement with structured pedagogical support. Several studies have reported that teachers implementing the Merdeka Curriculum frequently face difficulties in facilitating HOTS because students frequently struggle with conceptual understanding and complex thinking tasks (Faradella et al., 2024; Salsabila et al., 2025). Therefore, Direct Instruction may serve as an important instructional foundation that prepares students cognitively for transitioning to more independent, inquiry-based learning activities.

Another important finding concerns the large effect size observed in this study. The Cohen's *d* value of 0.87 indicates that the influence of Direct Instruction was the Cohen's *d* value of 0.87 indicates a substantial educational impact. This result suggests that the instructional treatment substantially improved students' HOTS achievement. The relatively consistent posttest scores within the experimental group further suggest that Direct Instruction helped reduce learning disparities among students by providing equal opportunities for guided understanding and practice.

Nevertheless, this study has several limitations. The research was conducted within a limited geographical area, involving secondary schools in Pekanbaru, which may limit the generalizability of the findings to broader educational contexts. In addition, the study focused primarily on quantitative outcomes, without qualitatively exploring students' perceptions, classroom interaction features, or long-term retention effects. Future studies may employ mixed-method or longitudinal designs to examine how Direct Instruction influences HOTS development throughout extended instructional periods and throughout various subject areas.

Overall, the findings deliver empirical evidence that Direct Instruction remains pedagogically relevant for supporting HOTS development within the implementation of the Merdeka Curriculum. This study adds to continuing discussions regarding the compatibility of teacher-centered instruction with state-of-the-art educational goals and suggests that structured instructional guidance can effectively facilitate HOTS when combined with HOTS-oriented activities.

## Conclusion

This study demonstrated that students who received Direct Instruction integrated with HOTS-oriented learning activities achieved significantly higher Higher-Order Thinking Skills (HOTS) performance than students who participated in conventional instructional practices during the implementation of the Merdeka Curriculum. The statistical analysis demonstrated significant differences between the experimental and control groups, while the large Cohen's *d* value indicated substantial educational significance of the instructional intervention. These outcomes suggest that structured instructional procedures, including explicit explanation, systematic modeling, guided practice, and immediate feedback, can efficiently support students' analytical reasoning, evaluation, and problem-solving competencies.

The findings suggest that structured instructional support can effectively facilitate HOTS development within the Merdeka Curriculum. Although Direct Instruction is commonly categorized as a teacher-centered approach, the results show that it can remain compatible with HOTS-oriented learning when combined with cognitively demanding tasks and active learning processes. The study, therefore, questions the assumption that teacher-centered instruction is inherently ineffective for twenty-first-century learning objectives.

In the context of the Merdeka Curriculum, this study suggests that effective HOTS development calls for not only student-centered activities but also sufficient instructional scaffolding to help students build a strong conceptual understanding before engaging in complex critical thinking tasks. Consequently, Direct Instruction may serve as an effective pedagogical foundation for supporting curriculum implementation and enhancing students' HOTS in secondary education.

In practice, the research shows that teachers implementing the Merdeka Curriculum may benefit from combining student-centered learning principles with structured instructional scaffolding to support students who continue to experience difficulties with higher-level cognitive tasks. Therefore, Direct Instruction may not function as a replacement for active learning approaches, but rather as a complementary pedagogical strategy that supports conceptual readiness and cognitive development.

As a result, the study was limited to a specific educational context and employed only a quantitative approach. Future research is proposed to involve broader samples, multiple regions, and mixed-method designs to gain a more comprehensive understanding of the lasting effectiveness of Direct Instruction for HOTS development across several learning environments and subject areas.

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