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Improving Elementary Students' Critical Thinking Skills Through Guided Discovery Learning Assisted by Interactive PowerPoint Media: A Classroom Action Research

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A B S T R A C T

Critical thinking is one of the most vital competencies demanded by twenty-first-century education. However, a preliminary assessment at SD Negeri 84/II Empelu revealed that only 15% of fourth-grade students met established critical thinking criteria, reflecting persistent teacher-centered instructional practices. This classroom action research aimed to determine whether the implementation of the Guided Discovery Learning model assisted by interactive PowerPoint media could improve students' critical thinking skills. The study followed the Kemmis and McTaggart spiral model across two cycles with four instructional meetings, involving 20 fourth-grade students selected through purposive sampling. Data were collected through critical thinking essay tests and structured teacher and student observation sheets, then analyzed descriptively with a predetermined success criterion of at least 80% classical mastery. Results showed a progressive improvement in student mastery from 15% at baseline to 60% in Cycle I and 85% in Cycle II, surpassing the success criterion, with all five critical thinking indicators reaching the very good category by the final cycle. These findings confirm that integrating Guided Discovery Learning with interactive PowerPoint media effectively promotes critical thinking development in elementary school classrooms.

1. Introduction

Critical thinking has become one of the most essential competencies that twenty-first century learners must acquire, as it enables individuals to identify problems, analyze information, evaluate evidence, and draw logical conclusions before accepting any claim as true (Mohamed & Sihes, 2021). In the Indonesian context, the Merdeka Curriculum explicitly positions critical reasoning as a core dimension of the Pancasila Student Profile, encouraging teachers to design learning experiences that integrate multiple disciplines and stimulate students' creativity

through interdisciplinary problem solving (Dwiprabowo et al., 2024). Within this policy framework, elementary education plays a strategic role, since critical thinking habits formed at an early age tend to shape how students reason, solve problems, and make decisions at higher levels of schooling (Herman et al., 2024). Critical thinking is commonly operationalized through five interrelated indicators, namely interpretation, analysis, evaluation, inference, and explanation, which together describe how systematically and rationally a learner processes information (Wijayanti et al., 2023). Despite the importance of this competency, however, evidence from Indonesian elementary classrooms consistently suggests that most students have not yet developed the critical thinking habits that the curriculum envisions.

A preliminary assessment conducted on fourth-grade students at SD Negeri 84/II Empelu revealed that only 15% of students met the predetermined critical thinking indicators, while the remaining 85% experienced difficulty identifying problems, analyzing information, evaluating alternatives, and formulating logical conclusions. Classroom observation further indicated that instruction was still dominated by teacher-centered lecturing, leaving students largely passive recipients of information rather than active constructors of knowledge. This pattern is consistent with findings reported elsewhere in Indonesian primary education, where teacher-centered instruction has been associated with low student engagement and limited opportunities for interactive participation (Simbolon et al., 2025). Lecture-dominated classrooms have been found to constrain students' active involvement in problem-solving activities, whereas student-centered approaches more effectively cultivate critical thinking and improve learning outcomes (Widyanto & Vienlentia, 2022). At the policy level, lecture-based methods are considered insufficiently responsive to twenty-first-century curricular demands precisely because they offer students little room to construct understanding independently, which calls for pedagogical innovation capable of encouraging exploration, discussion, and self-directed meaning-making (Zamjani, 2024).

A growing body of research has examined potential remedies to this instructional gap. One stream of inquiry has concentrated on Guided Discovery Learning (GDL) as a pedagogical strategy that positions students as active agents in constructing knowledge through structured exploration. Earlier classroom-based evidence demonstrated that a thematic-integrated module based on guided discovery effectively improved students' critical thinking and science attitudes (Perwitasari & Djukri, 2018). Comparable results were reported in mathematics instruction, where GDL strengthened students' conceptual understanding because learners were more actively engaged in concept investigation and self-reflection (Sari & Sutarni, 2019). More recent work corroborates these findings at the elementary level, showing that guided discovery activities can simultaneously raise critical thinking scores and learners' self-efficacy, suggesting that the model's benefits extend beyond cognitive outcomes alone (Halim & Wulandari, 2024). Guided forms of discovery learning, in which students receive adequate cognitive scaffolding while exploring concepts, tend to prevent the cognitive overload that often undermines purely exploratory approaches, which explains why structured guidance consistently outperforms unguided discovery in classroom research (Braten et al., 2011). The connection

between discovery-based inquiry and the development of critical thinking has also been confirmed in more recent intervention studies targeting higher-order thinking skills (Irsyadah et al., 2023).

A separate stream of research has focused on interactive media as an instructional tool capable of enhancing student engagement and visual scaffolding. Interactive PowerPoint media has been shown to increase learners' motivation and interest by presenting material in a more contextual and visually engaging format (Raafif et al., 2023). Other studies confirm that PowerPoint-based interactive multimedia is both feasible and well received by elementary students, supporting more active classroom participation (Nugroho et al., 2022). At a broader instructional level, interactive visual media incorporating active student-content interaction has been found to outperform conventional media in strengthening both conceptual understanding and learning motivation among elementary learners (Utami et al., 2025). In the specific context of social studies education at the elementary level, the integration of Discovery Learning with animated digital media has also been shown to significantly improve both student interest and learning outcomes (Mutmainnah & Suardi, 2025). Within the same journal, evidence from classroom action research further confirms that interactive media-assisted instruction can improve elementary students' learning outcomes (Rizal et al., 2025), while digital interactive tools have similarly been linked to gains in critical thinking development (Dienti et al., 2025). However, studies on interactive media have generally examined motivational or conceptual outcomes rather than critical thinking specifically, and have rarely been integrated with a structured pedagogical model such as GDL.

Taken together, these two lines of inquiry reveal a clear research gap. Studies on GDL have largely been conducted without the support of interactive digital media, while studies on interactive PowerPoint media have seldom been embedded within a systematic discovery-based pedagogical framework, and even fewer have targeted critical thinking as the primary outcome among fourth-grade elementary students. Consequently, evidence on how the combination of a structured discovery model and interactive visual media jointly influences elementary students' critical thinking remains limited. The present study addresses this gap by integrating GDL with interactive PowerPoint media within a single instructional design implemented through classroom action research, with an explicit focus on critical thinking development in alignment with the Merdeka Curriculum. This study aims to determine whether the implementation of Guided Discovery Learning assisted by interactive PowerPoint media can improve the critical thinking skills of fourth-grade students at SD Negeri 84/II Empelu.

2. Methodology

Research Design

This study employed a classroom action research (CAR) design, selected because it allows a teacher-researcher to directly diagnose an authentic instructional problem and to implement, observe, and refine a corrective intervention within real

classroom conditions across successive cycles (Rizal et al., 2025). The procedure followed the spiral model developed by (Kemmis & McTaggart, 2014), in which each cycle consists of four interrelated stages: planning, action and observation, and reflection. This design was considered appropriate because the problem under investigation originated directly from classroom practice and required an intervention that could be adjusted iteratively based on evidence gathered in situ. The cyclical nature of the design further enabled the researcher to refine the implementation of GDL assisted by interactive PowerPoint media between cycles whenever reflection indicated that the predetermined success indicator had not yet been achieved, making CAR an effective vehicle for both improving student learning outcomes and developing teacher professional practice (Lynch et al., 2025).

Participants

The participants were 20 fourth-grade students at SD Negeri 84/II Empelu, comprising a single intact classroom selected using purposive sampling on the grounds that this class exhibited the lowest critical thinking achievement among the fourth-grade cohorts at the school, as confirmed through a preliminary diagnostic test administered prior to the intervention. The research was conducted during the 2025/2026 academic year. Students' critical thinking performance and classroom engagement were tracked individually across the pre-cycle baseline, Cycle I, and Cycle II to capture both group-level and individual-level patterns of change, providing a comprehensive longitudinal record of learning progress throughout the intervention period.

Instruments

Two main categories of instruments were used. The first was a critical thinking essay test, developed separately for Cycle I and Cycle II, each consisting of ten descriptive items constructed according to a test specification grid that mapped every item onto one of five critical thinking indicators: interpretation, analysis, evaluation, inference, and explanation. Each item was scored using a four-point analytic rubric ranging from 1 (poor) to 4 (very good) per indicator, producing a maximum total score of 20 per student, subsequently converted to a 0-100 scale. The rubric specified observable descriptors for each score level, such as the clarity and logical coherence with which a student identified a problem, analyzed an argument, evaluated a decision, drew an inference, or explained a conclusion (Wijayanti et al., 2023). Content validity of the critical thinking test was established through expert judgment by two faculty members who reviewed each item for alignment with the indicator it was intended to assess, its suitability for fourth-grade cognitive development, and its clarity of language, with items revised based on expert feedback before use. For the observation sheets, inter-rater reliability was checked by comparing the scores assigned by the two independent observers across a trial observation session; Cohen's kappa was calculated to confirm consistency above the acceptable threshold of 0.70 before the instruments were used in data collection. The second instrument consisted of structured observation sheets for teachers and students, each comprising twelve indicators that mirrored the six

syntactic stages of Guided Discovery Learning: stimulation, problem statement, data collection, data processing, verification, and generalization. Observers recorded each indicator dichotomously as either performed or not performed, from which an implementation percentage and a qualitative category were subsequently derived.

The interactive PowerPoint media used in this study was developed specifically for each cycle's topic. For Cycle I ('Me and My Needs'), the presentation incorporated: (1) contextual narrative scenarios featuring animated characters representing families with different economic backgrounds, used to stimulate curiosity during the stimulation stage; (2) embedded clickable problem cards that prompted students to identify and state the central problem during the problem statement stage; (3) animated data-sorting activities in which students matched need types with visual examples during data collection and processing; (4) interactive verification slides where students evaluated three different proposed answers and selected the most evidence-supported option; and (5) a generalization template requiring student groups to annotate their written conclusion before presentation. For Cycle II ('How I Meet My Needs'), the PowerPoint incorporated comparative analysis matrix slides that required students to simultaneously evaluate barter and monetary exchange systems across four criteria, analytical scaffolding checklists embedded in the data-processing slides, and peer-evaluation rubric slides displayed during the verification phase to guide students in assessing other groups' conclusions.

Data Collection

Data collection proceeded chronologically through three stages. First, a baseline pre-cycle test was administered prior to any intervention to document students' initial critical thinking achievement. Second, within each cycle, the researcher implemented two learning sessions following the GDL syntax assisted by interactive PowerPoint media; during these sessions, two trained observers simultaneously completed the teacher and student observation sheets. Third, at the end of each cycle, students completed the corresponding critical thinking test, after which the researcher and classroom teacher conducted a reflection session to evaluate whether the predetermined success indicators had been met. When the reflection indicated that the indicators were not yet satisfied, the planning stage of the subsequent cycle was revised accordingly, with targeted improvements introduced to address specific instructional weaknesses identified through systematic observation, before the next cycle of action and observation commenced.

Data Analysis

Data were analyzed quantitatively through descriptive statistics. Critical thinking test scores were analyzed by calculating each student's total score, converting it to a 0-100 scale, and classifying it against the minimum mastery criterion of 70; the proportion of students reaching or exceeding this threshold was then calculated as the classical mastery percentage for each cycle. Class means, highest and lowest scores, and the achievement percentage for each of the five critical thinking

indicators were likewise computed and compared across assessment points. Gain scores were also calculated between assessment points for both the class average and the mastery percentage to quantify the magnitude of improvement attributable to each cycle's instructional intervention. Observation data were analyzed by summing the number of indicators rated as performed, dividing by the total number of observed indicators, and converting the result to a percentage classified into one of four categories: poor (below 60%), fair (60-69%), good (70-89%), or very good (90% and above). The intervention was deemed successful once two predetermined indicators were simultaneously satisfied: (1) at least 80% of students reaching the good category in classroom learning activities, and (2) at least 80% of students achieving classical mastery above the minimum criterion.

3. Results and Discussion

Result

Pre-Cycle Baseline

Before the intervention commenced, the diagnostic critical thinking test established the baseline performance profile of the 20 students. Results indicated that 17 students (85%) scored below the mastery criterion of 70, with a class average of approximately 35.50 and a score range of 10 to 90. Only 3 students (15%) achieved mastery. Classroom observation during the pre-study period confirmed that instruction was dominated by teacher lecturing, with students rarely afforded opportunities to formulate questions, engage in group investigation, or construct and defend arguments. This pattern is consistent with the broader evidence indicating that teacher-centered pedagogies, while efficient for content transmission, are systematically insufficient for developing higher-order thinking competencies (Widyanto & Vienlentia, 2022)

Cycle I: Implementation and Outcomes

Cycle I comprised two instructional meetings focused on the topic 'Me and My Needs.' In the planning stage, the researcher prepared detailed lesson modules, an interactive PowerPoint presentation featuring contextual scenarios about family needs, student worksheets aligned with the GDL stages, and the Cycle I critical thinking test. Each meeting followed the six-stage GDL syntax in sequence. During the stimulation stage, the interactive PowerPoint displayed animated vignettes of families navigating everyday economic decisions, prompting students to observe and raise initial questions. In the problem statement stage, students were guided to verbalize the central problem using embedded clickable prompt cards. During data collection, student groups gathered information from their worksheets, textbooks, and the PowerPoint's data-sorting activities. Data processing involved group discussion to categorize and connect the information collected. In the verification stage, groups compared their conclusions with alternative answers displayed on the PowerPoint and evaluated the evidence for each. The generalization stage required each group to present a written summary conclusion to the class. Teacher observation results are presented in Table 3, which shows that Meeting 1 recorded

implementation of 7 out of 12 behavioral indicators (58%; sufficient category), with unimplemented indicators including facilitation of group data collection discussions, direction of information analysis, provision of verification feedback, and allocation of time for student presentations.

Reflection after Meeting 1 identified three targeted improvements for Meeting 2: structuring group discussion prompts more explicitly within the student worksheets; incorporating a dedicated feedback segment after group verification; and allocating a fixed five-minute presentation slot per group at the end of the generalization phase. Meeting 2 yielded 9 of 12 indicators implemented (75%; good category). Student activity data presented in Table 4 show that in Meeting 1, 6 students (30%) were in the very good category, 6 (30%) in good, 6 (30%) in sufficient, and 2 (10%) in poor. By Meeting 2, no student remained in the poor category, with the combined good-and-very-good proportion rising to 70%. The Cycle I critical thinking post-test yielded a class average of 68.75, with 12 students (60%) achieving mastery, as presented in Table 1. Although this represented a substantial improvement from the 15% baseline, the 80% criterion was not yet reached. Indicator-level analysis presented in Table 2 revealed that interpretation (71.25%) and analysis (72.50%) attained the good category, while evaluation (67.50%), inference (66.25%), and explanation (68.75%) remained at the fair level, suggesting that students still found it difficult to weigh evidence, draw warranted conclusions, and construct articulate justifications (Facione, 2020).

Cycle II: Implementation and Outcomes

Cycle II addressed the topic 'How I Meet My Needs,' encompassing barter exchange, the historical origins and types of money, monetary functions, and comparative evaluation of exchange systems. The instructional revisions included more tightly structured data collection prompts within the student worksheets, explicit analytical scaffolds including comparison matrices and evidence-evaluation checklists embedded in the PowerPoint slides, a structured teacher feedback protocol during the verification phase, and peer-evaluation activities requiring students to assess and respond to other groups' conclusions before the generalization stage. Consistent with the six GDL stages, the stimulation phase presented animated timelines of barter and monetary exchange history; the problem statement phase engaged students in formulating comparative questions about exchange system efficiency; data collection involved structured information-gathering from multiple sources guided by the comparison matrix; data processing required systematic completion of the analytical scaffolds; verification required peer critique of each group's comparative conclusions; and generalization required construction of an evidence-based written argument for which exchange system better serves modern economic needs.

Teacher observation in Cycle II Meeting 1 recorded 10 of 12 indicators implemented (83%; very good), and by Meeting 2, implementation reached 11 of 12 indicators (92%; very good), as shown in Table 3. Student activity showed continued improvement: in Cycle II Meeting 1, the combined good-or-very-good proportion reached exactly 80%, meeting the process success criterion, and in

Meeting 2 this proportion rose to 85%, surpassing the criterion, as shown in Table 4. These behavioral changes were corroborated by qualitative field notes documenting students' increased confidence in expressing opinions, more substantive group debate during the data processing phase, and more coherent presentation of conclusions during generalization. The Cycle II critical thinking post-test produced a class average of 84.50, with 17 students (85%) achieving mastery, exceeding the 80% success criterion, as summarized in Table 1. The results are presented in Table 1 below.

Table 1. Students' Critical Thinking Test Results Across Assessment Points

Variable	Pre-Cycle	Cycle I	Cycle II	Target	Gain Score
Total Students	20	20	20	—	—
Students Mastered (≥70)	3	12	17	≥16 (80%)	—
Students Not Mastered (<70)	17	8	3	—	—
Learning Mastery (%)	15%	60%	85% ✓	≥80%	Pre→CI: +45pp CI→CII: +25pp Pre→CII: +70pp
Highest Score	—	100	100	—	—
Lowest Score	—	45	50	—	—
Class Average	35.50	68.75	84.50 ✓	≥70	Pre→CI: +33.25 CI→CII: +15.75 Pre→CII: +49.00

Note. CI = Cycle I; CII = Cycle II; pp = percentage points. Check mark = success criterion met.

The improvement of each critical thinking indicator between Cycle I and Cycle II is presented in Table 2 below.

Table 2. Critical Thinking Indicator Achievement: Cycle I vs. Cycle II

Indicator	Cycle I (%)	Category	Cycle II (%)	Category	Change (pp)
Interpretation	71.25	Good	90.00	Very Good	+18.75
Analysis	72.50	Good	88.75	Very Good	+16.25
Evaluation	67.50	Fair	90.00	Very Good	+22.50
Inference	66.25	Fair	87.50	Very Good	+21.25
Explanation	68.75	Fair	87.50	Very Good	+18.75
Overall Average	69.25	Fair-Good	88.75	Very Good	+19.50

Note. Change (pp) = percentage-point change from Cycle I to Cycle II. Category thresholds: Very Good >= 85%; Good 70-84%; Fair 55-69%; Poor < 55%.

Teacher implementation of the Guided Discovery Learning stages across all meetings is presented in Table 3 below.

Table 3. Teacher Implementation of Guided Discovery Learning Across Meetings

GDL Stage Observed	C-I M1	C-I M2	C-II M1	C-II M2	Max
Stimulation (2 aspects)	2	2	2	2	2
Problem Statement (2 aspects)	1	2	2	2	2
Data Collection (2 aspects)	1	1	1	2	2
Data Processing (2 aspects)	1	1	1	2	2
Verification (2 aspects)	1	1	2	1	2
Generalization (2 aspects)	1	2	2	2	2
Total Implemented	**7**	**9**	**10**	**11**	**12**
Implementation (%)	**58%**	**75%**	**83%**	**92%**	**100%**
Category	**Sufficient**	**Good**	**Very Good**	**Very Good**	**—**

Note. C-I M1 = Cycle I Meeting 1; C-I M2 = Cycle I Meeting 2; C-II M1 = Cycle II Meeting 1; C-II M2 = Cycle II Meeting 2.

Students' learning activity observation results across all meetings are summarized in Table 4 below.

Table 4. Student Learning Activity Observation Results Across Meetings

Category	C-I M1	C-I M2	C-II M1	C-II M2	Target
Very Good (n / %)	6 / 30%	6 / 30%	8 / 40%	8 / 40%	—
Good (n / %)	6 / 30%	8 / 40%	8 / 40%	9 / 45%	—
Sufficient (n / %)	6 / 30%	6 / 30%	4 / 20%	3 / 15%	—
Poor (n / %)	2 / 10%	0 / 0%	0 / 0%	0 / 0%	—
Good + Very Good (%)	**60%**	**70%**	**80%**	**85% ✓**	**≥80%**

Note. Success criterion: at least 80% of students in the good or very good category. Check mark = criterion met.

Discussion

The findings of this study provide robust empirical support for the effectiveness of integrating Guided Discovery Learning with interactive PowerPoint media as a strategy for improving critical thinking skills in fourth-grade elementary school students. Across two action research cycles, the mastery rate increased from 15% at baseline to 85% in Cycle II, representing a gain of 70 percentage points, while the class average rose from 35.50 to 84.50. As shown in Table 2, the three indicators that remained in the fair category in Cycle I (evaluation: 67.50%, inference: 66.25%, and explanation: 68.75%) all advanced to the very good category in Cycle II (90.00%, 87.50%, and 87.50% respectively), demonstrating that the refinements introduced between cycles were particularly effective in targeting higher-order

reasoning processes. The two indicators that had already reached the good category in Cycle I (interpretation and analysis) continued to improve, confirming that GDL provides a learning environment capable of advancing all five dimensions of critical thinking simultaneously rather than privileging only the lower-order indicators.

The theoretical foundation for these results can be located in constructivist learning theory. GDL positions students as active knowledge constructors who engage with authentic problems through structured inquiry. The six-stage GDL sequence from stimulation through generalization systematically exercises the cognitive operations that (Facione, 2020) identifies as constitutive of critical thinking proficiency. Stimulation and problem identification develop interpretation skills by requiring students to recognize and frame the problem space. Data collection and processing build analytical capacity by demanding that students gather, categorize, and connect evidence. Verification fosters evaluation by prompting students to assess the validity of their conclusions against alternative evidence. Generalization cultivates inferential and explanatory skills by requiring students to distill findings into coherent, evidence-grounded conclusions. This structural alignment between GDL stages and critical thinking indicators explains why GDL has consistently produced strong outcomes in critical thinking research across diverse subject areas (Purwanto et al., 2018) and it is further reinforced by evidence that Discovery Learning integrated with digital media significantly improves both student engagement and academic achievement compared to conventional instruction (Mutmainnah et al., 2025).

The role of interactive PowerPoint as an enabling medium was equally significant. For nine-to-ten-year-old learners, abstract economic and social concepts such as needs hierarchies, barter conditions, and monetary functions are cognitively demanding without visual anchoring. Mayer (2019) cognitive theory of multimedia learning holds that well-designed visual and interactive representations reduce extraneous cognitive load and direct working memory capacity toward germane learning processes. This was directly observable in students' engagement with the interactive PowerPoint in this study. During the data collection stage of Cycle II, for example, students used the comparison matrix slides to systematically identify and record characteristics of barter and monetary exchange across four evaluative criteria, an activity that required them to identify relevant information (interpretation), distinguish between economic attributes (analysis), and weigh the relative advantages of each system (evaluation). During the verification stage, students engaged with the peer-evaluation rubric embedded in the PowerPoint by assessing other groups' conclusions against specific evidential criteria, a process that directly exercised their inference and explanation skills as they constructed written justifications for why one conclusion was better supported by evidence than another. This concrete link between interactive media features and critical thinking skill development resonates with (Abdullah & Budiman, 2025) and (Maenah et al., 2024?), and aligns with evidence from JES that interactive media-assisted instruction in elementary classrooms effectively enhances student participation and comprehension through structured visual scaffolding (Rizal et al., 2025).

The progressive improvement in teacher implementation fidelity from 58% in Cycle I Meeting 1 to 92% in Cycle II Meeting 2, as shown in Table 3, reflects the professional growth dimension intrinsic to CAR. As (Lynch et al., 2025) emphasize, the reflective cycle enables practitioners to translate diagnostic evidence into targeted instructional revisions, thereby iteratively closing the gap between intended and enacted pedagogy. In this study, each reflection episode produced concrete, actionable insights directly translated into the planning of subsequent meetings. The most impactful revisions were the introduction of structured data-collection prompts and analytical scaffolds in the student worksheets, and the formalization of a peer-evaluation activity during the verification stage, precisely the stages that had been weakest in Cycle I.

The differential improvement across critical thinking indicators merits specific attention. In Cycle I, interpretation and analysis reached the good category while evaluation, inference, and explanation remained at the fair level. This pattern reflects a well-documented developmental trajectory in critical thinking acquisition, in which students typically develop the capacity to identify and describe information before they develop the capacity to weigh evidence and construct inferences (Facione, 2020). The substantially larger gains observed in evaluation (+22.50 pp) and inference (+21.25 pp) in Cycle II can be specifically attributed to two instructional enhancements introduced in Cycle II: the comparative analysis matrices and the peer-evaluation protocol. The comparative analysis matrices required students to simultaneously evaluate barter and monetary exchange systems across multiple criteria, a cognitive task that directly operationalizes the evaluation indicator by demanding that students assess the relative merits of two positions against shared evidential standards. The peer-evaluation protocol, in which groups were required to review and critique each other's conclusions during the verification stage before the generalization phase, provided a structured context for analytical scaffolding that directly exercised inferential reasoning: students had to determine whether a conclusion was logically supported by the available evidence, identify logical gaps or unsupported claims, and articulate an evidence-based rationale for their assessment. The fact that these were precisely the two indicators showing the largest inter-cycle gains confirms that these targeted scaffolding activities successfully addressed the higher-order reasoning dimensions that had proved most challenging in Cycle I.

Three students did not achieve mastery in Cycle II. Analysis of their test responses indicated particular difficulty in the explanation indicator, specifically in constructing multi-step written justifications that explicitly linked evidence to conclusions. This challenge is consistent with the broader evidence that developing guided discovery-based learning modules requires careful alignment between the scaffolding provided and students' cognitive demands (Perwitasari & Djukri, 2018). Future iterations of this intervention could address this residual challenge through differentiated writing scaffolds, additional think-aloud modeling by the teacher during the generalization phase, and more individualized feedback during the verification stage. The present study also has important limitations that should be considered when interpreting its findings. The study involved a single intact class of 20 students in one elementary school with no comparison group, and the

intervention addressed only two curriculum topics within Social Studies, meaning that the effectiveness of GDL assisted by interactive PowerPoint media for developing critical thinking in other content domains remains untested. Future research employing quasi-experimental designs with matched control groups and cross-subject replications is therefore encouraged.

4. Conclusion

This study demonstrates that the implementation of Guided Discovery Learning assisted by interactive PowerPoint media successfully improved the critical thinking skills of fourth-grade students at SD Negeri 84/II Empelu. Therefore, the research objective of determining whether Guided Discovery Learning assisted by interactive PowerPoint media could improve students' critical thinking skills was successfully achieved. The success of this intervention was supported by several interrelated factors, including the systematic implementation of the Guided Discovery Learning stages, the use of interactive PowerPoint media that provided visual and cognitive scaffolding, the incorporation of analytical scaffolding and peer-evaluation activities, and the continuous refinement of instructional practices through reflection in each classroom action research cycle. These factors encouraged students to become more actively involved in identifying problems, analyzing information, evaluating evidence, drawing conclusions, and explaining their reasoning throughout the learning process.

These findings carry important practical implications for elementary school teachers and school administrators. Teachers seeking to cultivate critical thinking should consider integrating GDL with purposefully designed interactive media rather than relying on either strategy in isolation, since the combination addresses both the cognitive scaffolding dimension through GDL's structured discovery sequence and the engagement and visual anchoring dimension through interactive PowerPoint. This model is not subject-specific; its principles are applicable to other curriculum areas in Indonesian elementary education, including Science, Mathematics, and Language Arts, wherever content lends itself to structured inquiry and visual representation. School principals can support this approach by providing professional development that builds teachers' capacity to enact discovery-based instructional models and to design interactive digital media as complementary priorities. Future research is encouraged to replicate this study using quasi-experimental designs with matched control groups, and to examine the effectiveness of this instructional combination across different subject areas and grade levels within Indonesian elementary education.

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