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Effectiveness of Flipped Learning Model in Improving Students' Critical Thinking Skill

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Abstract
The development of students' critical thinking skills is a major priority in 21st-century education. This study examined the effectiveness of the Flipped Learning Model (FLM) in enhancing critical thinking skills among elementary school students. Using a pre-experimental one-group pre-test–post-test design, the research involved 120 students from four elementary schools. The FLM intervention integrated pre-class digital video materials and collaborative in-class learning activities, while conventional instruction relied on direct teaching methods. Students' critical thinking skills were assessed using a validated test based on Facione's framework, which includes the indicators of Interpretation, Analysis, Evaluation, Inference, Explanation, and Self-regulation. The results revealed a significant increase in students' post-test scores compared to their pre-test scores ($p < 0.05$), indicating that FLM contributed to higher levels of critical thinking. The positive impact is attributed to the shift from teacher-centered to student-centered learning, allowing students to understand basic concepts independently before class and practice higher-order thinking during classroom activities. These findings provide important implications for teachers, curriculum developers, and policymakers in designing learning strategies that promote critical thinking and support Education for Sustainable Development. Future research is recommended to examine the long-term effects of FLM across broader cognitive outcomes and diverse educational contexts.
Keywords: *Flipped Learning Model, Critical Thinking, Elementary Education, 21st-Century Skills, Active Learning.*

Abstrak
Pengembangan keterampilan berpikir kritis siswa menjadi prioritas utama dalam pendidikan abad ke-21. Penelitian ini bertujuan untuk menganalisis efektivitas Model Pembelajaran Flipped Learning (FLM) dalam meningkatkan keterampilan berpikir kritis siswa sekolah dasar. Penelitian menggunakan desain pra-eksperimental dengan model one group pre-test–post-test yang melibatkan 120 siswa dari empat sekolah dasar. Intervensi FLM mengintegrasikan materi video pembelajaran yang dipelajari siswa sebelum kelas dan kegiatan kolaboratif selama pembelajaran di kelas, sedangkan pembelajaran konvensional mengandalkan metode ceramah langsung. Keterampilan berpikir kritis diukur menggunakan instrumen tes berdasarkan kerangka berpikir kritis Facione, mencakup indikator Interpretasi, Analisis, Evaluasi, Inferensi, Penjelasan, dan Regulasi Diri. Hasil penelitian menunjukkan peningkatan skor post-test yang signifikan dibandingkan pre-test ($p < 0.05$), menandakan bahwa FLM berkontribusi pada peningkatan keterampilan berpikir kritis siswa. Dampak positif ini muncul karena pergeseran dari pembelajaran berpusat pada guru ke pembelajaran berpusat pada siswa, sehingga siswa memahami konsep dasar secara mandiri sebelum kelas dan menerapkan keterampilan berpikir tingkat tinggi selama kegiatan kelas. Temuan ini memberikan implikasi penting bagi guru, pengembang kurikulum, dan pembuat kebijakan dalam merancang strategi pembelajaran yang mendukung berpikir kritis dan selaras dengan Pendidikan untuk Pembangunan Berkelanjutan. Penelitian lanjutan disarankan untuk meninjau dampak jangka panjang FLM pada berbagai hasil kognitif dalam konteks pendidikan yang lebih luas.
Kata kunci: *Model Pembelajaran Terbalik, Berpikir Kritis, Pendidikan Dasar, Keterampilan Abad 21, Pembelajaran Aktif*

INTRODUCTION

Critical thinking skills represent one of the essential competencies within current learning objectives, particularly for elementary school students. The elementary education stage serves as a foundational level at which learners acquire the basic principles of knowledge from various disciplines that will be further developed at subsequent educational levels (Herwin et al., 2019). Critical thinking is one of the cognitive skills that must be taught and mastered by students across all educational levels, including those in elementary schools (Rahmawati & Harun, 2019; Sarwanto et al., 2021). As one of the central issues in modern education, critical thinking must be explicitly taught, particularly in relation to digital literacy instruction, in order to elevate students' levels of reasoning, enhance learning outcomes, and prepare them to effectively confront the challenges of the modern era (Haryanto et al., 2022). Critical thinking is a fundamental cognitive competency that must be explicitly developed from the elementary level, as this stage forms the foundation for students' multidisciplinary knowledge and enables them to analyze information, solve problems, and make rational decisions. Strengthening critical thinking is essential to enhance students' reasoning abilities, improve learning outcomes, and prepare them to navigate the complex challenges of the twenty-first century.

The cultivation of critical thinking skills can be nurtured and implemented from the early stages of schooling. Critical thinking constitutes an organized skill that is crucial to be instilled from the beginning of formal education (Pebriana & Disman, 2017; Rahmawati & Harun, 2019). When developed from an early age, the habit of critical thinking yields cognitive abilities that are beneficial and applicable to students' daily lives and future endeavors (Kenedi, 2019). Although critical thinking skills are not identical across educational levels, as their complexity and cognitive demands develop progressively in accordance with students' stages of intellectual growth. While the core essence of thinking logically, reflectively, and rationally remains constant, the forms of application evolve, from simple observation and reasoning in early grades to more advanced analysis, evaluation, and evidence-based decision-making at higher levels of education.

The preliminary study was conducted in Makassar City (4 elementary schools in Makassar) between October 2021 and February 2022 through interviews with teachers in Makassar City revealed that the critical thinking skills of elementary students remain at a low level. The findings indicated that: (1) students' questioning and answering activities were minimal; (2) their responses tended to be brief, often limited to single-word answers, thus failing to stimulate reasoning; (3) students rarely engaged in higher-order analytical thinking; (4) classroom discussions among peers regarding lesson content were infrequent; and (5) instructional strategies, models, or methods used by teachers were inadequate in facilitating the development of students' critical thinking skills. The preliminary study was conducted in Makassar City because interviews with teachers during October 2021 to February 2022 indicated that elementary students' critical thinking skills were still at a low level, as reflected in limited questioning and answering, minimal peer discussion, and instructional practices that did not adequately support higher-order thinking. Although similar challenges may also occur in other regions, Makassar was selected as the initial focus because empirical evidence from the field clearly demonstrated an urgent need for intervention to strengthen students' critical thinking development. The low achievement of students' critical thinking abilities was attributed to their difficulties in engaging in analytical reasoning, which consequently affected their academic performance (Rahmawati & Harun, 2019).

Critical thinking ability represents a distinct form of reasoning that extends beyond ordinary thinking processes. It is defined as a logical and reflective mode of thought that involves judgment or evaluation aimed at analyzing claims, arguments, and evidence, as

well as drawing conclusions through deductive and inductive reasoning to solve problems or make decisions thus shaping individuals to become active and informed members of society (Butler et al., 2012; Facione, 2015; Ennis, 1996; Sarwanto et al., 2021). Such a skill is not acquired instantaneously but develops through several progressive stages of cognitive processing. Critical thinking skills expected to be demonstrated by elementary school students encompass the ability to think logically and reflectively, evaluate information or claims, and draw conclusions based on evidence in order to solve problems or make decisions. As a concrete example of this competency is when students are able to compare different viewpoints during classroom discussions, justify their answers using clear reasons rather than guessing, and provide solutions to real-life problems—such as proposing ways to reduce classroom waste by identifying causes, evaluating possible actions, and selecting the most effective alternative.

Critical thinking is a cognitive skill obtained through various analytical processes prior to expressing opinions or making decisions. It involves the organized ability to gather relevant information, establish logical connections, and verify the accuracy of information to draw conclusions based on observation and evidence (Haberlin, 2018; Rahmawati & Harun, 2019). Furthermore, critical thinking provides long-term benefits by supporting students in managing their learning processes and encouraging them to make creative contributions to their future professions (Fitriyadi & Wuryandani, 2021). Hence, critical thinking is a cognitive activity that encompasses several mental processes such as attention, categorization, selection, and decision-making.

In addition, critical thinking contributes significantly to students' abilities in communication and social interaction. Psychologists, philosophers, and educators generally concur that communicative competence becomes truly productive only when it is grounded in critical thinking (Akramova, 2017). This underscores the urgency for educators to design and implement instructional models that effectively enhance students' critical thinking skills. One such approach is the flipped learning model, which can facilitate the development of students' competencies in addressing the challenges of the 21st century. The flipped learning model is an instructional approach in which students learn the content independently before class through videos or digital materials, while classroom time is used for higher-order learning activities such as discussion, problem-solving, and collaboration. This model effectively promotes critical thinking because students arrive with prior knowledge and can focus on analyzing information, evaluating arguments, and making evidence-based decisions rather than merely receiving content passively. In its implementation, teachers prepare digital learning resources and facilitate inquiry-driven classroom activities, whereas students are responsible for studying materials at home and actively applying their understanding during class. The flipped model is chosen over other approaches due to its advantages in maximizing face-to-face time for deep cognitive engagement, supporting autonomous learning, and fostering active participation. Although many studies have examined flipped learning, this research contributes novelty by exploring its role in enhancing elementary school students' critical thinking skills within a digital literacy-oriented learning context, an area that remains underexplored at the primary education level. A set of 21st-century skills, aligned with the curriculum's objectives, emphasizes the cultivation of Higher Order Thinking Skills (HOTS)—a student's capacity to engage in complex cognitive processes such as analysis, synthesis, and problem-solving (Ichsan et al., 2019).

Competencies such as critical thinking are invaluable assets for students' future success. The present study is targeted to fourth grade in order to ensure focused instructional design, appropriate cognitive demands, and accurate measurement of students' critical thinking development according to their developmental stage. The research employs a particular learning topic that aligns with the curriculum and is

relevant for stimulating critical thinking—namely “Indonesiaku Kaya Budaya,” because critical thinking must be contextualized within meaningful content to be effectively cultivated. Therefore, this study does not cover all learning materials in elementary education; instead, it examines one selected topic as a representative context to evaluate the effectiveness of the flipped learning model in enhancing students’ critical thinking skills.Based on the preceding background and relevant studies, the present research aims to analyze the effectiveness of the flipped learning model in improving students’ critical thinking skills.

METHODOLOGY

Research Design

This study employed a quantitative approach, focusing on the analysis of numerical data through statistical methods. The sampling technique was conducted using a random sampling method, data collection utilized standardized research instruments, and data analysis was performed quantitatively through statistical procedures to test the hypotheses that had been formulated earlier. The type of research adopted was pre-experimental with a one-group pretest–posttest design, in which the primary objective was to analyze the differences in learning outcomes before and after the implementation of the flipped learning model. The intervention was carried out in Bab VI Topik B: “Indonesiaku Kaya Budaya”, as the topic was deemed relevant for encouraging student engagement in inquiry, comparison, and evidence-based reasoning—therefore providing an appropriate context for assessing the enhancement of students’ critical thinking skills..

Participants and Data Collection

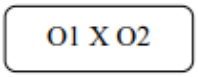
The subjects of this research consisted of 110 fourth-grade elementary school students in Makassar City. Four schools were selected as research sites: SD Negeri Unggulan Monginsidi 1, SD Negeri Monginsidi 2 Makassar, SD Negeri Bawakaraeng 1, and SD Negeri Bawakaraeng 2 Makassar. The selected elementary schools were chosen because they met the research criteria, including the implementation of the same curriculum, in one cluster area, and similar classroom learning conditions, as well as indications from the preliminary study that students’ critical thinking skills in these schools were still at a low level. Fourth grade was specifically selected because students at this developmental stage have reached a cognitive level that enables them to transition from concrete to more analytical thinking, making them suitable for interventions aimed at strengthening critical thinking skills through the flipped learning model.

Data Analysis

The data regarding the level of product effectiveness were obtained from students’ learning outcome tests administered through pretests and posttests. The assessed learning outcomes reflected the achievement of instructional objectives previously outlined in the teaching module, encompassing students’ competency attainment. To determine the effectiveness level of the flipped learning model, the study utilized the one-group pretest–posttest experimental design as described by Sugiyono (2010, p. 74).

The learning outcome test administered in this study consisted of reasoning essay, as this format enables objective scoring and allows for the quantitative comparison of students’ performance between the pretest and posttest. To validate the test items, the instrument underwent expert judgment validation involving content and construct evaluation by subject-matter experts, followed by empirical validation through item analysis—examining item difficulty, discrimination index, and distractor effectiveness—and refers to the 2015 Facione critical thinking indicators to ensure that the test accurately measured students’ competency attainment in accordance with the instructional objectives. The effectiveness test was conducted by comparing students’

performance before and after the treatment. The design of this study can be illustrated as follows.



Fugure 1. One group pretest-postest design

Keterangan:
O1 = Pretest score (before the treatment)
O2 = Posttest score (after the treatment)
X = Treatment
Source: (Sugiyono, 2010: 75)

FINDINGS AND DISCUSSION

Findings

The effectiveness of the flipped learning model supported by a digital application was determined through a field trial employing a quantitative research method with a one-group pretest–posttest design. Data analysis was conducted using the t-test, a statistical procedure for examining differences in means. As a parametric statistical test, the t-test requires the fulfillment of certain assumptions, specifically the normality test. Therefore, prior to conducting the t-test, a statistical analysis was first performed to verify the fulfillment of this prerequisite condition.

Normality Test

The distribution of students' critical thinking skills across all groups was considered normally distributed if the significance value of either or both statistical tests exceeded 0.05. The results of the analysis are presented in the following table.

Table 1. Uji Normalitas

No.	Kelas	Tes	Kolmogorov-Smirnov			Shapiro-Wilk		
			Statistik	df	Sig.	Statistik	df	Sig.
1	IV A	*Pre-tets*	0,113	43	0,200	0,975	43	0,460
		Post-test	0,084	43	0,200	0,956	43	0,096
2	IV A	*Pre-tets*	0,127	40	0,106	0,966	40	0,269
		Post-test	0,113	40	0,200	0,974	40	0,477
3	IV B	*Pre-tets*	0,113	43	0,200	0,975	43	0,087
		Post-test	0,084	43	0,200	0,956	43	0,496

The table indicates that the Kolmogorov–Smirnov and Shapiro–Wilk statistics for the distribution of students' critical thinking skill data yielded significance values greater than 0.05. This finding suggests that the data on students' critical thinking skills were normally distributed across all groups.

Paired Sample T-Test

The paired sample t-test was subsequently employed to determine whether a significant difference existed between the students' pretest and posttest mean scores. The prerequisite for conducting a paired sample t-test is that the data must be normally distributed. The results of this analysis are presented in the following table.

Table 2. Uji T Sampel Berpasangan

		Paired Differences					t	Df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pre Test IVA- Post Test IVA	-29,3	16,3	2,5	-34,3	-24,3	-11,8	42	0,000
Pair 2	Pre Test IVA- Post Test IVA	-6,6	13,2	2,1	-10,8	-2.4	-3.2	39	0,003
Pair 3	Pre Test IVB- Post Test IVB	-18,9	10,1	1,9	-8,9	-2.2	-3.0	40	0,002

Based on the output for Pair 1, the significance value (Sig. 2-tailed) was 0.000 < 0.05. Therefore, it can be concluded that there was a significant difference between the mean scores of students' critical thinking skills in the pretest and posttest for Class IVA of SD Negeri Unggulan Monginsidi 1. Furthermore, based on the output for Pair 2, the significance value (Sig. 2-tailed) was 0.003 < 0.05. Thus, it can be inferred that there was a significant difference between the pretest and posttest mean scores of students' critical thinking skills in Class IVA of SD Negeri Monginsidi II. Similarly, based on the output for Pair 3, the significance value (Sig. 2-tailed) was 0.002 < 0.05. Hence, it can be concluded that there was a significant difference between the pretest and posttest mean scores of students' critical thinking skills in Class IVB of SD Negeri Bawakaraeng I.

Therefore, it can be concluded that there was a significant difference in students' critical thinking test results before and after the implementation of the flipped learning model supported by a digital application. In other words, the digitally assisted flipped learning model had a positive and significant effect on improving the critical thinking skills of fourth-grade students at SDN Unggulan Monginsidi I, SDN Monginsidi II, and SDN Bawakaraeng I in Makassar City. The results indicated a significant difference in students' critical thinking performance between the pretest and posttest after the implementation of the digitally assisted flipped learning model, showing that students demonstrated considerably higher achievement following the intervention. The improvement was particularly evident in several dimensions of critical thinking skills, including the ability to formulate questions, provide logical justifications for answers, analyze information from various sources, draw evidence-based conclusions, and solve problems through reflective reasoning. This innovative instructional approach—integrating the flipped learning model with digital technology—proved to be effective in enhancing students' critical thinking skills. Learning innovations that are student-centered have been shown to effectively foster students' creativity, critical thinking, learning motivation, and problem-solving abilities in classroom activities (Wuryandani & Herwin, 2021).

Discussion

Based on the results of the independent sample t-test, the significance value (Sig. 2-tailed) was 0.000 < 0.05. This result indicates that there was a significant difference in students' learning outcomes between those taught using the flipped learning model supported by a digital application and those taught through conventional learning methods. In other words, the digitally assisted flipped learning model had a significantly greater impact on students' acquisition of language politeness and critical thinking skills compared to the conventional learning approach among fourth-grade elementary school students. The flipped learning model enhanced students' critical thinking skills by reallocating classroom time from content transmission to inquiry-based activities that required higher-order cognitive engagement. After accessing digital learning materials prior to class, students used classroom time to analyze cultural information, evaluate

arguments from multiple sources, and collaboratively solve problems, allowing them to practice key indicators of critical thinking proposed by Facione (2015). Specifically, notable improvement was observed in interpretation (students demonstrated a clearer understanding of cultural concepts), analysis (they distinguished facts from opinions across different cultural references), evaluation (they justified claims with valid evidence rather than personal preference), inference (they formulated logical conclusions about cultural preservation strategies), explanation (they articulated their reasoning coherently during presentations and discussions), and self-regulation (they reflected on feedback and revised their arguments accordingly). Thus, the flipped learning approach—supported by digital applications (learning videos)—did not merely increase test scores but fostered disciplined, evidence-based reasoning aligned with Facione's critical thinking framework.

Moreover, students' posttest scores in critical thinking were higher after the implementation of the flipped learning model supported by digital applications than before its use. This finding demonstrates that the integration of digital technology within the flipped learning model exerts a stronger and more positive influence on students' learning outcomes than traditional instructional methods in the elementary classroom context. Critical thinking is not only applicable in academic settings but also in everyday life and professional domains. It is a highly valuable skill for addressing complex challenges and making informed, rational decisions in contemporary contexts. The Foundation for Young Australians (FYA, 2016) analyzed 4.2 million job advertisements in Australia between 2012 and 2015 and found that the demand for employees possessing critical thinking skills increased by 158%, reflecting its growing relevance in the modern workforce.

Critical thinking enables individuals to analyze their own reasoning to ensure that they make sound judgments and draw intelligent conclusions (Satria & Sopandi, 2019). Through critical thinking, students learn to process information effectively and apply it judiciously and appropriately. The construction of students' critical thinking skills, however, largely depends on teachers' pedagogical contributions. Research findings reveal that critical thinking skills can be developed more rapidly when students are frequently engaged in activities that promote analytical reasoning. Therefore, educators must continuously reflect on how various pedagogical approaches can facilitate the development and enhancement of students' critical thinking abilities (Thorndahl & Stentoft, 2020).

Across Europe, Australia, and the United States, critical thinking has been identified as a primary instructional goal, a core educational competency, and one of the key learning outcomes in modern education systems (Eurydice, 2011; Moore, 2014; Association of American Colleges & Universities, 2004; 2015). Descriptive studies in these contexts suggest that elementary school students require structured activities, sustained engagement, and habitual thinking practices to enable them to apply critical thinking strategies effectively and master the art of reflective reasoning in their lives.

In essence, critical thinking represents a fundamental component of human intelligence and plays a pivotal role in achieving meaningful learning outcomes (Klein, 2011; Leasa et al., 2020).

Critical thinking skills serve as a vital indicator of learning outcomes, providing valuable insights for students and helping them address real-life problems (Ernst & Monroe, 2004; Bailin, 2002). When students interact with peers who possess advanced thinking abilities, such interactions often "transfer" critical thinking competencies through collaborative engagement. Several studies have also revealed that students with higher-order thinking skills tend to be more active and engaged in diverse learning activities, while avoiding monotonous routines. Furthermore, critical thinking skills among elementary school students are significantly influenced by teachers' active involvement

in the learning process. This study concludes that the school environment plays a crucial role in fostering and enhancing students' mastery of critical thinking skills.

Critical thinking can be examined from multiple perspectives, one of which is students' logical and analytical reasoning. It involves the ability to analyze information in a logical and rational manner, evaluate evidence supporting arguments, and develop reasoned opinions. Students are trained to identify problems, formulate alternative solutions, and evaluate the potential consequences of each option. Such skills must be cultivated from the early years of schooling to establish a strong foundation for higher-level reasoning.

One of the distinctive characteristics of elementary school students is their high level of physical activity. Through such activity, they often express creativity and curiosity. Critical thinking, therefore, also encompasses creative elements, as individuals who think critically are capable of generating new ideas and seeking innovative solutions. Students develop self-confidence, personal assumptions, and intrinsic motivation to continue learning and reflecting on their own thought processes.

A fundamental component of developing critical thinking skills is effective communication—the ability to construct arguments systematically while embracing multiple perspectives. Students must learn to remain open to new and differing ideas, and they should not hesitate to question or challenge existing views. Teachers should encourage classroom discussions that explore various possible answers, allowing students to express their opinions freely. Such collaborative dialogue broadens their thinking and exposes them to diverse viewpoints.

The development of critical thinking can and should begin at an early age. Several activities can effectively help elementary school students sharpen their analytical abilities, such as reading and storytelling. Reading storybooks and discussing their plots and characters enable children to understand narrative structures, draw conclusions, and articulate their thoughts. Students may also be encouraged to retell stories in their own words, thereby reinforcing comprehension and reflection. In addition, teachers can stimulate deeper thinking by asking open-ended questions, such as "Why do you think that happened?" or "What do you think would happen if…?"

Engaging students in question-and-answer activities is an effective yet challenging strategy to stimulate critical thinking when they encounter new facts or concepts. The use of questioning techniques is designed to encourage analytical reflection, aligning with the constructivist learning approach, which emphasizes learning processes rather than mere outcomes (Muhajarah, 2020). In this framework, students are regarded as thinkers and active constructors of knowledge, rather than passive recipients of information (Muhajarah, 2020).

Therefore, students must be taught to ask questions regularly in order to cultivate curiosity. They should be encouraged to seek answers independently and share the knowledge they gain. It is important to remember that elementary school children are still in the process of learning and development; thus, these activities should remain enjoyable and creativity-oriented. Through creative and play-based approaches, children can begin to build the foundational aspects of their critical thinking skills.

To cultivate students' interest in reading, teachers should present texts that are age-appropriate, visually engaging, and contextually relevant to the lesson theme so that reading becomes meaningful rather than obligatory. In the context of the Indonesiaku Kaya Budaya topic, suitable examples include illustrated storybooks about traditional dances, legends from various regions of Indonesia, or narrative biographies of local cultural figures, as these provide familiar cultural elements that encourage curiosity and personal connection. To reduce students' reluctance or embarrassment when retelling the story, teachers may create a psychologically safe learning environment by allowing voluntary sharing, using small-group storytelling before whole-class presentations, and

emphasizing appreciation rather than evaluation. Effective strategies that support this process include guided reading with open-ended questioning, think-pair-share, reader's theater, and role-play storytelling, all of which enable students to articulate ideas without fear of judgment while simultaneously fostering interpretation, explanation, and reflection—core components of critical thinking development.

From the perspective of Piaget's theory of cognitive development, critical thinking is part of a child's cognitive growth, which unfolds through several distinct stages. One of these is the concrete operational stage, which typically occurs between the ages of 7 and 11—corresponding to the elementary school years. At this stage, children begin to develop more advanced critical thinking abilities. They are capable of performing simple mental operations, understanding logical principles, and grasping the concept of conservation—the understanding that quantity remains constant despite changes in shape or arrangement.

Similarly, Vygotsky's concept of cultural tools emphasizes that thinking is mediated by "mental tools" or cultural instruments, which encompass the knowledge, skills, and concepts acquired from one's social and cultural environment. Interaction with the social world plays a crucial role in shaping how individuals process information, solve problems, and develop critical thinking. A learning environment that fosters collaboration and social interaction promotes the development of analytical reasoning and reflection. In essence, to think critically means to retain valuable knowledge while developing independent opinions, yet still demonstrating tolerance, flexibility, respect, and openness to multiple perspectives in the pursuit of collective problem-solving (Florea & Hurjui, 2015). Based on these perspectives, students' mastery and enhancement of critical thinking skills occur as a result of social interaction and collaboration with others. These factors are interrelated and mutually reinforcing, forming a complex foundation for the diverse development of thinking skills.

Teachers play a pivotal role in enhancing students' critical thinking abilities. They can model these skills by demonstrating and practicing critical thinking behaviors in daily life and classroom situations. When students observe their teachers using critical thinking to solve problems or make decisions, they are more likely to adopt similar reasoning patterns.

Engaging students in discussions and debates further supports the development of critical thinking skills. Teachers can establish a classroom environment that encourages the exchange of ideas, attentive listening to differing viewpoints, and stimulation of analytical thought. Critical questioning is a key strategy—teachers can pose challenging questions that require reflection, inquiry, and solution-seeking, rather than simple factual recall. Constructive feedback should also be provided, particularly on how students analyze information, construct arguments, and communicate ideas. To foster active student participation in discussions, teachers must create a supportive and psychologically safe classroom environment where diverse viewpoints are respected, allowing students to feel confident in expressing their ideas. Furthermore, teachers should pose thought-provoking questions that promote reflection and problem-solving, while providing constructive feedback to validate students' contributions and sustain meaningful dialogue.

Moreover, teachers can integrate technology and other learning resources to assist students in developing critical thinking skills. For example, the use of online resources, educational games, or digital learning applications can stimulate analytical thinking. In this study, the digital learning application embedded in the flipped learning model for Grade IV elementary school students consisted of instructional videos aligned with the Capaian Pembelajaran (learning outcomes) of the Ilmu Pengetahuan Alam dan Sosial (IPAS) subject in Phase B of the Kurikulum Merdeka. Students were expected to develop critical thinking skills to process and apply information in their daily lives. They were

trained to engage consistently in analysis, interpretation, argumentation, and communication with others. Ultimately, critical thinking skills have long-term implications, as they equip students with the ability to manage their learning, solve problems independently, and contribute creatively to their future professions (Fitriyadi & Wuryandani, 2021).

CONCLUSION

The effectiveness of the flipped learning model is demonstrated by a significant difference in students' critical thinking test results before and after the implementation of the digital-assisted flipped learning model to improve elementary school students' critical thinking skills. The significant difference is indicated by students' improved understanding of the topic "Indonesiaku Kaya Budaya," as shown by the increase in pre-test and post-test scores. This study recommends that: (1) subsequent effectiveness tests can be conducted using comparative or control group designs with a quasi-experimental approach involving two or more comparison groups; (2) the effectiveness of the digital-assisted flipped learning model in enhancing elementary students' critical thinking skills should be further tested in a wider range of elementary schools across various provinces in Indonesia; (3) the measure of effectiveness should not only be viewed from the cognitive aspect but should also include indicators of learning achievement in the affective and psychomotor domains; and (4) the flipped learning model will be more effective if the learning videos used are created by the teachers themselves in their respective classrooms. Broader research across schools in multiple provinces may provide deeper insights into contextual factors that influence the success of the flipped learning model in strengthening elementary students' critical thinking abilities.

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