International Journal of Technology and Education Research

https://e-journal.citakonsultindo.or.id/index.php/IJETER

E-ISSN: 2986-0733

Students' Critical Thinking Skills Through Active Learning

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Abstract

Critical thinking skills are essential competencies that elementary school students must possess to meet the challenges of 21st-century learning. This study aims to analyze the role and effectiveness of active learning in enhancing students' critical thinking skills. The method used is a literature review analyzing relevant studies published in accredited scientific journals from 2020 to 2025. The results of the review indicate that active learning approaches, such as problem-based learning, inquiry-based learning, discovery learning, and STEAM-based approaches, have been proven to significantly enhance students' critical thinking skills. This improvement is influenced by students' active engagement in the learning process, their prior knowledge, and the learning environment's support. Additionally, both internal and external factors contribute to the development of critical thinking skills. Active learning provides students with the opportunity to analyze, evaluate, and solve problems independently and collaboratively. Thus, it can be concluded that active learning is an effective and relevant strategy for implementation in elementary education to optimally develop students' critical thinking skills.

***Keywords: Critical thinking, Active learning, Elementary school students, Student skills, Elementary education*INTRODUCTION**

INTRODUCTION

Critical thinking skills are essential competencies that must be developed in elementary school students. However, conventional learning practices often do not support the development of these skills. Therefore, this study aims to analyze the effect of active learning on improving elementary school students' critical thinking skills. (Fajra Rabina, Syachruroji

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Ahmad, & Rokmanah Siti, 2023)

Critical thinking enables individuals to manage, adjust, change, or improve their thought patterns to produce more accurate decisions in their actions. Students engage in critical thinking when they systematically examine the evidence, assumptions, reasoning, and language underlying others' claims. Critical thinking aims to develop one's ability to construct a more comprehensive understanding of a problem or issue, rather than simply accepting or rejecting information outright. (Arina Manasikana & Anggoro Putranto, 2024)

Critical thinking skills are essential competencies that students must master to compete globally. Prior knowledge directly influences the development of students' critical thinking skills. (Maulidah, Anekawati, & Hidayat, 2024). One key aspect of being a critical individual is having an open and clear mind, where every decision made must be based on clear reasons and valid facts. Furthermore, the individual must be open to differing opinions. Critical thinking skills can be achieved by students if teachers implement a learning model that focuses on strategies for building students' knowledge or concepts. This process involves training students through exposure to real-life problems, followed by scientific research in the form of work practices to find solutions to these problems. (Maylia, Amelia, Suwarna, Muyassaroh, & Jenuri, 2024)

Critical thinking is an activity that involves the manipulation and transformation of information stored in memory. When thinking, individuals form concepts, make judgments, apply critical thinking, make decisions, think creatively, and solve problems. Critical thinking is a skill that can be developed through students' direct experience in dealing with problems. Therefore, if students are accustomed to applying these skills, their critical thinking abilities will develop optimally. The teacher's task in improving students' critical thinking skills is to provide a learning environment that encourages students to use their thinking skills actively. (Nafiah & Suyanto, 2014)

Critical thinking skills are crucial for every individual to possess, as they are essential abilities that function effectively in all aspects of life. Critical thinking is essential for all humans, especially students. The importance of critical thinking for students can be explained as follows: first, critical thinking enables students to evaluate the evidence, assumptions, logic, and language underlying others' statements. Second, critical thinking enables students to discover the truth amidst the flood of information that surrounds them every day. Third, critical thinking enables students to study problems systematically, address challenges with an organized approach, formulate innovative questions, and design original learning designs. (Huda & Abduh, 2021)

In education, critical thinking skills play a crucial role. Students who master these skills

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tend to excel in understanding and solving problems, while also achieving optimal performance on exams and tests. Therefore, cultivating critical thinking skills from an early age is essential. In the global workplace, these skills are a determining factor in strategic decision-making that has significant implications for an organization or company. Employees with these skills are able to formulate rational and timely decisions, as well as identify and resolve problems through creative and innovative approaches.

In the context of education, critical thinking skills are an absolute competency that students must master. Mastering these skills allows students to deeply internalize learning concepts, apply them to real-life situations, and improve academic success in formal assessments. However, not all individuals possess optimal levels of critical thinking skills. Various factors such as educational background, life experiences, and social dynamics influence their development. Therefore, efforts to improve critical thinking skills are imperative to support effective and adaptive decision-making in everyday life. (Ariadila, Silalahi, Fadiyah, Jamaludin, & Setiawan, 2023)

Basic education plays a crucial role in establishing a solid foundation for students' intellectual and social development. One of the key competencies that needs to be developed at this level is critical thinking skills, which form the basis for in-depth understanding, critical analysis, and effective problem-solving.

In the increasingly complex dynamics of the contemporary era, these skills are not merely a value-added asset but an imperative necessity for students' future success. Therefore, the implementation of innovative and effective learning methods is essential to optimize the development of critical thinking skills in elementary school students.

Among various approaches, active learning methods stand out as a strategy proven effective in stimulating student engagement and strengthening critical thinking skills. This method positions students as active agents in the learning process, encouraging participation through problem-solving, group discussions, and self-reflection. Therefore, research on the implementation of active learning methods to improve elementary school students' critical thinking skills is increasingly relevant within the contemporary educational framework. (Ritonga & Napitupulu, 2024)

Critical thinking skills are also influenced by two main groups of factors: internal and external factors. Internal factors refer to students' personal attributes that are innate or formed through individual experiences, including student character traits such as perseverance and curiosity; reading and writing skills as the basis for literacy for analyzing complex texts; learning motivation that encourages active solution-seeking; student habits such as routines of

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independent discussion; physical conditions that support cognitive concentration; anxiety that can hinder clear thinking if not managed; social interactions and intellectual development that enrich the integration of perspectives; and prior knowledge and gender that influence thinking styles. These factors are dynamic and can be developed through continuous practice.

Meanwhile, external factors involve the influence of the external environment, particularly the educational process and social context. These include the implementation of learning by teachers through strategies such as group discussions or project-based problem-solving; the habituation by teachers through routine activities such as case analysis and debate; and the social environment of family, peers, and community that encourages exposure to diverse ideas. Interventions on these external factors, particularly through a critically oriented curriculum, can amplify the potential of internal factors. Overall, a holistic understanding of these two factors forms the foundation of an effective educational strategy for optimally developing critical thinking skills. (Maulidah et al., 2024)

Critical thinking is also a concept adopted by students to achieve learning objectives through in-depth analysis of problems that arise during learning activities. Students who possess critical thinking skills can typically be identified by their distinctive characteristics, such as the ability to identify problems from collected data and information. Furthermore, they are able to analyze, communicate, and evaluate these findings, thereby drawing conclusions from the process. (Ridwan, 2021)

Active learning is a learning process in which students have broader opportunities to engage in various learning activities through dynamic interactions with the subject matter. This approach encourages students to independently construct understanding, rather than simply passively receiving information from a teacher or facilitator. Thus, students actively utilize their cognitive abilities to identify the main ideas of the subject matter, solve problems, and apply the new knowledge they have acquired to real-life contexts. (Imamah, nd)

Efforts to improve the quality of learning should be carried out through the implementation of innovative, student-centered learning models. One model that aligns with the demands of 21st-century learning is the STEAM (Science, Technology, Engineering, Arts, and Mathematics) model.

The STEAM model integrates various disciplines into a single, contextual and meaningful learning process, enabling students to understand concepts holistically and apply them to their daily lives. STEAM learning also stimulates students to develop critical, creative, and collaborative thinking skills through exploration and problem-solving activities. With technological advancements, the use of artificial intelligence (AI) in learning has become a

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potential innovation that supports the implementation of the STEAM model. AI can function as a learning aid that facilitates information exploration, concept visualization, and interactive presentation of materials. (Sianturi et al., 2026)

However, the successful implementation of active learning depends heavily on teacher competence, supporting facilities, and student readiness. Teachers require ongoing training to design and manage engaging and effective learning. Supporting facilities, such as conducive classrooms, information technology, and adequate teaching materials, also play a role in determining successful implementation. Based on this theoretical foundation, active learning is a potential approach to increasing student engagement in elementary schools, ultimately contributing to improving the overall quality of education. (Putri Indah Mawati Waruwu & Yulls Helsa, 2025)

Therefore, to improve students' critical thinking skills, support is needed in the form of learning activities specifically designed by teachers to strengthen students' understanding and analytical capabilities. A learning approach using group discussions is an effective strategy that can serve as a platform for developing students' thinking processes. This method facilitates students in developing a deep understanding of the subject matter, fosters motivation for active participation in the learning process, and hones communication and scientific thinking skills. The application of discussion learning provides space and flexibility for students to express diverse views or opinions regarding problems that exist in the social context of society. (Sa'diyah, Islamiah, & Fajari, 2022)

The Independent Curriculum emerged as an innovative approach that positions students as the central subjects in the learning process. By emphasizing contextual learning, this curriculum provides opportunities for students to develop critical thinking skills by understanding concepts in real-world situations. This approach aims to create a learning environment that focuses not only on academic achievement but also on strengthening students' capabilities in understanding, analyzing, and evaluating ideas in various contexts. (Kollo & Suciptaningsih, 2024)

In the process of critical thinking learning activities, students' abilities can be identified through their responses that reflect various skills, namely: the ability to reject inaccurate or irrelevant information, the ability to detect and correct conceptual errors, the ability to make decisions or draw conclusions based on the collection and consideration of comprehensive facts, and the ability to develop innovative solutions. Overall, in these learning activities, the average student demonstrated a moderate level of critical thinking patterns. (Marwah Sholihah & Nurrohmatul Amaliyah, 2022)

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International Journal of Technology and Education Research

https://e-journal.citakonsultindo.or.id/index.php/IJETER

E-ISSN: 2986-0733

Quality education is measured not only by student learning outcomes but also by the dynamics of the learning process. One of the determining factors for successful learning is the level of student engagement. High student engagement in the learning process can strengthen understanding of the material, develop critical thinking skills, and increase motivation to learn. However, students are often less active, both physically and mentally, in learning activities. Therefore, innovative learning models are crucial for maximizing student engagement.

Active learning is an approach that emphasizes direct student participation through various activities, allowing for in-depth exploration and understanding of the material. Active learning models, such as project-based learning, problem-based learning, and group discussions, are believed to be effective in increasing student engagement. This study aims to investigate how innovative active learning models can increase student engagement at the elementary school level. (Simanjuntak, Surbakti, & Kawilaa, 2023)

Based on the results of this study, active learning methods can be considered an effective approach to improving elementary school students' critical thinking skills. Implementing some of the methods mentioned above has the potential to help students develop critical thinking skills essential for facing the complex challenges of their lives.

METHODOLOGY

This research adopted a qualitative approach based on a literature review. This approach was chosen to examine and analyze various previous research findings relevant to the topic of the influence of active learning on the development of students' critical thinking skills. The researchers did not collect primary data directly in the field, but instead relied on secondary data sourced from various officially published written publications.

Source selection criteria include publications within the last five years (2020–2025), strong links to the themes of active learning and critical thinking skills, and originating from credible sources that have undergone a peer-review process.

In this study, researchers conducted a literature review of 17 relevant scientific articles. Based on the source quality criteria, the selected articles are publications accredited by SINTA (Science and Technology Index) and there are several articles sourced from the Google Scholar and Garuda databases that already have ISSN and have gone through a peer-review process. With details of 3 SINTA 3 articles, 4 SINTA 4 articles, 5 SINTA 5 articles, and 1 SINTA 6 article. The remaining 4 articles are sourced from Google Scholar and GARUDA.

The data collection technique is carried out by identifying, collecting, and selecting various literatures relevant to the topic of Research on Students' Critical Thinking Skills Through

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Active Learning. The data analysis process is carried out by describing and interpreting information obtained from various literature sources. Researchers also read and understand the contents of the literature thoroughly, then group the information based on themes that are in accordance with the focus of the research. The results of the analysis are then systematically arranged in the form of descriptive descriptions that are easy to understand.

In a literature review, there are several systematic steps that researchers must take, including the following:

1. Determining the research topic and focus, at this stage the researcher established the main topic, namely Critical Thinking Skills Through Active Learning. The topic was selected based on the urgency of developing higher-order thinking skills in the learning process, as well as its relevance to the demands of 21st-century education.
2. Determining keywords, where researchers identify relevant keywords, such as "Critical thinking, Active learning, Elementary school students, Student skills, Elementary education", to facilitate the search for literature sources that are appropriate to the research topic.
3. Searching and Collecting Literature, Relevant literature sources are collected through various scientific databases, such as Google Scholar and Garuda, as well as accredited journals. Researchers also consider the suitability of the topic, year of publication, and quality of the journal in assessing the suitability of the sources used.
4. Source selection and evaluation, where collected sources are selected based on relevance, credibility, and year of publication. Researchers ensure that the sources used are valid and support the research discussion.
5. Organizing and grouping literature, where the selected literature is then grouped to be used for comparison.
6. Compiling a literature review by organizing the results of the analysis systematically in the form of a coherent and structured narrative, so as to form a literature review that is integral and easy to understand.
7. Drawing temporary conclusions, in the final stage, researchers draw temporary conclusions based on the results of the literature review that has been reviewed.

RESULTS AND DISCUSSION

Author & Title Study	Research purposes	Method	Research result	Implications
Arindralkhwan, Nur Huda, & Abd	Improve Thinking Skills	PTK (2 Cycles)	There is an in crease from 68.96%	PBL Effectively Improves

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uh (2021) Improving Critical Thinking Skills Through PBL	Critical Elementary School Students		To 85.36%	Students' Critical Thinking and Activeness
Nafiah & Suyanto (2014) ImplementationPBL to improve critical thinking and results Study	Increasecritical thinking and learning outcomes	PTK	Critical thinking increased by 24.2 % and learning outcomes 31.03%	PBL is relevant for practice-based learning
Maylia et al. (2024) Inquiry Strategy for Critical Thinking elementary school students	Analyzethe influence of the inquiry model	Literature review (26 journals)	Effective inquiry models improve critical thinking	Inquiry recommendedfor active and scientific learning
Maulidah et al. (2023) Impact of prior knowledge	Analyzing knowledge relationshipsearly and critical thinking	Literature review	Knowledgethe beginning is directly proportional to the ability to think critically	It is important to identify the students' initial abilities before learning
towards critical thinking				
Manasikana & Putranto (2024) The influence of active learning on critical thinking	Knowing the influence of active learning models	Quantitative f(mental preexperi)	There is a significant influence (sig 0.000) and N-gain 0.745	Active learning improves thinking critical and learning outcomes
Ariadila et al. (2023) Analysis of the Importance of Skills	Examining the importance of critical thinking in learning	Literature Review	Think Critical thinking helps students understand, evaluate, and solve problems. effectively	It needs to be instilled from an early age through appropriate learning strategies.

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International Journal of Technology and Education Research

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E-ISSN: 2986-0733

N Critical thinking				
Ridwan (2021) Improving Critical Thinking through Discovery Learning Improve critical thinking and learning outcomes	Improving Critical Thinking Skills and Learning Outcomes	PTK (2 Cycle)	Think critical increase from 56% to 88%, learning outcomes from 68% to 84%	Discovery Learning effectively improves thinking critical and learning outcomes
Sianturi et al. (2026) STEAM Implementation AI-based	Improving critical thinking and learning outcomes of elementary school students	PTK (2 Cycle)	Learning completion increases from 65% to 88%, critical thinking go on to Category Very good	Integration AI in STEAM Effective for 21st century learning
Waruwu & Helsa (2025) Implementation i	Reviewing learning active in increasing student engagement	Literature Review	Active learning (PBL, cooperative, experiential) increase	Active learning is a solution to improve quality
Active Learning			motivation, participation, and learning outcomes	basic education
Arianadinha q Muarifin et al. (2025) – Implementation of Active Learning Methods in	Analyzing the application of active learning methods in improving critical thinking	Classroom Action Research (CAR) with 40 class XII students as subjects; the	The results show that 93.1% student able to think critical thinking after implementing active learning. In addition,	Active learning effectively improves critical thinking skills and student engagement.stude

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Improving Students' Critical Thinking Skills in Civics Subject Student Class XII SENIOR HIGH SCHOOL 1 Diponegoro Semarang	skills student in the subject of Civics	instruments were multiple choice tests and critical thinking questionnaires.	there was an increase in critical thinking scores as well as increased student interest and motivation in learning.	nt. Method It is recommended to apply this consistently in various subjects to improve quality learning
Halimatus Sa'diyah, Robitotul Islamiah, & LakshmiEvasufi Widi Fajari (2022) – Improving Skills Students' Critical Thinking through Group Discussion Method: Literature Review	Knowing the importance of applying group discussion methods in improving students' critical thinking skills and describing the characteristics of critical thinking and the steps for implementing it.	Literature review by analyzing various sources related to group discussion methods and critical thinking	The results of the study show that group discussion methods effectively improve students' critical thinking skills through analysis, argumentation, and social interaction activities.Discussion encourages students think scientifically, actively express opinions, and be able to solve problems rationally	Group discussion methods are recommended as active learning strategies that can improve students' critical thinking skills, participation, communication, and decision-making. Teachers act as facilitators in creating learning. interactive and meaningful
Nikson Kollo & Oktaviani Adhi Subuatnings ih (2024) – Skills n Students' Critical Thinking through the	Analyzing the implementation and strategy in improving students' critical thinking skills	Qualitative research with a phenomenologic al approach; subject of fourth grade students, teachers and	The results show that the Independent Curriculum is able to improve thinking skills. critical thinking through contextual, project-	Independent Curriculum can be an effective strategy to develop thinking critical if supported by teacher training,

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Implementation of the Independent Curriculum	through Independent Curriculum	principals; data collection techniques through observation, interviews, and documentation	based learning, and an emphasis on creativity, collaboration, and problem solving. However, there are obstacles such as a focus on standardized tests and a lack of teacher understanding	a conducive learning environment, and parental involvement. It is necessary to adjust the evaluation system to place more emphasis on ability. think student critical
The Noble Spirit &Nurrohmatul Amaliyah (2022) – The Role of Teachers in Implementing Group Discussion Methods to Improve Skills ThinkCritical Class Students VElementary school	Knowing pedagogical skills Teacherin applying group discussion methods to improve students' critical thinking skills in learning	Descriptive qualitative method with data collection techniques through observation, interviews, and documentation	Teachers are able to encourage students to think critical, brave in expressing opinions, and active in learning through group discussion method. This method is effective in improving critical thinking skills, although there are still obstacles such as student passive and lacking in self-confidence	Teachers need to have good pedagogical competence and thorough preparation. in applying the discussion method. This method can be used as an effective learning strategy to increase activity and thinking skills. student critical
Natalia Br Simanjuntak, Murni Br	Analyzing the Application off Active Learning Models	Quantitative experiment	Active learning model (project-	Model active learning is necessary

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International Journal of Technology and Education Research

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E-ISSN: 2986-0733

Surbakti, & Reni Sara A. Kawilaa (2023) Innovation of Active Learning Models to Increase Student Engagement inSchool Base	in increasing student engagement in elementary schools	n (questionnaire, observation, t-test)	based learning, problem-based learning, discussion) increase student engagementsignificantly (85% vs 45%). Students were more active, focus, and motivated	widely implemented because it is effective in increasing student engagement, motivation, and the quality of learning.
Yuli Habibatul Imamah (2021) – Active Learning Strategies in Improving Indonesian Language Learning Achievement	Analyzing the application of learning strategies active in improving student learning achievement onIndonesian language subjects	Descriptive study (literature-based conceptual study and learning phenomena in the classroom)	The implementation of active learning strategies can improve student responsiveness, activeness, and learning achievement. This is demonstrated by the increasing number of students achieving above-standard scores and increased student attention, concentration, and self-confidence.	Active learning strategies need to be optimally implemented by teachers because they can improve student achievement and engagement. Teachers act as facilitators and need to pay attention to individual student differences. learning

An analysis of 15 articles and a comparison of the studies in the table shows that all studies share the same goal: improving students' critical thinking skills through active learning. However, there are some differences in their implementation. Some studies directly apply learning models such as Problem-Based Learning (PBL), discovery learning, or STEAM for quick results. Others discuss the influence of active learning models or factors such as students' prior knowledge. These differences make the comparisons not only practical but also in-depth and analytical, providing a comprehensive overview of how to develop critical thinking in schools.

In terms of methods, this research employed several approaches, including classroom

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action research (PTK) and a literature review, which were the most widely used due to their focus on improving direct classroom learning. A literature review summarizes previous findings for a strong theoretical foundation; a numerical method provides statistical evidence of the effectiveness of the learning model; and finally, a qualitative method explains the learning process in detail.

In the comparative learning model section above, all studies used an active, student-centered approach. PBL, inquiry, discovery learning, group discussions, and STEAM actively engage students, practicing analysis and problem-solving. The achievement of students' critical thinking skills is not only determined by the model itself, but also by how well the model can create engaging, collaborative, and useful learning for students.

The results from the table demonstrate consistency, demonstrating improvements in students' critical thinking, academic performance, and engagement. There were no conflicting results; all active learning activities were significantly effective. These improvements were influenced by internal factors such as student knowledge and motivation, as well as external factors such as teacher skills, classroom atmosphere, and curriculum.

CONCLUSION

Based on the results of a literature review of various relevant studies, it can be concluded that active learning has a significant influence in improving the critical thinking skills of elementary school students. Various active learning models, such as Problem-Based Learning (PBL), Discovery Learning, inquiry, group discussions, and AI-based STEAM, have been proven to improve analytical skills, problem-solving, decision-making, and student engagement in the learning process. Research findings also show that the success of developing critical thinking skills is not only determined by the learning model used, but is also influenced by internal student factors, such as prior knowledge and learning motivation, as well as external factors including teacher competence, the learning environment, and curriculum support. Thus, active learning can be seen as an effective approach to building higher-order thinking skills while improving the quality of learning in elementary schools.

However, this study has limitations because it only used a literature review approach, so the results obtained depend on the quality, scope, and characteristics of the previous studies analyzed. Furthermore, most of the studies reviewed used different contexts and samples, so generalization of the results requires caution. Therefore, further research is recommended to conduct empirical studies with experimental or mixed-method designs at various school levels and characteristics to obtain more comprehensive evidence regarding the effectiveness of active

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learning on critical thinking skills. Practically, the results of this study provide implications for teachers to design student-centered learning, encourage discussion, collaboration, and real-world problem-solving, and optimally utilize learning technology so that students' critical thinking skills can develop sustainably and in line with the demands of 21st-century education.

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