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THE PARADOX OF ARTIFICIAL INTELLIGENCE IN LEARNING: THE EXISTENCE OF TECHNOLOGY AND THE CHALLENGES OF CRITICAL THINKING FOR HIGH SCHOOL STUDENTS

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Abstract:
This article examines the paradox of Artificial Intelligence (AI) in learning, focusing on the coexistence of technological advancement and the challenges it poses to students' critical thinking at the senior high school level. The study aims to critically analyze how AI is positioned in learning practices and how its use influences students' cognitive processes and critical thinking skills. This research employs a qualitative approach through a literature study (library research), analyzing books, scientific journals, and relevant scholarly publications that discuss AI in education, critical thinking, and contemporary pedagogy. The findings indicate that AI has become a dominant entity in students' learning practices, particularly in completing academic tasks. AI is widely perceived as an efficient and practical tool that provides instant answers and reduces cognitive effort. However, this convenience simultaneously contributes to a shift in learning orientation from knowledge construction to answer consumption. The study reveals a tendency toward cognitive offloading, reduced analytical engagement, and the weakening of epistemic processes such as evaluation, reflection, and argumentation. These conditions illustrate a pedagogical paradox: while AI holds potential as cognitive scaffolding, its unregulated use often substitutes students' reasoning rather than supporting it. The study concludes that the core challenge of AI in education lies not in the technology itself, but in the absence of reflective pedagogical design. Without clear instructional strategies and critical mediation by teachers, AI risks reinforcing instrumental rationality and surface learning. Therefore, this research underscores the need for pedagogical frameworks that position AI as a medium for critical dialogue, metacognitive reflection, and meaningful learning, ensuring its alignment with the fundamental goals of education.
Keywords: Artificial Intelligence, Critical Thinking, Pedagogy, Senior High School

1. Introduction

Education in the 21st century focuses on developing four core skills: critical thinking, creativity, collaboration, and communication. Critical thinking is considered a key foundation for meaningful and sustainable learning. Critical thinking cannot be reduced to simply finding the right answer. It involves the ability to analyze information, evaluate arguments, construct rational arguments, and make reflective and ethical decisions (Facione, 2015; Ennis, 2018; OECD, 2019). In this context, secondary schools play a strategic role as a transitional space for students to develop abstract thinking, develop scientific reasoning skills, and internalize academic values and ethics (Santrock, 2023).

However, the need to enhance critical thinking coincides with the widespread influence of artificial intelligence (AI) as a disruptive technology, fundamentally changing the learning ecosystem. AI not only impacts how students acquire information but also how they understand knowledge, complete assignments, and interpret the learning process itself (Luckin et al., 2016; Knox, 2020). In education, AI is often touted as an innovative solution, promising increased efficiency, personalized learning, and massive, instant access to knowledge (Holmes et al., 2022; UNESCO, 2023). In practice, artificial intelligence (AI) can indeed assist students in various academic activities, such as quickly answering questions, summarizing complex material, and providing immediate solutions to learning difficulties.

However, it is precisely at this point that the paradox of teaching begins to emerge. When AI is primarily used for outcome-oriented purposes, the cognitive processes that students should experience—such as analysis, synthesis, and reflection—are often weakened or even bypassed (Carr, 2020; Selwyn, 2023). Rather than enhancing critical thinking, AI can create cognitive dependency, reduce analytical depth, and undermine students' ability to reason independently. This paradox suggests that the primary

problem with artificial intelligence in learning lies not with the technology itself, but with its place in teaching practice. Critical thinking requires students to actively participate in intellectual processes such as asking questions, questioning, considering options, and constructing meaning, while artificial intelligence often provides immediate certainty and ready-made answers (Biesta, 2022).

In this context, the learning orientation has shifted from "learning to think" to "learning to replicate," and academic success depends on the speed and accuracy of results, rather than the quality of the thinking process. This situation becomes even more challenging in high school. At this stage, students must be guided to develop higher-order thinking skills (HOTS), cultivate independent thinking skills, and instill academic integrity and responsibility (Anderson & Krathwohl, 2017; Brookhart, 2018). Without adequate critical thinking and instructional support, the use of artificial intelligence can lead students to adopt a flash-in-the-pan learning pattern, hindering HOTS development and blurring the line between learning aids and thinking substitutes. In this scenario, technology ceases to be a tool for enhancing reasoning skills and can instead undermine the foundations of students' critical thinking.

On the other hand, there is a contradiction between curriculum requirements and actual learning practices. Curriculum standards emphasize the development of higher-order thinking skills (HOTS) and critical thinking; however, learning practices in schools are often oriented towards completing assignments and achieving grades, leaving little room for reflection, and monitoring of students' use of AI remains inadequate (Noddings, 2021; Biesta, 2022). In this context, AI is often used as a tool to complete academic assignments, rather than as a means to explore ideas, engage in academic dialogue, and foster critical awareness.

Based on the above description, most research on AI in education focuses on aspects such as effectiveness, efficiency, and technological innovation (Zawacki-Richter et al., 2019; Holmes et al., 2022). Research that deeply explores students' personal experiences, rethinks the concept of critical thinking in the AI era, and views AI as a pedagogical and philosophical phenomenon rather than simply a technical tool remains limited in scope (Knox, 2020; Selwyn, 2023; Williamson & Eynon, 2024). Therefore, this article aims to examine the paradox of artificial intelligence in learning by focusing on the presence of technology and the challenges it poses to critical thinking among high school students, so that the use of AI remains aligned with the fundamental goal of education, namely developing individuals who are reflective, critical, and responsible in their thinking.

2. Research Methods

This research employed a qualitative method with a literature study approach (library research). This method was chosen because the research aimed to explore in-depth theories, concepts, findings, and arguments from various relevant scientific sources related to the existence of AI technology and its relationship to the critical thinking processes of high school students. The literature study approach allows researchers to conduct a critical review of existing literature, compare various perspectives, and formulate a conceptual understanding of the phenomenon being studied (Furlong & Lester, 2023). Literature study is a data collection technique that involves reviewing books, scientific journals, articles, reports, and other relevant documents to answer the stated problem. This approach is particularly suitable for exploratory and conceptual research, as well as when primary data is difficult to obtain or when the research focus is more theoretical and reflective.

The steps of this research are carried out in 3 stages: 1) the initial stage, namely collecting the library sources to be studied. The contents of the library are divided into two types, namely primary sources and secondary sources. In this study, the library sources use secondary data sources, where the source of the material to be studied is data that has been processed by the researcher from various sources for additional information. Examples include books, journals, and other trusted websites. 2) reading the sources that have been collected. Reading the sources that have been collected aims to actively absorb information so that the results obtained can be maximized. In reading the sources, the author tries as much as possible to find research titles related to the ideas expressed, and 3) creating and processing research notes. At this stage, it can be said that the important stage and the peak of the research, because all the materials that have been read will be processed and analyzed to reach conclusions in the form of a report.

3. Results and Discussion

3.1. Artificial Intelligence as a Dominant Entity in Student Learning Practices

Research results show that Artificial Intelligence (AI) has assumed a dominant role in high school students' learning practices, particularly in the context of completing academic assignments. AI is no longer used in a limited or situational manner, but has become part of students' learning routines. In various assignments, particularly written assignments, short analyses, and material summaries, AI serves

as an initial or even primary reference in the work process. AI use tends to increase in certain situations, such as when assignments are individualized, the timeframe is relatively short, and the grades are high.

Under these conditions, students view AI as the most rational and efficient option. AI is positioned as a "quick aid" that allows students to obtain answers or answer structures without having to independently search and process information. Furthermore, AI is also perceived as a "safe path" that can minimize the risk of errors in completing assignments. Thus, this indicates that AI functions not only as a learning support tool but has transformed into an entity that influences how students make academic decisions. This dependency indicates a shift in learning patterns, where learning success is no longer measured by the process of understanding and constructing knowledge, but rather by the ability to effectively complete assignments according to school requirements.

3.2. The Meaning of Ease: Students' Perceptions of AI Efficiency and Practicality

This study found that students' perceptions of AI were heavily influenced by the concepts of ease and efficiency. AI is perceived as being able to help students understand course material at an early stage, especially when they experience confusion or difficulty grasping concepts presented in class. With the help of AI, students feel they can quickly gain an overview of the material without having to read lengthy or complex sources. In addition to aiding initial understanding, AI is also perceived as being able to boost students' academic confidence.

When students receive answers or explanations from AI, they feel better prepared to complete assignments and face assessments. In this sense, AI serves as a psychological buffer, providing a sense of security in the face of academic demands. The speed of AI responses and ease of access are key factors that reinforce this perception. Compared with conventional learning resources, such as textbooks or direct interaction with teachers, AI is perceived as more practical and flexible. AI can be accessed anytime, without time constraints and without social pressures, such as the fear of making mistakes or being reluctant to ask questions in class. This perception fosters a pragmatic learning pattern, where speed of obtaining answers and ease of completing assignments are key indicators of student learning effectiveness.

3.3. Shifts in Students' Cognitive Patterns in Completing Tasks

The research revealed a shift in students' cognitive patterns in completing academic assignments with the help of AI. Most students tended to accept AI-generated answers directly without further verification or evaluation. AI answers were treated as a valid, neutral, and trustworthy source, rarely questioning their veracity or depth. In practice, students' thinking processes tended to be minimally analytical and poorly explored for alternative answers. Students rarely asked follow-up questions or attempted to develop arguments based on their own understanding.

Students' primary focus is on the final product, the answer or assignment text, ready to be submitted, rather than the underlying thought processes. Reflective activities, such as linking answers to previous learning experiences or evaluating their relevance to the context of the problem, are rarely undertaken independently. Reflection only emerges when teachers explicitly ask students to explain the reasoning or thought processes behind their answers. These findings suggest that the use of AI tends to simplify students' cognitive processes and shift the learning orientation from the thinking process to the end result.

3.4. Students' Critical Thinking Awareness as a Practice

This study found that students have a conceptual understanding of the importance of critical thinking in learning. Critical thinking is defined as the ability to think more deeply, not accept answers at face value, and consider the reasons behind an answer. This understanding indicates that students are normatively aware of the value of critical thinking in the learning process. However, this awareness is not always translated into practical use of AI. In many situations, the need to complete tasks quickly and efficiently outweighs the urge to think critically. Students often find themselves in a dilemma between the desire to think independently and the lure of the convenience offered by AI. This dilemma often leads to critical thinking being understood as an ideal rather than a consistent cognitive habit. This suggests a gap between normative understanding and students' actual practice in using AI. Critical thinking has not been internalized as part of the daily learning process, especially when students are faced with time pressures and academic demands.

3.5. Pedagogical Void in Management*Artificial Intelligence*

The research findings indicate a pedagogical vacuum in managing the use of AI in schools. Teachers generally lack clear and explicit rules regarding the use of AI in learning. Furthermore, pedagogical strategies that consciously utilize AI as a tool to train students' critical thinking and reflection are still very limited. AI is rarely discussed openly in class as part of the learning process. Its use often occurs individually without adequate pedagogical support. AI is not utilized as a medium for discussion, a tool for evaluating arguments, or a means for collective reflection. As a result, AI use develops freely without a clear conceptual framework. This pedagogical vacuum indicates that technological

development is outpacing schools' readiness to manage it educationally. The main challenge lies not in the presence of AI, but in the absence of pedagogical design capable of directing AI use to align with learning objectives and the development of students' critical thinking.

4. Discussion

4.1 Artificial Intelligence and Instrumental Rationality in Contemporary Education

The findings of this study indicate that high school students' use of Artificial Intelligence (AI) is primarily driven by efficiency, speed, and completion of academic tasks. AI is positioned as an instrumental means to achieve pragmatic goals, namely obtaining answers, completing assignments, and meeting assessment requirements. This pattern reflects the strengthening of instrumental rationality in contemporary educational practices, where the value of learning is reduced to the final result (output), while critical and reflective thinking processes lose their space for actualization. Several recent empirical studies demonstrate a similar trend. Research by Kasneci et al. (2023) and Zhai et al. (2024) confirms that the use of generative AI in education often encourages students to focus on cognitive efficiency, rather than on concept elaboration.

In this context, AI is no longer simply a learning tool, but rather a symbol of a shift in epistemic orientation: from learning as a process of knowledge construction to learning as an activity of instant information consumption. The results of this study also align with the findings of Huang and Chen (2022), who showed that intelligent technology in learning has the potential to reinforce surface learning approaches if not accompanied by pedagogical designs that encourage high-level cognitive engagement. Thus, AI functions as an accelerator of instrumental rationality, speeding up the academic process, but at the same time risks dwarfing the reflective dimension of learning. In this perspective, AI is not simply a technological innovation, but an agent of transformation in learning culture. When the orientation of learning shifts to speed and results, critical thinking is no longer understood as an essential epistemic practice, but rather as an additional burden that can be negotiated or even avoided.

4.2 The Pedagogical Paradox of AI: Between Cognitive Scaffolding and Reason Substitution

Theoretically, AI holds great potential as a cognitive scaffolding that supports students' thinking development. Numerous studies have shown that AI can function as a facilitator of adaptive learning, a provider of formative feedback, and a catalyst for cognitive dialogue that encourages analysis and reflection (Luckin et al., 2022; Holmes et al., 2023). Within this framework, AI should serve as a support for the thinking process, not a substitute for human reasoning. However, the results of this study indicate that this potential has not been realized in high school students' learning practices. Instead, AI is often used as a substitute for reasoning, where the processes of analysis, evaluation, and synthesis of knowledge are replaced by instant answers generated by technology. This finding emphasizes the pedagogical paradox of AI: on the one hand, AI promises to strengthen higher-order thinking, but on the other, its practical use actually undermines this function.

Khalil and Er's (2024) research revealed that without clear pedagogical intervention, AI tends to be treated as an "epistemic authority" by students. The answers generated by AI are accepted as final truths, rather than as material for dialogue or reflection. A similar finding was found by Smutny and Schreiberova (2023), who stated that the use of generative AI without pedagogical guidance can shift students' roles from knowledge constructors to knowledge consumers. This paradox suggests that the primary problem lies not with AI itself, but rather with the absence of a pedagogical design that positions AI as a medium for cognitive dialogue. Without such a framework, AI transforms from a thinking support tool into a substitute for thinking activity.

4.3 Reduction of Epistemic Processes in Students' Critical Thinking

Critical thinking is essentially an epistemic process involving the activity of constructing, testing, verifying, and reflecting on knowledge. This process requires students to actively engage in questioning assumptions, evaluating arguments, and linking information to a broader context. However, the findings of this study indicate a significant reduction in this epistemic process. Most students tended to accept AI answers immediately without conducting verification, further analysis, or critical reflection. This pattern indicates a shift in learning from a process of searching for meaning to an activity of consuming instant answers.

Research by Wang et al. (2023) and Dwivedi et al. (2023) confirms that the use of unstructured generative AI has the potential to reduce the quality of students' cognitive engagement, particularly in the evaluative and reflective dimensions of critical thinking. In the context of educational epistemology, this reduction has serious implications. Knowledge is no longer treated as something to be understood and questioned, but rather as a ready-to-use product. This finding aligns with a study by Yang et al. (2024) which found that reliance on AI for completing analytical tasks correlated with a decline in students' argumentation and critical reasoning skills. Thus, AI not only influences what students learn but also how

knowledge is constructed. This reduction in epistemic processes is an important indicator that the use of AI without pedagogical reflection can change the nature of learning itself.

4.4 Cognitive Offloading and the Risk of Cognitive Dependence on High School Students

The phenomenon of cognitive offloading provides a relevant conceptual framework for understanding students' reliance on AI. Cognitive offloading refers to an individual's tendency to delegate the burden of thinking to external tools to reduce cognitive effort. Several recent studies have shown that generative AI reinforces cognitive offloading practices due to its ability to provide quick and comprehensive answers (Risko and Gilbert, 2021; Barr et al., 2023). In the context of high school students, this finding is crucial. High school is a crucial phase in the development of abstract, reflective, and metacognitive reasoning.

When students consistently delegate their thinking activities to AI, there is a risk of hindering the internalization of critical thinking skills. Gerlich's (2023) study showed that increasing intensity of AI use is directly proportional to a decline in critical thinking skills as measured by formal cognitive instruments. This dependence is not merely technical, but rather shapes students' thinking habits. AI becomes the primary reference point for cognitive decision-making, while confidence in their ability to think independently weakens. In the long term, this situation has the potential to produce a generation of learners who are technically efficient but epistemically fragile.

Based on the above description, it can be said that there is a crisis of reflective pedagogy in the management of AI in schools. Teachers lack explicit rules, pedagogical strategies, or a clear evaluative framework regarding the use of AI in learning. As a result, AI operates in a pedagogical space devoid of values and reflection. Research by Howard et al. (2022) and Ng et al. (2023) confirms that the successful integration of AI in education depends heavily on teachers' pedagogical capacity, not solely on technological sophistication. Without reflective pedagogy, AI reinforces mechanistic and instrumental learning practices. In this context, the role of teachers needs to be reconstructed from merely supervising the use of AI to becoming architects of reflective learning. Teachers are required to be able to orchestrate AI as a medium for critical dialogue, a catalyst for questioning, and a means of metacognitive reflection. Without this shift in role, AI has the potential to deepen the pedagogical crisis characterized by the loss of space for critical thinking in learning.

5. Conclusion

This article explains that the use of artificial intelligence (AI) in high school education creates a complex pedagogical paradigm. On the one hand, AI provides ease of use, efficiency, and rapid access to information that have the potential to enhance student learning. However, in another context, the use of AI that focuses on results and speed risks reducing the critical, reflective, and epistemic processes that are the goals of education. The findings of this study confirm that AI has transformed from a mere learning tool into a dominant entity that influences how students make academic decisions, interpret learning, and complete assignments. The use of AI that is not based on reflective pedagogical design encourages the development of a learning orientation from a process of building knowledge to consuming instant answers.

This phenomenon is explained by the analysis, evaluation, and reflection activities, as well as the practice of cognitive discarding among students. Consequently, critical thinking is more often understood as a normative approach rather than being used as a cognitive bias in everyday learning. This situation suggests that the primary use of AI in education does not depend on its technological advancement, but rather on how the technology is implemented in pedagogical practice. Thus, the use of AI in education must be understood as a pedagogical and philosophical issue, not merely a technical one. Without critical and reflective teaching methods, AI has the potential to undermine students' critical thinking. Furthermore, with the right pedagogical application, AI can be used productively to support critical, analytical, and mindful learning, in line with the primary goal of education to create reflective and intelligent individuals.

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