

Peer Review

# Review of: "Metacognition and Pedagogy in the Era of Artificial Intelligence"

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There are some comments for this paper, such as:

1. The paper would benefit from a more explicit theoretical framework linking metacognition, pedagogy, and AI. While the connections are implied, a dedicated section outlining the theoretical underpinnings would strengthen the argument.
2. The discussion on metacognitive practices in the classroom (Section VI) lacks empirical evidence. Including case studies or quantitative data would bolster the claims made about the effectiveness of these practices.
3. The paper briefly mentions the metacognitive limitations of AI (Section IV), but this could be expanded. A deeper exploration of why AI currently lacks true metacognition would add nuance to the discussion.
4. A comparative analysis between traditional pedagogy and metacognitive approaches, highlighting measurable outcomes (e.g., student performance, engagement), would provide a stronger justification for the proposed shift.
5. The paper assumes a universal applicability of metacognitive pedagogy. Discussing how cultural differences might influence the adoption and effectiveness of these strategies would make the argument more inclusive.
6. The role of teacher training in implementing metacognitive practices is underemphasized. How can educators be prepared to foster metacognition, especially in under-resourced settings?
7. The discussion on DeepSeek (Section V) is intriguing but speculative. More concrete examples or evidence of its metacognitive capabilities would strengthen this section.
8. The paper could explore interdisciplinary links, such as cognitive psychology or neuroscience, to ground the discussion of metacognition in broader scientific research.

9. Terms like "metacognitive predicates" and "technological singularities" are used without clear definitions, which might confuse readers. A glossary or explanatory footnotes would be helpful.
10. The paper does not address potential biases in AI systems (e.g., in learning analytics) and how these might affect metacognitive development. This is a critical oversight.
11. The feasibility of scaling metacognitive practices across diverse educational systems (e.g., large public schools vs. small private institutions) is not discussed. Practical challenges should be acknowledged.
12. The paper does not consider how metacognitive strategies might need to be adapted for students with learning disabilities or neurodiverse conditions.
13. The paper could address how educational policymakers might integrate metacognitive approaches into curricula, including potential barriers and incentives.
14. The role of technology in enabling metacognition is emphasized, but the risks of technological dependency (e.g., reduced human interaction) are not explored.
15. The manuscript references relevant and recent studies but would benefit from citing additional work; cite some related recent references, such as the following references:

- <https://doi.org/10.30958/aje.12-1-3>
- <https://doi.org/10.52866/2788-7421.1231>
- <https://doi.org/10.31893/multirev.2025263>
- Performance Assessment of the Calculus Students by Using Scoring Rubrics in Composition and Inverse Function, *Applied Mathematics and Information Sciences*, 18(5), 1037-1049 (2024).
- The Mediating Role of Learning Management System Use in Enhancing System Effectiveness, *WSEAS Transactions on Business and Economics*, 21, 2067-2078 (2024).
- Internet of Things (IoT) in Education: Teachers' Perspectives, Practices and Challenges. *WSEAS Transactions on Computer Research*, 12, 429-442 (2024).
- Artificial Intelligence in Education: Mathematics Teachers' Perspectives, Practices and Challenges. *Iraqi Journal For Computer Science and Mathematics*, 5(1), 60-77 (2024).

The paper demonstrates significant potential, but incorporating the above suggestions would enhance its impact and clarity for academic and applied researchers. So, I recommend this paper for **(Major Revision)**.

## **Declarations**

**Potential competing interests:** No potential competing interests to declare.