Learning with AI: Losing critical thinking at the worst time

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Nancy Butler Songer argues that learning with artificial intelligence is contributing to the erosion of critical thinking skills at a time when it is most needed

Today, many K-12 school districts and universities are widely adopting artificial intelligence (AI) tools, with implementation as early as elementary school and across all grade levels, curricular topics, and university majors. The argument, such as that for prospective applicants to the Applied Generative AI Certificate at Johns Hopkins University in partnership with Great Learning (Johns Hopkins University, 2025), focuses on preparing students to “harness the power of generative AI” for the present and future workforce amid rapid change.

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The role of AI in education

There is no doubt that we need curricula, courses, and certificate programs to help learners navigate AI and prepare for the present and future workforce. Such educational programs need to both teach with AI, e.g., guide learners in using AI as a tool for instructor support, student learning, or school management, as well as teach about AI, e.g., help learners to understand how AI works, including studying foundational concepts from computer science, data science, social studies, the natural sciences, and mathematics (Grover, 2025).

However, universities and K-12 organizations are racing toward the widespread integration of AI, before we have many research studies to articulate how, when, and why to incorporate AI into learning environments. It is also unclear whether we share a common understanding of the knowledge and skills learners need to navigate learning with and about AI successfully. For example, have we systematically addressed the question, What skills and knowledge do learners need to thrive in an AI-infused world?

Optimizing students' reading comprehension research

In the 1990s, I was part of a research team that studied how to optimize students' reading comprehension. Our research found that when readers had prior knowledge of the topic, they learned more from intentionally less coherent passages than from fully coherent ones. Our data

analysis revealed that more incoherent text prompted readers to do more cognitive work to “fill in the gaps” as they read, thereby engaging more deeply with the material and resulting in stronger reading comprehension scores (McNamara, Kintsch, Songer & Kintsch, 1996).

Interestingly, a recent research team from MIT studying learning with ChatGPT came to very similar conclusions. Students were divided into three groups to create a series of short essays over four months. The three conditions were: ChatGPT-assisted, Google Search-assisted, and no technology (brain only). The researchers measured brain activity using EEG and evaluated the quality of the essays generated by each group. Results demonstrated that learners in the no-technology condition showed the highest level of brain activity and the highest-quality essays.

On balance, those in the ChatGPT condition demonstrated the lowest level of brain activity and produced vague, poorly reasoned essays that often included passages that were cut and pasted by students rather than newly constructed (Kosmyna et al., 2025). Similar to our research studies from the 1990s, the ChatGPT learners were not as cognitively engaged with the material and therefore performed poorly on both brain activity and essay quality evaluations. To quote the MIT researchers, “Over four months, LLM [Large Language Models] users consistently underperformed at neural, linguistic, and behavioral levels. (Kosmyna et al., 2025).

These research results encourage a return to our earlier question: What skills and knowledge do learners need to thrive in an AI-infused world? Based on what we know so far, we might suggest that to survive and thrive in an AI-infused world, learners need at least the essential abilities to: ask great questions, think flexibly, apply creative thinking, evaluate material for ethical and appropriate use, and construct multiple solutions to problems.

Research indicates that problem-solving skills are underdeveloped in the majority of K-12 programs and that many complex problems also require expertise across multiple, interconnected disciplines (e.g., interdisciplinary). In addition, education research indicates that fostering problem-solving and flexible thinking takes much more time, practice, and repeated exposure than is common in many educational programs (e.g., Songer, Kelcey, Gotwals, 2009).

Collectively, then, if we accept that we are not fostering enough critical and flexible thinking in our current K-12 and university educational systems, why are we promoting the widespread use of AI tools, such as ChatGPT, that, at least based on currently available evidence, encourage learners to do even less critical thinking than before?

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Advances in AI and learning: Conclusions

New advances in AI and learning present a more complex and dynamic landscape than this article represents. In other words, we recognize the many promising research studies focused on using AI tools that are mediated by human activity, including those that improve formative assessment, tailor lessons or activities to individual learner or teacher needs, and make curricular programs more culturally responsive. On balance, we cannot emphasize enough the necessity of building on past studies to conduct increasingly rigorous research to guide the careful development of AI programs informed by research.

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