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eBRIEF
RESEARCH SUMMARY FOR PRINCIPALS

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"Your brain on ChatGPT": What we really know so far

Key insights from recent research:

- A significant number of **studies and media reports** have suggested that the use of AI in education can have **outcomes ranging from being a highly effective learning aid to a source of cognitive damage for students.**
- **Research from MIT breaks this down to show more accurately that there are some cognitive risks** associated with the use of AI in essay writing.
- **When used appropriately, AI can support better performance and efficiency, but to achieve positive effects and prepare students for the future, educators must teach key critical thinking skills when integrating AI.**

Significant media coverage over recent months has claimed that student use of AI can have a negative impact on brain and cognitive development, especially when working on tasks involving essay writing. But what do we really know about the studies behind these claims? Researchers from the Massachusetts Institute of Technology have undertaken research that shows while there are risks to using AI for tasks such as essay writing, it comes down to how students are taught to use these tools. AI can be a powerful tool for students, and one that isn't going to disappear. With educators being encouraged to incorporate AI into many aspects of schooling, it is essential that principals and school leaders have access to this latest research in order to implement best practice approaches based on accurate studies.

Over a period of four months, MIT researchers worked with 54 students who were asked to write essays on particular topics. They were separated into three groups known as the "brain-only group" (who did not use any AI or similar tools), the "search engine group" (who used a search engine to assist in their work) and the "LLM (Large Language Model) group" (who used AI platforms such as ChatGPT). The researchers then assessed how students' brain activity functioned while undertaking these tasks, in combination with feedback provided by an AI judge and real, human teachers. What they found is important: There is a cognitive and practical impact of AI on learning environments. Understanding this impact will help schools make decisions on how to use these tools in the classroom.

One of the main outcomes identified by researchers was the impact on student essays. There was a significant difference in essay responses for students who didn't use any AI tools and those

who used tools like ChatGPT – and the human teachers who provided feedback were much more aware of identifying and navigating these nuances when providing feedback compared to the AI judge. Students who didn't use AI tools showed greater variation in how they approached the essay questions. The AI group produced essays with much less deviation in their responses. The "search engine group" were partially influenced by advertised content as well as search engine optimisation, which impacted what content students saw in response to their searches. This group did have more individual influences in their responses, although this was not as strong as the students from the "brain-only" group.

The other key aspect of these research findings was *how* students use these tools. The researchers found that students who used search engines and AI were more likely to focus on the output given by the tools, including spending time copying and pasting content into their essays rather than incorporating their own thoughts and experiences into their responses. Students who used AI were less likely than the others to be able to quote content from their essays. There was also an impact on students' thoughts around ownership of their work, with nearly all students who did *not* use AI claiming full ownership of their work. Yet responses about ownership were highly conflicted among students who used AI, with some explicitly denying ownership, and some only claiming partial credit.

The implications are significant. The researchers are open that there must be careful attention directed to neurocognitive development. This is not to say that AI tools will be detrimental to student brain and cognitive development – especially if used appropriately. However, the project has shown that students developed their essays differently based on which tools they used. There was also an associated cognitive impact when researchers studied student brain activity. As the MIT team suggests, this means there is an important consideration of the "potential trade-offs between external support and internal synthesis".

Students who did not use search engines or AI tools had stronger memory skills, greater semantic accuracy when recalling work, a stronger identity with their learning output, and deeper learning outcomes. This occurred even with students being under a higher cognitive load. Students who used AI tools benefitted from the efficiency of the tool, but had weaker memory, reduced self-monitoring and fragmented responses to authorship. The implications of this for educators is that AI tools can provide valuable support for performance, but there can be an unintentional impact on deep cognitive processes, memory/retention, and a loss of genuine and authentic engagement with written material. If students rely heavily on AI tools, they may develop a superficial fluency, but they may not internalise the knowledge they are using or feel a sense of ownership over their work.

The MIT team refer to this as a "technological crossroads" with "unprecedented opportunities for enhancing learning and information access", and say that longer-term studies are needed to better understand this in more depth. They also openly say we need to consider the impact of these tools on "cognitive development, critical thinking, and intellectual independence". AI certainly helps students answer questions faster, but this does come at a cognitive cost, including the potential lack of ability to critically evaluate the outputs from AI.

For educators, this comes back to helping students learn how to *effectively* use these tools in conjunction with other skill sets. But how can we help students understand this amidst the

overwhelming presence of AI? Brian Stone, an Associate Professor of Cognitive Psychology from Boise State University, suggests this analogy: Skill comes from effort, and the brain is like a muscle. If we don't challenge the muscle, it won't grow. If you went to the gym with a robot that lifted weights for you, your muscles won't grow and eventually you could become reliant on the robot for even simple tasks. Stone suggests that based on current studies, AI is the same. Used well, it can be an amazing and effective tool that can benefit students. Used poorly, or with over-reliance, it can have a negative effect on learning and memory. But AI can help students, with benefits ranging from keeping on track with tasks to being an individualised tutor.

Moving forward in this field does include a need for researchers to develop further knowledge on AI – just as happened with the advent of smart phones and the internet. The MIT team is correct that a more nuanced understanding of this technology will be required. Ultimately, students will need to develop their cognitive skills, regardless of whether or not they use AI. This can be supported by teaching responsible and effective use of AI tools, understanding their risks and benefits, and helping students understand how to make the most of these tools while still developing other cognitive skills.

References

Kosmyna, N., Hauptmann, E., Yuan, Y. T., Situ, J., Liao, X., Beresnitzky, A. V., Braunstein, I., & Maes, P. (2025). *Your brain on ChatGPT: Accumulation of cognitive debt when using an AI assistant for essay writing task.* ArXiv. https://doi.org/10.48550/arXiv.2506.08872.

Stone, B. W. (2025, September 10). *How does AI affect how we learn? A cognitive psychologist explains why you learn when the work is hard*. The Conversation. https://theconversation.com/how-does-ai-affect-how-we-learn-a-cognitive-psychologist-explains-why-you-learn-when-the-work-is-hard-262863.