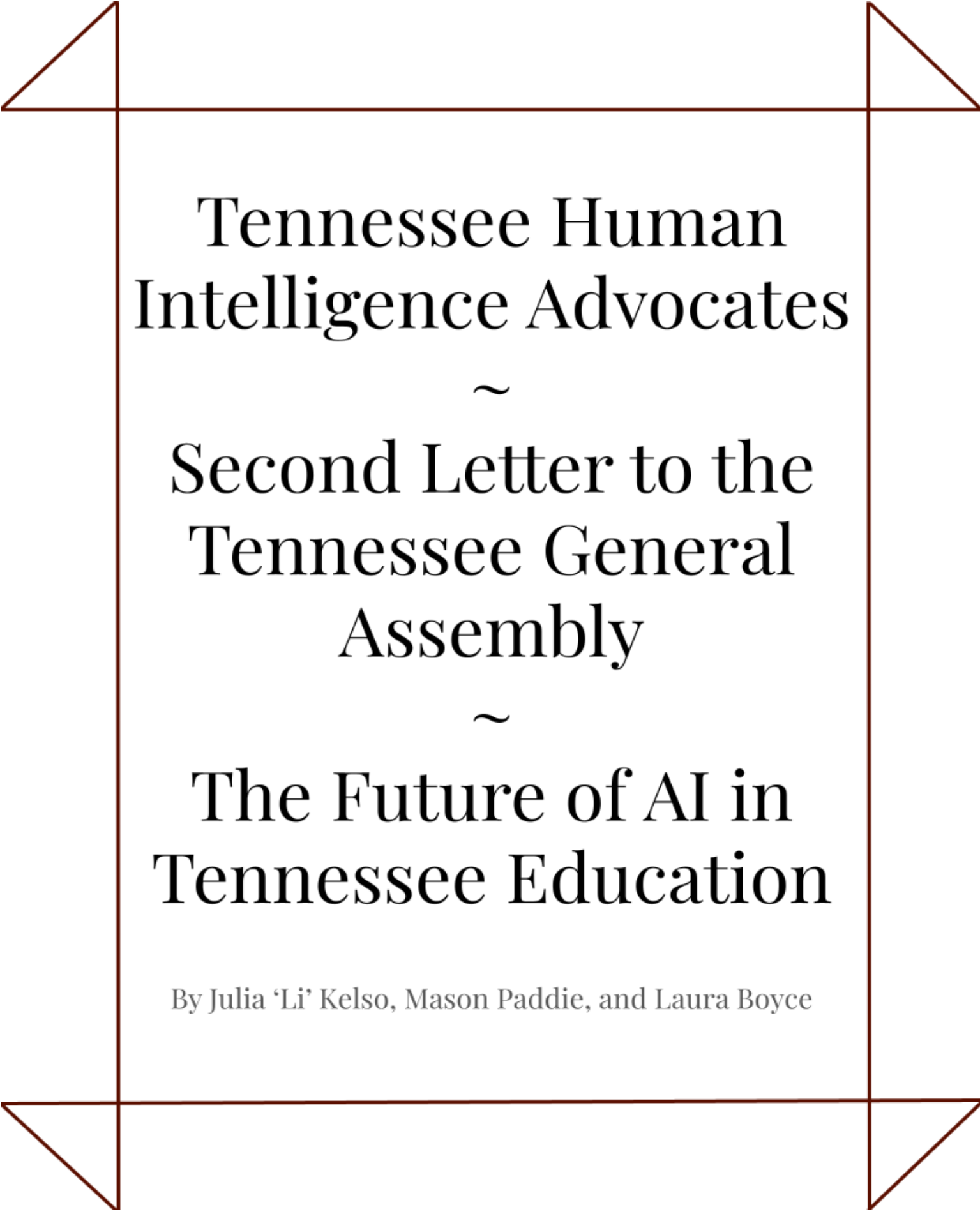




Tennessee Human
Intelligence Advocates

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Second Letter to the
Tennessee General
Assembly

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The Future of AI in
Tennessee Education

By Julia 'Li' Kelso, Mason Paddie, and Laura Boyce

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Introduction

With our review of the currently available research nearly complete, and the Legislative Session drawing to a close, we have determined to present our findings here, summarizing the most compelling studies on the subject. Though AI technologies appear in some studies to show short-term advantages in things like engagement, the best information we have on long-term cognitive pathway development, crucial in the growing minds of children, reveals staggering risk. For this reason we urge caution and pre-emptive action to prevent overuse of these technologies before the effects compound beyond control.

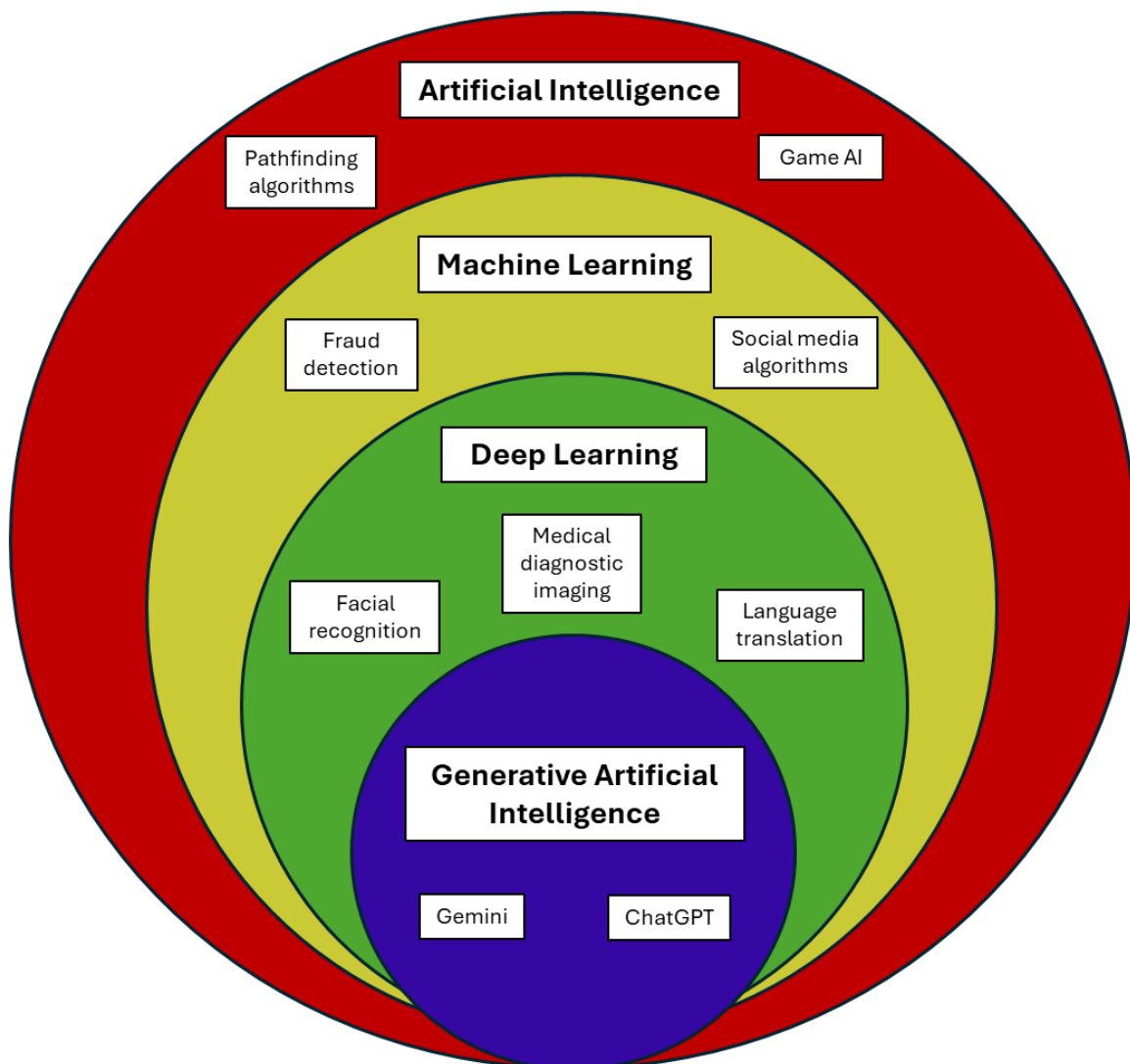
For too long, integration of experimental technology into school environments has been rushed and haphazard. Only in the last few years have verdicts consolidated that use of screens like phones and laptops inside and outside of school is deleterious to learning. This body has led the charge in correcting such hasty policy with HB-0932/SB-0897 limiting cell-phone use in schools. Today we ask it to go further and prevent the loss of foundational cognitive skills among the next generation. Integration with those technologies of unimpeachable benefit should take place once their positive utility is verified beyond reasonable doubt.

To enable the Legislator a more direct review of the available evidence, this letter will begin with an introduction to the technology and devote a page in summary of each of the most important studies herein presented.

What is Generative AI?

Any technology that is designed to mimic human behavior is artificial intelligence. The first artificial intelligence machinery dates back to 1950 where Claude and Betty Shannon designed a robotic mouse that could find its way through a maze [1]. The robotic mouse can trial and error its way through a maze, but it is unable to make predictions. The mouse could not, for example, reliably find its way around moving objects.

Machine learning is a subset of AI that is able to use current data to make predictions about future data. Deep learning is a more specific form of machine learning that uses neural networks to make predictions. This is more advanced and computationally heavy, but these technologies could enable the maze-running mouse to predict the future location of a moving object and navigate the maze without being hit. Lastly, generative artificial intelligence is a subset of AI that uses training data to create new content based on prompted information. Though, this new content is limited to what is available in its training data. The figure below gives a visual understanding of how these different technologies are related.

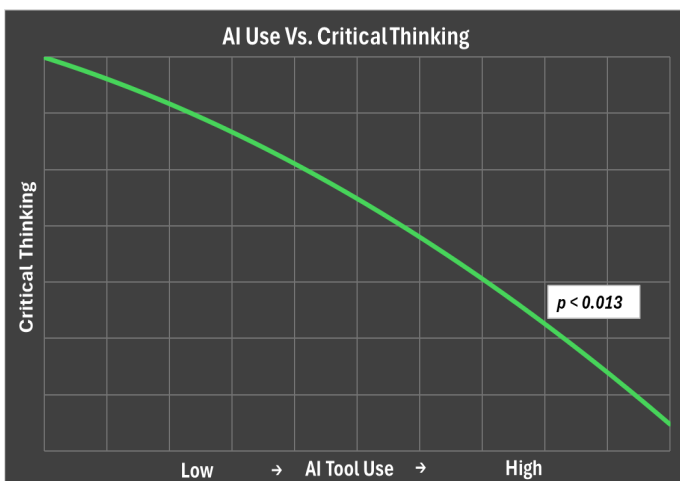
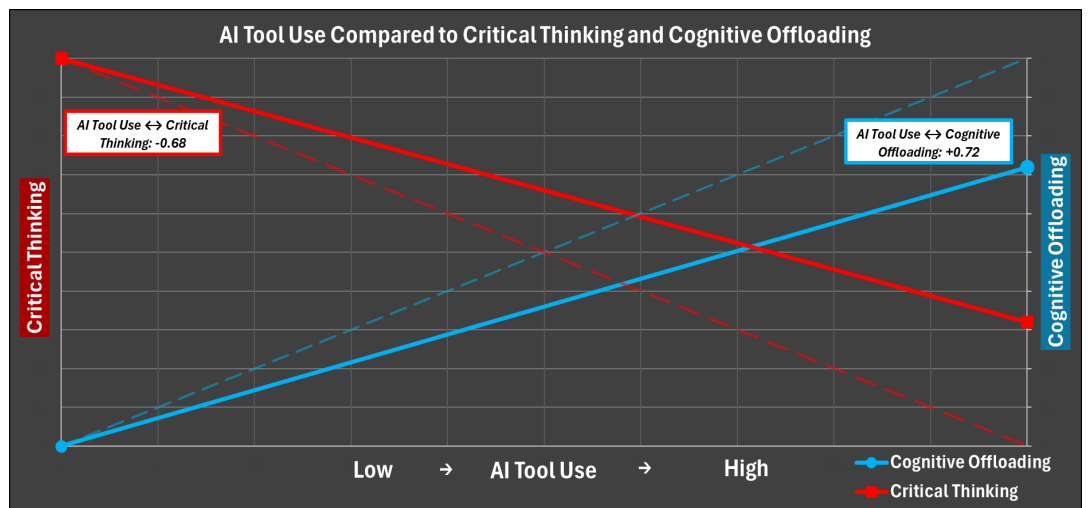


AI Tools in Society: Impacts on Cognitive Offloading and the Future of Critical Thinking

by M. Gerlich

This study split 3 groups by age, with an older group (45+), a middle group, and younger group that included teenage adolescents (<25). The goal of this study was to test the effect of GenAI usage and cognitive offloading on demographic factors such as age and education. This study showed a connection where younger people are more likely to have their critical thinking ability hindered by cognitive offloading, such as usage of GenAI. The relationships with AI use are shown below, and this is considered a moderately strong relationship in statistical analysis. The axes are unitless since this only represents a trend.

This study also did a deeper analysis correlating GenAI tool use with critical thinking. With this, a negative quadratic relationship developed. This tells us that a little bit of GenAI use may not lead to a large decrease in critical thinking, but as GenAI use increases, critical thinking decreases more rapidly.



The same study showed that younger populations are more likely to have less deep thinking with GenAI use, so younger populations are more likely to experience this rapid decrease. This is shown in the figure to the right. Likewise, the axes are unitless since this represents a trend and not absolute values.

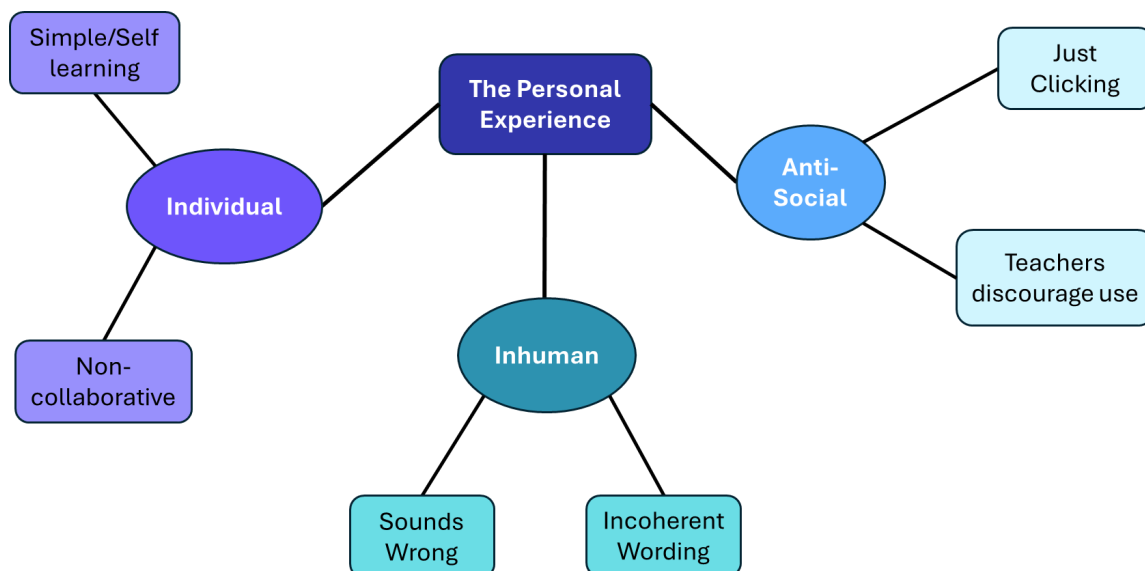
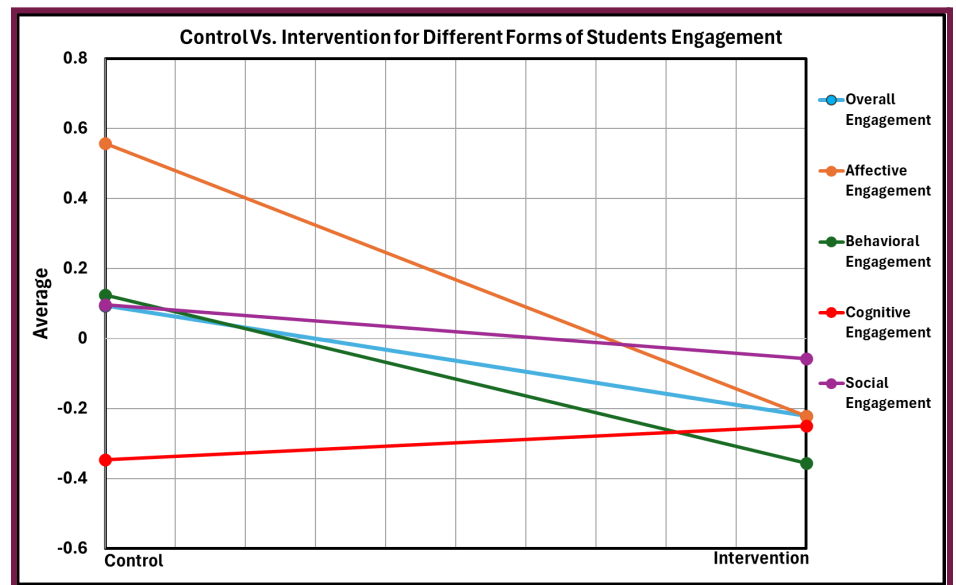
The Effect of Generative AI Chatbots on High-School Student Engagement: A Mixed Methods Approach

by C. Kline

This study uses a sample of 52 students from a Virginia high school to measure the effects of chatbot usage on multiple metrics of student engagement. Half of the students were given directions to use a chatbot for assistance with a writing assignment, and the other half did not use chatbot assistance. The results were measured 1) quantitatively, in terms of the measurable effects on student engagement, and 2) qualitatively, with student interviews illustrating their conceptual associations to use of the chatbots.

The quantitative figure shows the statistically significant decline in Overall, Affective, and Behavioral engagement. The changes in Cognitive and Social engagement are not statistically significant.

This figure demonstrates the students' associations with AI use. Notable are the uncanny sound of the writing and social isolation.

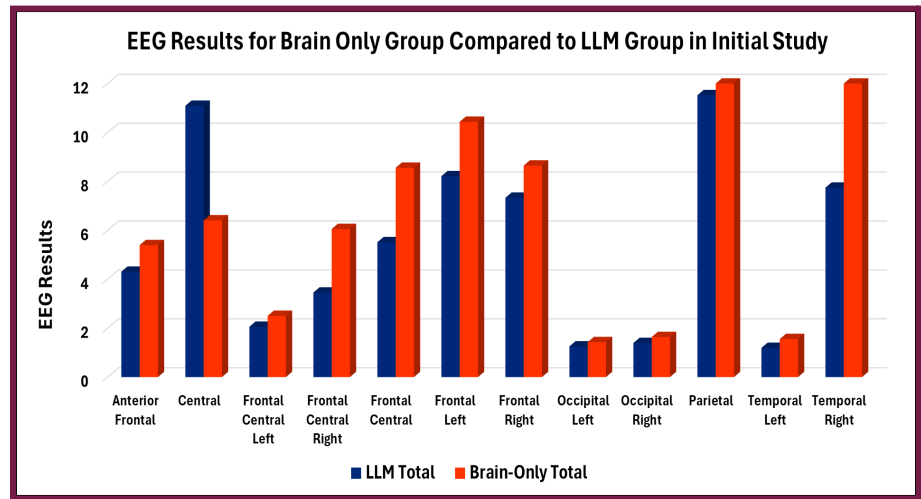


Your Brain on ChatGPT: Accumulation of Cognitive Debt when Using an AI Assistant for Essay Writing Task

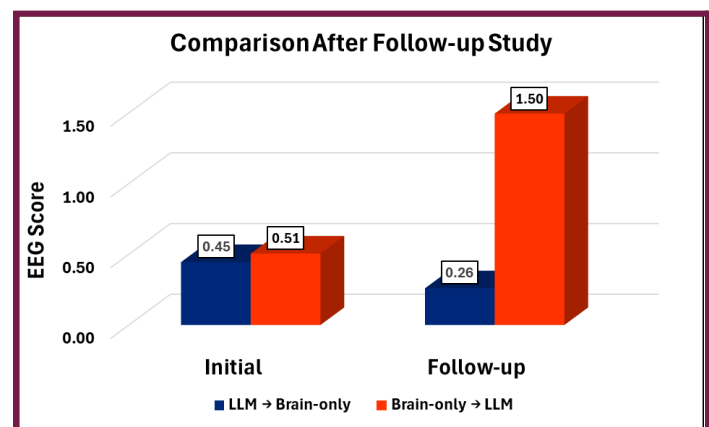
by N. Kosmyna, E. Hauptmann, Y. T. Yuan, and J. Situ

A recent study out of MIT used electroencephalogram (EEG) to measure the amount of brain activity for users doing different tasks. This is the only study discussed without any adolescent participants, but the results are significant and empirical enough to make note of.

The 3 different study groups in this study were tasked with writing an essay utilizing either no technology (brain-only), search engines, or an LLM. Outcomes in the initial study suggested that LLM's certainly assisted with writing grammatically correct and lengthy essays, though the users in the LLM group sometimes struggled to identify quotes in their own essays. Even still, as seen in the figure to the right, the brain-only group showed higher levels of cognitive activity.



In a follow-up to the initial study the brain-only and LLM group swapped. The original brain-only group was now allowed to use an LLM when writing, and the original LLM group was now required to use no technology when writing their essay. In this scenario, the original brain-only group still showed high levels of brain activity even when using the LLM to write. In the original LLM group, there was less brain activity in the initial study, and this brain activity actually decreased when the LLM was removed in the follow-up study.



As it relates to adolescent education, this shows the importance of ensuring students learn critical thinking skills prior to using technologies to offload these tasks in the interest of saving time. An expert can offload tasks to technology or an assistant without losing their understanding of the industry. However, a novice must first learn the industry, or they will lack the knowledge to think about their work. Adolescents should learn to think critically before they utilize technology to offload those critical thinking skills. A similar study on the extended use of genAI is shown in *AI Assistance Reduces Persistence and Hurts Independent Performance*. This study utilizes math tests instead of essay writing and similarly shows some short-term benefits and a long-term lack of cognitive engagement for participants who use genAI.

Young people's use of generative AI to support literacy in 2025

by I. Picton, C. Clark, and F. Bonafede

A large survey by the National Literacy Trust in the UK assessed the usage and attitudes around AI chatbots among a sample of over 50,000 UK secondary school students. The massive sample size permits a great deal of confidence in the results. Although taken from a different locale, British students will have similar access to AI tools to their American counterparts.

Figure 2: Frequency of use of generative AI for young people aged 13 to 18 in 2024 and 2025

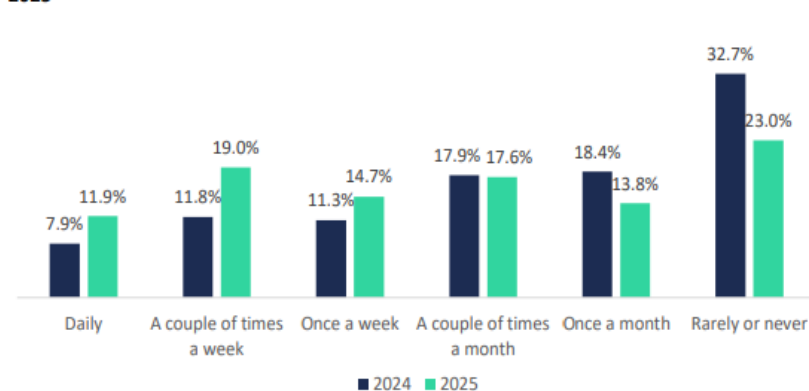


Figure 2 depicts the overall rise in use of GenAI among secondary students, a staggering change for a single year. Frequency of use is intensifying over time.

Figure 11 shows that 25.1% of users self-report copying AI answers to complete their homework without checking it, up from 20.9% in 2024, again a change of startling rapidity.

Figure 11: Young people aged 13 to 18's attitudes and behaviours around using generative AI in 2024 and 2025

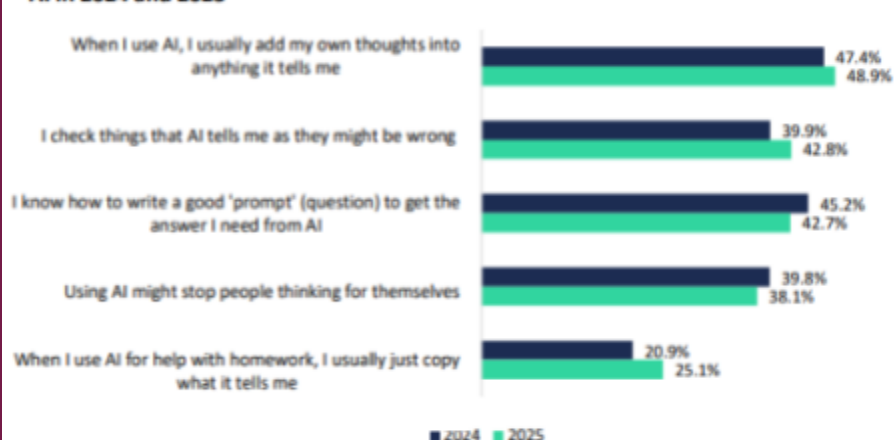


Figure 12: Young people aged 13 to 18's attitudes to using generative AI in 2025

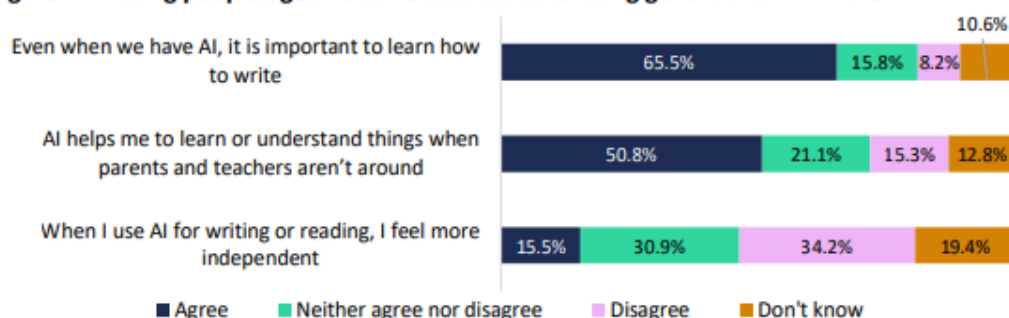
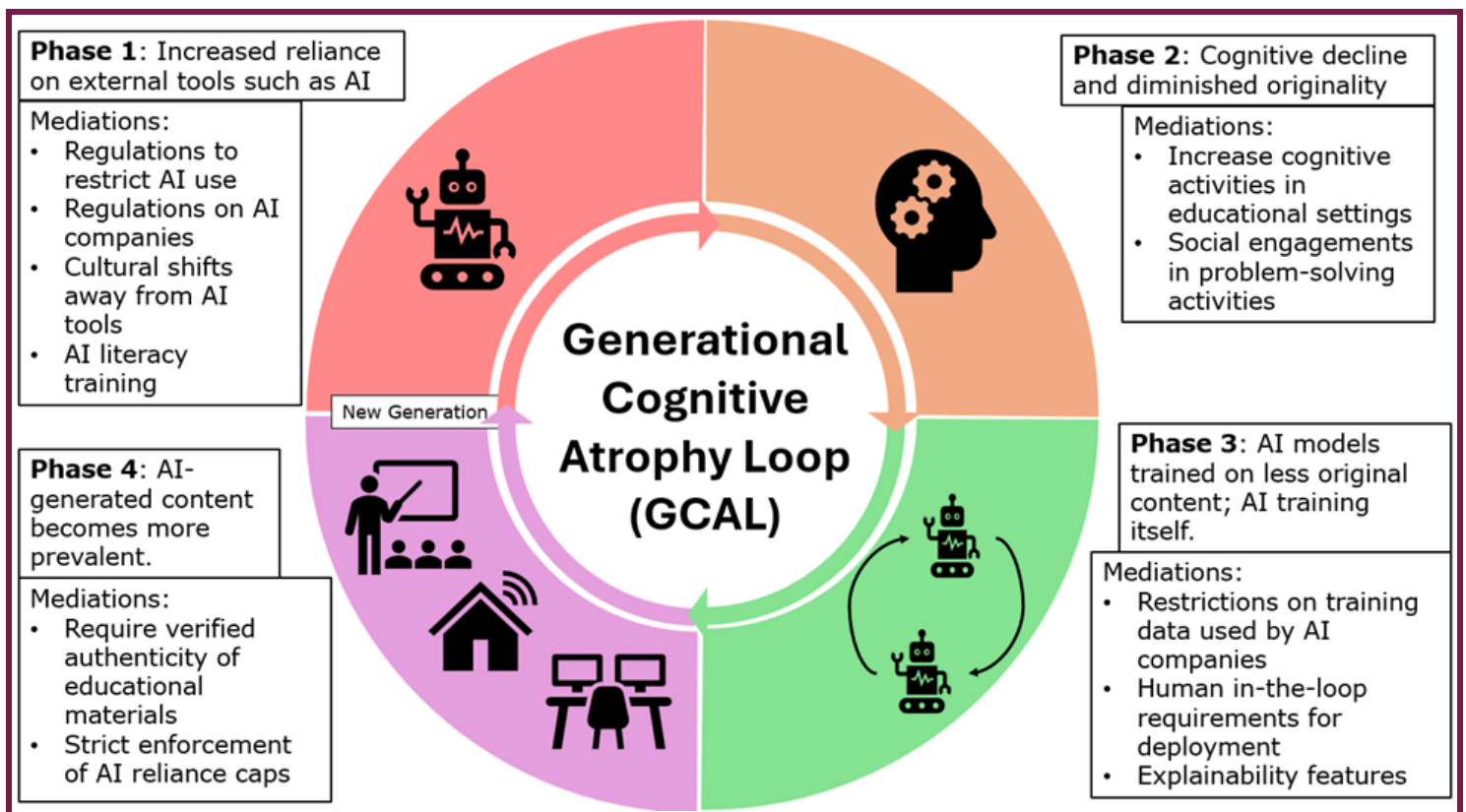


Figure 12 shows that a plurality of students feel less independent using AI for reading and writing.

The Silent Erosion: Global Generational Cognitive Decline in the Age of AI and the Future of Human Intellectual Agency

by P. Mahajan

Although not an experimental study, Mahajan presents a comprehensive review and analysis on the current state of GenAI in adolescent education. As part of this analysis, the Generational Cognitive Atrophy Loop (GCAL) is presented. This loop provides a cohesive description of how an excess of GenAI integration in educational settings leads to not just the overreliance of technology, but also the decline in the quality of educational materials.



The loop begins with an integration of GenAI technologies in the classroom, which means the output from students and future workers consists of some level of GenAI content. Since GenAI is trained on the new data that is created, newer models of GenAI will have its own generated content in its training data. Continuing this pattern over the course of generations, GenAI will reaffirm any negative biases that it has. Since GenAI is being relied upon in the classroom, these negative biases will then become commonplace in adolescent knowledge and eventually fed back to the GenAI for training, further reinforcing this negative bias. This loop is visually demonstrated in the figure below.

Appendix:

Contrary (Positive) evidence on the impacts of AI tools in education, including a meta-analysis by Zhu et al.

Research on Artificial Intelligence is an emerging field. This is doubly the case when these technologies intersect with social and psychological fields like education.

Still, it's important to note that a lot of the research coming out on the educational effects of AI tools are coming back with positive results. Zhu et al. is a meta-analysis that studied a diverse suite of tools and found broadly positive impacts on learning outcomes.

More important to note is that this apparent preponderance may reflect a quirk of timing: long-term research hasn't had a chance to be conducted and come out yet. For the purposes of Zhu et al., a 10-week study counts as 'long term,' and the short term studies were as short as seventy (70) minutes.

That AI tools would show initial positive impacts is not at odds with the tech-skeptical perspective, and is in fact completely predicted by it. AI tools provide instant feedback and make the performance of any task easier. The problems come when dependence on these tools cause students' skills to atrophy from underuse, just like any muscle.

Add to this that the studies assessed in the meta-analysis were disproportionately based on coding and foreign language learning, essentially rote fields at the lower level. In these, the mechanical outputs of the machine are a decent substitution for a memorization guide, and the creative and critical faculties that make great innovators don't come into play. In these fields especially, we would expect positive outcomes in the short term.

The worry that spurred us on to this project was the following: what if the students of the next generation grow up with so much of their learning spoon-fed to them that they can't handle basic mental tasks without the aid of a chatbot; a nightmare for individualism and autonomy.

That is essentially a long-term concern. We await the release of proper long-term evidence to guide better policymaking going forward, and urge the State of Tennessee to do the same.

Our Policy Recommendations

We Recommend:

- The Establishment of a scientific **review process**, to be conducted by the State Department of Education upon any AI program intended to be used in school instruction, meeting the following criteria:
 - A long term criterion, demonstrating the absence of adverse consequences on independent (no-chatbot) critical thinking, creative synthesis, and engagement measures sustained over a period of no less than 365 days.
- A **Moratorium** on the use of AI chatbots and teaching technologies in Tennessee Public Schools for 2 years, as such a policy
 - Provides adequate time for the Department of Education to perform rigorous studies in the absence of incentives to rush through the review process, and
 - Gives more time to the Legislature for the proper assessment of the state of the technology as a whole, and its value in furthering the education of TN students.
- An Exception for the purposes of **scientific review** by the Department of Education, allowing for no more than 10 high schools, 10 middle schools, and 10 elementary schools to be used in assessing the virtue of an AI technology.

Conclusion

Based on our evidence we believe the character of the threat is grave enough to justify steadfast action in defence of our children's intellectual futures.

As a legislator at the state level in Tennessee, you are poised to take action to do everything you can to bolster Tennessee students' education.

At this time, we, as researchers, authors, and concerned citizens, urge you to take precautionary action.

- A moratorium is absolutely called for to avert a **likely** worst-case scenario set to do generational damage to critical, creative, and innovative thinking in our state's children.
- Establishing a review process is necessary so our schools can take advantage of new innovations once we're sure they'll do more good than harm.
- If we want to most reliably assess outcomes on Tennessee students, scientific studies will have to be performed in Tennessee, and limited exceptions to the restriction we propose would allow for research while insulating most students from faulty programs.

We encourage you to reach out to us at THIA with any questions about our research or science.

Legislators or their staff are also encouraged to meet with us to discuss how and when any bill might be drafted and proposed.

We thank you for your attention to this matter and your continued public service.

- THIA Team

Works Cited

- AN ACT to amend Tennessee Code Annotated, Title 49, relative to communication devices at schools, Tenn. Code Ann. § 49-6-320 (2025).
- freeCodeCamp.Org. “Machine Learning vs Deep Learning vs Generative AI - What Are the Differences?” October 2, 2025.
<https://www.freecodecamp.org/news/machine-learning-vs-deep-learning-vs-generative-ai/>.
- Gerlich, Michael. “AI Tools in Society: Impacts on Cognitive Offloading and the Future of Critical Thinking.” *Societies* 15, no. 1 (2025). <https://doi.org/10.3390/soc15010006>.
- Kline, Chelsi V. “The Effect of Generative Artificial Intelligence Chatbots on High-School Student Engagement: A Mixed Methods Approach.” Ph.D., Regent University, 2024.
<https://www.proquest.com/docview/3118618340/abstract/51AB51BBF02D43F9PQ/1>.
- Kosmyrna, Nataliya, Eugene Hauptmann, Ye Tong Yuan, and Jessica Situ. *Your Brain on ChatGPT: Accumulation of Cognitive Debt When Using an AI Assistant for Essay Writing Task*. N.d.
- Liu, Grace, Brian Christian, Tsvetomira Dumbalska, Michiel A. Bakker, and Rachit Dubey. “AI Assistance Reduces Persistence and Hurts Independent Performance.” arXiv:2604.04721. Preprint, arXiv, April 7, 2026. <https://doi.org/10.48550/arXiv.2604.04721>.
- Mahajan, Prashant. *The Silent Erosion: Global Generational Cognitive Decline in the Age of AI and the Future of Human Intellectual Agency*. n.d.
- MIT Museum. “Theseus.” Accessed March 8, 2026.
<https://mitmuseum.mit.edu/collections/object/2007.030.001>.
- Picton, Irene. *Young People’s Use of Generative AI to Support Literacy in 2025*. n.d.
- Zhu, Yinkun, Qiwen Liu, and Li Zhao. “Exploring the Impact of Generative Artificial Intelligence on Students’ Learning Outcomes: A Meta-Analysis.” *Education and Information Technologies* 30, no. 11 (2025): 16211–39. <https://doi.org/10.1007/s10639-025-13420-z>.