

COLUMN: STUDENT SHOWCASE**The Good, the Bad, and the Concerning: Considerations on Artificial Intelligence in Middle School****Author:** Madeline Kimes

I am a high school sophomore with many concerns about Artificial Intelligence (AI)'s short- and long-term effects on learning. My brother and I conducted our own research to explore the short-term effects of using AI on retention of knowledge. The results were frightening but fascinating, and will direct future work for me on this subject.

From our research results, the effects of AI on learning are not good, to put it bluntly. Many students we surveyed are using AI on nearly every assignment that comes their way. Research is beginning to indicate the potential for skill atrophy in our youth as a result of AI misuse (Kos'myna et al., 2025), which is extremely troubling to me. Students in middle school should especially put a focus on limiting their use of AI. In these formative years, they are developing their critical and deep thinking skills (Crone and Dahl, 2012). Critical thinking skills are imperative to ensure these students can form arguments, think things through, and succeed in school and their future careers. AI's potential to disrupt the development of these skills is troubling.

How will middle school students know how AI is potentially affecting their brain's development if they are not taught? The answer is that they likely will not. If we would like to see reduced use of AI, we must incorporate responsible AI use courses into schools' curricula. These courses should teach students about the negative and

positive effects of AI on learning, how it works, and how to use AI responsibly.

These issues, as well as others, have been a large concern for me as a high school student. Not only am I concerned for my peers, but I am also concerned for the future generations that must work alongside the students who overrelied on AI. Although research is being published on AI, it is still a relatively new subject. To learn more about it, I took a hands-on approach and decided to do my own research with my brother. Last semester, we were enrolled in "Introduction to Artificial Intelligence" through NCSSM Connect. We reached out to our professor, Fola Omofoye, MD, and he offered to mentor us in creating our project. We conducted a crossover study in our high school, in which we were looking to find how well students who used AI were able to retain information vs. students who were asked to use a textbook to do the same research. We found that students who used AI to write an essay were not able to retain nearly as much information as students who had used a textbook. We came to the conclusion that when students are using AI, they may be mindlessly writing information down rather than interacting with the information from the textbook and putting information into their own words. As a result of not interacting with the information in a hands-on approach, you are likely not able to retain as much information.

My research is in its infancy, and I have ideas about how I would continue this

work. I am looking to conduct my study again with the lessons that I have learned. Some improvements to my study would be to have the participants take an initial test to assess their knowledge on the topic they are to be tested on. This would provide me with a baseline and a better idea of how much these students learned and how much they initially knew. Additionally, I would conduct the study not only with students from my high school, but with students of a variety of demographics, including age and location. This would ensure that I have a diverse variety of participants, which would increase the validity of my study.

Teachers and students could take the lessons learned in this study to encourage them to put an emphasis on limiting the usage of AI in their classrooms and daily lives. Although AI is a powerful tool that can be a complement to our lives, it is not a replacement for critical thinking. We must establish this precedent and apply it, especially in the classroom.

My message to middle school students is to empower yourselves to seek out information, to be inspired, to voice your opinions, and to be curious and inquire. When you are a young student, you have every opportunity for education and success at your fingertips. You can and should optimize your future by resisting over-reliance on AI.

How can you build fundamental skills?

If you are a current middle school student, you should work to build a wide range of fundamental skills rather than outsourcing your learning opportunities to AI models. When you are learning a topic in a subject like math, for instance, the first thing you must do is learn to do the process by hand. After you establish these initial skills, you then learn how to do this topic on a calculator. This means that there are not

many applications of AI that would benefit you long-term before you have developed these initial skills. However, there are some ethical ways that you can use AI. Using it to create flashcards, explain complex concepts to you in a way that you can understand, and to give you feedback on assignments are all great ways that you can use AI.

How should you, as a middle school student, seek information?

First, you should consider ignoring the “AI overview” when you conduct a Google search. I personally have done this, and I have seen a significant improvement in my ability to find and locate information online. The AI overview feature is unnecessary and encourages students to passively find information. This is an issue because passively finding information might decrease your likelihood of retaining it long-term. Instead, you should actively seek information by searching a textbook or reliable websites.

Next, I would recommend that students, in their everyday lives, research more than only topics that they are assigned to write about. Alternatively, they should seek out information that they are interested in. This is a far better way to spend your free time, in contrast to scrolling through social media platforms. Becoming an informed person, especially on things that you care about, likely will open up a myriad of new opportunities for you. I beseech you to consider becoming someone who knows how to seek out information, because it means that you are the type of person who is doing above what is expected to learn.

How do you voice your opinions?

To voice your opinion, you should start by speaking to your peers about things that are important to you, whether that is climate

change or your favorite video game. What we are lacking in this day and age is people's ability to communicate. Learning to communicate will not only help you foster new friendships, but it will also open new doors for you in your future careers.

Once you refine these skills, you should use these skills to make a positive impact on your community. Become an active member of your community by volunteering and leading local community organizations.

Conclusion

I believe that AI is an extraordinarily powerful tool that could be used to help us learn. However, I also believe that if we do not teach our youth about the possible negative effects of using it, we can face adverse consequences. Some questions that I implore middle schoolers to consider before they decide to use AI are:

1. Why are you using this tool at this time?
2. What do you give up when you choose to utilize an AI tool for a given task?
3. Are you learning for the sake of learning, or just for a grade?

My name is Madeline Kimes and I am from North Carolina. I am interested in studying chemistry on a pre-med track to become an Oncologist. In my free time I golf, weightlift, and skateboard!

If you ask yourself these questions and still earnestly believe that using AI is in your best interest, then I encourage you to use it to your advantage. However, AI is still in its infancy, and I believe that you should use it with caution above all else.

References

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