I’m a Math Teacher. Graphing Calculators Taught Me a Thing or Two About AI

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There is no avoiding the constant chatter about AI these days. Really, it’s been months. As a math teacher, this struggle over new technology feels oddly familiar.

More than 30 years ago, the National Council of Teachers of Mathematics released standards about how to teach with the “newly emerging” calculator technology. Charmingly, this was a physical book that you had to buy, but I digress.

I remember watching, as an intern teacher, transfixed and amazed as my former high school teacher, and now my mentor, used nascent TI-80 graphing calculators to make connections I’d never seen between tables, graphs, and equations of polynomials. When I say “never seen,” I mean I had *never even thought about this*. I had mastered her class five years before. I had mastered calculus and other higher-order math on my way to earning my college math degree. And yet I sat there and learned everything from my high school pre-calc course all over again. As my brain rewired itself, creating new connections, I swear I actually felt my fingers tingle as I made notes.

A month later, my understanding of trigonometric functions likewise deepened as I took over the class to learn to teach students using those same graphing calculators. Suddenly, as I watched the sine and cosine waves unspool from the unit circle on the calculator’s screen, I grasped for the first time why they were called “cyclic functions.”

That was 1992, and the math teaching community has struggled ever since, productively most of the time, to integrate calculators of increasing complexity and ability into all levels of instruction. For a while, we could discourage calculator use with pithy statements like, “You’re not always going to have a calculator with you!” (Insert iPhone here.) I still run into students who’ve been taught trigonometry or ratio and proportion facts in isolation and through procedures, but we continue, as a community of math educators, to generally move in the direction of capitalizing on the calculator’s ability to enhance conceptual understanding.

We came to view calculators as tools, like protractors or straight edges, which students must be taught to use. We coached students on how to determine if an answer is reasonable—or garbage. We modeled strategic use, pointing out both when calculators can enlighten and when they can hinder progress.

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Over time, some of the content we teach has changed. We've worked to define what computational "fluency" means over and above precision of calculations. Fluency includes drawing on mathematical understanding to find flexible and efficient pathways to correct answers. Knowing most students will pull out their phones to perform even the smallest of calculations, we've had to rely on our relationships of trust to teach them to have confidence in their own abilities. We help them understand that they are more capable without the technology than they believe.

The scariest part of this journey was that at all levels of math education, we had to ask ourselves, "What do we teach? What does it mean to do *math?"* As I learn more about AI, as I think about how kids will and are already using it, this feels like déjà vu. Except this time I'm joined by my English/language arts, science, social studies—actually *all*—my teaching colleagues. Welcome to my world!

I have a message for you, and you may not be ready to hear it. AI is here. AI is not going away, not ever, and you cannot ban it. It will continue to evolve and become more powerful. Those online tools you used in the spring of 2023 to help you determine if a chatbot had "written" something? Even some of the developers of those tools, such as OpenAI, which came up with ChatGPT, no longer think they are reliable. That's how fast things are changing.

This will, literally, change everything about how you teach in ways that nobody can predict, not even the "experts." After two months of reading about AI, listening to podcasts, and even attending hearings and briefings about AI on Capitol Hill, I've come away with a great big "who knows?" shrug of the shoulders.

AI will frustrate you and make you question what it means to "learn" content. But, if you let it, this creates an opportunity to make your teaching better, to make your content more relevant. We have been thrust into the top four levels of Bloom's taxonomy of educational objectives together, and it's a pretty exciting place to be. When our students have access to all the information that they once spent much brain power memorizing, they are able to apply, analyze, evaluate, and create. The miracle here is that brain research tells us that when they are doing these magical things, they remember and understand *at the same time and more permanently.*

Make no mistake, public school teaching is at a crossroads. We change and become relevant, or more and more parents will join those clamoring for “choice” in educating their children. They are right to want what’s best for their children. What they want, ultimately, should be what we want as well—for their kids to grow into adults who can be productive members of a technologically savvy world.

If we open ourselves to the technology as it develops, always with a mind to protecting our students while teaching them how to use it, surprising things will happen. We will prepare our students to thrive in a world that has AI embedded into nearly everything they are going to be asked to do. In a very basic sense, teaching students to thrive in a future we can’t completely predict is what we’re supposed to be doing anyway.