The Slide Rule Guide

Ideas for If, When, and How to use Generative AI Tools for Education[i]

September 10, 2025
Michael Heroux[ii]
Scientist in Residence
Department of Computer Science
College of Saint Benedict & Saint John's University

The analogy of paper-and-pencil vs. calculator is often used to help illustrate the tradeoffs of using technology or not for performing tasks. We want students to understand the basics of arithmetic by performing calculations by hand but then eventually use a calculator as a tool to for solving problems that need calculations.

In this article, I focus on the same analogy and bring in a third item, the slide rule[iii], to help determine if, when, and how we might use generative AI tools for educational activities. The slide rule represents a tool for performing calculations that, for centuries, was the best approach available, but was replaced when hand-held calculators became widely available.

For the educational community, I believe generative AI tools represent the new calculators that make some, but not all, of our existing approaches to learning and teaching the equivalent of a slide rule. The challenge we face as educators is to ensure that our approaches are like paper-and-pencil when necessary for building foundational skills, or like calculators when needed, but not like slide rules.

Before the arrival of generative AI tools, many educational activities were designed around the constraints of the available technology, much like how mathematics instruction once relied on slide rules. These activities often required students to perform labor-intensive steps—such as manually summarizing large bodies of text, generating repetitive code structures, or composing boilerplate reports—not because the process itself was inherently valuable, but because there was no faster or more efficient way to obtain the result.

Today, with generative AI tools capable of handling these tasks in seconds and often at a higher baseline quality, continuing to require students to complete them in the old way risks becoming the pedagogical equivalent of insisting they use a slide rule after calculators have become ubiquitous.

As educators, I believe we run two primary risks with respect to using generative AI tools:

1. **We permit the use of these tools as calculators when we should require a pencil-and-paper approach, missing the opportunity for students to learn fundamentals that they need for life after college.**
2. **We prohibit the use of these tools when they are appropriate for accelerating learning and making students more productive, giving them a slide rule when they need a calculator as a tool for life after college.**

The challenge for us is to distinguish between exercises that build essential understanding—akin to learning arithmetic by hand—and those that are now obsolete workflows whose instructional value can be replaced or enhanced by focusing on interpretation, creativity, and critical thinking around AI-generated outputs.

---

[i] I have written periodically about my experiences using generative AI tools in my Computer Science capstone course. This article and previous ones are available at https://maherou.github.io/Teaching/AI-Assisted-Research/

[ii] The initial draft of this essay was produced via the author's use of the verbal conversation mode of ChatGPT-5, a generative AI tool. All ideas represented in this essay were dictated by the author to a handheld device and reformatted by the tool to produce the initial draft essay.

[iii] The slide rule is a mechanical analog computer based on logarithmic scales. It was invented in the 17th century following the discovery of logarithms. For more than three centuries, it was the primary calculating tool for engineers, scientists, and students, allowing rapid multiplication, division, and other functions—provided the user understood the principles of logarithms. Mastery of the slide rule required not only mechanical skill but also a solid grasp of how logarithms transformed multiplication into addition, meaning this mathematical concept was embedded in technical education. Slide rule use ended abruptly in the 1970s when affordable electronic calculators offered direct, instant computation without requiring logarithmic knowledge. Within just a few years, calculators became standard in education and industry and, while logarithms remained a topic in mathematics curricula, practical familiarity with them as a daily computational tool largely disappeared (https://en.wikipedia.org/wiki/Slide_rule).