AI-Based Strategies to Enhance Reading Comprehension

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Introduction

AI has become deeply embedded in how we work, learn, and think. For us in education, this raises important questions about where AI fits into the cognitive processes that matter most, particularly the kind of thinking we do when we read and write. These are not simple mechanical tasks. Reading and writing involve interpretation, critique, connection-making, and meaning construction. They are how we process the world and articulate our place in it.

My concern is not with AI itself. The tools are remarkable, and their potential for education is real. My concern is with how we use them. When we offload complex cognitive work to AI without first doing that work ourselves, we risk weakening the very capacities we need to develop. The research literature increasingly supports this concern. A growing number of studies now document the negative effects of uncritical AI use on individuals' cognitive abilities and critical thinking (Chatfield, 2025; Gerlich, 2025; Kosmyna et al., 2025; Zhai et al., 2024). The convenience is undeniable, but so is the cost.

This is why I frame AI as an issue of literacy. Framing it this way moves the conversation away from a narrow focus on tools and toward the ways we engage with those tools. When we talk about AI in education, we are really talking about AI literacy: the competencies, knowledge, and attitudes that enable us to use AI in critical, reflective, and responsible ways. A student who knows how to prompt ChatGPT is not necessarily AI literate. A student who understands when to use AI, when to step back from it, and how to remain the author of their own thinking, that student is developing real literacy.

Reading and writing are at the heart of this conversation. Both are complex cognitive activities, and both reveal the paradox of AI in education. AI can support these processes in powerful ways, but it can just as easily hollow them out if we let it take over too soon or too completely.

I touched on writing in my book, *Teaching with AI*, where I argued that writing is a form of thinking and that the first draft should always be learner-generated, independent of AI. In that first draft, you dump your ideas onto the page, raw and unedited. Only then do you bring in AI to help with editing language and mechanics. I may return to the topic of writing and AI in a future guide with more detail. But the purpose of this guide is to talk about reading.

The need for this conversation became vivid to me over the last few weeks. I came across several posts on LinkedIn from established researchers complaining that their work had been inappropriately cited, or that they had been credited for work they never produced (see this example). These errors appeared in academic peer-reviewed papers, the very publications that are supposed to uphold rigorous scholarly standards. Why does this happen? Because authors offloaded the reading and writing process to AI. Everyone knows that AI's limitations are serious: hallucination, fabrication of citations, inaccuracies, and bias are real issues. Yet for some users, the appeal of speed, the ability to quickly generate a report or summary, overrides these concerns.

I want to be clear: I am all for embracing AI in our teaching and research. I strongly advocate for its use (see for instance Kharbach & Woodworth, 2025). But, and this is a significant but, I do not advocate for unbridled and uncritical use. Doing so can lead to what researchers call "intellectual atrophy" (Sobo et al., 2025). AI becomes a powerful cognitive enhancement tool only when we know how to use it in ways that foreground our original thinking, amplify our voice, and free up cognitive space for deeper engagement with ideas.

What This Guide Covers

In this guide, I offer a practical framework for using AI to enhance reading comprehension without sacrificing the cognitive benefits that come from doing the hard work yourself.

I begin with a two-layered approach to reading with AI. The first layer is AI-free: students engage in close reading independently, highlighting passages, taking notes, and wrestling with ideas on their own. The second layer is AI-enabled: students bring in tools strategically to extend and deepen the understanding they've already built.

From there, I break down AI-enhanced reading into two levels. The access level focuses on entering the text, building vocabulary, unpacking difficult passages, and establishing a foundational understanding of what the author is communicating. The conceptual level goes deeper, supporting students as they grapple with ideas, raise critiques, and form their own interpretations.

Throughout the guide, I introduce specific tools and strategies for each level. For access-level reading, I discuss how general purpose chatbots like ChatGPT, Gemini, and Claude can help with text adaptation, contextual translation, and generating examples and analogies. For conceptual-level reading, I recommend context-limited AI tools such as NotebookLM, Elicit, Scispace, and others that allow students to build custom knowledge bases from their own sources. I also cover features like Projects and Custom GPTs, as well as AI-powered tools for visualizing ideas. The goal throughout is the same: to share practical suggestions on how to use AI thoughtfully to enhance reading comprehension.

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A Two-layered Approach to Using AI in Reading

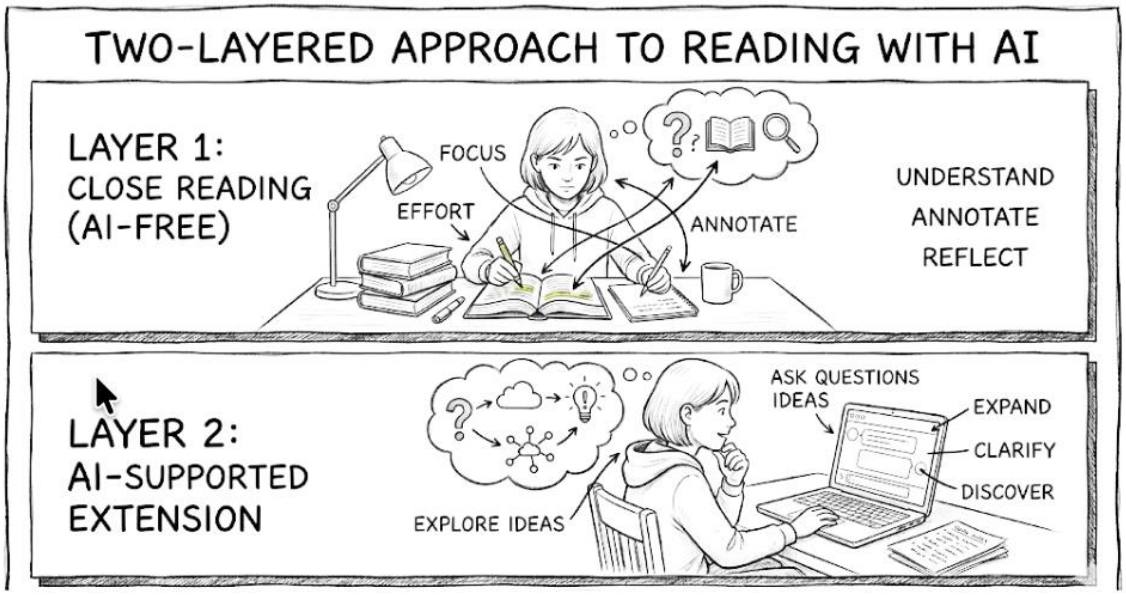
Reading with AI works best when we think of it in two distinct layers. The first layer belongs entirely to the student : no AI, just the reader and the text. This is where students highlight passages, add notes, and capture key ideas in their own words. If it takes two or three readings to get there, that's fine. Close reading demands time and attention, and that's precisely the point.

The real strength of this kind of reading is that it introduces friction into the learning process (Watkins, 2024). Students grapple with novel ideas, view them through their own perspective and lived experiences, compare and analyze, construct and reconstruct meanings. This "productive friction" (Holtz, 2018) is exactly what builds comprehension and deepens learning.

So, can we use AI at all in this first layer?

I already said this is an AI-free layer, but there's one exception: AI can serve as an enhanced dictionary. Students can use it to define unfamiliar words or clarify complex concepts. The key distinction here is that AI helps with access to meaning, not with doing the reading or summarizing the text. That comes later.

Once students have completed their first reading, they can bring in AI to extend their comprehension and deepen their learning. The following sections outline strategies for integrating AI to enhance reading at different levels.



Strategies to Enhance Reading Comprehension Using AI

Before we get into specific tools and strategies, let me clarify what I mean by using AI to enhance reading comprehension. I think of it as happening at two levels: the access level and the conceptual level.

The access level is about entering the text. This is where students work through unfamiliar vocabulary, untangle complex sentences, and make sense of difficult passages. The goal here is foundational: understanding what the author is actually saying. The conceptual level goes deeper. Once students have grasped the content, they begin to engage with the ideas themselves, questioning arguments, connecting concepts to what they already know, and forming their own interpretations. Both levels benefit from AI support, but the kind of support looks different at each stage.

With that distinction in mind, let's look at how general purpose chatbots and other AI tools can help students at each level.

At the Access Level

Tools like ChatGPT, Gemini, and Claude are versatile enough to support reading at both the access and conceptual levels. Here's how students can use them effectively.

The access level, as I explained previously, is the entry point into a text's meaning. Students at this stage struggle with unfamiliar words, dense passages, and concepts that don't click right away. The goal is to build an initial understanding of what the author is communicating. And the assumption here is important: students have already done their first reading and productively struggled with the material on their own. AI enters only after that independent effort.

1. Text Adaptation

One powerful strategy at this level is text adaptation. Students can ask a chatbot to rephrase a difficult passage at a more accessible reading level. This might seem to contradict what I said earlier about intellectual atrophy, but here's the key distinction: scaffolded help, offered at the right moment, has real cognitive benefits. When students move from a challenging original passage to an AI-adapted version, they're not skipping the work. They're building a bridge. And

over time, with repeated practice, their reading levels progress. Think of it like weight training. You start with lighter weights, but through repetition and gradual increases, you build the strength to lift heavier loads.

Vygotsky's Zone of Proximal Development is useful here. The ZPD describes the space between what a learner can do independently and what they can achieve with guidance. This is exactly where AI should come in: right at the edge of a student's independent capacity, just before frustration leads to giving up. AI becomes the scaffold that keeps them in the learning zone.

2. Contextual Translation

Another valuable use of chatbots at this level is contextual translation. Traditional dictionaries have always struggled with context. A word can mean different things depending on how it's used, and pre-AI dictionaries often missed those nuances. Chatbots like ChatGPT and Gemini handle this far better. I taught English as a foreign language for many years, and I know how much contextual accuracy matters for second language learners. Some concepts, especially abstract ones, only make sense when students can see equivalents in their mother tongue. With AI, students can type or voice-record a word, phrase, or even a full passage and receive translations that stay faithful to the original meaning. From my own repeated experience, these translations are remarkably reliable.

3. Real-Life Examples and Analogies

Some concepts remain fuzzy no matter how many times students reread a passage. The words make sense individually, but the idea itself doesn't land. This is where chatbots can make a real difference. Students can ask AI to generate real-life examples or analogies that connect abstract ideas to familiar experiences.

A student reading about "opportunity cost" in an economics text, for instance, might ask ChatGPT: "Can you give me a real-life example of opportunity cost that a college student would relate to?" The chatbot might respond with a scenario about choosing between a part-time job and an unpaid internship, illustrating how every choice involves trade-offs. Suddenly, a concept that felt distant becomes personal and concrete.

Analogies work similarly. A student struggling to understand how neural networks process information could ask for an analogy, and the chatbot might compare it to how a postal sorting system routes mail through multiple checkpoints before it reaches its destination. These comparisons give students a

mental foothold, something to hold onto as they return to the original text with fresh eyes.

What makes this strategy particularly effective is that students can tailor the examples to their own context. A nursing student and a business student reading the same article on decision-making under uncertainty will benefit from different illustrations. AI allows each student to request examples that resonate with their field, their interests, or their everyday life. This kind of personalized scaffolding was nearly impossible before AI. Now, it's a prompt away.

At the Conceptual Level

The conceptual level is where students have already earned access to the meaning of a text and are now sitting with it, turning it over in their minds. They're viewing the ideas through the lens of their own intellectual context, their learning experiences, and their existing knowledge.

This is a more nuanced and advanced form of understanding. Students at this stage jot down notes, raise critiques, push back against certain interpretations, and shape their own understanding of the text, one that may not align with what the original author intended. This kind of grappling with ideas can also be supported by AI.

For this deeper level of engagement, I recommend moving beyond general purpose chatbots toward context-limited AI tools. These are platforms that allow you to build a custom knowledge base from the sources you upload. The AI then generates responses drawn specifically from those materials. General purpose

chatbots pull from their vast training data, which means their answers can drift, introduce outside information, or even hallucinate sources.

Context-limited tools, on the other hand, keep the conversation grounded in the texts you've chosen to work with. This constraint is actually a strength: it forces the AI to stay within the intellectual boundaries of your reading and helps students engage more authentically with the material they've already processed.

Here are some of the most useful tools for supporting reading at this conceptual level.

1. NotebookLM

NotebookLM by Google is one of the best AI-powered tools available for this kind of work, and its educational potential is significant. The platform allows you to upload documents, including handwritten notes, and create a context window based entirely on those sources. You can then chat with your materials, ask questions, and receive answers drawn directly from the texts you've uploaded. Nothing from outside your sources enters the conversation unless you bring it in.

For students working through multiple readings, this is incredibly useful. They can upload a collection of papers they've already read and ask NotebookLM to synthesize ideas across them, surface recurring themes, or identify points of tension between different authors' arguments. From there, students can develop counter-arguments, spot gaps in the existing research, or begin shaping a novel research question.

The tool also functions as a powerful search engine for your own reading stack. We've all had the experience of remembering an idea but forgetting who said it. Flipping back through a dozen papers to find that one passage takes time. NotebookLM can locate it in seconds.

Two additional features make NotebookLM especially valuable for neurodiverse learners. The first is the Audio Overview feature, which generates a podcast-style discussion of your uploaded content. For auditory learners, this is definitely a great asset. Students can listen to an AI-generated conversation that walks through the key ideas in their sources, and they can even join the discussion by submitting prompts that shape the direction of the conversation. The second feature is Video Overviews. This allows students to generate short video summaries of their uploaded materials. For visual learners who benefit from

seeing ideas presented in a dynamic format, this adds another layer of engagement and reinforcement.

2. Other Context-Limited Research Tools

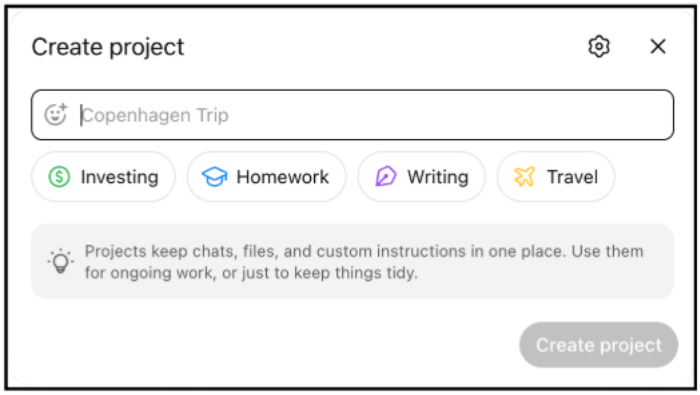
Beyond NotebookLM, several other AI tools offer similar capabilities, and I've been recommending them to teachers for the past couple of years. These platforms allow you to upload papers, engage in dialogue with them, and extract key insights. What sets many of them apart is their added functionality for research-focused reading. They can help you discover related literature, trace citation networks, and build out a reading list in ways that are especially helpful for research projects and literature reviews.

Here are some worth exploring:

- Elicit AI
- Scispace
- ResearchRabbit
- Connected Papers
- Consensus
- R Discovery

3. Projects Feature

Both ChatGPT and Claude offer a feature called Projects that functions similarly to NotebookLM. You can upload documents to create your own context window, then provide custom instructions that guide how the AI responds. Once your project is set up, you can chat with your uploaded materials, ask questions, and receive answers grounded in those specific sources.



If I want a tightly controlled context window, I still prefer NotebookLM. Its responses stay more strictly within the boundaries of your uploaded sources, which matters when you want to avoid outside information creeping into the conversation. That said, Projects is a strong option for students who already use ChatGPT or Claude regularly. The projects live right alongside your other chats, making them easy to access without switching platforms. For students who've built a workflow around these tools, adding a research project to the same interface feels natural and convenient.

You can also add custom instructions to shape how the AI behaves within a project. For example, you might instruct it to always cite which uploaded document it's drawing from, or to flag when a question falls outside the scope of your sources. This level of control helps keep the AI focused and makes it easier to trust the responses you receive.

Perplexity AI offers a similar feature called Spaces. Like Projects, Spaces allows you to upload documents and build a custom knowledge base. What makes Perplexity distinct is its integration with web search. You can choose to keep your Space limited to uploaded sources, or you can allow it to pull in external information when needed. This flexibility is useful for students who want to ground their reading in specific texts but also need the option to explore beyond them. Spaces also supports collaboration, so students working on group projects can share a common knowledge base and build on each other's contributions.

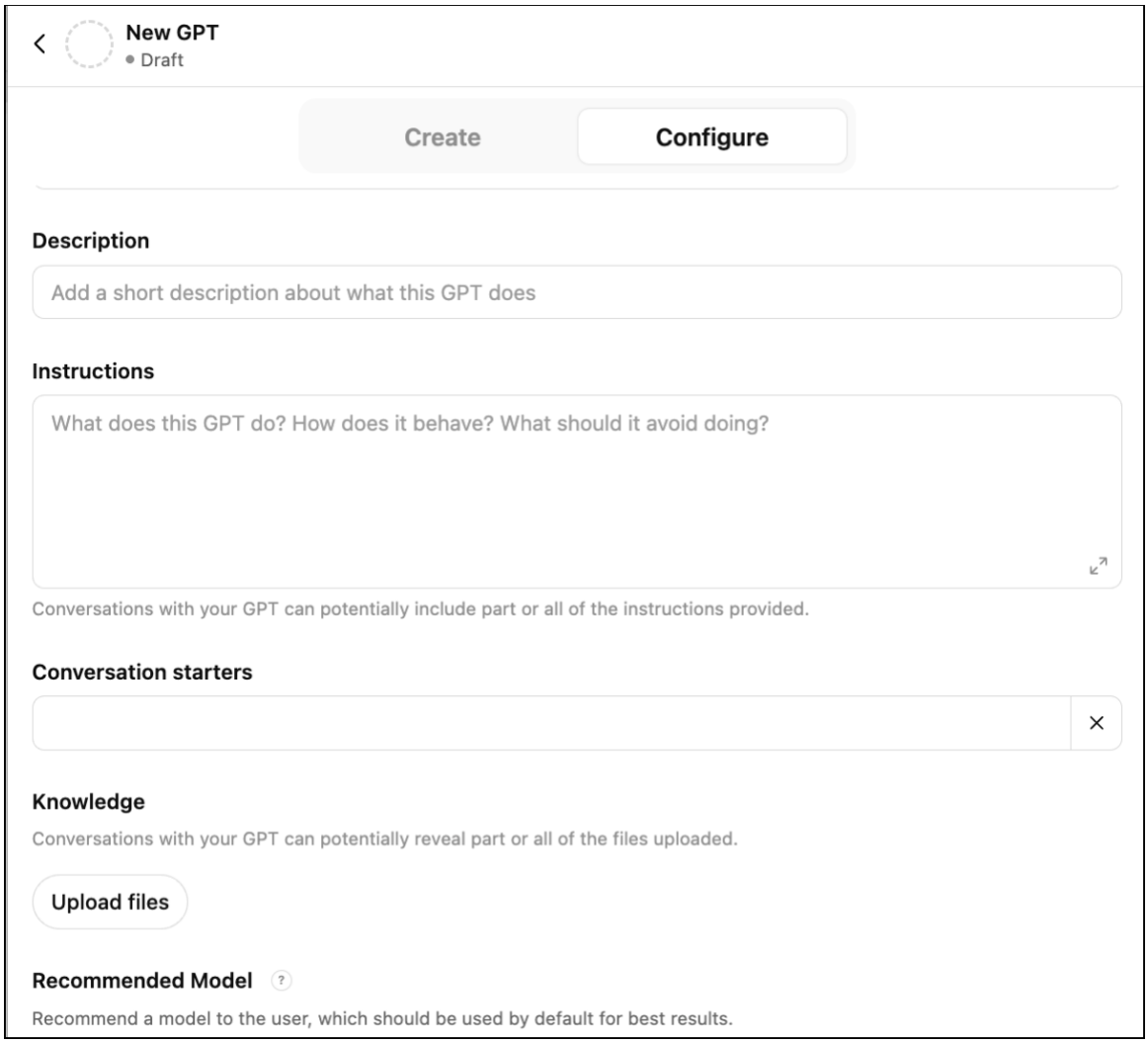
4. Custom GPTs

Custom GPTs are available through ChatGPT and offer another way to create a personalized AI assistant. You can build a GPT tailored to a specific purpose, give it custom instructions, and upload documents for it to reference. Students can use Custom GPTs in much the same way they use Projects or NotebookLM: uploading readings, asking questions, and getting responses grounded in their materials.

The process of creating a Custom GPT is straightforward. You name it, describe its purpose, set behavioral instructions, and upload relevant files. Once it's built, the GPT lives in your ChatGPT sidebar and can be accessed anytime. Students could, for example, create a Custom GPT specifically for a course they're taking,

upload all the assigned readings, and use it throughout the semester as a study companion.

That said, Custom GPTs are less practical than other options for most reading comprehension tasks. Projects offers similar functionality with less setup, and NotebookLM keeps responses more tightly bound to your sources. Where Custom GPTs do shine is in their shareability. Once you create one, you can share it with classmates or colleagues, which means a student who builds a useful reading assistant can pass it along to others in the same course. For collaborative learning environments, this can be a real advantage. But for individual use, Projects or NotebookLM will usually be the simpler choice.



Visualizing Ideas

Visuals are a powerful conduit for learning. Some concepts are better grasped visually and non-linearly, and for these, AI-enabled tools can prove incredibly helpful. Visual learners will especially benefit, but even students who don't identify that way often find that seeing an idea represented graphically unlocks understanding that text alone couldn't provide.

AI image generation has advanced dramatically over the last few months. We now have tools that can produce beautiful, detailed visuals from a single prompt. Students can use these tools to enhance their reading comprehension by translating abstract ideas into images, diagrams, and illustrations that make concepts tangible.

Here are a few tools I recommend for turning text into visuals:

1. Nano Bana Pro and ChatGPT Image Generator

Both Gemini 3 Pro Image (Nano Banana Pro) and ChatGPT's image generator have received major updates that significantly boost their functionality and output quality. From my experience, the latest version of Gemini 3 Pro Image performs better than ChatGPT's generator, but either tool can produce visually rich illustrations that support learning.

Students can use these tools to create visual representations of concepts they encounter in their reading. Sometimes, seeing the relationships between ideas laid out in an image clarifies things in ways that rereading a passage never could. A student reading about the structure of an argument, for instance, might prompt the AI to illustrate the logical flow from premise to conclusion. Suddenly, the abstract becomes concrete.

I find the sketch style particularly effective for this kind of work. It keeps the focus on ideas and relationships without the distraction of photorealistic detail. A prompt like this works well: "Create a hand-drawn sketch illustrating the relationship between [provide topic] and [provide topic]. Use arrows to show how they connect." The result gives students something to return to as they continue reading, a visual anchor for the concepts they're working to understand.

2. NotebookLM Infographics

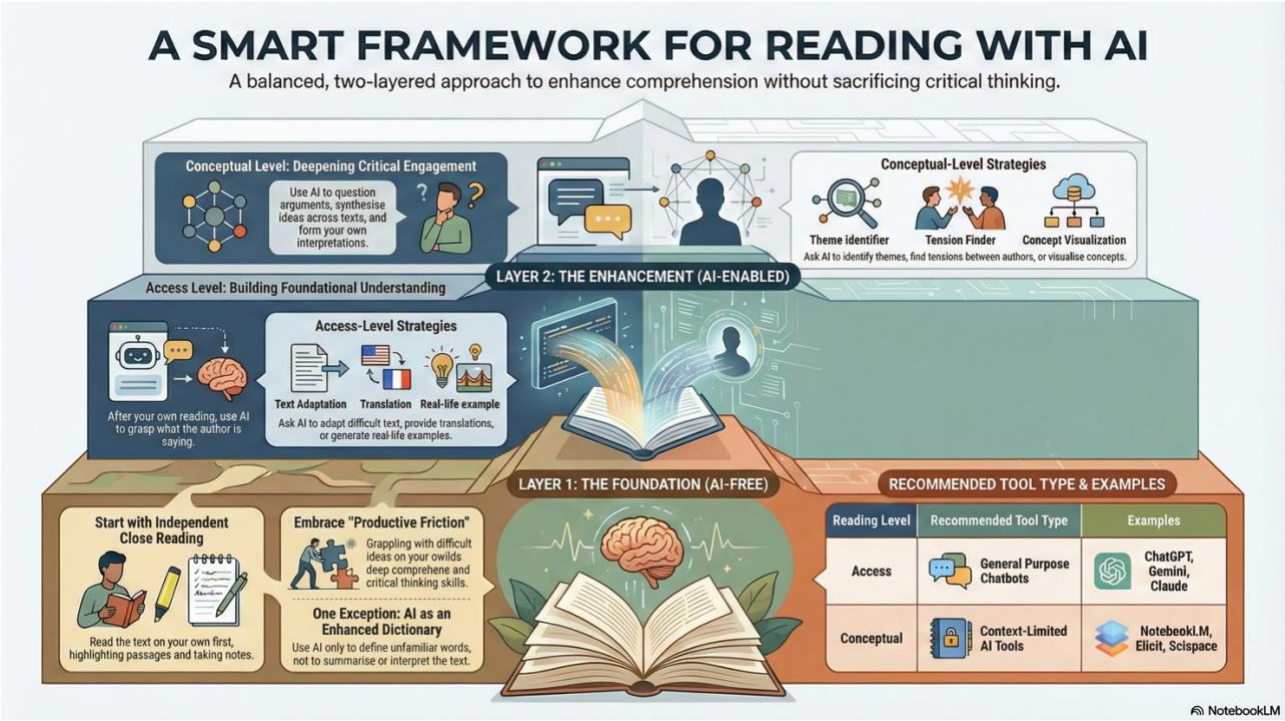
NotebookLM recently introduced an infographics feature that does exactly what it sounds like: it generates infographics based on the sources you upload. The

tool does a solid job summarizing and synthesizing ideas, then presenting them in a visual format. For students who want a quick visual overview of their reading materials, this feature is genuinely useful.

The main limitation compared to Gemini or ChatGPT's image generator is control. With those tools, you can specify style, layout, and exactly which concepts to include. NotebookLM's infographics are more automated. You upload your sources, and the tool decides how to represent them. The results are often good, but if you have a specific vision in mind, you may find the output doesn't match it. For quick, low-effort visuals, NotebookLM works well. For customized illustrations, the image generators give you more flexibility.

Beyond these options, several other AI image generators are worth checking out: Napkin AI, Midjourney, Adobe Express, and Canva.

Here is an example of an infographic created using NotebookLM based on the content of this guide.



Conclusion

Reading is a cognitive activity that involves thinking, processing, and synthesizing, all of which are feats better executed by humans. Our minds are built to wrestle with ideas, make unexpected connections, and construct meaning from complexity. These are not tasks to hand off lightly. That said, AI, with its remarkable capabilities, can enhance this cognitive process in unprecedented ways, but only when used critically, productively, and responsibly.

In this guide, I offered a framework for integrating AI into reading practices without sacrificing the intellectual work that makes reading valuable in the first place. I began with a two-layered approach. The first layer is independent reading, done without AI except in its limited capacity as a dictionary to clarify unfamiliar terms. This is where students engage in close reading, annotate passages, and grapple with ideas on their own. The second layer is AI-enabled, where students bring in tools strategically to extend the understanding they've already built.

Within this second layer, I distinguished between two levels of AI support. The access level helps students enter semiotic field of the text: adapting difficult passages to their reading level, providing contextual translations, and generating real-life examples and analogies that make abstract concepts concrete. The conceptual level goes deeper, supporting students as they synthesize ideas across sources, identify recurring themes and tensions, develop counter-arguments, and form their own interpretations of the material.

I also introduced a range of AI tools suited to each level. For access-level support, general purpose chatbots like ChatGPT, Gemini, and Claude offer versatile assistance. For conceptual-level engagement, context-limited tools such as NotebookLM, Elicit, Scispace, ResearchRabbit, Connected Papers, Consensus, and R Discovery help students build custom knowledge bases and engage more authentically with their sources. I also covered features like Projects and Spaces in ChatGPT, Claude, and Perplexity, as well as Custom GPTs for those who want shareable, course-specific assistants. Finally, I explored AI tools for visualizing ideas, including Gemini's image generation, ChatGPT's image generator, and NotebookLM's infographics feature.

I hope the suggestions I shared in this guide help. Keep in mind, every reader, every course, and every text will call for different approaches. The tools and

strategies I've outlined here are starting points, ways to begin thinking about how AI can support reading without replacing the thinking that reading demands.

References

Chatfield, T (2025). AI and the future of pedagogy (White Paper). London: Sage. doi: 10.4135/wp520172

Gerlich, M. (2025). AI tools in society: Impacts on cognitive offloading and the future of critical thinking. *Societies, 15*(1), 6. https://doi.org/10.3390/soc15010006

Holtz, P., Kimmerle, J. & Cress, U. Using big data techniques for measuring productive friction in mass collaboration online environments. *Intern. J. Comput.-Support. Collab. Learn* **13**, 439–456 (2018). https://doi.org/10.1007/s11412-018-9285-y

Kharbach, M. (2025). *Teaching with AI: Practical strategies to integrate AI in the classroom*. Self-published.

Kharbach, M., & Woodworth, J. (2025). The AI turn in academic research: A practical guide to research tools and methods. *Mount Saint Vincent University*. https://doi.org/10.61756/KYQU7678

Kosmyna, N., Hauptmann, E., Yuan, Y. T., Situ, J., Liao, X. H., Beresnitzky, A. V., ... & Maes, P. (2025). Your brain on ChatGPT: Accumulation of cognitive debt when using an AI assistant for essay writing task. *arXiv preprint arXiv:2506.08872*, *4*.

Sobo, E. J., Goldberg, D. M., & Alstot, M. N. (2025, December 17). Faculty are first responders in averting an epidemic of intellectual atrophy. *Inside Higher Ed*. https://www.insidehighered.com/opinion/views/2025/12/17/faculty-are-first-responders-averting-epidemic-intellectual-atrophy

Watkins, M. (2024, May 3). No one is talking about AI's impact on reading. *Substack*. https://marcwatkins.substack.com/p/no-one-is-talking-about-ais-impact

Zhai, C., Wibowo, S., & Li, L. D. (2024). The effects of over-reliance on AI dialogue systems on students' cognitive abilities: A systematic review. *Smart Learning Environments, 11*(1). https://doi.org/10.1186/s40561-024-00316-7

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