Marshall Memo 1053

A Weekly Round-up of Important Ideas and Research in K-12 Education
September 16, 2024

Special Issue:

Generative Artificial Intelligence and Schools

The arrival of ChatGPT in November 2022, followed by several other GenAI tools, has sparked intense discussion among K-12 and university educators. This Memo organizes the most helpful Memo summaries so far under four headings:

Potential problems, including students cheating

1. GenAI – what could go wrong?
2. Classroom assessments vulnerable to AI cheating
3. Keeping kids honest in this brave new world

Ensuring that deeper learning happens

4. What human-type teachers do that AI can't
5. Classroom rigor and artificial intelligence
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Quotes of the Week:

"I have absolutely no way of knowing whether the work I'm seeing at the end is the student's or has been created partially or entirely with GenAI."
Leon Furze (see article #2)

"Writing is an important way for students to show me – and each other – how they are thinking. ChatGPT isn't a threat because it fixes spelling and grammar or tells students how to

be more concise or expressive. It's a threat because, when used thoughtlessly, it replaces the *creation* of ideas."

Matthew Kay (see article #3)

"Our humanity, as imperfect as it may be, is a gift to our students. In an age of AI, our students still need a human to listen and empathize; to experiment and adapt; to make mistakes and apologize. They will need a guide who can build a relationship and help them navigate a complex world."

John Spencer (see article #3)

"Most skills will benefit from a combination of practice and reflection. We try something, we think about what happened, and then we try again. The space between these two attempts gives our brains time to process and improve."

James Lang (see article #7)

"Research shows that real learning requires things to be a little bit hard."

Joss Fong (see article #6)

"At its worst, rigor is difficulty without purpose, more about assessing what students can endure rather than what they have learned."

Eric Hudson (see article #5)

"The complexity of teaching is guiding students to the right places in the learning process where they can focus their precious cognitive and emotional energy on the tasks that will increase knowledge and competence."

Eric Hudson (*ibid*.)

POTENTIAL PROBLEMS, INCLUDING STUDENT CHEATING

1. GenAI – What Could Go Wrong?

In this article in *Visual Capitalist*, Katie Jones lists nine potential problems with large language models:

• *Mindless parroting* – "Despite their advanced capabilities," says Jones, "generative AIs are constrained by the data and patterns they were trained on. This limitation results in outputs that may not encompass the breadth of human knowledge or address diverse scenarios."

• *Static* – Keeping large language models up to date requires substantial computational resources and time, says Jones, so only the most highly capitalized models are up to date.

• *Bias in, bias out* – Chatbots reproduce biases that are present in the vast amounts of data they "scrape" from the Internet to formulate answers. "Rather than mitigate biases," says Jones, "these tools often magnify or perpetuate them, raising questions about the accuracy of their applications – which could lead to much bigger problems around ethics."

• *Hallucinations* – Generative AI models sometimes make up statements or images when they encounter gaps in their data.

• *Human values* – Chatbots are amoral, not considering the consequences of their

actions – for example, spreading deepfakes or false information about a public health menace.

• *Black box* – The chatbots' decision-making process is not transparent, so users can't check on the accuracy (or even existence) of the sources.

• *Copyright and intellectual property infringement* – Many artists and content creators are concerned about their work being disseminated without consent, credit, or compensation.

• *Power hungry* – The computers behind large language models consume enormous amounts of electricity – for ChatGPT, the equivalent of 33,000 U.S. households. Answering a single query takes AI ten to one hundred times more energy than sending an e-mail.

"9 Problems with Generative AI, in One Chart" by Katie Jones in *Visual Capitalist*, November 26, 2023, summarized in Marshall Memo 1013

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2. Classroom Assessments Vulnerable to AI Cheating

In this online article, Australian educator Leon Furze says that as an English teacher in the age of generative AI, "I have absolutely no way of knowing whether the work I'm seeing at the end is the student's, or has been created partially or entirely with GenAI." The best way to address this challenge, Furze believes, is for a school's faculty to take a close look at the assessments being given to students. He recommends these steps:

- Ask teachers to choose and share one or two recent assessment tasks.
- Identify a couple of teachers who are proficient with generative AI tools.
- Ask those teachers to pretend they are students and use the AI tool to complete as much of several assessments as possible, as quickly as possible.
- During a faculty meeting, share the AI-generated solutions (click the article link below to see several examples).
- Facilitate a discussion in which teachers share their reactions, which will produce a clear realization (among those not already savvy) of how easily students can misuse AI.
- Form teacher teams and ask them to brainstorm specific ways to modify their assessments, or create new ones, so they are more resistant to cheating – for example, in-person demonstration of skills, collaborative work, and project-based learning.

What will emerge from this exercise, says Furze, is (a) how vulnerable many assessment tasks are to GenAI; (b) the need for teachers to clearly identify "which skills we are assessing and why;" and (c) the urgent need to decide which fundamental skills students need to learn "slowly, methodically, and without offloading onto technology and which skills and content lend themselves to using technology."

"The brutal reality is that Generative AI is here to stay," concludes Furze, "and it's going to impact every aspect of education, whether we like it or not… It doesn't matter if you're teaching English, maths, science, or art – GenAI is coming for your assessments."

"GenAI Strategy: Attack Your Assessments" by Leon Furze, May 13, 2024, summarized in Marshall Memo 1037

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3. Keeping Kids Honest in This Brave New World

(Originally titled "Grading Writing Just Got Weird")

In this *Educational Leadership* article, Philadelphia teacher Matthew Kay says the new AI bots have made grading students' written assignments a lot trickier. In his high-school classes, says Kay, "writing is an important way for students to show me – and each other – how they are thinking. ChatGPT isn't a threat because it fixes spelling and grammar or tells students how to be more concise or expressive. It's a threat because, when used thoughtlessly, it replaces the *creation* of ideas. If writing cannot be reasonably assumed to represent a student's thinking, it loses most of its scholarly value."

Right now, standard plagiarism detection tools can't reliably detect students' AI-produced writing, says Kay, but he believes he's found a way to spot students taking shortcuts:

- Add the Draftback extension to your Google Chrome browser.
- Require students to give teachers edit access to the Google Doc of every major piece of writing, and have students commit to doing all parts of every draft on the same Google Doc.
- Draftback turns a document's revision history into a video that can be played at controllable speeds, which allows the teacher to see every keystroke a student makes on a piece of writing.
- Draftback also gives a detailed breakdown of a document's history, including every revision, the number of "distinct writing sessions," the time and duration of each session, and which user made them.
- This allows the teacher to review each student's revisions on a piece of writing and compare it to the average for that type of assignment.
- If something seems fishy, the teacher can play the history of the document back at quick speed, looking for moments when chunks of text appear from nowhere.
- If that happened, a one-on-one chat with the student is in order: "Help me understand this. What happened here?"
- The bottom line: for students to game the system, they would have to put in more time than it would take to produce authentic writing.
- Draftback is also helpful for students to monitor and think about their own writing steps by watching the video of their revisions.

Another practice (which Kay believes is a good idea anyway) is having students submit successive drafts of their essays for feedback.

"Grading Writing Just Got Weird" by Matthew Kay in *Educational Leadership*, September 2023 (Vol. 81, #1, pp. 76-77), summarized in Marshall Memo 1001

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4. What Human-Type Teachers Do That AI Can't

In this online article, John Spencer makes the case for a blended approach to teaching, taking advantage of what artificial intelligence does well and what only teachers can do:

AI's strengths:

- Synthesize information
- Generate examples
- Role-playing
- Create systems
- Use predictive analytics
- Analyze a problem
- Help with conceptual understanding

What teachers do best:

• *Context* – We bring broader and deeper knowledge to in-person interactions and problem-solving – situations like the debate at a local school board, the institutional knowledge of a teacher, or the number of cultural values present in any classroom. As they conduct interactive pedagogy like project-based learning and Socratic seminars, says Spencer, teachers can be "the experts in facilitating the understanding of context… in a way that a machine simply cannot do."

• *Divergent thinking* – "Humans can think abstractly, draw on personal experiences, and incorporate emotional and cultural nuances into their decision-making processes," says Spencer. "Teachers can be wildly and unabashedly different." AI, on the other hand, is limited to its training data and lacks the ability to imagine and innovate.

• *Creativity* – In humans, this is "almost like an itch that we need to scratch," says Spencer. "Something nags at you and you just have to figure it out… A.I. experiences no joy when it finds an answer and no mild anxiety when an answer is elusive." Artificial intelligence depends on inputs and outputs from vast datasets, lacks self-awareness, and responds only when we ask it questions.

• *Empathy* – Humans can often "read the room" and pick up on intangibles like a person's body language. "Many teachers have an uncanny ability to figure out what is actually motivating a student in the moment," says Spencer, then scaffold learning based on interests, strengths, and goals, and fine-tune in real time as the student responds. What people remember about their best teachers is almost always in this affective realm.

"Our humanity, as imperfect as it may be, is a gift to our students," Spencer concludes. "In an age of AI, our students still need a human to listen and empathize; to experiment and adapt; to make mistakes and apologize. They will need a guide who can build a relationship and help them navigate a complex world."

"Why AI Can't Replace Teachers" by John Spencer, May 23, 2024, summarized in Marshall Memo 1040

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5. Classroom Rigor and Artificial Intelligence

In this online article, Eric Hudson says that during a recent workshop he gave on how students can use artificial intelligence to help them think, he was asked: *If students need to struggle in order to learn, why would we encourage them to use artificial intelligence?*

"I love this question," says Hudson. "It gets to the heart of what causes learning." What the question reveals is a common belief about rigor: that if we want students to learn, we need to get them doing things that are hard. Rigor is also associated with students' output: pages read, courses taken, levels completed. "At its worst, rigor is difficulty without purpose," says Hudson, "more about assessing what students can endure rather than what they have learned… Designing learning experiences for challenge is different than simply making things hard."

What's more important, he believes, are the *inputs* teachers design – meaningful tasks aligned to students' prior knowledge and responsive to students' values, culture, and identity – and the *process* involved in having students learn those tasks – scaffolding, differentiation, feedback – so students feel challenged and supported. "Outputs," says Hudson, "are simply how we assess how well students used the inputs to navigate the learning process."

More important than rigor, he continues, is students learning in their "zone of proximal development" (Vygotsky) and experiencing "flow" (Csikszentmihalyi). "Students learn," says Hudson, "when they take on challenging tasks that are emotionally satisfying and involve the guidance of a skilled partner like a teacher, tutor, or peer." The sweet spot of learning lies between boredom on one hand and confusion and anxiety on the other.

The human brain can only handle so much at a time and will stop processing when it's overloaded. But students will work hard if they trust the teacher, value the task, and are motivated to try something new and hard because they have a sense of belonging, relevance, and confidence that they will succeed. "The complexity of teaching," says Hudson, "is guiding students to the right places in the learning process where they can focus their precious cognitive and emotional energy on the tasks that will increase knowledge and competence."

Can artificial intelligence help with this kind of learning? Hudson believes AI can support good work at every level of Bloom's taxonomy:

- Remember – Helping a student memorize vocabulary or formulas by presenting them in a variety of formats;
- Understand – Helping students process information by organizing and explaining it in different ways;
- Apply – Modeling a potential way to solve a problem that allows the student to create their own solution and compare it to AI's;
- Analyze – Reviewing students' work and asking follow-up questions;
- Evaluate – Generating alternative arguments or perspectives for critique;
- Create – Offering feedback and elaboration on students' new ideas.

Initial research indicates that AI is especially effective at accelerating improvement among lower-performing students. Why? "Perhaps using AI knocks down some of the cognitive and emotional barriers that hold these performers back from learning deeply," says

Hudson. “Perhaps it offers assistance not previously accessible to them (like human tutors). Perhaps it smooths out the simpler or less-important parts of the process to ensure they’re fresh for complex tasks.”

“Back to School with AI, Part 4: AI and the Question of Rigor” by Eric Hudson on his website, September 22, 2023, summarized in Marshall Memo 1006

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6. Thinking Through the Pros and Cons

In this 17-minuteVox video podcast, Joss Fong explores the advantages and disadvantages of large language models for student learning. She makes the analogy of driving somewhere using GPS and not being able to remember the route afterward. GPS is a great help, and we’re willing to take a shortcut on the mental effort that would be involved in figuring out and remembering the route on a map.

But what about important learning in classrooms, Fong asks, “and how will we know that students have learned?” She lists a number of possible learning tasks and asks for which using a chatbot would – and would not – be acceptable to teachers and helpful to students’ long-term learning:

- Answers to a homework question;
- Background information on a topic;
- Definitions or explanations of a concept;
- Sources to find more information;
- Summaries of readings and lectures;
- Study guides for an exam;
- Ideas for how to respond to an assignment;
- Instructions for solving a problem;
- An outline for a paper or presentation;
- Examples, analogies, or counterarguments;
- A draft of a paper or a discussion post;
- A script of a presentation;
- Feedback on work;
- A revision of a text to improve it;
- A revision of a text to change its word count.

“Some of these definitely seem helpful for learning,” says Fong, “but others, it’s not so clear.”

Back to the question of desirable difficulties and our sense of when we’re learning. A study compared learning in two physics classes. In one students listened to well-presented lectures; in the other, students were given problems and had to struggle with them and then hear explanations. Students learned more in the latter, but thought the lectures were more effective. “Fluency is when information is going down easy,” says Fong. “It’s well presented, it’s organized, it’s convenient.” But in fact, “effortful participation” is superior.

"The risk with AI," Fong concludes, "is that we might not preserve that effort, especially because we already tend to misinterpret a little bit of struggling as a signal that we're not learning… Research shows that real learning requires things to be a little bit hard."

"AI Can Do Your Homework. Now what?" by Joss Fong on *Vox*, December 12, 2023, summarized in Marshall Memo 1016

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7. Four Guiding Principles

In this *Chronicle of Higher Education* article, James Lang (University of Notre Dame) says discussions of new artificial intelligence tools "are creeping like kudzu vines into every corner of the higher-education landscape, blocking out our views of everything else." Lang sees the potential of AI, but advises educators to proceed cautiously – not resisting but "creating more space for reflection and discussion as we enter this new era of human history." He suggests these guidelines:

• *Variety* – Students in any classroom learn in different ways and it's impossible for teachers to cater to each individual preference. "The best you can do," says Lang, "is offer multiple pathways to engage with the material, and hope that everyone in the room will discover the one that makes the difference for them." It's also good for students to struggle with using a learning modality that isn't their strong suit.

Thinking about how he will teach essay writing next year (Lang is returning to the classroom after a three-year hiatus), he is considering a hybrid use of AI. First, he'll have students spend ten minutes in class drafting an outline in longhand, sharing their ideas in small groups, getting feedback from him, and making revisions. Then he'll invite students to paste a rough thesis into ChatGPT, ask it to produce an outline, evaluate the result in a short written in-class assignment, then revise the AI outline and compose their essays.

• *Transparency* – Students will undoubtedly ask why they should do part one of this two-part exercise when ChatGPT could have done it for them. Lang believes that organizing one's thoughts – along with writing, speaking, understanding other viewpoints, and solving difficult problems – are skills that can only be learned through repeated, hands-on, AI-free practice. In an age of chatbot shortcuts, he believes teachers need to be explicit with this message: students need to do the work or they won't develop thinking and presenting skills that will be vital in their lives.

• *Sequencing* – A calculator can be used as a short-cut for laborious mathematical computations – but to use a calculator effectively, people must understand numbers. In the same way, says Lang, teachers need to make sure students have writing and thinking skills before diving into ChatGPT. The two-part lesson plan described above – getting students to first think through an assignment without AI – can assess and develop key skills and help teachers decide when it's appropriate for students to use technology.

• *Reflection* – "Most skills will benefit from a combination of practice and reflection," says Lang. "We try something, we think about what happened, and then we try again. The space between these two attempts gives our brains time to process and improve." This happens

when students write multiple drafts of an essay, with feedback and refining between each one. While ChatGPT can accelerate this process, human reflection is essential, and teachers need to slow things down so that will happen frequently.

"The Case for Slow-Walking AI" by James Lang in *The Chronicle of Higher Education*, March 15, 2024 (Vol. 70, #14, pp. 46-47), summarized in Marshall Memo 1029

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AI TOOLS AND TIME-SAVERS FOR TEACHERS

8. Enhancing Pedagogy

In this *SSRN* paper, Ethan Mollick and Lilach Mollick (Wharton School, University of Pennsylvania) identify five classroom strategies that are underutilized because they re time-consuming but are greatly enhanced with the new technology– and show how the new bots can be helpful:

• *Generating examples to help students understand difficult and abstract concepts* – The best way to explain new and challenging material is to give students a number of examples. "If students are presented with only one example," say Mollick and Mollick, "they may focus on the superficial details of that example and not get at the deeper concept. Multiple examples of a single concept can help students decontextualize the idea from the example, leading to better recall and understanding."

Ideally, examples provide a real-world context, anchor abstract ideas in an analogy or story, ground concepts in engaging details, reveal complexity, highlight nuances, help students think critically, and support the transfer of learning to new situations. These demanding criteria show how difficult it is for teachers to generate enough high-quality examples. That's where the bots come in. All a teacher needs to do is specify the concept, ask for varied examples, and describe the grade level of students and the style of writing required. Click on the full article below for examples on the concept of opportunity costs.

Of course the teacher needs to evaluate the examples generated: Are they factually correct? Are they relevant? Do they have enough detail? Will students find them interesting? Do they connect the abstract to the concrete? Having narrowed down to a good list of examples and presented them to a class, the teacher might then ask students what the examples have in common, have them compare and contrast several, and ask which different aspects of the concept each example highlights.

• *Providing varied explanations and analogies to address student misconceptions* – Clear explanations are central to good teaching, helping students build mental maps and achieve deeper understanding. But good explanations must be built on students' prior knowledge, take into account likely misconceptions, plan a step-by-step approach with organizational cues so students can follow along, and provide concrete details and analogies. LLMs can tackle these exacting demands, quickly generating explanations and analogies for a

specific grade level and level of understanding. See the article link for a suggested explanation of the concept of photosynthesis for elementary students.

• *Producing low-stakes tests so students can practice retrieving information* – Checking for understanding is a proven method of cementing material in long-term memory. But generating high-quality tests, quizzes, and mid-lesson "hinge" questions (to see if students are ready to move on to a new topic) is "an effortful task," say Mollick and Mollick. LLMs can quickly generate diagnostic retrieval exercises. See the article link for examples of quizzes on U.S. history and high-school biology.

• *Assessing students' knowledge gaps to guide instructors' next steps* – The best way for teachers to know what to do next is asking students questions like these:

- *What is the most important idea or concept covered in class today?*
- *Why do you think this idea is important?*
- *What is the most difficult class concept so far?*
- *What did you struggle to understand?*
- *What concept or problem would you like to see explored in more detail?*

LLMs can be asked to digest students' responses to questions like these (perhaps in the middle of a class) and quickly generate an analysis of responses. See the article below for key points and areas of confusion on a lesson on BATNA (Best Alternative to a Negotiated Agreement).

• *Creating distributed practice exercises to reinforce learning* – "Students need to practice retrieving information not just once but multiple times during a course," say Mollick and Mollick. It's also important for students to continuously make connections among the different concepts and skills they've learned. But even when students know about the value of distributed practice, they continue to "cram" for tests at the last minute, which means teachers must be intentional about distributing practice. To do so, teachers need to know:

- *What are the most important topics for students to remember?*
- *Which connections between topics are critical and should be practiced often?*
- *How often and when should students retrieve previously learned material?*
- *What is the best spacing of assessments to allow just the right amount of forgetting?*
- *When have students had enough practice?*

LLMs can be very helpful designing and scheduling quick quizzes spread out over days, weeks, and months, providing an effective way to lodge concepts and skills in students' long-term memory. See the article link for examples of distributed practice during a unit on the Enlightenment and the American Revolution.

"Using AI to Implement Effective Teaching Strategies in Classrooms: Five Strategies, Including Prompts" by Ethan Mollick and Lilach Mollick in *SSRN*, March 17, 2023, summarized in Marshall Memo 978

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9. AI As Co-Teacher in a Nevada High School

In this *English Journal* article, Nevada English teacher James Oldham says schools need to get past trying to block and prohibit AI apps like ChatGPT. Yes, some students are

cutting corners and cheating, he says, but generative AI is here to stay and we should explore "safe, productive" strategies for using it. "This intelligent tool," he says, "can revise, edit, research, and redesign our use of language in new, complicated ways." That's especially helpful because today's English teachers must go beyond novels, plays, and poetry and give students the intellectual tools to explore graphic novels, films, and interactive digital content. Here's how he's been using ChatGPT with his students:

• *Part 1: Revision with AI* – Oldham asked students to find a previous piece of their own writing on which they'd received a grade of C or lower, accompanied by suggestions teachers made on how it might be improved (and, if possible, the rubric). Students fed their essays and feedback into ChatGPT and asked for revisions along the lines of the comments. The bot rapidly made improvements in spelling and grammar and suggested new content to fill gaps in their argumentation. Working with Oldham, students found they had to prompt ChatGPT several more times to improve essays but they were still not up to standards.

• *Part 2: Research with AI* – Students then used ChatGPT to develop topics for their essay, find research materials (including academic papers), and make further revisions. They presented a claim and then asked the bot for a counterargument, which they then had to address in their essay. This greatly improved the quality of their thinking and writing. "Searching for and using research papers can seem like a daunting task," said one student, "but GPT made it much more of an attainable goal." In one-on-one conferences with students and all-class discussions, Oldham prompted students to question the quality and possible bias of some of the material that popped up.

• *Part 3: Literary analysis with AI* – Oldham then had students choose a work of literature they'd studied earlier that school year and ask ChatGPT to act as an academic search engine and find sources to support the claims they'd written about. Students found they often needed to resubmit their questions to find what they were looking for. When students asked "leading" questions, Oldham noticed *user interaction bias*, with the bot producing what students were looking for rather than broadening their thinking. "It allows the student to maintain an echo chamber of what they already hold to be true," he says, "without having to research various resources that present more-complicated views of the literature."

• *Part 4: Narrative writing with AI* – Finally, Oldham asked students to use ChatGPT to develop their writing technique, descriptions, sensory language, and precise use of words and details. Students came up with their own prompts, asked ChatGPT to create a two-page narrative, and revised it to incorporate details, figurative language, dialog, and other literary devices. Working with an initial essay generated by the bot allowed students to focus on style and voice without having to go through the initial process of generating the content. "We discussed what AI wrote," says Oldham, "what the student added, and how their additions changed others' perceptions of the story."

During this stage, students could easily see ChatGPT's limitations. Some of the stories it generated were confusing and all seemed mechanical, formulaic, vague, and lacked "realness." Oldham says students realized "the tropes common among narratives get recycled, and AI lacks the unique human ability to take unlike ideas and create something new out of

them." But students were getting instant feedback on their writing – great for students and also for Oldham, who wasn't taking home stacks of essays and not giving students feedback for days or weeks.

"The assignments and lessons that I assigned my students," Oldham concludes, "evolved into collaborations, as many students were fascinated by how the technology worked… Using ChatGPT in my classroom has allowed me to personalize curriculum and instruction for students. Now, a student who reads *Diary of a Wimpy Kid* and one who reads *Moby Dick* can both receive personalized writing prompts. A student who struggles to write entire essays can now receive round-the-clock support from ChatGPT every step of the way, from research assistance to revision. Students can now explore realms of literature, media, and technology in an interactive way with ChatGPT."

"ChatGPT: The Co-Teacher We Need?" by James Oldham in *English Journal*, March 2024 (Vol. 113, #4, pp. 53-60), summarized in Marshall Memo 1033

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10. Putting the Tools to Work in Classrooms

"AI is here to stay," says Daniel Leonard in this *Edutopia* article, "and today's students will enter a world where they'll be expected to engage with it. So it is critical for students to understand the capabilities – and limitations – of AI tools, even as those capabilities rapidly evolve." Leonard suggests nine AI-based lesson ideas:

• *Animate students' drawings* – Using the Animated Drawings tool from Meta AI Research, students make a sketch, take a photo of it, upload the photo to the site, and see the sketch come alive performing dozens of actions: walking, dancing, leaping, and more. Students can then write a story about why their drawing is moving in certain ways.

• *Spur critical thinking about science* – A teacher might ask ChatGPT, *Please explain how clouds form to a third-grade audience* and have students critique the response: What did it leave out? What parts of the answer might not be accurate? Is there anything that's still not clear?

• *Images as writing prompts* – AI image generators like Stable Diffusion, Craiyon, Microsoft Bing's Image Creator, or Canva's New AI Image-Generating Tool can generate an image (like a goat eating cake while on a surfboard) that can spark creative writing by students.

• *Fact-check AI-generated historical images* – A teacher might ask one of the AI tools above to create an image of Sacagawea guiding Lewis and Clark, switch the "style" setting to "photograph" for maximum realism, and ask students to use what they've learned about this period of history to tell what is accurate and what isn't.

• *Seeing all sides of a math problem* – A teacher can have students solve problems with pen and paper, then feed the problems into Photomath and compare its solutions in terms of strategy and efficiency.

• *Voice imitation* – ChatGPT can be asked to imitate the style of well-known historical figures – for example, a teacher might ask it to write poems about the school's mascot in the

style of Shakespeare or Maya Angelou, or speeches about the impact of climate change by Abraham Lincoln and Martin Luther King Jr., then ask students to comment on language use, alliteration, and literary devices.

• *Chat with historical figures* – Hello History allows students to simulate conversations with Cleopatra or Einstein (for example) and then look for inaccuracies and distortions.

• *World languages* – Chatbots can be helpful for vocabulary development, grammar, and overcoming students' self-consciousness about pronunciation and making mistakes. A possible prompt: *I want to practice my Spanish. Can you speak to me in Spanish at a ninth-grade level, with short sentences?*

• *Grading ChatGPT's writing* – Ask the chatbot to generate an analysis of, for example, *Of Mice and Men*, then have students get into groups and critique the essay using a rubric and come up with constructive criticism. "By taking on the role of an editor," says Leonard, "students can actively develop a better understanding of what makes an essay successful."

"9 Tips for Using AI for Learning (and Fun!)" by Daniel Leonard in *Edutopia*, October 30, 2023, summarized in Marshall Memo 1010

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11. Tips for Evaluating AI

"AI edtech tools can provide power boosts to instruction," say Tracy Huebner and Rachel Burstein in this *SmartBrief* article. They suggest five questions teachers might ask as they figure out the best ways to harness AI tools:

• *Does the tool allow me to differentiate?* The features to look for are scaffolding, multiple ways of assessing learners, opportunities for immediate feedback, and ways to free up teacher time. For example, Khan Academy's chatbot Khanmigo allows students to get responses directly linked to their questions.

• *Does the tool offer access to vetted educational materials?* This is helpful for finding the best resources without having to sort through unvetted options – a real time-saver for teachers.

• *Can the tool promote student interest?* "So-called intelligent tutoring systems may have the potential to make this process easier," say Huebner and Burstein, "offering guidance to students about how to evaluate sources of interest to them and freeing teachers to foster deeper student interest. Of course, accuracy, bias, and ease of use will be important considerations as educators evaluate such tools."

• *Does the tool help build relationships?* Automatic translation of meetings with parents about students' progress is a very attractive feature. Tools like AllHere and Family Engagement help educators communicate with historically underserved families.

• *Does the tool offer helpful learning analytics?* AI has great potential for providing real-time data on student learning and struggles, say Huebner and Burstein, and offering suggestions for specific interventions. For example, TeachFX provides teacher feedback at scale.

"5 Questions to Ask When Evaluating AI Edtech Tools" by Tracy Huebner and Rachel Burstein in *SmartBrief*, February 4, 2024, summarized in Marshall Memo 1024

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CRAFTING AND FINE-TUNING PROMPTS

12. Skillfully Framing Questions

(Originally titled "Prompt Literacy: A Key for AI-Based Learning")

In this *Educational Leadership* article, consultant/instructional coach Michael Fisher and curriculum mapping guru Heidi Hayes Jacobs say that to get the most from ChatGPT and other large language models, educators and students need to become adept at posing the right questions. They suggest the four-step CAST model:

• *Criteria* – The format and scope of what's being requested – for example, are you looking for short sentences, a bulleted list, rhyming couplets, a specific type of vocabulary?

• *Audience* – Who the output is geared toward – for example, fourth-grade students, a group of meteorologists, a DEI committee?

• *Specifications* – Relevant details and descriptions – for example, "Write a poem about summer in iambic pentameter using a languid tone."

• *Testing* – Check and refine the original prompt to add additional criteria and fine-tune the product, perhaps asking AI to help brainstorm or present a logical sequence of steps.

"As part of prompt literacy development," say Fisher and Jacobs, "educators should also encourage students to defend or extend their output. Why is this the best answer? What products could I create with this information? Did the AI get it right and how do I know?" All this is vital to working proficiently with and thinking critically about these new tools, they say – "skills that will become increasingly important in the age of AI."

"Prompt Literacy: A Key for AI-Based Learning" by Michael Fisher and Heidi Hayes Jacobs in *Educational Leadership*, Summer 2023 (Vol. 80, #9, pp. 18-19, summarized in Marshall Memo 994

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13. How to Improve Results from Prompts

In this article in *School Library Journal*, Virginia educators Idamae Craddock and Kristen Wilson suggest six ways to improve results when tapping into ChatGPT and other large language models:

- *Be specific*. Include the information, tone, voice, audience, length, and type of output you're seeking; long prompts will work just as well as a short one.
- *Provide background information*. If you're asking for a lesson plan, tell how many students you're teaching, their ages, the languages they speak, and the preceding curriculum unit.

- *Mind your manners*. If your prompt uses crude language, the LLM will respond in kind; if you use polite language, you'll train it to respond in kind.
- *State your constraints*. You can request a 20-minute lesson plan, a 750-word article, a list of 10 historical events.
- *Fine-tune*. If you don't get what you're looking for the first time, re-word your prompt.
- *Push back*. "If the output is incorrect, too long, too short, the wrong tone, wrong information, or wrong structure," say Craddock and Wilson, "you need to reply with that feedback. Treat the prompt as a conversation – that's what it is."

"Six Prompt Tips" by Idamae Craddock and Kristen Wilson in *School Library Journal*, November 2023 (Vol. 69, #11, p. 16), summarized in Marshall Memo 1011

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14. Some Specific Suggestions

With input from her colleagues, Texas-based educator Alexis Wiggins has generated a set of prompts for using ChatGPT in a wide variety of school settings. Here's a sampling:

• *Curriculum design* – Create a lesson plan for a 4th-grade science class on the water cycle, including videos and interactive activities.

• *Assessment design* – Create a problem-based assessment for 12th-grade physics on the topic of electromagnetism.

• *Class activities* – Provide a topic for a debate in a high-school government class about digital literacy.

• *Student collaboration* – Create role-play scenarios for practicing French conversational skills.

• *Personalized learning* – Create a set of personalized math problems for a student at the 8th-grade level who is struggling with algebra, including step-by-step solutions to enhance understanding.

• *Professional development* – Generate a list of ideas and activities that help educators adopt inclusive language practices that respect and affirm all students' identities.

• *Language learning* – Design a two-week project with the theme of restaurants, markets, and food for a third-year Spanish class. The project should require students to engage in all of the ACTFL proficiencies at some point, though it should only assess speaking and writing. Please provide a breakdown/timeline of due dates for various components.

• *Counseling, advising, and student life* – Generate 10-minute engaging activities for high-school students using Yale's RULER approach.

• *Art and creativity* – Suggest an art project idea for 1st graders that combines drawing and storytelling.

• *Physical education and athletics* – What are some drills that can help improve passing accuracy and decision-making under pressure for a high-school girls' varsity basketball team?

• *Essential questions* – Based on Grant Wiggins and Jay McTighe's definition of Essential Questions, please generate eight Essential Questions for a seventh-grade unit on the solar system, seasons, and moon phases.

"ChatGPT Tips and Tricks for K-12 Educators" by Alexis Wiggins, February 21, 2024, summarized in Marshall Memo 1025

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15. Prompts for Social Emotional Learning

This collection of suggested prompts, developed by AI for Education in collaboration with Margot Toppen, can elicit from a chatbot ideas for developing K-12 lessons on social emotional learning topics:

• *Reflective journaling*: Create a list of journal reflection prompts that help students reflect on their emotions, strengths, and goals.

• *Mindfulness*: Design mindfulness strategies to help my students cope with stress, test anxiety, and feelings of isolation.

• *Classroom meetings*: Create a class meeting agenda that fosters inclusion, empathy, perspective-taking, respect for others, and a positive community.

• *Cooperative learning*: Design a cooperative learning project for [a curriculum unit] that includes strategies to help students develop positive relationships with their peers.

• *Conflict resolution role-play*: Generate culturally responsive role-playing scenarios to help students practice navigating difficult situations, solve problems, and/or resolve conflicts.

• *Modeling SEL competencies*: Brainstorm different strategies that I can use to model [specific SEL skills and competencies] for my students.

For more SEL prompts and other ideas, click here.

"6 Strategies for Using AI for Social-Emotional Learning" from *AI for Education*, developed in collaboration with Margot Toppen, December 1, 2023, summarized in Marshall Memo 1014

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If you have feedback or suggestions, please e-mail kim.marshall48@gmail.com

About the Marshall Memo

Mission and focus:

This weekly memo is designed to keep principals, teachers, superintendents, and other educators very well-informed on current research and effective practices in K-12 education. Kim Marshall, drawing on 54 years' experience as a teacher, principal, central office administrator, writer, and consultant lightens the load of busy educators by serving as their "designated reader."

To produce the Marshall Memo, Kim subscribes to 60 carefully-chosen publications (see list to the right), sifts through more than a hundred articles each week, and selects 5-10 that have the greatest potential to improve teaching, leadership, and learning. He then writes a brief summary of each article, pulls out several striking quotes, provides e-links to full articles when available, and e-mails the Memo to subscribers every Monday evening (with occasional breaks; there are 50 issues a year). Every week there's a podcast and HTMI version as well.

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Core list of publications covered

Those read this week are underlined.

All Things PLC
American Educational Research Journal
American Educator
American Journal of Education
American School Board Journal
AMLE Magazine
ASCA School Counselor
ASCD SmartBrief
Cult of Pedagogy
District Management Journal
Ed Magazine
Education Digest
Education Gadfly
Education Next
Education Week
Educational Evaluation and Policy Analysis
Educational Horizons
Educational Leadership
Educational Researcher
Edutopia
Elementary School Journal
English Journal
Exceptional Children
Harvard Business Review
Harvard Educational Review
Independent School
Journal of Adolescent and Adult Literacy
Journal of Education for Students Placed At Risk (JESPAR)
Kappa Delta Pi Record
Kappan (Phi Delta Kappan)
Knowledge Quest
Language Arts
Learning for Justice (formerly Teaching Tolerance)
Literacy Today (formerly Reading Today)
Mathematics Teacher: Learning & Teaching PK-12
Middle School Journal
Peabody Journal of Education
Principal
Principal Leadership
Psychology Today
Reading Research Quarterly
Rethinking Schools
Review of Educational Research
School Administrator
School Library Journal
Social Education
Social Studies and the Young Learner
Teachers College Record
Teaching Exceptional Children
The Atlantic
The Chronicle of Higher Education
The Journal of the Learning Sciences
The Language Educator
The Learning Professional (formerly Journal of Staff Development)
The New York Times
The New Yorker
The Reading Teacher
Theory Into Practice
Time
Urban Education