Using AI to Fuel Engagement and Active Learning

Used in combination with creative human intelligence, artificial intelligence can transform the way students experience school.

Amy Holcombe and Steve "Woz" Wozniak

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"What's your favorite subject?"

"Recess," she promptly replied.

"What's your second favorite subject?" I asked.

Noelle, the precocious 2nd grader and burgeoning artist who had mastered reading at the age of 3, answered, "Dismissal!"

Despite the presence of supportive adults and a nurturing learning environment, Noelle found herself disengaged from school. Spending long hours confined to a desk for 180 days a year did not ignite her passion for learning. Instead, she thrived outdoors, enjoying activities like bug collecting, devouring books, and sketching the bats that flew out of the bat house she got for her birthday. While her curiosity knew no limits, school failed to engage her in exploring, thinking, and problem solving. To Noelle, it was a place where teachers imparted knowledge and students listened dutifully.

Like Noelle, most children possess an innate curiosity and drive to acquire knowledge. They exhibit boundless enthusiasm for experimentation, skills acquisition, and problem solving. This is evident when observing them at zoos, children's museums, playgrounds, or engaging in imaginative play with friends. These stimulating environments, where children are *active* participants in their learning as opposed to passive recipients of information, yield 100 percent engagement. As educators, our greatest challenge is replicating these engaging learning experiences within the confines of four classroom walls filled by 30 desks and limited resources, a scenario designed to educate the masses. Impossible to reach a 100 percent engagement level? No. Challenging? Yes.

New artificial intelligence (AI) tools are rapidly making it *less* challenging to break down the proverbial classroom walls and create more interactive and engaging learning experiences in schools. AI encompasses a wide array of applications that can be used in K–12 education. These include robotics, natural language-processing models, image and music generation tools, automated planning and scheduling, machine learning, and knowledge-based systems (U.S. Department of Education, 2023). Many educators have become early adopters and champions of AI, using it as a pedagogical tool to enhance student engagement and motivation for learning (Quizlet, 2023). Already, we are beginning to experience the ways in which AI can increase engagement in the classroom while also reducing the rote work of teachers.

But there is more to be done. We believe that *artificial intelligence* (machine learning) powered by large language models and prompted by *actual intelligence* (the human brain) can significantly increase engagement for students like Noelle. Here are some examples.

Creative Ways to Use AI

From simple idea generation to the use of AI chatbots for research to working with customized GPTs (generative pre-trained transformers) targeted at specific content areas, teachers are experimenting with AI to level-up learning. The following student engagement activities are each based upon Steve's model:

Artificial Intelligence
+ Actual Intelligence
Increased Student Engagement

This model relies on machine learning to support more authentic learning experiences for students. We tested each of these activities with the most widely used natural language GenAI tools, including ChatGPT, Gemini, Claude, and Perplexity. The generated results were of similar quality and usability; however, we anticipate that these, and other tools, will rapidly advance in their usability as the technology improves.

As with any GenAI tool, the output quality increases in relation to the quality of the input. For best results, teach students how to provide detail and specificity in their prompts (the question or input that is provided to the GenAI model) and then take advantage of the "ask follow-up" option provided to increase the quality of the output.

Gather Facts Quickly

Remember those early research projects when your class spent a week going to the school library, using a card catalogue to find resources on a topic? Educators are now well-aware that basic facts are readily available online and that it is students' *transformation* of them into new products that holds the real educational value. Shorten the fact-finding process by teaching students how to use AI to quicky gather information, allowing more time for complex information-processing tasks that require "actual intelligence," such as fact-*checking* and analysis. After inputting a prompt to gather facts (and vetting those facts), students should activate their "actual intelligence" to transform those facts into new products such as a comparison paper, presentation, speech, or diorama.

Sample prompt: *Create a content matrix for beavers, nutria, groundhogs, and muskrats that compares their scientific name, physical characteristics, preferred environment, and behaviors.*

Create Accessible Content

Student engagement increases when content is both culturally relevant and accessible. To enhance content accessibility, educators are turning to AI to adjust the reading level for mixed-ability groups within a class and are translating content into students' primary languages, catering to diverse learning needs with great efficiency. After inputting a prompt to revise the text level, students can then complete the teacher planned activity for that particular lesson without the barrier of accessibility.

Sample prompts: *Rewrite this passage at a 3rd grade level. [Or] Translate this passage from English into Spanish.*

Craft Case Studies

AI tools efficiently create content, such as case studies or scripts, saving educators time. By inputting a prompt with parameters such as audience, voice/tone, and length, educators can receive tailored case studies in seconds, enhancing student engagement in complex problem-solving discussions with real-life simulations. Students can further engage in the content and ideas through role-play, debate, or by writing persuasive arguments to convince others of their viewpoints.

Sample prompt: *Create three single-paragraph case studies depicting the experiences of the British, French, and Germans following the signing of the Treaty of Versailles. In each case study, identify the country's main motivations and explain the conflicts they had with each of the other countries.*

Gamify Learning

Enhance learning through gamification by using AI to create interactive

3 Tips for Citing AI in Student and Teacher Work

1. Note the way AI is used in an assignment (e.g., was it used for brainstorming, inspiration, revising, or generating the content?).
2. Name the AI tool used.
3. Provide the prompt used.

Impossible to reach a 100 percent engagement level? No. Challenging? Yes.

activities like word walls, Jeopardy or game boards, scavenger hunts, crossword puzzles, and vocabulary games. Introducing novelty into the learning process boosts student engagement and retention of content.

Sample prompt: *Create a Jeopardy Board for the novel* To Kill a Mockingbird.

Generate Activities

One of the more popular uses of AI by educators is to brainstorm grade-level learning activities that are more engaging than what they've done previously or than what is suggested in their curriculum materials. The AI tool will first deconstruct the learning standard, breaking it down into its fundamental components. Then it will generate learning activities designed to engage students with the content by drawing from the best ideas from across the web. To explore a single suggestion further, use the "ask follow-up" option for more details and how-to's.

Sample prompt: *Generate a list of highly interactive activities that are appropriate for teaching a 4th grader about the causes of day and night and the phases of the moon.*

Stimulate Writing

Many teachers use RAFT (role, audience, format, topic) as a structured framework for increasing writing engagement. This entire process can be modeled and taught to students using AI. As a whole group, students can practice writing AI prompts—changing out the role, audience, format, and topics—and quickly review how the output of the AI tool changes. After sufficient modeling, challenge students to create their own RAFT writing sample. They can then feed it into an AI tool for personalized recommendations on increasing clarity, tone, organization, or even to serve as a grammar checker.

Sample prompt: *Generate a 200-word letter written from the perspective of an atom, asking the Cavendish Laboratory not to be split.*

Personalize Tutoring and Test Preparation

Using AI to study smarter is one of the most cited uses by students. AI is a highly effective tool for engaging students in previewing and reviewing content by generating vocabulary games, feeding questions at different DOK levels, summarizing complex material, reviewing processes, and more. When students use AI to craft their own study experiences, they are more engaged and motivated to learn the content.

Sample prompt: *Create a match game to teach me the parts of a plant cell.*

Write Songs for Learning

There is much research linking music to information retention. Teachers and students can select a well-known tune and ask AI to generate a content-related song using that melody. Challenging students to use AI to write a first version or even a first verse followed by further student-written verses will not only create a highly engaging learning activity but will aid in moving the information into long-term memory.

Sample prompt: *Write a song to the tune of "Happy Birthday" to teach me about Marie Curie.*

Generate Choice Boards

Nothing is more engaging than getting to choose how you learn. Provide a curriculum standard, grade range, and number of choices and let AI do

the hard work of generating assignments. Present the choice board to students, allowing them to select which activities they will complete to demonstrate mastery.

Sample prompt[1]: *Create a choice board for 8th graders with 10 options for mastering the following curriculum standard: Analyze the relationship between trade routes and the development and decline of major empires (e.g., Ghana, Mali, Songhai, Greece, Rome, China, Mughal, Mongol, Mesoamerica, Inca, etc.).*

Produce Plays

Do you want to engage all your students in active learning? Ask AI to generate short plays, complete with stage design tips, costuming, narration, and dialogue around a topic. Divide the class into groups, each with a different AI-generated play, and challenge them to produce the play for the class, interpreting the script by acting it out for themselves and their peers as they gain a deeper understanding of the content.

Sample prompt: *Write a five-page script at a 9th grade reading level for a play about the Boston Tea Party that presents the perspectives of both the British government and American colonists. Provide stage design tips, costuming, narration, and dialogue for six characters.*

For those seeking more inspiration, Facebook and Instagram have a multitude of groups dedicated to the use of AI in K–12 education. Popular tools being used by educators include but are not limited to MagicSchool, Mizou, Diffit, Khanmigo, Hello History, Curipod, Parlay Genie, Teacher's Buddy, Eduaide.Ai, Brisk Teaching, Twee, LingoTeach.ai, Gibbly, and PI. Teachers are largely leading the way in the development of these tools and are even monetizing GPTs by developing and offering them to others in the field seeking to save time.

Reflect & Discuss

How could you use AI in the classroom to strengthen your students' critical thinking skills or "actual intelligence"?

Which activity suggested by Holcombe and Wozniak piqued your interest the most? How could you incorporate it in an upcoming lesson or introduce it to staff?

Looking Around the Proverbial Corner

It is expected that AI will soon become a standard tool for all educators, akin to textbooks or computers. As its adoption grows, the need for regulation will rise in tandem. In 2023, the U.S. Department of Education published its report *Artificial Intelligence and the Future of Teaching and Learning*, which includes definitions of terms, explanations of new technologies, and guidance on the appropriate use of AI tools. Nonprofit organizations such as the Consortium of School Networks (COSN) and AI4K12.org have crafted guidelines for AI use in classrooms, in addition to an increasing number of states and districts.

In general, there are three best practices for the transparent use of AI in teacher and student work. To cite AI use in instruction, Steve suggests:

1. Noting the way AI is used in an assignment (e.g., was it used for brainstorming, inspiration, revising, or generating the content?).
2. Naming the AI tool used.
3. Providing the prompt used.

As with any technology, the increased adoption of AI will lead to both innovative practices and unintended consequences. For example, overreliance on the use of AI may lead some educators to stray away from state mandated curriculum standards in favor of novelty activities. Further, a lack of training may lead to the misuse of AI, failure to cite original sources, or even the spread of misinformation when facts are not checked. As educators, we must take these lessons of experience and learn from them so that we mitigate any collateral damage while realizing the benefits of combining AI with actual intelligence to achieve increased engagement for all students. AI is not a substitute for human connection but rather a support for teachers. It cannot replace the "human element of teaching, which includes empathy, creativity, and adaptability to unique learning needs" (Greene-Harper, 2023).

When used in purposeful ways by talented educators, AI offers the potential to personalize learning engagement for all students, ensuring that actual intelligence will always carry greater value than artificial intelligence. And for learners like Noelle, AI allows them to become active participants in their own

learning, offering limitless paths to engage with data, information, and other students in ways that are beyond our current imagination.

[1]Sample prompt from the North Carolina Department of Public Instruction's social studies standards.

Authors' note: Portions of this article were edited with Perplexity AI, using the prompt, "Rewrite for clarity."

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