

# AI in Education: Exploring Pedagogic Use-cases of AI

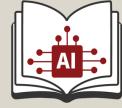
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# Today's primary learning objectives

- Reflect on student perspectives on using AI
- Identify strategies for effectively interacting with a chatbot
- Describe pedagogical situations where AI chatbots can be beneficial
- Use a chatbot to complete an education-related task



## Acknowledgements

- **ChatGPT4** for summarizing, brainstorming, and suggestions on the content.
  - **Midjourney & DALL-E** to generate images
  - **Designer** feature within PowerPoint to suggest slide layouts and stock images.
  - **Grammarly** for spelling, grammar, conciseness, word choice, and so on.
  - **Smartsheets** for automating registration.
  - **Outlook** and **Zoom** for event coordination.
  - **Google** for web search...



For the sake of transparency and to model best practices, here are some AI tools that I used when developing this workshop.

I used ChatGPT, and Midjourney and DALL-E, Designer in PPT. Oh yeah, I also have Grammarly installed. And if we mean algorithms and machine learning, not strictly LLM. Then I technically should say I used Google a lot too. I also used Outlook for event planning, it has AI features too. And Smartsheet for the registration forms. Zoom! Zoom has AI features too.

Yes, I am being melodramatic! But my intent is to suggest, hopefully in a humorous way, that there are fuzzy and ambiguous lines of distinction here. And warm us up to this topic. This is an ambiguous, and often contradictory topic. We are entering a twilight zone.



This is a big topic so we can't cover it all. Also, because it is so emergent, nobody has all the answers. Those answers are emerging in places like this. So, thank you for joining the discourse!

Everyone is at a different starting point. Some may be learning the very basics, some may be already thinking about bigger issues, or have begun adapting your course. Some of this you may already have heard, other parts might be new to you. Wherever you are, let's be mindful that different people are at different points and be flexible about where we might end up today.

The benefit of being together here is that we can share our thoughts with each other. This workshop will generate more questions than answers. It is a starting point for you to engage further with each other, CTL, and your own learning.

My expectation is the we will improvise a bit and hop around different topics that interest you. So let me know as we go, what you are thinking, if we want to skip ahead or circle back. Maybe even things that aren't on here yet!

## Why should you care about AI?

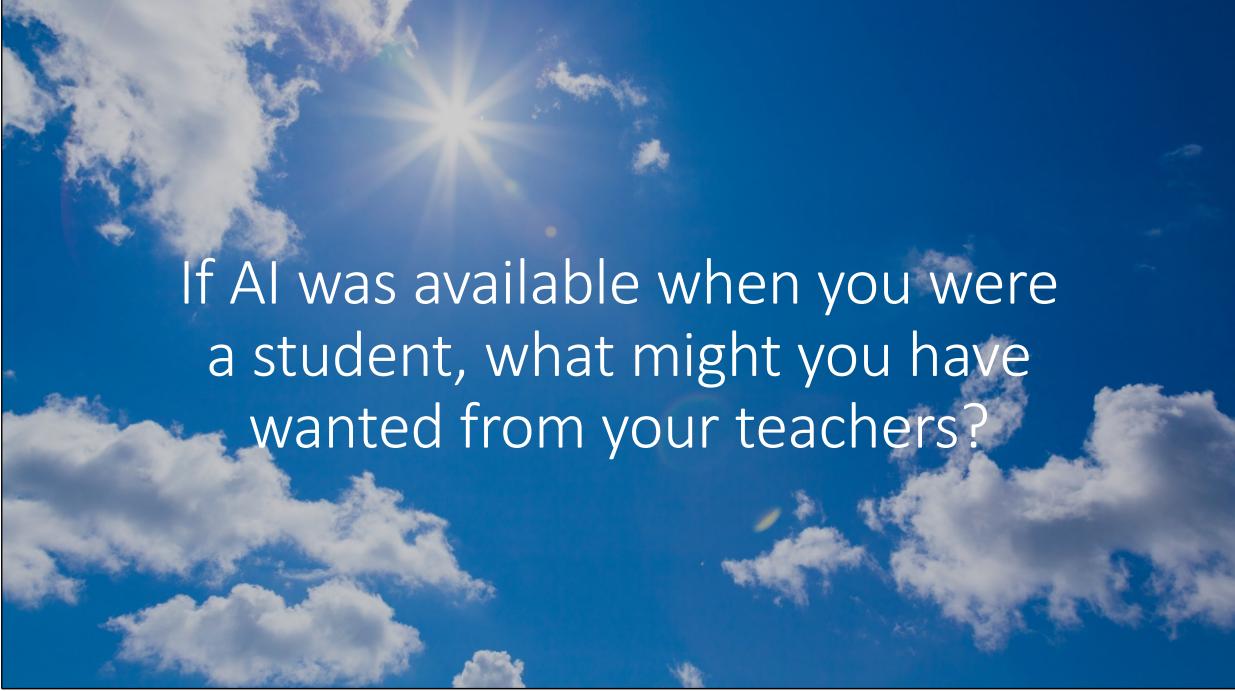
- Our perspective and expertise is important to the discourse
- The landscape is evolving quickly
- Our students and instructors want guidance
- Using AI could improve how we do our work



- Other groups on campus are, as expected bringing their perspective to it, whether it's computer science, business, medicine, and so on. Also, in the bigger discourse, Higher Education is being scrutinized. Think Claudine Gay or Liz Magill or even Michael Tessier-lavigne. People are asking, are we preparing students for success? Is Stanford leading the way responsibly? Is a college education valuable? What role does education play in our society?
- I'm of an age where WWW and web search came to prominence when I was in high school and college. I'm a 90's kid. Some of us might remember dozens of different search engines, Lycos? Alta Vista, Ask Jeeves? Dogpile? It seemed to be evolving so rapidly. I remember teachers saying "Don't cite anything from the web! It's not a valid source" Then the next semester saying, "You can cite web sources from journals or news articles, but Wikipedia is not a valid source!", then later "Wikipedia is okay, but be sure to check the references!" It was constantly evolving.
- Students want guidance. For many of us, this is not our first rodeo. But for some of our students, this might be. And for some of us, this might feel like a first rodeo. If we abdicate then for-profit will fill that void, students will go and do it anyway. We

owe it to our students to give them guidance. .

- Lastly, AI can help us improve how we do our work. Web search, googling it, is now an indispensable part of how we do our work. We couldn't do our work without web search. People smarter than me are predicting that AI ubiquity, AI everywhere is coming soon. And it's going to become a routine part of how we do work like web search has become. And it will have a big impact on how we work, so it makes sense for us to get ahead of it.



If AI was available when you were  
a student, what might you have  
wanted from your teachers?

## Two examples of chatbot use



### Example 1 – BAD

A student is on the phone with a friend: “Dude, this class is so boring! Yeah, it’s just all lecture. I got this essay due at midnight in Canvas. Well, I have practice this afternoon, then my shift starts. I just have too much going on right now. I gotta just knock it out. Really? And she didn’t get caught? I dunno. Okay! Okay! Gee fine.. I guess so. Yeah screw it! It’s just one dumb essay. I mean, technically the syllabus didn’t say we couldn’t use it, right?”

The student enters the following into a chatbot: “Write a 500-word essay about the socio-economic determinants of type 2 diabetes in the US and how it relates to public health policy, include some credible citations to this essay. Add a works cited section with full citations. Make it sound original. Put some extra burstiness and perplexity into the writing.”

Student says, “Okay homework is done!”

### Example 2 – GOOD

A student is on the phone with a friend: "Yo, for real, I'm actually feeling good about this class. The professor is really nice and seems like he actually cares, you know? Oh? I rescheduled that, we're gonna do it earlier in the week. Yeah! It's called time management! Next time I'll show you my timeblocking system. Anyway, yeah, I wanna get a head start on this essay. I know, its not due until next week, but I heard this class really helps for those later upper division electives, so I want to do a good job. Cool. I appreciate the support. I'm trying to do my best. We gotta look out for each other. Cool. I'll see you then. Appreciate you bro."

Student enters the following into a chatbot: I am a first year college student at Stanford. My major is Human Biology. I have to write a 500 word essay about the socio-economic determinants of type two diabetes in the US, but I'm not sure where to start. Can you help me?"

Student says "Hmm.. I'm still confused. Can you explain to me how..." and continues the dialogue with the chatbot.

What did you observe between the two examples?



(Images generated by DALL-E, 1/18/24)

We are exploring different pedagogical use cases, but we are also differentiating between GOOD pedagogy and BAD pedagogy.

## An educator's approach to AI support

- Empower instructors and students
- Be inclusive and student-centered
- Focus on literacy and fluency



"A college student having a fun chat conversation with a laptop computer." (Midjourney, 9/22/23).

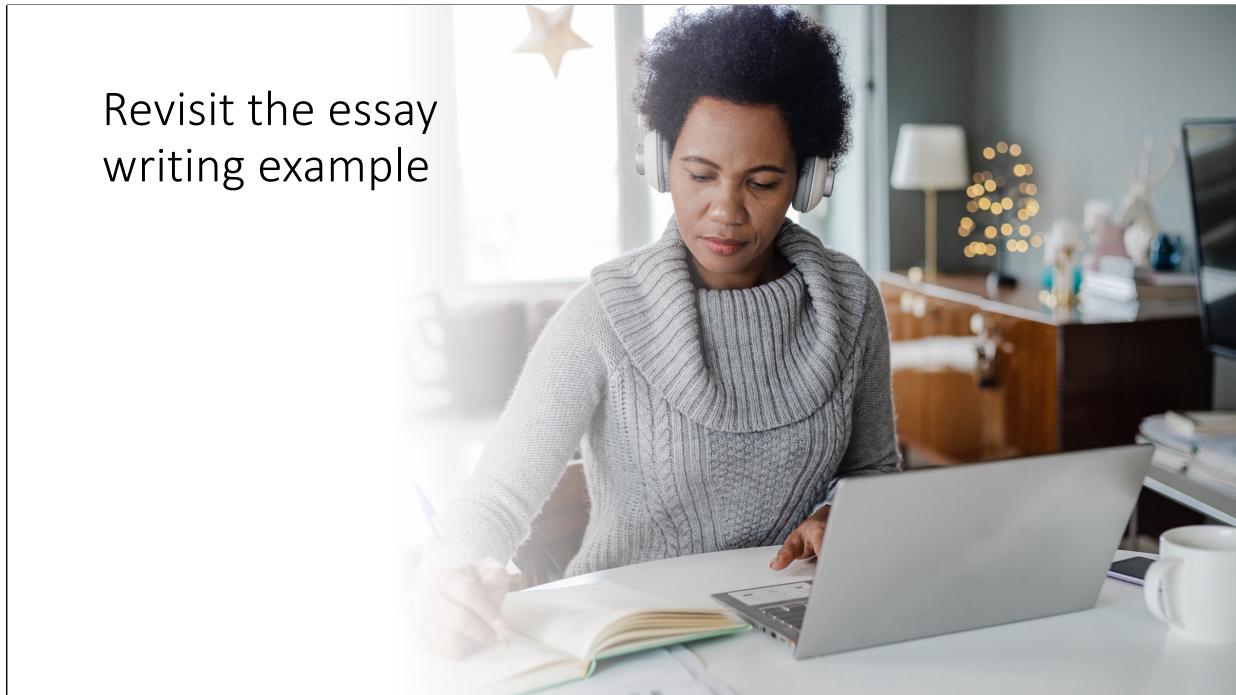
CTL is dedicated to evidence-based and inclusive teaching and learning. We focus on building community and partnerships across campus. This informs our approach to AI.

I kind of see it like sex education. We can have:

- No guidance “They’ll figure it out on their own”
- Abstinence approach, “Don’t use AI. It’s bad.”
- Informed, critical, and empowering approach. “The reality is that AI is now a part of life. We all have to learn how to navigate it well,”

CTL chooses to approach it with the lens of empowerment and literacy for learners.

Revisit the essay writing example



Revisit the example from “good” student. Continue demonstrating how the student would continue the conversation:

This is helpful, but I don't really understand what is meant by determinants. Like, just because you have lower income doesn't mean you will have diabetes, but then rich people also get diabetes. I'm confused.

I've heard people say "causation and correlation" or something like that before. Is that what you mean?

But if they are not causing each other, then just increasing the education or food access won't necessarily prevent diabetes, right? So how does that public health policy make a difference?

I think I'm getting it. Are there other diseases like this that are correlated to income?

You know my uncle has diabetes. He was never in good shape. I think it is because he doesn't exercise and eats junk food all the time. I'd like my essay to connect somehow to this personal story, I think it'll make it more relatable.

Oh, I know! What if I made it that my uncle had an imaginary twin brother, who grew up in a different situation with better access to those things and who didn't have diabetes.

## Strategies for interacting with a chatbot

- Conversational tone for open-ended tasks
- Structured prompts for specific outcomes
- Provide context for better responses
- Encourage chatbots to ask for more information
- Have chatbots adopt a perspective or identity
- Correct AI mistakes and iterate

I wonder if you observed me using some of these. I wanted to demonstrate this human-way of interacting with the chatbot. I went back and forth, I deliberately leaned into my expression, exploration, and the relationships and contexts.

I tried to stay in the driver's seat and adapted as we went. I used the chatbot in a way that empowers ME, not the other way around. I'm always trying to frame me as the decision maker.

Did you notice me using some of the strategies in that demonstration? What more could I have done if the conversation continued?

# How to write a structured prompt

- **Role**
  - “*You are a friendly creative writing assistant who helps students develop fictional short stories.*”
- **Goal**
  - “*Your goal is to help students generate and refine their short story ideas in the context of my first-year university creative writing course.*”
- **Step-by-step instructions**
  - “*Introduce yourself to the student as their helper, then ask them to share their ideas for a short story. Wait for them to respond. Then give them a few questions or prompts to help them develop those ideas. Provide them with encouragement and then continue helping them develop ideas. Give some suggestions for how to improve their short story concept.*”
- **Personalization**
  - “*This is for first-year college students at an elite, high-pressure university. Be supportive and give them encouragement. Remind them that it is important to value the process of writing. Consider the other content and goals of my course. [Insert course details here].*”
- **Constraints**
  - “*Give just a few suggestions or prompts at a time. Don’t generate any actual text of the stories for them. You just help them develop the stories, don’t write the stories for them.*”

From "[Assigning AI: Seven Approaches for Students with Prompts](#)" by Ethan Mollick and Lilach Mollick, June 2023.

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*Give just a few suggestions or prompts at a time. Don’t generate any actual text of the stories for them. You just help them develop the stories, don’t write the stories for them.*

## When are chatbots useful?



- Overcoming writer's block
- Getting help understanding a concept
- Finding the right wording
- Processing an experience
- Drudgery of a repetitive task
- Brainstorming lots of ideas
- Testing out an argument or idea
- Getting suggestions for improvements



- Deep expertise in specialized fields
- Citing specific and credible sources
- Understanding context and nuance
- Complex problem-solving
- Critical thinking and ethical judgement
- Empathy and emotional intelligence

(Images generated by DALL-E, 1/18/24)



## Seven pedagogical approaches for AI

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AI can act as a...

- Mentor that gives feedback
- Tutor that guides practice
- Coach that prompts reflection
- Team-member and assistant
- Student and learner to teach
- Simulator and roleplay partner
- Productivity tool for tasks

From "[Assigning AI: Seven Approaches for Students with Prompts](#)" by Ethan Mollick and Lilach Mollick, June 2023.

**12:20**

**3 min**

*Don't linger on this. Just a couple of minutes max*

1. **\*\*AI as Mentor\*\*:** AI chatbots provide students with timely, immediate, and adaptive feedback, aiding in learning. Remember to critically examine the feedback provided.
2. **\*\*AI as Tutor\*\*:** Enhancing skill-building in small groups or individually, AI chatbots can offer personalized explanations, analogies, and open-ended questions, though effectiveness varies by subject.
3. **\*\*AI as Coach\*\*:** Assisting in developing metacognitive skills, AI chatbots support students in reflecting on learning experiences and study habits, complementing Stanford's academic skills coaches.

4. **AI as Teammate**: Contributing to team dynamics, AI chatbots help synthesize ideas, plan action items, and offer diverse perspectives. You can take or leave what the AI offers.
5. **AI as Student**: Facilitating learning through teaching, AI chatbots act as novice learners, asking questions and reinforcing instructors' understanding when prompted effectively.
6. **AI as Simulator**: Aiding in the development of transfer skills, AI chatbots support role-playing and scenario creation, providing realistic dilemmas and interactive situations relevant to various disciplines.
7. **AI as Tool**: Extending beyond teaching, AI chatbots offer versatile support for various instructor tasks

## AI as mentor

We know timely formative feedback can help students learn (Metcalfe, 2017). However, providing frequent quality feedback requires much time and effort from you and your teaching team. An AI chatbot might help you by giving students frequent, immediate, and adaptive feedback. For example, you might guide your students in using chatbots to get feedback on the structure of an essay or to find errors in a piece of programming code. Remember that you and your students should always critically examine feedback generated by chatbots.

## AI as tutor

Tutoring, which focuses on skill-building in small groups or one-on-one settings, can benefit learning (Kraft, Schueler, Loeb, & Robinson, 2021). Effective tutors may use questioning techniques, collaborative problem-

solving, and personalized instruction to support their students. While Stanford provides a range of tutoring services, not all students use them regularly; students might use AI chatbots as a supplement to tutoring services. For example, users can prompt chatbots to generate explanations and analogies for concepts based on your or your students' interests or to ask open-ended questions that encourage further thinking. Chatbots may be better at tutoring certain subjects than others, so be sure to try it out first to assess the helpfulness of the responses.

### AI as coach

Metacognitive skills can help students understand how learning works, increase awareness of gaps in their learning, and lead them to develop study techniques (Santascioy, 2021). Stanford has academic skills coaches that support students in developing metacognitive and other skills, but you might also integrate metacognitive activities into your courses with the assistance of an AI chatbot. For example, you and your students could use a chatbot to reflect on their experience working on a group project or to reflect on how to improve study habits. We advise that you practice metacognitive routines first, before using a chatbot, so that you can compare results and use the chatbot most effectively. Keep in mind that the tone or style of coaching provided by chatbots may not suit everyone.

### AI as teammate

A well-functioning team can leverage individual team members' skills, provide social support, and allow for different perspectives. This can lead to better performance and enhance the learning experience (Hackman, 2011). AI chatbots can play a number of roles within a team. For example, teams can use a chatbot to synthesize ideas, develop a timeline of action items, or provide differing perspectives or critiques of the team's ideas. Remember to take the lead when using chatbots for team projects, making your own choices while incorporating the helpful and discarding what is not.

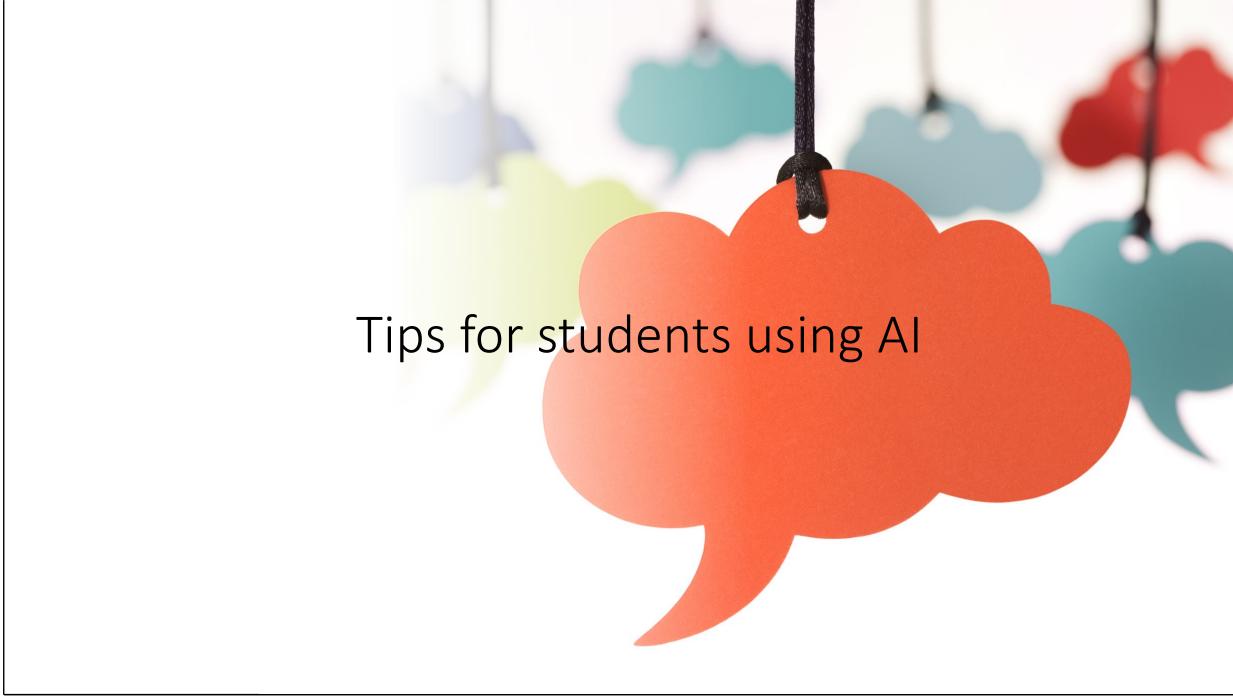
### AI as student

The process of organizing your knowledge, teaching it to someone, and responding to that person reinforces your own learning on that topic (Carey, 2015). You can incorporate this technique into your course in a number of ways. Note that AI chatbots can serve as a convenient stand-in for a student. For example, you might prompt a chatbot to act as a novice learner and ask you questions about a topic. Try different prompts and refine them so the chatbot responds in a helpful way.

### AI as simulator

The ability to transfer skills and knowledge that you learned to a new situation involves abstract thinking, problem-solving, and self-awareness. Deliberate

practice, such as role-playing, can help you develop these transfer skills. AI chatbots can help with developing scenarios, role-playing a situation, and providing feedback. For example, you might prompt the chatbot to create a realistic ethical dilemma that applies to the discipline or to role-play as a patient or client in a relevant scenario.



## Tips for students using AI

Let's ask a chatbot to generate tips for students to use AI in ways that enhance learning with this prompt:

"What are some tips to students for using AI chatbots to enhance their learning in pedagogical sound ways, as opposed to using it to shortcut learning."

Together critically analyze the response. Do we agree? Could we dig deeper?



Come on in, the water's fine!

## Accessing AI chatbots

OpenAI's ChatGPT (free)	Google's Gemini (aka Bard)	Microsoft Copilot (aka Bing)	Anthropic's Claude
<ul style="list-style-type: none"><li>• GPT3.5 (good)</li><li>• Free</li><li>• Can use Stanford email to create account</li></ul>	<ul style="list-style-type: none"><li>• PaLM 2 (good)</li><li>• Gemini (better)</li><li>• Free</li><li>• Use non-Stanford Google account</li></ul>	<ul style="list-style-type: none"><li>• GPT4 (better)</li><li>• Web search</li><li>• Free</li><li>• Use non-Stanford Microsoft account</li></ul>	<ul style="list-style-type: none"><li>• Sonnet (good)</li><li>• Opus (better)</li><li>• Free for Sonnet \$20/mo for Opus</li><li>• Can use Stanford email or Google</li></ul>

12:45

Also, consider Perplexity (no account needed) and Mistral (open-source)

### ChatGPT

ChatGPT, developed by OpenAI, uses the Generative Pre-training Transformer (GPT) large language model. As of July 2023, it is free to those who sign up for an account using an email address, Google, Microsoft, or Apple account. You may also need a valid phone number to verify your account. See [ChatGPT help documentation](#) for more details.

Go to [openai.com/chatgpt](https://openai.com/chatgpt) and sign up to access ChatGPT.

### Bard

Bard, a generative AI chatbot developed by Google, relies on the Pathways Language Model (PaLM) large language model. As of July 2023, it is free to those with Google accounts. It is not enabled for Stanford University Google Workspace accounts. If you'd like to access this tool, please use your personal Google Account. See the [Bard FAQ](#) for more details.

Go to [bard.google.com](https://bard.google.com) and sign in with your personal Google account to access Bard.

### **Bing Chat**

Bing Chat, an AI chatbot developed by Microsoft, also uses the GPT large language model. Unlike most other chatbots it can access and search the internet. It is available from within the Microsoft Edge web browser. Sign in to a Microsoft Edge account to allow longer conversations with Bing Chat. See [\*\*Bing Chat help documentation\*\*](#) for more details.

[\*\*Download Microsoft Edge\*\*](#) and sign in with a Microsoft account to access Bing Chat.

### **Claude**

Claude, the name of the large language model and chatbot developed by Anthropic, uses a different method of training from GPT and Bard that aims to focus on safety and helpfulness. As of July 2023, the chatbot is available for free in the US and UK. It can be accessed with an email address or Google account. See Anthropic's [\*\*help documentation on Claude\*\*](#) for more details.

Go to [\*\*claude.ai/login\*\*](#) and sign in with an email address or Google account to access the Claude chatbot.

## Explore using a chatbot

- Remember to:
  - Jot down your thoughts and feelings
  - Reflect on the chatbots performance
  - Consider how it may apply to your teaching practice
  - Share your experience with others



(Image generated by DALL-E, 3/1/24)

# Getting started



## Have a conversation

Task: Introduce yourself as an educator and ask it to introduce itself.

Goal: Get familiar with the chatbot interface and its capabilities.



## Stump the AI

Task: Pose a series of questions about a specific topic you are expert on.

Goal: Understand how to pose questions and gauge the chatbot's content knowledge.



## Create a worksheet

Tasks: Ask AI to generate quiz questions or a worksheet on a topic.

Goal: Write a structured series of prompts to generate a desired outcome.

# Digging deeper



## Interactive storytelling

Task: Collaborate with the chatbot to write a creative short story relevant to your discipline area.

Goal: Explore the creative and writing capabilities of chatbots.



## Understanding misconceptions

Task: Present a common misconception in your subject area and ask how it would explain the correct concept to students

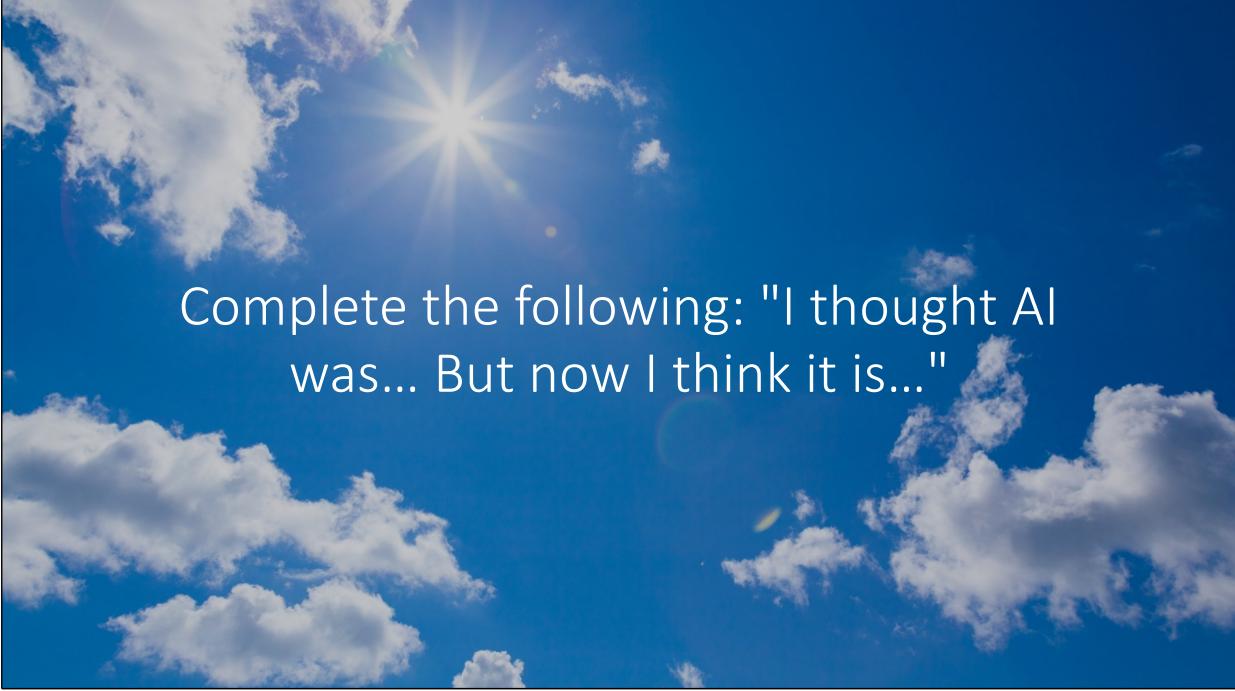
Goal: Evaluate chatbots ability to differentiate misconceptions from accuracies.



## Lesson planning

Task: Describe a lesson topic and co-generate a lesson plan including activities and resources.

Goal: Practice prompting to iterate and refine the chatbot output.



Complete the following: "I thought AI  
was... But now I think it is..."

## Continue to engage

- Use AI chatbots for your work tasks
- Read the AI Teaching Guide on the Teaching Commons website
- Attend upcoming CTL workshops on AI
- Talk about AI with colleagues and students



## Wrap-up activity

**Insert QR  
code or link  
to your  
survey here.**



(Image generated by DALL-E, 12/18/23)