

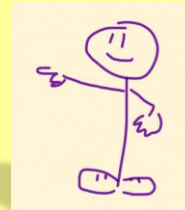
LLM for educators

Meeker School District RE-1

October 20, 2023

Outline

1. LLM: what it is
2. How it works
3. What it can and cannot do
4. Applications in the classroom
5. Problems in the classroom
6. The AI future



Take-aways

1. Think of LLM as a highly productive classroom assistant
2. LLM's already have become essential tools in the work force
3. Tips for use:
 - a. Practice clear prompts with plenty of context
 - b. Engage in conversation with LLM
 - c. Be nice, and help it learn



Testimonials at ten months into the GPT era

- Generative AI increased productivity by 14% average in a cohort of 5179 customer support workers and by 35% among novice and least skilled employees. *National Bureau of Economic Research, April 2023.*
- Generative AI reduces API development and deployment time from 1 year to 1 week. *Andrew Ng, Stanford AI Lab.*
- Present trajectory of AI development will increase global economic output by \$15 trillion over the next five years. *World Bank Digital Development Group.*
- GPT saves teachers about ten hours per week of prep time. *Khan Academy Khanmigo study.*

Terminology

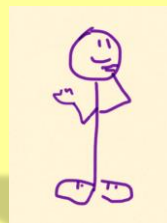
- AI (artificial intelligence): a general term for computer systems that mimic human intelligence
- Generative AI: AI systems built on deep neural networks that generate different modalities, e.g. text (ChatGPT, Bard, Bing, others), images (Dall-E), audio and video, etc. They train on large data sets in that modality.
- LLM (large language model): generative AI trained on enormous volumes of text. An LLM generates responses, one word after another, based on the most likely sequence of words it found in its training.
- GPT (Generative Pretrained Transformer): a particular computer architecture for LLM's developed by OpenAI, built on a deep neural transformer network

Available platforms

- ChatGPT (OpenAI)
 - strengths: text generation, translation, coding, chat interface
 - weaknesses: not up to date on facts, weak in math (but improving)
- Bard (Google)
 - strengths: up to date (linked to Web via Chrome), access through school email account, finds graphs and images, finds details (e.g. specific references to State Standards)
 - weaknesses: not as polished as ChatGPT
- Claude (Anthropic)
 - strengths: a spin-off from OpenAI, comparable to ChatGPT in functionality and maybe better at coding, trained on data considered appropriate for general users (PG-13 vs. R)
- Bing (Microsoft)
 - strengths: linked to Dall-E (image generator)

Platforms (cont'd)

- Khanmigo (Khan Academy)
 - strengths: this is a collaboration with OpenAI filtered for appropriate student content, linked directly to all the Khan Academy courses, functions as a tutor
 - weaknesses: limited to KA courses (but there are a zillion of them), mostly math and science, not a general purpose chat bot
- Semantic Scholar
 - dedicated vetting of research
 - so you and your students can check facts



LLM's: What they can do

- generate publication-quality text in response to general queries in a wide variety of disciplines, i.e. just about any realm of discussion on the internet
- write high quality computer code in a variety of programming languages
- translate between more than 100 human languages
- other generative AI's can produce quality art (Dall-E) and convincing audio and video indistinguishable from real life productions

What they cannot do (yet)

- LLM's are not reliable. They cannot distinguish truth from fantasy. For example, if they trained on text that included many uses of the words "earth" and "flat", they may tell you the earth is flat.
- LLM's are not search engines. They do not (yet) replace the functionality of a Google Chrome or Firefox.
- They do not always calculate accurately. They are not yet expert at math.
- Their information is out of date, only accurate as of the date of training.

Applications in the classroom

- LLM can assist learning
 - . . . as reading coach
 - . . . writing coach
 - . . . code editor
 - . . . exercise in fact-checking
 - . . . springboard for discussion of COR
- LLM can act as individual tutor for self-directed student learning
- It can guide writing
- It can grade written assignments
- It teaches coding skills
- It can translate forms and handouts to 100+ languages
- It can serve as an assistant for producing lesson plans, forms, study guides, test questions, etc.
- and much else that nobody has thought of yet . . .

Tips for engaging LLM

1. Most important is to **write good prompts**.
 - a. write concise and specific queries
 - b. provide plenty of context
 - c. be polite, and request the same of LLM
 - d. instruct LLM to explain its output
2. **Carry on a conversation**. Ask it to explain why it responded as it did. Ask it to provide further information about what it said. Point out any errors that you see in it's response. Ask it to re-think any questionable statements. Ask for the sources of its information (and then fact check those yourself). And if you are not satisfied with the LLM response, ask for a re-do and tell it why. etc. etc.



Tips (cont'd)

3. These systems encompass essentially all human knowledge. Our task is to coax them to apply that knowledge appropriately and accurately.

Concerns in the classroom

- How do you know if students completed an assignment themselves or if it's from LLM?
- How can students learn to distinguish fact from hallucination in LLM output? How can they discern appropriate content?
- What do students need to know about the AI systems in their lives? (They are everywhere.)
- What do students need to learn about potential AI threats to their personal well-being?
- What do students need to learn about the ethical and moral implications of AI systems?
- What will be the jobs of the future?
 - Prompt engineering and beyond



Options for dealing with the concerns

1. Ignore generative AI and it will go away.
 - a. Not possible. Students (and the rest of the world) are already using it.
2. Prohibit its use.
 - a. Possible if you restrict all student work to your classroom under your direct supervision, e.g. write out all assignments in class using pencil and paper.

Options for dealing with concerns (cont'd)

3. Welcome these new tools and educate your students in their appropriate use.
 - a. But how do you know they're not cheating, letting LLM do all the work for them? Here's one suggestion: require LLM iterations on assignments.
 - i. Require that student writes first draft . . .
 - ii. then submits draft to LLM for evaluation . . .
 - iii. followed by second draft . . .
 - iv. submitted to LLM for evaluation . . . etc.
 - v. Final submission includes the LLM paper trail above. And the LLM effectively has already graded it for you.



Our AI Future

Generative AI, AI for big data analysis, recognition software, expert systems, AI robotics – we have entered a whole new world. Even the people at the center of AI development are surprised how fast these systems are evolving. Each time the engineers add more connections to neural networks they find new and unexpected capabilities. Our students need to understand these systems and prepare for a future we haven't yet imagined. They are already using generative AI's, and they will need those new skills for success after graduation from MHS. Teachers can employ these new tools to enhance student learning and to facilitate their own classroom preparation and paperwork.

References:

UCLA Center for Advancement of Teaching. 2023. Guidance for the use of Generative AI.

https://teaching.ucla.edu/resources/ai_guidance/#toggle-id-5

A good reference for applications of AI in the classroom.

How ChatGPT and similar AI will disrupt education. 2023.

<https://www.sciencenews.org/article/chatgpt-ai-artificial-intelligence-education-cheating-accuracy>

An overview of perceived problems for use of AI in the classroom.

AI education for teachers. McQuarrie University online course.

Coursera. <https://www.coursera.org/learn/artificial-intelligence-education-for-teachers>

One of several online courses available from Coursera and EdX.

References (cont'd):

Aaronson, Scott. 2023. AI Safety: Public lecture at the Machine Learning Lab.

<https://www.youtube.com/watch?v=D4yiZcPthDI&t=346s>

An overview of potential AI threats and recent work to enhance the safety and accuracy of AI platforms.