AI as Teaching Assistant
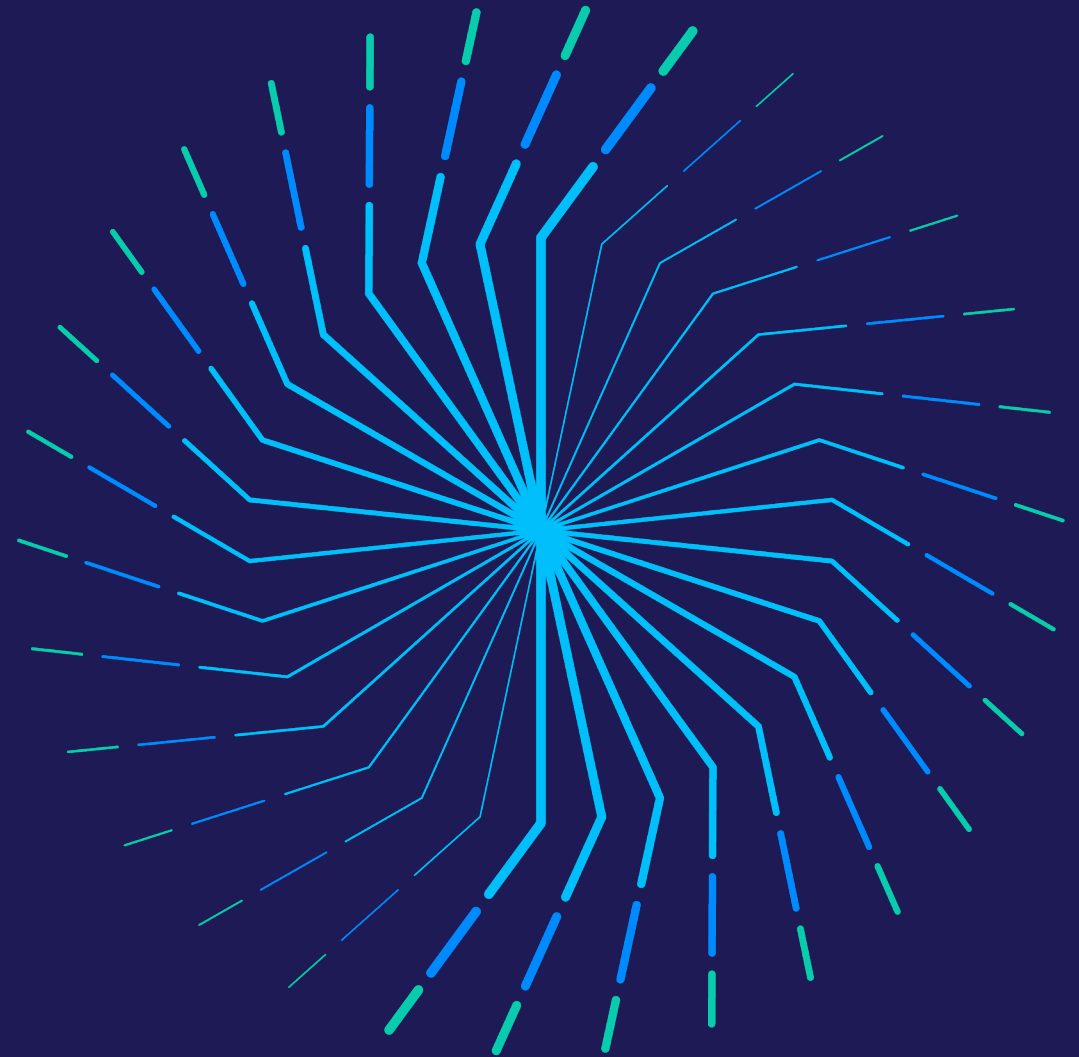
Early Findings on Integrating ChatGPT and other LLMs into Discovery-based Entrepreneurship Education

May 2023

David Shrier

Professor of Practice, AI & Innovation

david.shrier@imperial.ac.uk

Provocation:
Do LLMs represent more opportunity than threat to modern education?

Context: Rise of LLMs

- Large Language Model (LLM) AI such as ChatGPT uses predictive algorithms to construct sentences, paragraphs and entire documents that are sophisticated and difficult to distinguish from human-generated text

- (similar systems can create photoreal images and sophisticated 'deep fakes')

- Built on 'deep learning' systems that structurally resemble human brain

- According to OpenAI, OpenResearch and UPenn (Eloundou 2023), LLM AI could impact **80+% of jobs**

- Anecdotally: marketing services, investment banking, management consulting, law, computer programming & other high-value knowledge industries previously resistant to AI automation, now under threat

Context: Discovery-based AI Entrepreneurship Class

- AI Ventures is an upper level elective for mix of full time and part time students

- Cross-campus collaborative class across Business and Computing

- Designed to largely follow principles of Discovery-Based Learning

- Objective: Students write first approximation of a business plan in the module

- Divided into teams: largely group work (70% of assessed grade incl peer eval)

- Self-formation of teams, self-selection of venture idea, self determination of tasks

- Lecture and reading provide supplemental context

- Mentorship/guidance from faculty in the form of team tutorial

- Some online quizzes, but most assessment based on individual & group submission of written assignments, plus an oral presentation by the group

- 'Dragon's Den' in front of real investors at end of term (although assessment still conducted by faculty)

Typical student assignment (pre ChatGPT)

Written Assignment 2

Grades released on April 5, 2022

Following your problem identified in Written Assignment 1, please write a short essay of 200 to 500 words on the topic of "what is unique about your solution?". As before, you may potentially (but are not required to) describe the same unique attributes that differentiate your solution from others that might exist, but you should provide your own individual perspective on the answers.

January 2023: ChatGPT!
(what do we do?)

How do you retool a business planning class built around essays?

- Retool curriculum in 2 weeks; identify and test various LLM systems to recommend to students (ChatGPT downtime was/is significant, athough improving)

- Formally require students to use ChatGPT or another LLM to respond to essay prompts

- Engage students in critical thinking

- New assignments:

Following your problem identified in Written Assignment 1, you will again be collaborating with your LLM-AI. You will be submitting 2 items in this written assignment:

(1) Instruct your LLM-AI of choice to generate a 250-word explanation of what is unique about your AI solution. Your written assignment is to critique this output (250 words+/-). What was good about the result? What did not work well? What would you do differently.

(2) Submit the venture description output that the LLM-AI itself generated. Please identify which LLM-AI you used.

Earning findings were interesting…
(preliminary analysis)

N = 78 (27% computing, 73% MBA, with 27 sit-ins almost all MBA)

68 students submitted written assignments*. Of those who submitted:

- 66 (97.1%) noted that LLMs produce incomplete and/or repetitive outputs

- 39 (57.4%) thought assignment was only intended to critique LLM output

- 29 (42.6%) understood exercise was to generate an input for final assignment

- 3 (4.4%) discovered that by iterating ('prompt engineering') you could get the LLM to generate a better output

- 1 (1.5%) stated the LLM helped them identify a gap in their business strategy

* 9 students failed to submit a written assignment or submitted late; however, may include some sit-ins despite their signing a written document agreeing to do all course work

Discussion (both pedagogical design & experimental design)

Inducing students to critically evaluate LLM performance resulted in almost all* students noticing that outputs are repetitive and/or incomplete

- Student readiness to use LLMs varied, could be improved with more preparation (next year, provide students with a lesson on **prompt engineering**)

- Possibly? Gain more uniformity of student responses by using a single LLM

- Conversely, did not set up experiment to compare outputs of comparable LLMs (Bard had not launched at time of class; e.g., could compare ChatGPT, Bard, Vicuna, WizardLM)

- Our assignments can more explicitly call out class structure of written components contributing to a final plan, clarify <u>what</u> students are evaluating in critical thinking (however, in an upper level class built around writing a business plan and pitching, why did ~ half the class fail to connect the dots?)

- Next year, eliminate sit-ins and expand class to include other departments/schools

- Now have inputs to design a formal experiment

- **Most interesting question: how to improve human productivity using LLMs?**

* 9 students failed to submit assignments so metacognition cannot be assessed

Towards Human+AI Systems

Research can provide insight to design better human+AI systems

- Human+AI can perform tasks and achieve goals neither can do by themselves

- For example, collective intelligence systems can predict future events (Adjodah 2021)

- Which AI skills and tasks do we need to teach our students?

- How can human+AI systems improve higher education?

- How can we reshape nature of work to leverage AI?