

A proposed study: Awareness and perceptions of generative AI usage for supporting learning

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Generative AI (GenAI) in higher education

- *Assessment*: marking, anti-plagiarism
- *Content creation*: lectures, problem sets
- *Tutoring*: real-time feedback, tailored learning

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Rubber duck debugging

Stuck on a problem? Describe it to a rubber duck!

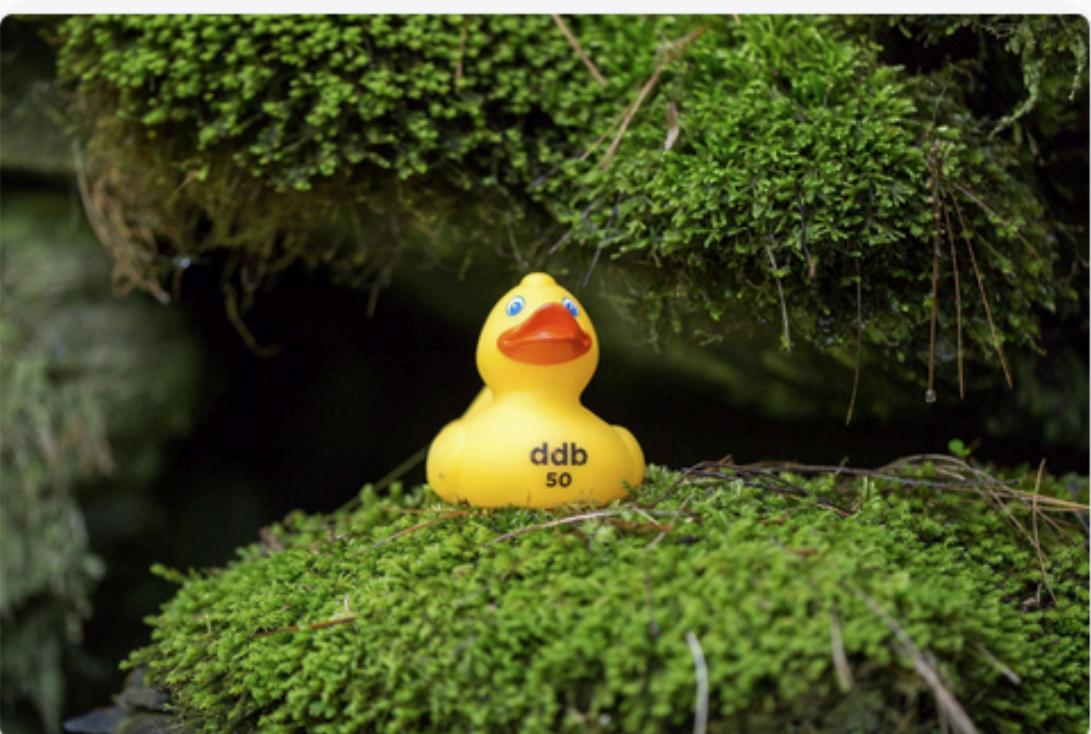
CS50.ai



CS50's adaptation of **ChatGPT** for students and teachers
with support from Microsoft and OpenAI

beta

Log In



CS50 duck

Harvard University's AI chatbot for
CS50: Introduction to Computer
Science

<https://cs50.ai/>



CS50 Bot
Yesterday

ENDORSED



3



It seems like you're trying to declare the `main` function with only one parameter. However, in C, the `main` function should have either zero parameters or two parameters, which are `int argc` and `char *argv[]`. The first parameter, `argc`, represents the number of command-line arguments, and the second parameter, `argv`, is an array of strings representing each of those arguments.

For the Caesar problem, you'll want to use these parameters to access the command-line argument that represents the key. To do this, you should declare your `main` function as follows:

```
int main(int argc, char *argv[])
{
    // Your code here
}
```

Then, you can check if the user has provided the correct number of arguments (in this case, just one additional argument for the key) and handle the input accordingly.

P.S. I am an experimental bot. Quack. Do not assume that my reply is accurate unless you see that it's been "endorsed" by (human) staff. Quack.

Comment Edit Delete Unendorse ...

Add comment

JH John Harvard STUDENT 1d

Thank you, weirdly informative robot

♥ 8 Reply Edit Delete ...

6

CS50 duck

- "ChatGPT can be too helpful"
- "The CS50 duck, by contrast, provides helpful hints and guides students to an answer"

<https://www.insidehighered.com/news/tech-innovation/artificial-intelligence/2023/06/30/harvard-rolls-out-ai-help-free-tas-time>
<https://yaledailynews.com/blog/2023/09/07/yale-to-integrate-artificial-intelligence-into-introductory-computer-science-course/>



```
parse_expenses.py × addresses.rb × sentiments.ts ×

1 import datetime
2
3 def parse_expenses(expenses_string):
4     """Parse the list of expenses and return the list of triples (date, amount, currency)
5     Ignore lines starting with #.
6     Parse the date using datetime.
7     Example expenses_string:
8         2023-01-02 -34.01 USD
9         2023-01-03 2.59 DKK
10        2023-01-03 -2.72 EUR
11    """
12     expenses = []
13
14     for line in expenses_string.splitlines():
15         if line.startswith("#"):
16             continue
17         date, value, currency = line.split(" ")
18         expenses.append((datetime.datetime.strptime(date, "%Y-%m-%d"),
19                         float(value),
20                         currency))
21     return expenses
22
23 expenses_data = '''2023-01-02 -34.01 USD
24                 2023-01-03 2.59 DKK
25                 2023-01-03 -2.72 EUR'''
```

Copilots / IDE integration

- GitHub Copilot
- Codeium

IDE stands for Integrated Development Environments like VSCode, PyCharm, Sublime Text, etc.

<https://github.com/features/copilot>

Virtual Learning Environments (VLE) embedding

- University of Westminster
 - "...AI generated quizzes within a module designed to support students to write effective research proposals"
- Northumbria University
 - "...to generate formative assessment activities, using the in-built AI test generation tools"

<https://nationalcentreforai.jiscinvolve.org/wp/2024/04/24/case-study-blackboard-learn-ultras-ai-design-assistant/>

<https://nationalcentreforai.jiscinvolve.org/wp/2024/06/19/product-notes-blackboard-learn-ultra-ai-design-assistant/>

Auto-Generate Discussion

Define the discussion

Description

Enter a description or set of keywords...

Desired cognitive level

Apply

Inspire me!

Apply

Analyze

Evaluate

Create

This is auto-generated content and needs to be checked for accuracy.

Case Study Analysis: Expanding into a New Market

- Imagine you are a consultant for a multinational corporation | concepts, apply your understanding to analyze the potential risks and opportunities. Use diagrams, reference lists, or real-life experiences to support your analysis. Explain how these factors may impact the success or failure of the expansion. Discuss strategies for mitigating risks in entering a new market.

Simulating Global Supply Chain Challenges

- Imagine you are a manager of a global supply chain for a multi-national company. You need to simulate a scenario where unexpected challenges arise in the work-related environment. Share your experiences, diagrams, or interviews with industry experts. Explain how effective communication, collaboration, and risk management are crucial for maintaining a smooth supply chain operation.

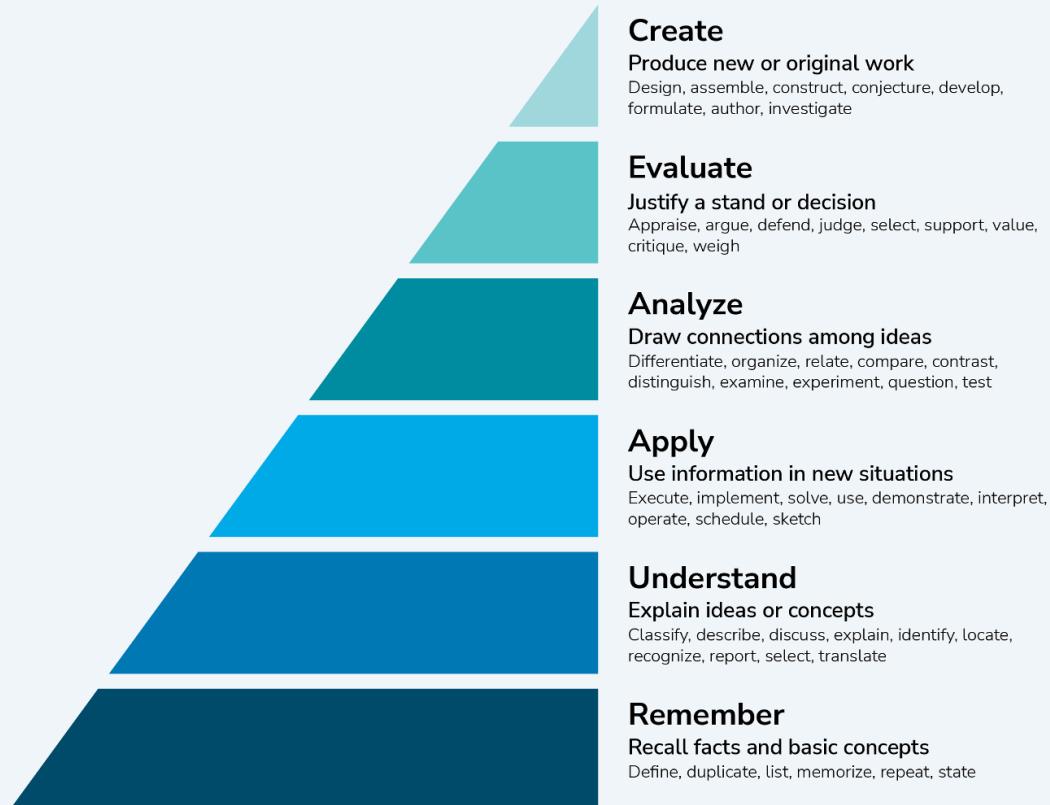
Developing a Cross-Cultural Training Program

- In a global business environment, cultural intelligence is crucial. You need to create a comprehensive cross-cultural training program for employees. Focus on topics such as cultural etiquette, language skills, and intercultural communication. Illustrate the importance of cultural intelligence in real-life situations through case studies and practical examples.

Blackboard Learn Ultra

Able to generate suggestions based on different cognitive levels from Bloom's taxonomy

Bloom's Taxonomy



Bloom's Taxonomy

Hierarchy of cognitive levels for learning

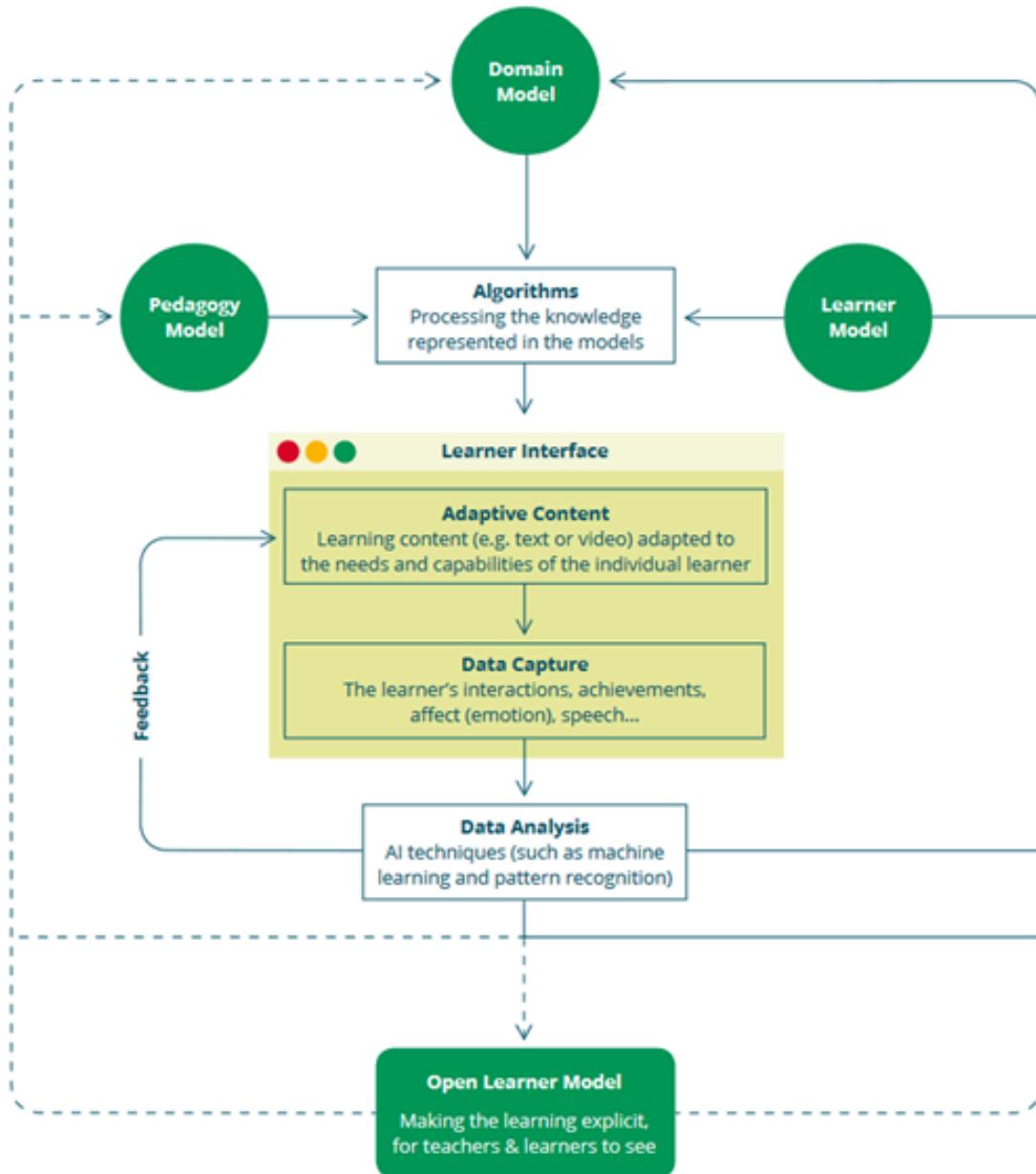
Teaching with AI

- Retrieval-augmented generation
- Multiple-agent systems
- AI-tutor, AI-coach, AI-mentor, AI-teammate, AI-tool, AI-simulator, and AI-student
- Simulations, mentoring, coaching, and co-creation

<https://interactive.wharton.upenn.edu/teaching-with-ai/> <https://ai-analytics.wharton.upenn.edu/generative-ai-lab/ai-and-education/>
<https://www.harvard.edu/ai/teaching-resources/>

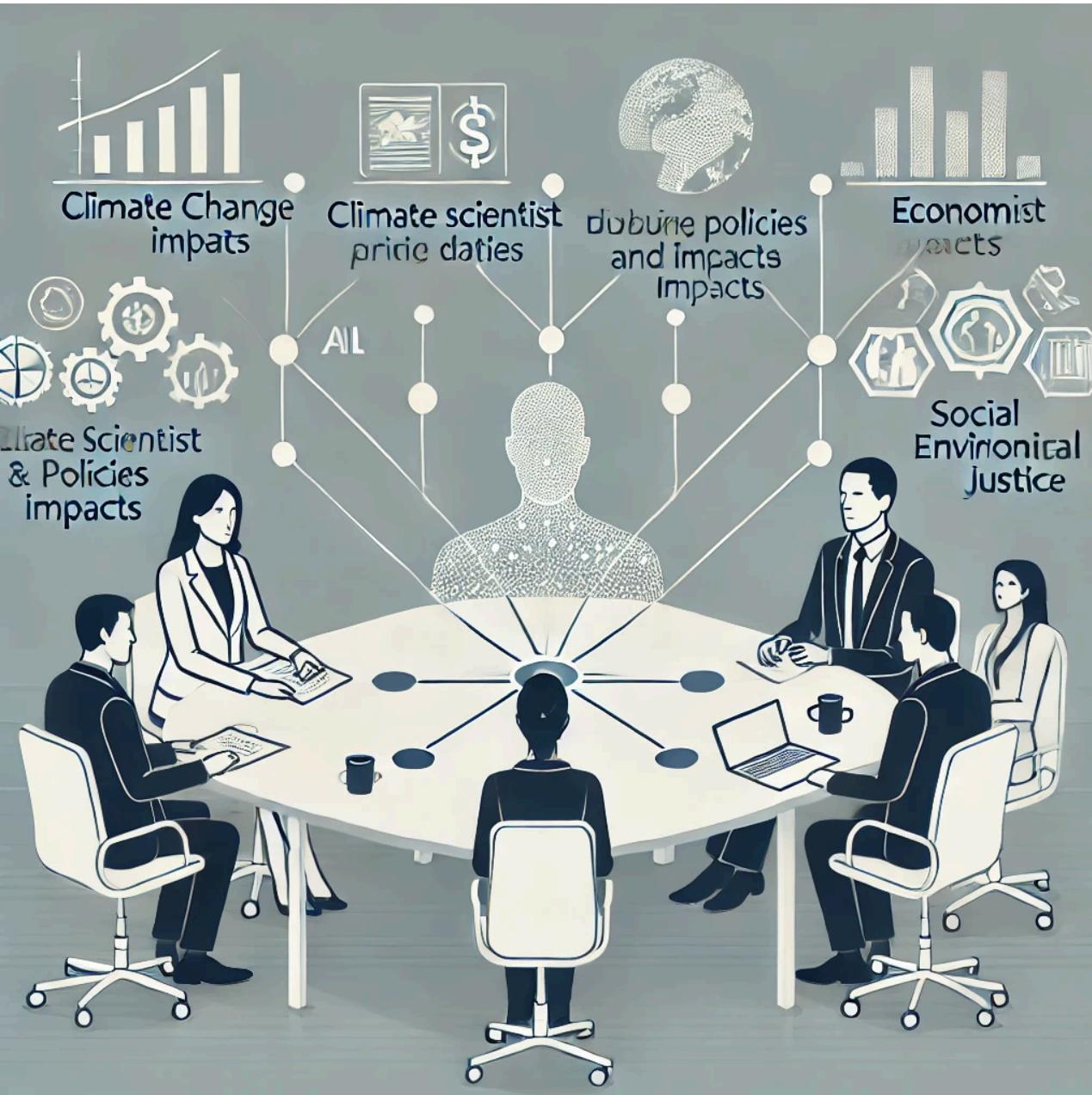
Figure 1

AIEd system showing a simplified picture of a typical model-based adaptive tutor.



Retrieval-augmented generation (RAG)

- LEFT: A model-based adaptive tutor



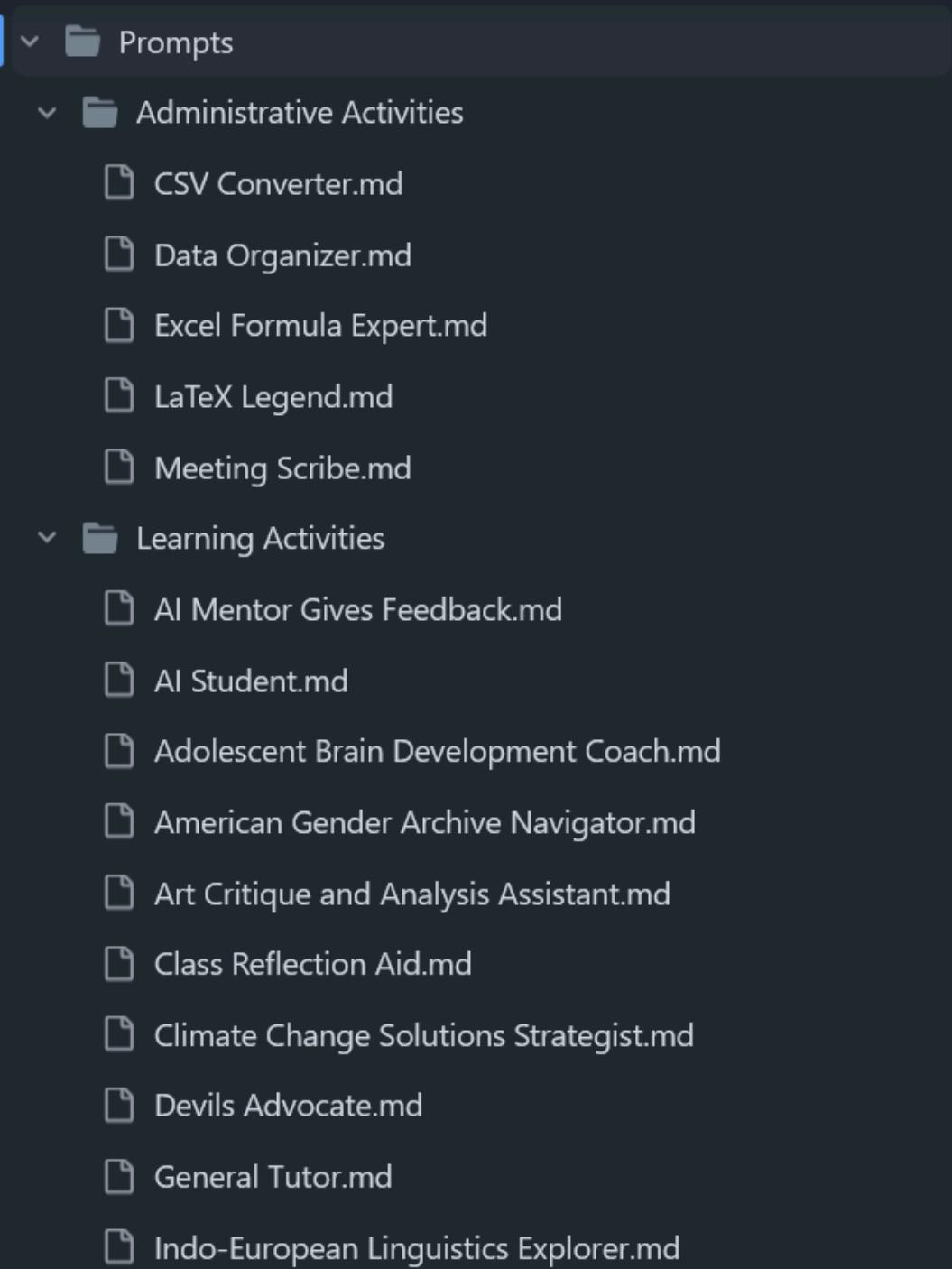
Multi-Agent Systems

Discussing climate change impacts

- Moderator
- Scientist:
 - scientific data and analysis
- Economist:
 - economic impacts / policies
- Activist:
 - perspectives on environmental justice

DALL-E 3 generated image

<https://github.com/ncwilson78/System-Prompt-Library/blob/main/Multi-Agent%20Systems/Multi-Agent%20Systems%20Interaction%20Structures.md>



Prompt library

- Administrative
- Learning
- Teaching

<https://github.com/ncwilson78/System-Prompt-Library>



Alright, let's begin! I'll take on the role of a potential business partner with a STEM background, but limited knowledge of business concepts. Here's the scenario:

Scenario:

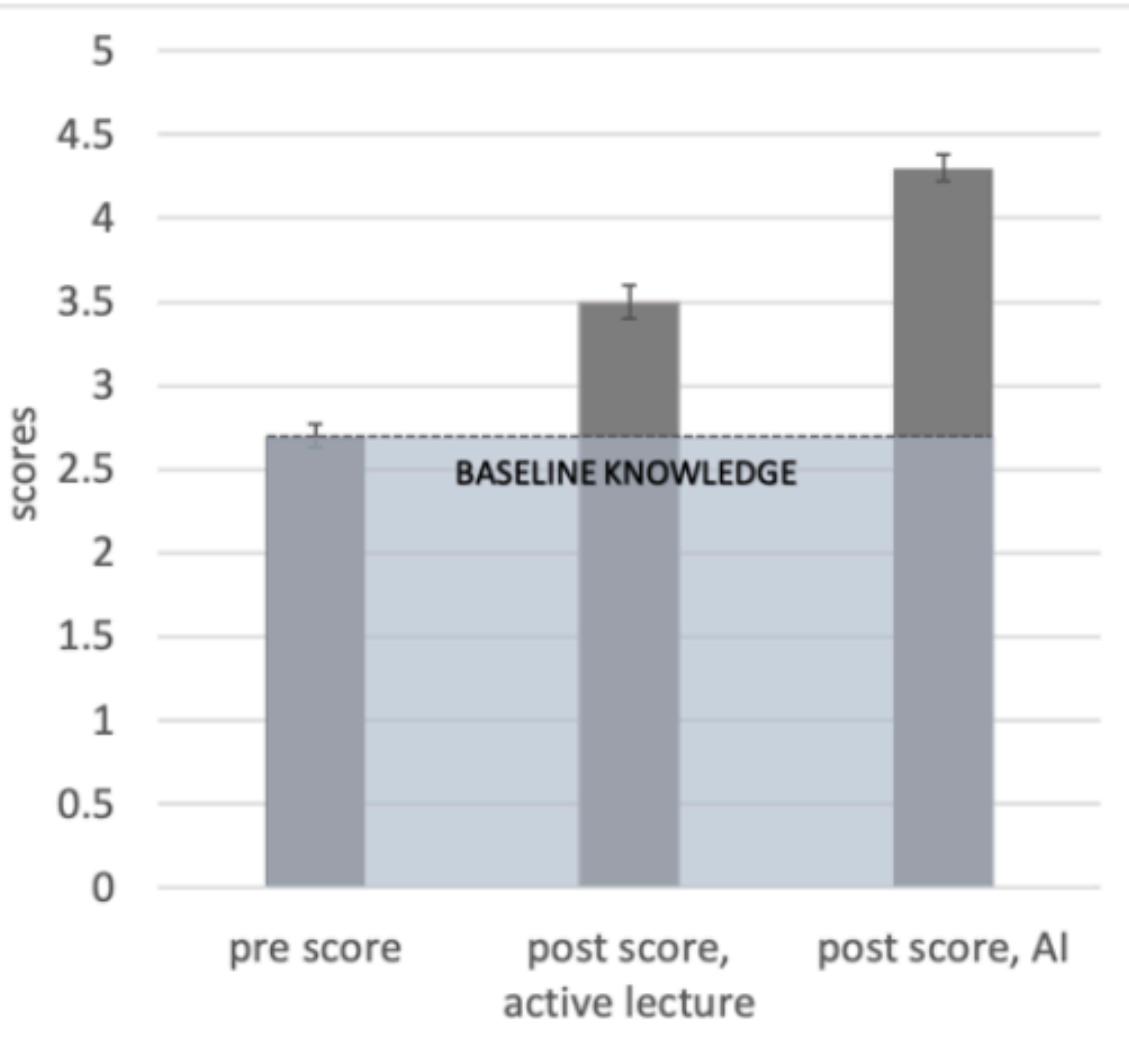
I'm a data scientist and I've been developing a machine learning model that predicts demand for solar energy in various geographic regions. I think we should launch a startup around this. I've done what I think is a good "customer discovery" process by talking to a few of my friends who are also data scientists. They're really excited about the potential of the model, and I feel like we've nailed down our customer base. With this feedback, I think we're ready to start selling to solar energy companies. What do you think?

Now, it's your job to correct my understanding of what "customer discovery" actually means in the entrepreneurial sense. Explain it to me in a way that's accessible, technically correct, and relevant to this context.

Creating problem sets

Click here for full conversation:

<https://chatgpt.com/share/66e99f0e-8474-8002-8c90-fd0b10ec04f3>



AI Tutoring Outperforms Active Learning*

*in a Harvard University (USA) undergraduate physics course

- "...learn more than twice as much..."
- "...while spending less time on task"

Challenges: Purpose and role of higher education providers

- Redefining educational roles
- Cultivating critical skills
- Pedagogical reflection

Educators' views

Luleå University of Technology staff survey

- 76.12% of the university teachers surveyed expressed willingness to encourage their students to use generative AI ethically.
- Over 50% currently use generative AI in some form.

Texas A&M University

- 47% are somewhat to extremely comfortable with students using ChatGPT in courses.
- 64% of faculty and 73% of students have used ChatGPT.

Challenges: Enhancing student learning experience

- Balancing technology with human guidance
- Ethical and pedagogical concerns
- Technocratic solutions versus human problems

Students' views

HEPI Policy Note 51

- More than half of students (53%) have used generative AI to help them with assessments.
The most common use is as an 'AI private tutor' (36%), helping to explain concepts.
- A 'digital divide' in AI use may be emerging. Nearly three-fifths of students from the most privileged backgrounds (58%) use generative AI for assessments, compared with just half (51%) from the least privileged backgrounds.
- Only a fifth of students (22%) are satisfied with the support they have received on AI. Most students (62%) are neutral or say they do not know.

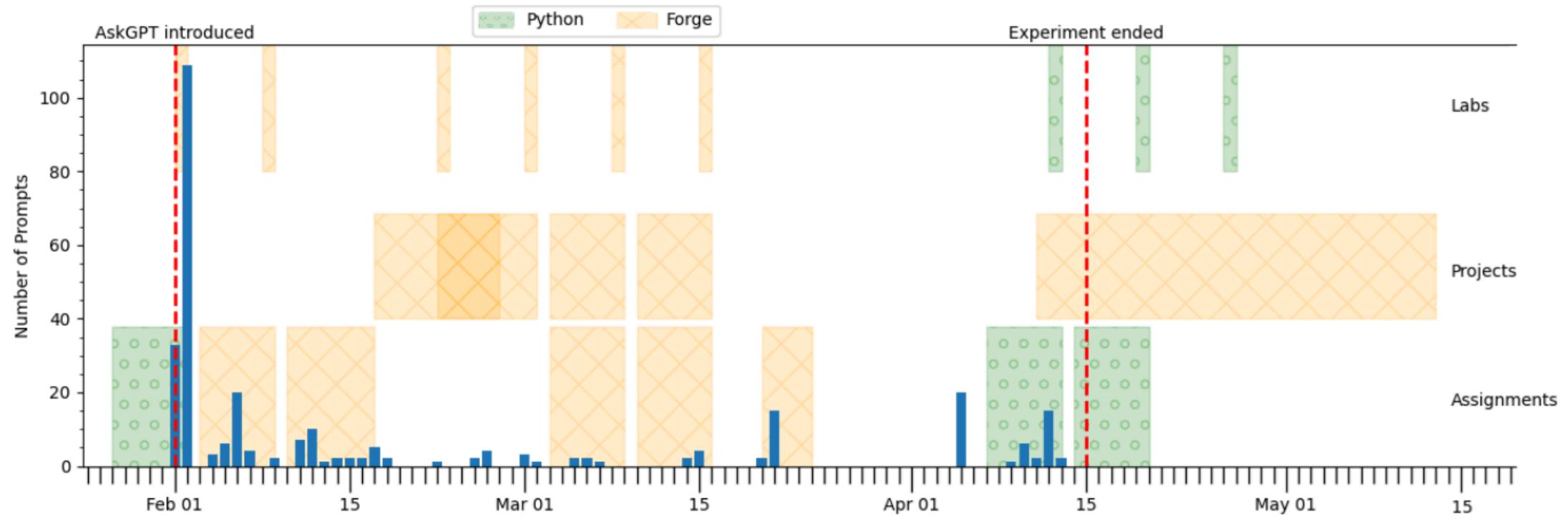


Figure 3: Number of student prompts to AskGPT per day, overlaid on a course schedule.

Student use of GenAI declining over time?!

*in a Brown University (USA) undergraduate course on applied logic and formal methods

Table 2: Reasons students did not use AskGPT.

Reason	Count	% Responses
May interfere with learning	25	57 %
Fear of breaking course rules	12	27 %
Awkward UI	9	20 %
Concerns about logging	7	16 %
Worse than alternatives	6	14 %
Responses were not useful	6	14 %
Did not want to use	4	9 %
Fear of overuse	4	9 %
Installation issues	2	5 %
Concerns about AI	2	5 %
Did not use VS Code	1	2 %

Student responses

- P2: "I learn better through struggling to find an answer. If it comes too easy, it's hard for me to remember any information I've learned."
- P11: "I have a vitriolic hatred toward AI."

Purpose of study

- To inform generative AI-based pedagogical developments
 - University policy
 - Staff guidance and training
 - Integration into teaching and learning

Survey questions: perceptions and awareness

- Do you **trust** answers from GenAI?
- Are you **encouraged** to use GenAI?
- Has using GenAI made you more **confident** in learning?
- How **anxious** do you feel when:
 - asking lecturers or colleagues for help?
 - using GenAI (for assignments)

Survey questions: feeding forward

- Do you need **training** in using GenAI:
 - from lecturers or support centres?
 - to avoid plagiarism?
 - craft good prompts?
- Would you **use** GenAI for:
 - analysing data?
 - as a tutor?

Research themes

- Awareness and understanding
 - Common tools: ChatGPT, Microsoft Copilot
 - Embedded technology: Microsoft Word, Grammarly
- Usage patterns
 - Implicit versus explicit usage expectations

Research themes

- Trust and confidence
 - Ethical concerns
 - Domain expert knowledge
- Perceptions and anxiety
 - Breach of privacy
 - Confidence to ask questions
- Digital divide and equity of access
 - Accessibility and cost

Research themes

- Guidance
 - Supplementing university instructors and tutors
- Learning and teaching strategies
 - Fostering generative AI culture

Logistics

- Multi-stage survey targetting students and educators
 - Current focus: statistics and data science
 - Future focus: business, management, entrepreneurship

Participants

Currently focussing on students from:

UK

University College London

Coventry University

Australia

La Trobe University

Federation University

Macquarie University

Appendices: some literature

- Generation gap
- Artificial intelligence anxiety scale
- Intelligent tutoring systems
- Technology Acceptance Model links to an user acceptance perspective:
 - perceived usefulness
 - perceived ease of use

The end 🤔