

Chatbot Extravaganza!

By Sierra Wang, advised by Prof. John Mitchell and Prof. Chris Piech

Introduction

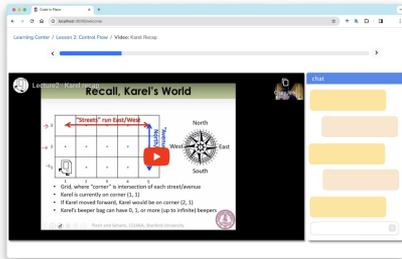
To maximize the potential use of AI for providing real time help, we must understand the risks that these systems may pose - such as undermining motivation, diminishing student social skills, or fostering learned helplessness.

In this project, we will investigate how four different chatbot systems impact student learning and curiosity.

Code in Place

We will implement and evaluate the chatbots in a large scale randomized controlled trial in Code in Place, an open-access, online introductory computer science course [1].

Each student will have access to the chat as they work on their lessons (videos, exercises, and readings).



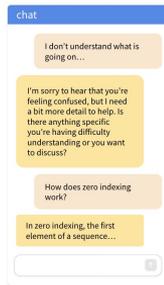
The Basic Chatbot

DESCRIPTION

The Basic Chatbot will be very similar to ChatGPT, but with specific prompting to prevent revealing answers to students.

IMPLEMENTATION

We will use OpenAI's chat completion API and careful prompt engineering to prevent GPT from giving assignment solutions [2].



The Grounded Chatbot

DESCRIPTION

The Grounded Chatbot will use context on the student and knowledge of the course to give the student a response that is relevant and grounded in the course materials.

IMPLEMENTATION

We will use RAG techniques to identify relevant course content and student context. We will use this information, alongside the student's chat history, to prompt an LLM for a grounded response.



The Community Chatbot

DESCRIPTION

The Community Chatbot will be a communal chatbot that is shared among this entire group of students. It will be more like a messaging forum (or like a Slack channel) where students publicly ask questions and the chatbot will publicly answer.

IMPLEMENTATION

All of the students in this control group will see a communal chat for each of their lessons. They will have the ability to ask a question, or post a comment in the communal chat at any time. If they would like for AI to answer their question, they can tag it. Otherwise, the AI will not automatically respond to a student's message.



No Chatbot

DESCRIPTION

It is possible that AI Chatbots have a negative impact on student learning and/or curiosity.

IMPLEMENTATION

The students in this group will just see the lesson materials without any chatbot.



Evaluation

The goal of this project is to understand how different chatbot systems impact student learning and foster curiosity.

Towards this end, we will evaluate student:

- **Performance in the course:**
 - Correctness of work
- **Engagement in the course:**
 - Attends section
 - Completes assignments
 - Completes lessons
- **Signs of curiosity:**
 - Works on independent projects
 - Asks questions

Using the Basic Chatbot as a baseline, comparing these different chatbot systems will help us understand the impact of

- Using relevant context to provide a more targeted response (Grounded Chatbot)
- Crowdsourcing questions and shared experience (Community Chatbot)
- Using an AI chat as an educational tool (No Chatbot)

References

[1] Ali Malik, Juliette Woodrow, Brahm Capoor, Thomas Jefferson, Miranda Li, Sierra Wang, Patricia Wei, Dora Demszky, Jennifer Langer-Osuna, Julie Zelenski, Mehran Sahami, and Chris Piech. 2023. Code in Place 2023: Understanding learning and teaching at scale through a massive global classroom. <https://piechlab.stanford.edu/assets/papers/codeinplace2023.pdf>.

[2] 2023. Create chat completion - API Reference. <https://platform.openai.com/docs/api-reference/chat>. Accessed 2024-01-26.