

# Elevating Education: Enhancing Learning with Personalized AI Models at the University of Central Florida

## Project Objective

The purpose of this project is to study the potential benefits of having a generative AI tool for students attending the University of Central Florida. We aim to evaluate the advantages and disadvantages that come with a personalized artificial intelligence agent, but we will also elaborate on our AI model specifically made for the students at UCF.

The research focuses on previous AI models that have been integrated into working classrooms and the benefits those models have provided. We will also look at faults within these models so we can effectively improve on these faults for the model being created for UCF. Furthermore, we look at how current academic systems could be improved by using generative AI. We do not seek to replace professors and staff with AI but rather enhance learning, understanding, and creativity for students and professors during their time at the University of Central Florida.

## Project Background and Significance

The traditional approach to education involving large lectures and a many-to-one relationship between students and professors is flawed, presenting many opportunities for optimization. One primary flaw is the lack of options for individual learning styles. Due to circumstances such as class size and limited resources, instructors are not able to accommodate and effectively target students whose style of learning differs from the instructor's teaching style. As a result, students whose learning styles differ from their teachers perform worse academically compared to their peers (Chetty).

While problematic on their own, the consequences of these flaws become evident when put against the highly variable climate of current events. For instance, a study analyzing the effects of COVID-19 found that the vast majority of students reported a significant decline in learning quality (Hu et al.). These results reveal that standard lecturing and distribution of class materials

are not enough on their own to overcome current events, hindering students' academic performance.

In the past, the only option for students seeking personalized educational assistance was a traditional tutor, which in many cases is unaffordable for students. With the rise of generative AI, more and more students are turning to tools like ChatGPT to assist with learning and schoolwork. However, current AI language models are not yet fit for education.

Current AI agents are trained on too broad of a range of information and expose students to potential misinformation and academic dishonesty. Generative AI such as ChatGPT has been shown to produce inaccurate information, known as "hallucinations". Additionally, these models tend to plagiarize material to produce a response, but since the specific wording is subject to change, traditional plagiarism detectors are rendered useless against it (Grassini, 692). Students may also begin to use generative AI models as a crutch to circumvent learning through homework assignments or other assessments of learning comprehension.

Though AI presents multiple challenges to the education system, it also has the potential to improve it. One use case for generative AI is for use in the classroom, where it can be used to produce teaching materials and as an instructional aid (Elbanna et al. 20). Another use case is as a personalized learning assistant which can help deepen students' understanding by encouraging them to ask questions to gain a deeper understanding of the subject matter (Elbanna et al. 20-21). By training AI agents on specific subjects, we can achieve higher accuracy on subject-specific topics and work to prevent plagiarism by filtering the training data based on intellectual property rights. This would also afford institutions greater control over how students use generative AI while providing students with a better tool for education.

## **Research Methods**

In our research project, we plan to have three distinct phases, each with its own set of specific methodologies to develop an effective AI language model that can enhance student learning while addressing academic dishonesty worries.

### *Phase 1:*

First, we will interview a sample of twenty UCF students to gain insight into their current impressions and critiques regarding AI in educational environments, as well as their experience using these models for academic purposes. Through these interviews, we will garner valuable information regarding student's expectations, wants, concerns, and criticisms regarding AI tools in educational environments. We will incentivize students to participate by offering a \$5 gift card for each interviewee. We will reach students by posting flyers and asking professors to share the opportunity to students if possible.

### *Phase 2:*

Next, through the use of the insights gained in phase 1, we will entirely develop the AI language model software by fine-tuning a pre-trained GPT model with subject-specific training data. We plan to use school-approved resources to train the language model, such as books, videos, articles, and other resources that the University of Central Florida deems acceptable. This way, we can optimize the language model to the student's specific academic needs through the use of approved resources while preventing academic dishonesty.

To create training data for the model, we will use the OpenAI GPT-3.5 Turbo API to process the raw training materials in small chunks, prompting the model to transform the information into question and answer pairs. Then, the output of this process will be used as input for fine-tuning a custom model based on GPT-3.5 Turbo. The GPT-3.5 Turbo API costs about \$2 per million tokens (words), and the fine-tuning API costs \$8 per million tokens, totalling \$10/1M tokens. Assuming 20 million tokens of training data, the total training cost will be \$200.

### *Phase 3:*

Finally, we will begin usability testing to evaluate the effectiveness of the software in improving student academics. Users who are granted the ability to use the language model will be sent weekly surveys to gather data regarding their academics before and after the usage of the language model, as well as reports on things like bugs or errors. Through this assessment, we will be able to assess the effectiveness of the language model regarding student's academics, and thus carry out changes based on the feedback to provide the best results.

## Expected Outcome

After the first year of using the AI model, we are looking to produce a research article to outline the results of using the AI models within a working classroom at the University of Central Florida. The research paper will show the outcome over the last three semesters and what the students thought of the AI model during those semesters. Additionally, it will include a technical description of the training process so that it can be replicated by other researchers. We want to be completely open with the outcome to further advance the future of AI within education, so that other universities can start using the model and help with creating a learning environment that all students can prosper in.

If the study shows positive results, we will offer technology demonstrations for educators at UCF and other universities so that they can learn more about use cases for the model and decide whether they want to use the technology. As there would likely be operational costs involved in training and running the model in production, we will also create cost estimates based on projected usage.

We want to make sure that the AI model supports the student's learning style, and as it interacts with the student it learns how to best support the student with their studies. The AI that we are proposing to produce for the University of Central Florida is mainly meant for the use of accommodating students during their time at the university. While this is a good starting point, we hope to later also introduce this AI model to support professors with more feedback from students after the initial testing period. We hope to improve the algorithm of the model to better suit all students coming to the university, and gather more information from other universities that are also adopting the AI education model.

## Literature Review

Chetty, Nithya Dewi, et al. "Learning Styles and Teaching Styles Determine Students' Academic Performances." *International Journal of Evaluation and Research in Education (IJERE)*, vol. 8, no. 4, 1 Dec. 2019, <https://doi.org/10.11591/ijere.v8i4.20345>.

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- Elbanna, Said, et al. “Exploring the Integration of ChatGPT in Education: Adapting for the Future.” *Management & Sustainability: An Arab Review*, vol. 3, no. 1, 31 May 2023, pp. 16–29, <https://doi.org/10.1108/msar-03-2023-0016>.
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## **Preliminary Work and Experience**

All members of our team are computer science majors at UCF, and we share a passion for technology and the ways it can be used to improve people’s lives. In particular, the growing prominence of AI recently has prompted us to explore its potential to improve education. Having personally experienced the impact of generative AI on learning throughout our courses at UCF, we are uniquely qualified to research a solution to this growing issue. Furthermore, as computer

science students, we know the systematic and programming fundamentals required to build the proposed machine learning models, including experience coding with Python, C, Java, and Pytorch.

By developing personal AI agents, and then releasing an article on their effectiveness, we hope to bring more visibility to this issue while providing a real-world tool to assist students and educators with this new technology. Our previous research on this topic consists of reviewing current literature and gathering sources to directly inform our research plan. Although it's a new area of research, we were able to find valuable sources to help us understand the context surrounding the use of generative AI in education, and the potential uses of AI as a constructive tool for learning.

### **IRB/IACUC statement**

We will be conducting research that will include the need for human interviews/surveys so approval from IRB will be required. We will not be conducting animal testing so the approval for IACUC will not be required.

### **Budget**

Item Request	Price
Gift cards for study participants	\$5 x 20 participants = \$100
OpenAI GPT-3.5 Turbo chat and fine-tuning	\$10/M x 20M tokens = \$200
Total	\$300