

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

Project Objective or Aim:

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 look at the advantages and disadvantages that come with an academic artificial intelligence model, 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 will look at current academic systems, and what parts 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 current approach to education is flawed and presents many opportunities for optimization. One primary flaw in the current approach to education is the lack of options for individual learning styles, which is something we are looking to. 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 an effort to compensate for educational faults, many students explore supplementary resources. This presents a problem, however, as tutors are costly and not sustainable for many students. Other students may resort to the use of generative AI such as ChatGPT. However, current AI language models are not yet fit for education. The AI is trained on too broad of a range and exposes the student 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. 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., 16–29). However, current manifestations of generative AI are not optimized for this use case.

In the past, the only option for students seeking personalized educational assistance would be 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, these tools often fall short of educational assistants, both due to the aforementioned issues and due to their inherently broad scope. 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 conduct an all-inclusive analysis of various recent articles and studies that focus on current AI models' involvement in classroom and educational environments. Within this analysis, we will gain insight as to how current AI models perform in educational environments, as well as the respective model's influence on student academics. Additionally, we will conduct interviews on University of Central Florida 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.

Phase 2:

Next, through the use of the insights gained in phase 1, we will entirely develop the AI language model software. The development process will use the information gathered through the literature review and interviews to create an exemplary model, as it will build and improve on faults of previous language models in the educational environment. We plan to use school-approved resources to design the information the language model will function on, such as books, videos, articles, and other resources that the University of Central Florida deems acceptable. This way, we can effectively develop a language model that is optimized to the student's specific academic needs through the use of approved resources, while also not allowing academic dishonesty to occur.

Phase 3:

Finally, we will implement the language model and begin on-hand testing to test 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. The two things that we will be looking at are the students and the AI model. How we will measure the student's productivity will be with grades at the end of each semester and compare them to previous semesters before using the AI model. The way that we will look to measure the AI model improvements is by feedback from the students. We will send emails to the students who are using the AI model to answer survey questions. The survey will ask what has helped the student and what could be improved on within the software, as well as reports on any bugs or issues. 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. We want to be completely open with the outcome to further advance the future of AI within education. So that other universities join the model and help with creating a brand-new learning environment that all students can prosper in. 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>.

- Chichekia, Tanya, et al. "The Potential of Learning with (and not from) Artificial Intelligence in Education" *Frontiers*, vol. 5, 22 August 2022, <https://doi.org/10.3389/frai.2022.903051>
- 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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- Kamalov, Firuz, et al. "New Era of Artificial Intelligence in Education: Towards a Sustainable Multifaceted Revolution." *Sustainability*, vol. 15, no. 16, 16 August 2023, <https://doi.org/10.3390/su151612451>
- Meyer, Jesse G., et al. "ChatGPT and Large Language Models in Academia: Opportunities and Challenges." *BioData Mining*, vol. 16, no. 20, 13 July 2023, <https://doi.org/10.1186/s13040-023-00339-9>
- Ouyang, Fan, et al., "Artificial Intelligence in Education: The Three Paradigms." *Computer and Education: Artificial Intelligence*, Elsevier, vol. 2, 28 April 2021, <https://www.sciencedirect.com/science/article/pii/S2666920X2100014X>

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
AWS SageMaker	\$ 200
Total	\$200