

# **The Impact of AI Chatbots on Student Learning: Critical Thinking, Misinformation Detection, Ethics, and Academic Integrity**

## **Project Objective**

This project investigates how AI-powered chatbots such as ChatGPT affect university students' critical thinking skills, especially their ability to identify factual versus misleading information. The study aims to understand how reliance on AI-generated content influences students' ability to verify sources, question accuracy, and engage in reflective analysis.

By examining students' evaluation of AI-generated responses in various contexts, this research seeks to provide insights into whether chatbots enhance or hinder independent thought. The goal is to inform educators, institutions, and policymakers about the responsible integration of AI in education, ensuring that its use supports—not replaces—students' development of essential analytical and ethical reasoning skills.

## **Project Background and Significance**

AI-powered chatbots like ChatGPT have become increasingly present in educational settings due to their ability to provide learners with personalized academic assistance and engage them in interactive, human-like conversations (Wu & Yu, 2024). While these tools support students by delivering feedback and guidance, concerns have been raised about how students interpret and engage with AI-generated information, particularly regarding critical thinking. Research shows that even graduate-level students trained in higher-order thinking may accept chatbot outputs without verifying their accuracy. One study found that students who completed reflective assignments still struggled to evaluate sources or assess the reliability of information, indicating that reliance on chatbots may reduce students' ability to critically analyze and question content (Dilekli & Boyraz, 2024).

Students increasingly turn to ChatGPT for academic help, but concerns have emerged about its ability to produce convincing content that may not always be accurate. While ChatGPT can generate fluent and coherent responses, it often presents information that appears legitimate but is sometimes fabricated (Lambert & Stevens, 2024). For instance, Lambert and Stevens (2024) explain that ChatGPT can produce false narratives in response to misleading prompts and has fabricated entire articles, essays, and TV scripts based on previously debunked misinformation. This is especially troubling because such responses are often delivered confidently, leading users to accept misinformation as fact. OpenAI also acknowledges this issue, warning that

ChatGPT may fabricate citations or misrepresent arguments. These concerns highlight risks to students' ability to evaluate AI-generated information and maintain strong fact-checking habits (Lambert & Stevens, 2024).

Non-native English-speaking students often use ChatGPT to help them understand academic materials, which supports language comprehension but may lead to overreliance (Buripakdi & An, 2024). Buripakdi and An (2024) found that some students depended on ChatGPT for idea generation and paraphrasing, raising concerns about weakened critical thinking and reduced awareness of misinformation.

While this ease of access offers undeniable benefits in terms of efficiency and engagement, it also raises concerns about how students interpret and rely on the information provided by AI systems (Bobula, 2024). Specifically, these tools may affect students' ability to think critically and verify facts, especially when AI-generated responses sound confident but may be incorrect or misleading (Dilekli & Boyraz, 2024).

This proposal explores how students engage with AI-generated content by investigating their ability to distinguish between accurate and misleading chatbot outputs. It focuses on how students interpret, trust, and respond to information produced by tools like ChatGPT, especially in academic settings. By assessing student behaviors and perceptions, this study will provide insights into how chatbots may influence students' critical thinking and their ability to evaluate factual accuracy. The findings will support the development of educational strategies that encourage independent analysis and responsible use of AI in learning environments.

## **Research Methods**

This study will be conducted in three phases: survey development and distribution, data analysis, and interpretation of results. It aims to examine how AI chatbots like ChatGPT influence students' critical thinking, particularly their ability to distinguish between accurate and misleading information. Each phase is strategically designed to generate comprehensive insights.

### *Phase 1: Survey Design and Distribution*

A Qualtrics-based survey will be designed and distributed to undergraduate students at the University of Central Florida (UCF). Qualtrics is widely used and UCF-supported online survey tool, which is freely available to UCF students. Recruitment will occur through official UCF email lists to current UCF students, Webcourses announcements via professors, and student organizations in disciplines like computer science, psychology, and education. This ensures a diverse and representative sample.

The survey will include both closed-ended and open-ended questions. Closed-ended items will measure chatbot usage frequency, levels of trust in responses, and students' verification behaviors. Open-ended questions will prompt participants to describe their

experiences with AI-generated content, particularly instances of encountering or identifying misinformation.

To evaluate students' critical thinking skills more directly, the survey will feature short excerpts from AI-generated responses—some accurate, others with subtle factual errors. Students will assess whether the information is factual, misleading, or uncertain and explain their reasoning. This mixed-format approach, combining scenario-based, multiple-choice, and reflective questions, will provide both quantitative trends and rich qualitative insights aligned with the study's goals.

### *Phase 2: Data Analysis*

The collected data will be examined using both statistical and thematic analysis. Quantitative data from closed-ended questions will be analyzed through descriptive statistics, correlation analysis, and basic regression models to uncover patterns in chatbot reliance and misinformation detection.

Qualitative data from open-ended responses will be thematically coded to reveal patterns in trust, reasoning, and fact-checking behavior. Students' classifications of AI-generated excerpts will be coded based on their accuracy and supporting rationale. This will highlight common misconceptions and critical reasoning tendencies when evaluating AI content.

### *Phase 3: Interpretation and Timeline*

In the final phase, results will be interpreted to assess how students engage with AI-generated information and think critically about its accuracy. The process will span four weeks: Week 1 for finalizing and distributing the survey, Weeks 2–3 for data collection and analysis, and Week 4 for interpreting results and preparing findings. These insights will inform AI literacy strategies and critical thinking training at UCF, supporting responsible chatbot use in academic environments.

## **Expected Outcome**

The expected deliverable from this project is a detailed research report that highlights how AI chatbot usage affects students' critical thinking and their ability to detect misinformation. This report will be designed for submission to UCF's undergraduate research repository or presented at the UCF Showcase of Undergraduate Research Excellence (SURE). The findings will also be shared with faculty members through department newsletters and brief faculty seminars to promote awareness and encourage classroom discussions around ethical and responsible AI usage.

Beyond institutional dissemination, the report will offer actionable recommendations to educators, emphasizing the importance of guiding students in critically engaging with AI tools rather than passively accepting chatbot-generated responses. It will encourage universities to implement targeted AI literacy training integrated into general education

courses or writing-intensive curricula, enhancing student preparedness in navigating digital information.

Additionally, the research will be useful for academic advisors developing resources to support students in evaluating digital content critically. It may lead to trial programs for responsible AI use within classrooms or workshops led by writing centers and academic support offices. These efforts could help build sustainable support systems that reinforce fact-checking and analytical skills in coursework across disciplines.

The research will also serve as a foundational reference for future studies examining how digital tools shape cognitive development in academic environments. It addresses a gap by focusing on the student perspective in real educational settings, especially in detecting misinformation. The results may inform UCF policymakers, academic advisors, and curriculum developers interested in balancing the integration of AI with efforts to cultivate higher-order thinking.

To maximize accessibility and impact, digital copies of the research report will be made available on the UCF Libraries website and institutional repository. Key findings may also be presented through infographics and short videos shared on UCF social media platforms and academic websites. These formats aim to engage a broader audience, including students, faculty, and educational technologists. Ultimately, this work will contribute to a broader understanding of how emerging technologies influence learning outcomes and help shape best practices for ethical AI usage in higher education.

## Literature Review

Bobula, M. (2024). Generative artificial intelligence (AI) in higher education: a comprehensive review of challenges, opportunities, and implications. *Journal of Learning Development in Higher Education*, 30.

<https://doi.org/10.47408/jldhe.vi30.1137>

Buripakdi, A., & Truong An, L. (2024). “Why can’t I use ChatGPT for my academic learning?” Voices from Ph.D. students in a Thai university. *LEARN Journal: Language Education and Acquisition Research Network (Online)*, 17(2), 299–319. <https://doi.org/10.70730/VRVS6900>

Dilekli, Y., & Boyraz, S. (2024). From “Can AI think?” to “Can AI help thinking deeper?”: Is use of Chat GPT in higher education a tool of transformation or fraud? *International Journal of Modern Education Studies*, 8(1).

<https://doi.org/10.51383/ijonmes.2024.316>

- Duran, V. (2024). Analyzing teacher candidates' arguments on AI integration in education via different chatbots. *Digital Education Review*, 45, 68–83. <https://doi.org/10.1344/der.2024.45.68-83>
- Lambert, J., & Stevens, M. (2024). ChatGPT and generative AI technology: A mixed bag of concerns and new opportunities. *Computers in the Schools*, 41(4), 559–583. <https://doi.org/10.1080/07380569.2023.2256710>
- Wu, R., & Yu, Z. (2024). Do AI chatbots improve students learning outcomes? Evidence from a meta-analysis. *British Journal of Educational Technology*, 55(1), 10–33. <https://doi.org/10.1111/bjet.13334>

## Preliminary Work and Experience

The research team has completed a range of relevant academic coursework that provides a strong foundation for this project. All members have taken *English Composition II*, which emphasized academic research, source evaluation, critical thinking, and research-based writing. This experience has equipped the team with the ability to identify credible sources, synthesize information, and clearly present findings.

In addition to writing proficiency, the team brings programming knowledge from courses such as *Introduction to Computer Programming* and *Introduction to the C Programming Language*. Two team members are computer science majors and have applied these technical skills in class projects involving software tools, simulations, and data analysis.

The team also has a solid foundation in statistical reasoning. One member is a statistics major who has completed both *Introduction to Statistics* and *Statistical Methods I*, while another team member has also completed *Introduction to Statistics*, contributing additional support for data interpretation.

Together, these experiences ensure the research team is well-prepared to develop the survey instrument, analyze both quantitative and qualitative data, and carry out a successful software-based research project.

## IRB/IACUC Statement

IRB approval is required because the research requires human participants to participate in the survey. No animals will be officially involved in the research, thus, IACUC approval will not be needed.

## **Budget**

### **ChatGPT Pro Subscription – \$200.00**

- One-month subscription to access GPT-4.5, Operator tools, and Sora video generation. These features will be used to generate a variety of AI-produced responses, including confidently written misinformation. The excerpts created through this process will be embedded in the survey to assess how well students can detect factual versus misleading content.

### **Copyleaks EDU License – \$34.00**

- Two-month subscription to an AI detection tool that will validate the ChatGPT-generated excerpts. Copyleaks will help confirm whether the misinformation in selected responses is detectable by existing AI detection software, ensuring the accuracy and relevance of the survey content.

### **Dedoose Student License – \$12.95**

- One-month license for qualitative analysis of open-ended survey responses. This software will help identify patterns in students' reasoning when evaluating chatbot responses, providing deeper insight into critical thinking behaviors.

### **Poster Printing for SURE – \$50.00**

- Cost to print a high-quality research poster for the UCF Showcase of Undergraduate Research Excellence, where the project's findings will be presented to a broad academic audience.

### **Printing and Recruitment Materials – \$50.00**

- Expenses for printing flyers, consent forms, and other materials to support campus-wide participant recruitment and clear communication about the study.

**Total Amount Requested: \$346.95**