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## AI ASSISTANCE VARIANTS IN SOFTWARE DEVELOPMENT CYCLES

Micheal Callahan	Grand Canyon University, Phoenix, AZ, USA	<a href="mailto:micheal.callahan@icloud.com">micheal.callahan@icloud.com</a>
Joseph Claus	Grand Canyon University, Phoenix, AZ, USA	<a href="mailto:joeyclauss27@gmail.com">joeyclauss27@gmail.com</a>
Emmy Voita	Grand Canyon University, Phoenix, AZ, USA	<a href="mailto:JVoita@my.gcu.edu">JVoita@my.gcu.edu</a>
Christine Bakke*	Grand Canyon University, Phoenix, AZ, USA	<a href="mailto:christine.bakke@gcu.edu">christine.bakke@gcu.edu</a>

\* Corresponding author

### ABSTRACT

Aim/Purpose	With the technology of artificial intelligence (AI) improving every day it is important to find ways to harness AI in the software development life cycle (SDLC). This research demonstrates how AI tools were incorporated into an upper division Computer Science course to assist with development of various memory games.
Background	Since ChatGPT's release in 2022, other companies have released rival chatbots each competing for a piece of the new market. With the plethora of AI options now available, it is important for a developer to learn to use AI as an assistant within the development of a custom project.
Methodology	The research presented is a multi-case, cross-analysis of four student researchers in a required, senior level Computer Science course. All students were tasked with collecting mixed-methods data on two AI assistants, throughout design and development a unique memory app; then these four students pooled data and conducted a cross-comparative analysis. To prepare for cross analysis, standardized Likert rankings and thematic categories were developed and consistently used during data collections. AI assistants evaluated: Claude, Copilot, ChatGPT Free, and ChatGPT Paid. Throughout the development process, each

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student provided both of their AI assistants with the same initial queries, the results of which were given a Likert ranking and notes were kept regarding AI accuracy. Individual datasets were examined, then pooled and the combined dataset was used to finalize hypothesis findings. The four student-researchers presented their multi-case, mixed-methods analysis as a snapshot in time regarding the value of AI as assistants in the development of their projects.

Contribution	This paper builds on prior research focusing both on student experience and instructional methods in capstone-like courses. This study examines using AIs as assistants as a current trend in Computer Science education.
Findings	During multi-case analysis, two hypotheses were analyzed against the data of the four student-researchers. The cross examination of data found no statistical significance between the helpfulness of paid vs. free AI as course project assistants; while non-IDE AI assistants performed significantly better than IDE assistants across 7 out of 8 usage type categories.
Recommendations for Practitioners	Technology instructors can use this research to incorporate AI assistants into advanced courses that focus on building custom software, with cautions that foundational coding skills and knowledge should be in place prior to attempting complex projects. Companies that are researching how AI can be integrated into the software development process can use this research to see preferred strengths of various AI's, with cautions for use with proprietary data.
Recommendations for Researchers	Researchers can observe how different AI's can assist with application development. Further research is encouraged as AI capabilities will continue to evolve.
Impact on Society	The researchers' findings show AI in light of its current abilities and limitations in the software development life cycle. While AI assistants excelled in simple to medium complexity debugging tasks, there were many complex tasks where a human coder was preferred over the AI assistants; however, this is expected to change over time.
Future Research	As future technology strengthens AI some aspects of the study may become historical; however, the core of the research, that of using AI as assistants in development of software projects is expected to remain pertinent to education for some time.
Keywords	AI, artificial intelligence, ChatGPT, Claude, Github CoPilot, software development life cycle, SDLC

## AUTHORS

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**Micheal Callahan** graduated in December 2024 with a Bachelor's degree in Computer Science from Grand Canyon University in Phoenix, Arizona. He is currently working in a data analytics position, pursuing his passion for data science and exploring how new technologies, such as Artificial Intelligence, can be used to improve the field. He has completed several projects, with some highlights including a neural network for deepfake detection, a data analysis project on flight scheduling, and sports analytics.



**Joseph Clauss** is a Computer Science student at Grand Canyon University in Phoenix, Arizona, with an emphasis in Business Entrepreneurship. With a passion for blending technical innovation and real-world application, Joseph is focused on developing software solutions that support user-centered design and entrepreneurial strategy. His academic interests include software development, game design, AI-assisted learning tools, and full-stack applications for business scalability. Past projects include developing Unity-based memory games, integrating VR into educational simulations, and creating Excel-based financial modeling tools for project analysis. Joseph is driven by the goal of using technology to solve practical problems and is actively exploring how to merge coding expertise with entrepreneurial insight to launch future ventures.

**Emmy Voita** [Information not available]



**Dr. Christine Bakke** is an Associate Professor at Grand Canyon University in Phoenix, Arizona. She has been a technology instructor since 2008 and earned her doctorate in 2013, specializing in IT with a focus on robotics and coding within educational settings. Dr. Bakke is passionate about project-based learning, particularly in guided learning environments. Her professional career spans 18 years in the industry, with expertise in networks, cybersecurity, databases, and programming. Her research is centered on integrating academic and professional best practices into agile, active learning methodologies. Past projects include developing Scrum-inspired chatbots, speech-assistant software, memory-assistive learning games, and custom IoT devices equipped with tailored software solutions.