A preliminary Study on the Use of Generative AI in SE Education

P. Hidalgo, Marko Mijac, A. Domínguez, Daniel Rodriguez
University of Alcala, FOI

CECIIS 2025

foi

Universidad de Alcalá

Outline

- Background
- Methodology
- Results
- Discussion
- Threats to Validity
- Conclusions and Future Work

Background

- Generative AI tools (e.g., ChatGPT, GitHub Copilot) are common in SE.
- There is a need to understand student engagement, challenges, and support needs.
- This study examines AI use in a second-year SE course.
- Aims to inform instructional design and AI integration.

Methodology

Methodology

- RQ1: How do students use Generative AI for SE tasks?
- RQ2: What challenges do students face?

- Survey

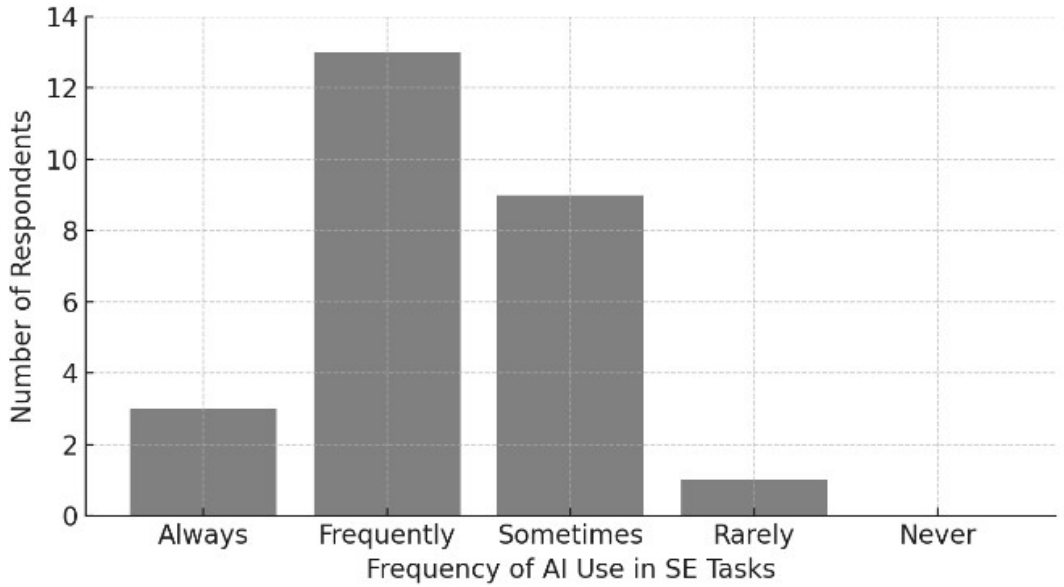
Methodology - Survey

- Research Design: 10-question survey (quantitative + qualitative)
  - Usage patterns & frequency
  - Prompting techniques
  - Challenges & skill gaps
- Participants: 26 second-year SE students, anonymous, voluntary, end-of-term
- Analysis:
  - Descriptive statistics (frequencies, means)
  - Open-ended responses

Results

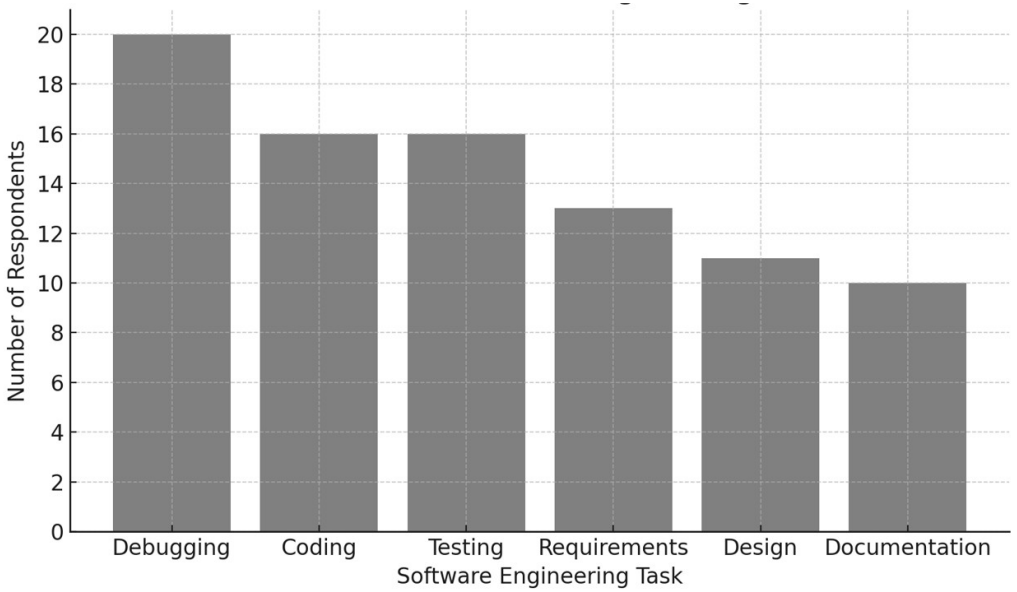
Frequency of AI Use

- Frequency of Use:
  - Always: 3 students (12%)
  - Frequently: 13 students (50%)
  - Sometimes: 9 students (35%)
  - Never: 0 students



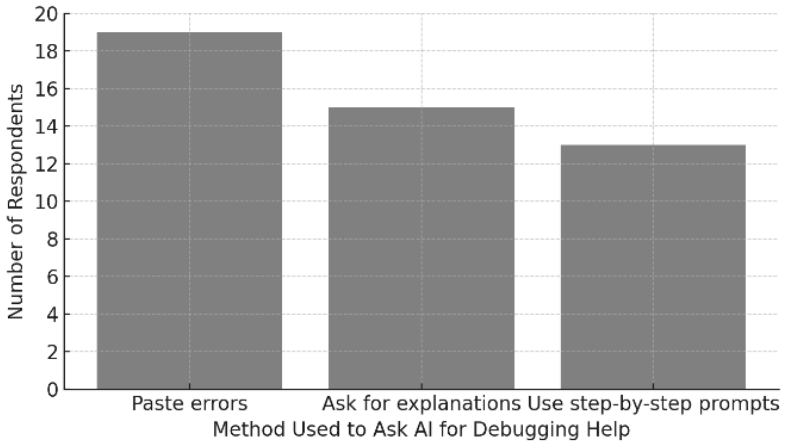
Results – Task Distribution

- Debugging: 20/26 students (77%)
- Coding: 16/26 students (62%)
- Testing: 16/26 students (62%)
- Requirements: 13/26 students (50%)
- Design: 11/26 students (42%)



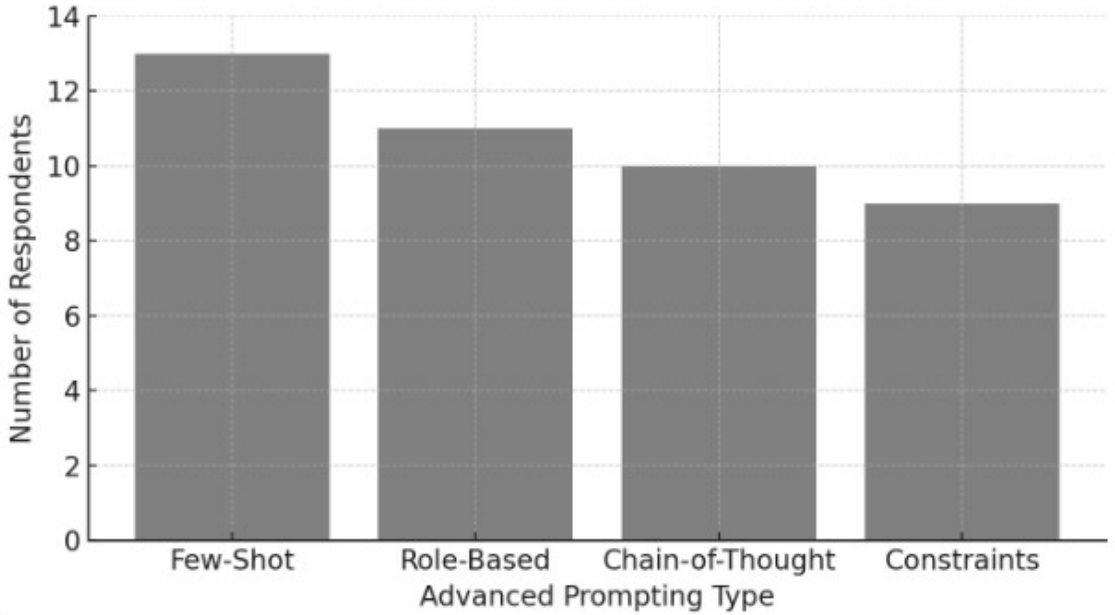
Results - Debugging Help Methods

- Paste errors: 19
- Ask for explanations: 15
- Step-by-step prompts: 13



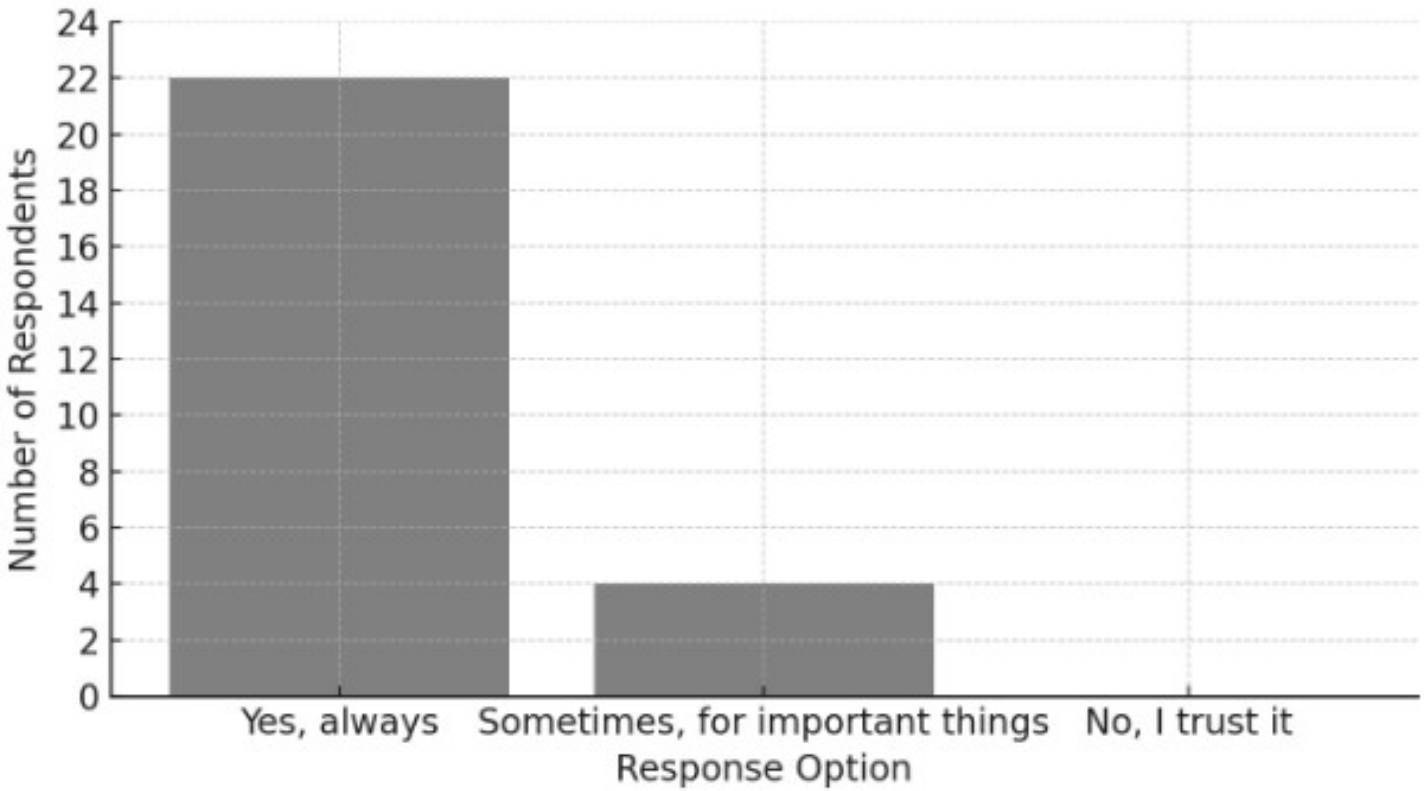
Results - Advanced Prompt Techniques

- Few-Shot: 13
- Role-Based: 11
- Chain-of-Thought: 10
- Constraints: 9
- None: 6



Results - Verification of AI Outputs

- Always: 22
- Sometimes: 4
- Never: 0

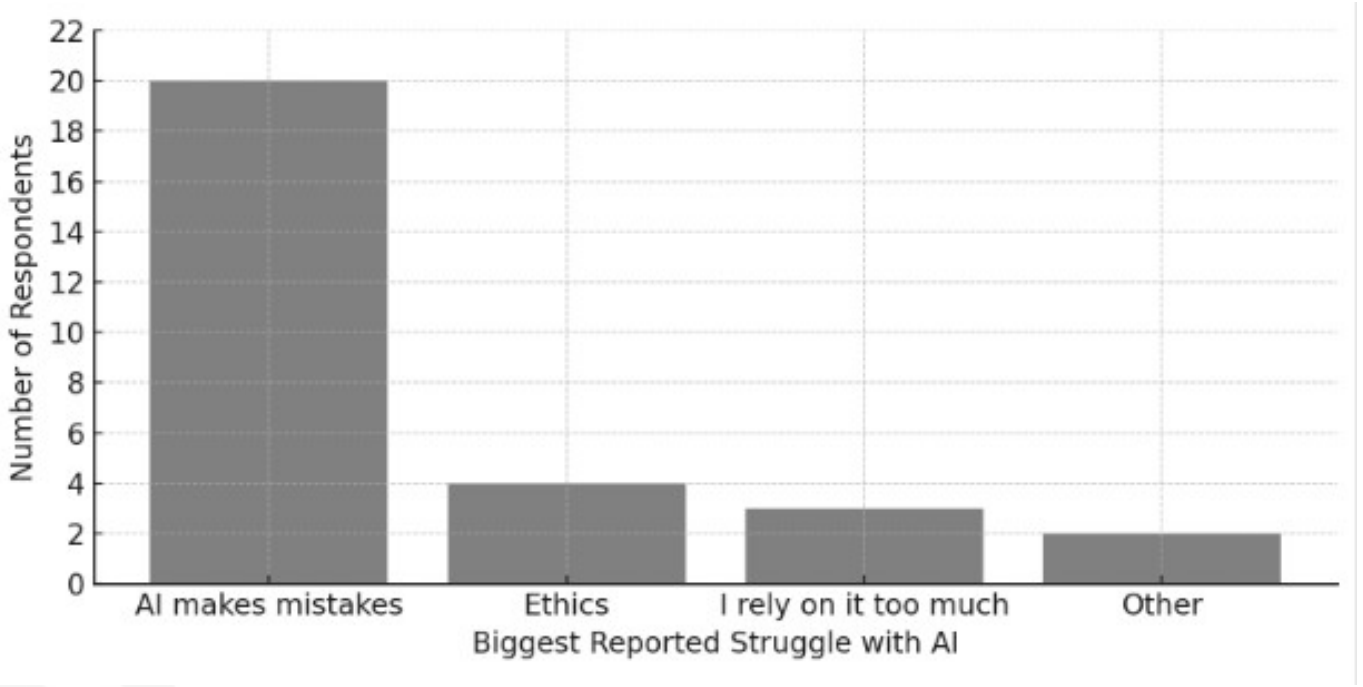


Results - Understanding Prompt Patterns

- Yes: 14
- No: 10
- (2 non-responses)

Results - Challenges with AI

- Makes mistakes: 20
- Ethical concerns: 4
- Over-reliance: 3
- Other: 2



Results - Open-Ended Feedback

- Positive experiences (8):
  - Error fixing (4), coding (2), design (1), summarization (1)
- Negative experiences (14):
  - Incorrect code (7), error fixing failures (5), diagram issues (2)

Discussion

Discussion - RQ1: How Students Use AI

- High adoption: → 60% use AI frequently or always.
- Used across SDLC, not just coding.
- Students verify outputs (85%).
- High self-rated proficiency (73%).
- Advanced prompting used but not fully understood.

Discussion - RQ2: Challenges

- Main challenge: AI produces incorrect/misleading outputs
- Diagram creation particularly challenging
- Ethical and over-reliance concerns less reported.
- Failures more common in code and diagram generation.
- Students want to improve prompting and holistic AI use.

Implications for Education

- Integrate AI literacy modules:
  - Prompt engineering
  - Ethical use
  - Critical evaluation of outputs
- Adapt project designs for AI-enhanced workflows.
- Teach across all SDLC phases.

Threats to Validity

- **External**: Small sample from one course.
- **Internal**: Survey timing, peer influence.
- **Construct**: Self-reported data, non-validated questionnaire.

- Still offers foundational insights for future research..

Conclusions and Future Work

- AI is routine in student workflows.
- Confidence exists but understanding is limited.
- Need for structured AI education in Software Enginnering.

- Future work: larger studies, instructional modules, performance-based assessments.