Published: 04 September 2025

UKICER 2025: UK and Ireland Computing Education Research Conference
September 4 - 5, 2025
Edinburgh, United Kingdom

ABSTRACT

Ethical Generative AI Use with Novice Programmers: Co-Created Heuristics, Including the SAV Framework

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UKICER '25: Proceedings of the 2025 Conference on UK and Ireland Computing Education Research (September 2025)
https://doi.org/10.1145/3754508.3754525
ISBN: 9798400720789

Ethical Generative AI Use with Novice Programmers: Co-Created Heuristics, Including the SAV Framework

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Abstract

This research, conducted in an upper post-primary Computer Science classroom, explores how students learning Python engaged with ChatGPT. A key output of the study was the co-creation, with students, of heuristics (guiding principles) to support the ethical and effective use of ChatGPT while learning to program. These include: (i) a general set to support learning in contexts where generative AI is available, and (ii) the SAV framework (Specify the problem, Ask again, Verify the output), a specific set for engaging with ChatGPT. These heuristics are presented as working prototypes.

Keywords

artificial intelligence; ChatGPT; CS1; design-based research; generative AI; heuristics; human-centered; novice programming; python; second-level; student-centred

ACM Reference Format:
Irene Stone. 2025. Ethical Generative AI Use with Novice Programmers: Co-Created Heuristics, Including the SAV Framework. In *UK and Ireland Computing Education Research Conference (UKICER 2025), September 04–05, 2025, Edinburgh, United Kingdom.* ACM, New York, NY, USA, 1 page. https://doi.org/10.1145/3754508.3754525

Methodology and Outputs

This research, conducted with 20 students in my Computer Science class in Ireland, followed a Design-Based Research approach, an applied and iterative methodology developed to bridge practice and theory [2, 4]. The research unfolded in three phases:

Phase 1: Analysis and exploration This phase involved problem identification, reviewing literature, and exploring students' experiences, attitudes, and understanding of AI. An ethical foundation was established early: students first learned *about* AI before *using* any tools[3]. This was followed by programming lessons during which students had the option to use ChatGPT alongside existing approaches. ChatGPT use was monitored in accordance with ethical approval, relevant literature, and international guidance [5, 6].

Phase 2: Design and construction Informed by insights from Phase 1, students participated in brainstorming sessions to generate ideas on how ChatGPT could support their learning. An initial prototype heuristic was co-created to guide ethical and effective use of the tool while programming.

Phase 3: Evaluation and reflection The prototype was implemented during further programming lessons and iteratively refined through student feedback and classroom use.

Data collection included pre- and post-questionnaires, classroom observations, student ChatGPT conversation transcripts, student reflections, photos of whiteboard work, and focus group interviews. A key outcome of the study to date was the development of two complementary sets of heuristics:

(i) A general set to support the learning of programming in contexts where tools such as ChatGPT are available.
(ii) The **SAV** framework, designed to help students formulate prompts: **S**pecify the problem, **A**sk again, **V**erify the output.

Both sets of heuristics will be presented in the poster.

Conclusion and Next steps

This study responds to calls for human-centred approaches to AI in education [5], showing how students can play an active and ethical role in shaping AI use in their learning. The student-informed heuristics and the SAV framework aim to contribute to the growing need for practical guidance integrating generative AI into programming education [6]. The heuristics presented are early outputs of a broader study. Data analysis is ongoing and prototypes will be reviewed in a follow-up teacher focus group to explore how they might be adapted in other contexts [2]. The research also aims to generate a theoretical understanding of students' experiences, attitudes toward, and understanding of AI. These insights and practical outputs may inform future practice and contribute to emerging local and national guidance on AI integration in schools [1].

Acknowledgments

I gratefully acknowledge support of the *John Smith Award* and guidance of my supervisors, Dr. Margaret Leahy and Dr. Hsiao-Ping Hsu.

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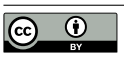

UKICER 2025, Edinburgh, United Kingdom

ACM ISBN 979-8-4007-2078-9/25/09
https://doi.org/10.1145/3754508.3754525