

Beyond the Code: Integrating Emotional Resilience in AI-Driven Computer Science Education

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ABSTRACT

Artificial intelligence (AI) is reshaping how students learn and interact with learning tools, making them face new emotional demands such as frustration with unpredictable outputs and fatigue. Research has explored how software engineers who regularly use generative AI tools encounter emotional strain, debugging fatigue, and reduced trust in their decision-making. However, there is a lack of studies focusing on computer science students, a high-risk group due to the many tasks involving AI. Furthermore, emotional strain in computing is not distributed equally. Prior research shows that women and minoritised students often face additional emotional labour, stereotype threat, and systemic bias, adding an extra layer of emotional challenges.

This study aims to develop a framework to incorporate emotional literacy, coping strategies, and inclusive pedagogical practices into the AI-integrated curriculum with attention to gendered experiences and equity. This study advocates for a shift in AI pedagogy to account for emotional development, empowering future professionals to thrive in AI-rich learning and work settings.

CCS CONCEPTS

• **Social and professional topics** → **Computing education**.

KEYWORDS

Computing education, Artificial Intelligence, Emotional Literacy, Resilience

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1 INTRODUCTION

The rise of generative AI (GenAI) tools in education in general and computer science in particular is reshaping how students learn, create, and interact with technology and introducing new cognitive and emotional challenges. Research has shown how AI can accurately solve programming problems and exam questions in different contexts [2, 5–7]. Conversely, other studies showed concerns about excessive dependence on the tools, underlying model bias, and inappropriate or unethical use in educational settings [3, 8, 12, 13].

In response to these tensions, this study focuses on practical adoptions and opportunities to integrate AI into computing education in a trustworthy and secure way, with special attention to emotional resilience. There is a clear need to create ways to measure

user interaction with GenAI covering different areas, for example, the emotional impact.

Montes and Khojah investigated how software engineers in industry and academia interact with large language models (LLMs) for their daily work tasks, finding that frustration is the most common emotion triggered in these interactions [10]. Their results support the notion of the need to start emotional literacy as early as possible, in university, to equip future professionals with tools to have better AI-user interactions. Building on this, the current study proposes a framework that develops technical and emotional competencies related to GenAI in inclusive and equitable ways.

The research goal guiding this study is:

- To design a framework integrating emotional literacy, coping strategies, and inclusive pedagogical practices into computing education while developing students' ability to use GenAI tools ethically.

This framework aims to contribute to more ethical and human-centred learning environments by addressing the technical and emotional dimensions of GenAI use in computing education.

2 FINDINGS FROM SOFTWARE ENGINEERS

Research about emotional reactions to AI-user interaction is still in the development phase. Most studies have researched the psychological impact of extended technology use, finding that digital tools affect individuals' productivity and mental and emotional well-being [4, 9].

Naseer [11] found that cognitive overload, mental exhaustion, and decreased decision-making ability resulted from long AI usage. They also found correlations between the extent of AI usage, emotional stress, and short attention span, which reduce professionals' cognitive involvement.

Focusing only on emotions, Gabbiadini et. al. [1] found that exposure to Generative AI (e.g., ChatGPT) triggered higher negative emotions in participants (N=410) compared to a control group. These emotions were linked to a perceived threat from AI, including concerns about jobs, human identity, and societal value.

3 METHODOLOGY

A series of steps are being followed to ensure the framework is empirically grounded, inclusive, and actionable.

1.- Exploration. The study is currently in this step. The data collection is done using interviews and focus groups. The interviews will include computer science students (diverse in gender, background, and prior AI experience) to understand their emotional challenges when using GenAI and compare it with professionals. In addition, educators from different levels (bachelor's and master's) will be invited to focus groups to explore current pedagogical

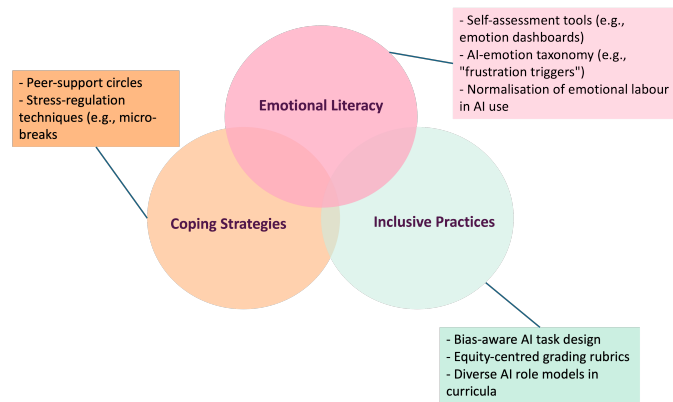


Figure 1: Envisioned Framework as Outcome

gaps in addressing emotional resilience. This stage aims to create a framework in a development phase that will be validated in the next stage.

2.- Measurement and Validation Phase. This stage will implement a large-scale survey with students and university educators to measure three aspects: emotional responses (frustration, trust, fatigue) when using GenAI, differences across gender and race, prior AI exposure, current coping strategies, and perceived support needs. Additionally, the survey will validate the framework's first draft to make it more generalisable.

3.- Testing, Evaluation and Refinement. The framework is piloted in selected computing courses. The objective is to collect pre- and post-intervention data on emotional resilience and learning outcomes. After the data analysis, the framework is refined based on feedback.

4 PROPOSED FRAMEWORK AND RECOMMENDATIONS

Figure 1 presents what the framework could look like. As stated before, the idea is to integrate the three main goals and to provide recommendations to achieve the inclusion of said recommendations into the CS curricula. The empirically grounded framework will support educators and course designers in shaping course design (including structured group work and scaffolded assignments), emotional onboarding when introducing AI tools, and activities that encourage ethical dialogue and foster personal agency.

5 CONCLUSION

This study focuses on creating an empirically based framework to guide educators to engage and motivate human-AI interaction resilience. An implicit goal is to acknowledge and accommodate students' diverse experiences and backgrounds.

Ultimately, the framework aims to prepare students to use GenAI tools ethically and effectively and to navigate the emotional and cognitive demands these technologies introduce.

REFERENCES

- [1] Gabbiadini Alessandro, Ognibene Dimitri, Baldissarri Cristina, and Manfredi Anna. 2025. The emotional impact of generative AI: negative emotions and

- perception of threat. *Behaviour & Information Technology* 44, 4 (2025), 676–693.
- [2] Sihem Amer-Yahia, Angela Bonifati, Lei Chen, Guoliang Li, Kyuseok Shim, Jianliang Xu, and Xiaochun Yang. 2023. From large language models to databases and back: A discussion on research and education. *ACM SIGMOD Record* 52, 3 (2023), 49–56.
- [3] Brett A Becker, Paul Denny, James Finnie-Ansley, Andrew Luxton-Reilly, James Prather, and Eddie Antonio Santos. 2023. Programming is hard-or at least it used to be: Educational opportunities and challenges of ai code generation. In *Proceedings of the 54th ACM Technical Symposium on Computer Science Education V. 1*. 500–506.
- [4] Rafael A Calvo and Dorian Peters. 2014. *Positive computing: technology for wellbeing and human potential*. MIT press.
- [5] James Finnie-Ansley, Paul Denny, Brett A Becker, Andrew Luxton-Reilly, and James Prather. 2022. The robots are coming: Exploring the implications of openai codex on introductory programming. In *Proceedings of the 24th Australasian computing education conference*. 10–19.
- [6] James Finnie-Ansley, Paul Denny, Andrew Luxton-Reilly, Eddie Antonio Santos, James Prather, and Brett A Becker. 2023. My ai wants to know if this will be on the exam: Testing openai's codex on cs2 programming exercises. In *Proceedings of the 25th Australasian Computing Education Conference*. 97–104.
- [7] Irene Hou, Owen Man, Sophia Mettelle, Sebastian Gutierrez, Kenneth Angelikas, and Stephen MacNeil. 2024. More robots are coming: large multimodal models (ChatGPT) can solve visually diverse images of Parsons problems. In *Proceedings of the 26th Australasian Computing Education Conference*. 29–38.
- [8] Sam Lau and Philip Guo. 2023. From "Ban it till we understand it" to "Resistance is futile": How university programming instructors plan to adapt as more students use AI code generation and explanation tools such as ChatGPT and GitHub Copilot. In *Proceedings of the 2023 ACM Conference on International Computing Education Research-Volume 1*. 106–121.
- [9] Gloria Mark, Shamsi Iqbal, Mary Czerwinski, and Paul Johns. 2015. Focused, aroused, but so distractible: Temporal perspectives on multitasking and communications. In *Proceedings of the 18th ACM Conference on Computer Supported Cooperative Work & Social Computing*. 903–916.
- [10] Cristina Martinez Montes and Ranim Khojah. 2025. Emotional Strain and Frustration in LLM Interactions in Software Engineering. *arXiv preprint arXiv:2504.10050* (2025).
- [11] Aliza Naseer, Naveed Rafaqat Ahmad, and Muhammad Amjad Chishty. 2025. Psychological Impacts of AI Dependence: Assessing the Cognitive and Emotional Costs of Intelligent Systems in Daily Life. *Review of Applied Management and Social Sciences* 8, 1 (2025), 291–307.
- [12] James Prather, Paul Denny, Juho Leinonen, Brett A Becker, Ibrahim Albluwi, Michelle Craig, Hieke Keuning, Natalie Kiesler, Tobias Kohn, Andrew Luxton-Reilly, et al. 2023. The robots are here: Navigating the generative ai revolution in computing education. In *Proceedings of the 2023 working group reports on innovation and technology in computer science education*. 108–159.
- [13] James Prather, Brent N Reeves, Paul Denny, Brett A Becker, Juho Leinonen, Andrew Luxton-Reilly, Garrett Powell, James Finnie-Ansley, and Eddie Antonio Santos. 2023. "It's weird that it knows what i want": Usability and interactions with copilot for novice programmers. *ACM transactions on computer-human interaction* 31, 1 (2023), 1–31.