

Introduction to the Minitrack on Computing Education

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1. Introduction

Computing Education (CE) extends beyond formal academic instruction, encompassing broader social responsibilities and impacts (Wong-Villacres et al., 2023). While important progress has been made in this area in recent years, challenges persist, particularly in addressing how computing programs can tackle ethical dilemmas influenced by diverse cultural, philosophical, governance, religious, and linguistic contexts (Brown et al., 2024). Research into computing students' motivation, resilience, and self-regulation strategies is a critical component of the educational process. Gaining insights into the cognitive, emotional, and social aspects of learning is essential for designing educational experiences that promote effective knowledge acquisition. This minitrack aims to unite research on various topics within CE. The papers presented provide insights into different perspectives of CE, which we believe stimulate meaningful engagement within the community.

2. Minitrack Details

In this second edition of the Computing Education minitrack, nine papers were initially submitted for this minitrack. All papers were reviewed anonymously by at least two external reviewers and then carefully analyzed and summarized by the minitrack chairs. Four papers were accepted considering the strong framework that demonstrated academic rigor and practical relevance. Thus, the acceptance rate was 44.44%. Two papers focused on the ethical aspects of CE. One paper focused on the conceptions of Artificial Intelligence (AI) among K-12 students and the other focused on shaping the relationship between programmers' experience and their performance.

3. Accepted Papers

The paper **When Project Conditions Clash: How 3D Development Packs & Team Size Shape the Relationship Between Video Game Programmers' Experience & Performance**, by *Anke Schulz*, discusses the influence of project conditions, specifically the use of 3D development packs and team size, on the relationship between programmers' experience and their performance. The results suggest that 3D development packs positively contribute to programmers' learning progress, acting as supportive tools that enhance their ability to perform effectively on the job. Conversely, larger team sizes appear to have a negative impact, hindering the learning process. According to the authors, these findings underscore the need for managers to consider the interaction between support technologies and other project conditions, such as team size, rather than assessing them in isolation.

The paper **Conceptions of AI among K-12 Students in Azerbaijan: A Topic Modeling Approach**, by *Mirka Saarela, Ayaz Karimov, Ville Heilala, and Pieta Sikström* This study employed automatic topic modeling, utilizing a recent multilingual sentence transformer, to explore Azerbaijani students' perceptions of AI. Data collected from 73 participants revealed that students widely acknowledged AI's ability to facilitate tasks and recognized its autonomous capabilities. However, the analysis also uncovered significant student knowledge gaps and misconceptions. Some participants expressed concerns regarding the potential negative impacts of AI, such as job displacement or ethical issues. These findings highlight the importance of introducing explainable AI (XAI) concepts in K-12 education.

The paper **Conveying the Ethics of Artificial Intelligence in K-12 and Academia: A Systematic**

Review of Teaching Methods, by *Nils Tschoppe, Johannes W. Katsarov, Paul Drews, and Hannah Trittin-Ulbrich*, presents a systematic literature review, guided by the PRISMA framework, to investigate the ethics of AI in K–12 education and academia. The authors provide an overview of both established and emerging methods for teaching AI ethics across these educational settings. The review offers insights into the pedagogical strategies currently employed to teach AI ethics and derives key implications for both theory and practice, emphasizing the importance of integrating AI ethics education to prepare students for ethical challenges in the age of AI.

The paper **Ethical Considerations and Student Perceptions of Engagement Data in Learning Analytics**, by *Ayaz Karimov, Mirka Saarela, Samir Aliyev, and Ryan Baker* explored students' perceptions of engagement data collection and usage, focusing on their attitudes towards privacy and data management. By examining responses from 108 students who participated in online education, the authors investigated students' views on data collection practices, privacy concerns, and data handling preferences. The results reveal that although many students are comfortable with their engagement data being used for personal and instructor dashboards, there are significant privacy concerns, particularly regarding the collection of facial expression and chat participation data.

4. Papers Session

The papers were presented at the conference following the sequence presented next:

1. When Project Conditions Clash: How 3D Development Packs & Team Size Shape the Relationship Between Video Game Programmers' Experience & Performance
2. Conceptions of AI among K-12 Students in Azerbaijan: A Topic Modeling Approach
3. Conveying the Ethics of Artificial Intelligence in K–12 and Academia: A Systematic Review of Teaching Methods
4. Ethical Considerations and Student Perceptions of Engagement Data in Learning Analytics

5. Challenges for the Future

The studies presented in this minitrack highlight several emerging research challenges. One key challenge involves optimizing project conditions in game development, particularly how technological

tools like 3D development packs and team dynamics influence programmers' learning and performance. Future research could explore how to balance team size and supportive technologies to enhance performance across various development environments. Additionally, addressing the significant knowledge gaps and misconceptions about AI among K-12 students presents another challenge. There is a need to develop educational interventions that introduce XAI and promote a clearer understanding of AI concepts from an early age.

Another major research avenue involves the integration of AI ethics education in both K-12 and higher education. Developing effective pedagogical strategies for teaching ethical considerations in AI, especially as it becomes more pervasive, will be essential. Furthermore, as learning analytics become more sophisticated, addressing privacy concerns related to data collection in education is critical. Research should focus on designing privacy-preserving analytics systems that still provide valuable insights while ensuring student data is managed transparently and ethically. At the same time, there is a need to think about a curriculum or guidelines that can guide the teaching of topics that are more related to the new developments in generative AI. These challenges underscore the need for interdisciplinary approaches that bring together technological advancements with ethical and educational frameworks to shape the future of digital education and AI deployment responsibly.

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References

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