

# Understanding Secondary Student Conceptions of AI

Robert Whyte  
University of Cambridge  
Cambridge, UK  
rw724@cam.ac.uk

Diana Kirby  
University of Cambridge  
Cambridge, UK  
dgk21@cam.ac.uk

Sue Sentence  
University of Cambridge  
Cambridge, UK  
ss2600@cam.ac.uk

## Abstract

As generative AI tools become more pervasive in education contexts, it is argued that students should develop a critical understanding of the opportunities and limitations of emerging AI technologies. Where existing work has focused on students' conceptions of AI, there is limited empirical evidence of student understanding in light of these new advancements. In this study, we investigated students' emerging conceptions of AI and how these could be understood through classification. Using an appropriate framework, SEAME, we investigate students' conceptions across four dimensions: (i) the social and ethical (SE) implications of AI; (ii) its use in applications (A); (iii) how models (M) are trained; and (iv) the underlying engines (E) used. We report a qualitative analysis of survey data collected from 474 secondary and college students. Using the SEAME framework, we found that students had most accurate conceptions relating to AI applications, including generative tools (e.g. ChatGPT, Snap's My AI), as well as its social and ethical implications. Many students also held accurate conceptions of how AI technologies work, including how models are trained using large datasets and how human behaviours. When describing generative AI, students described the ability to generate content (e.g. images, text, video)

and simulate human-like responses to text prompts. However, we also identified naive conceptions relating to AI systems having agency or emotions. We suggest that efforts to embed generative AI technologies in the classroom should challenge students' naive conceptions and carefully consider how language and representation are used (e.g. being mindful of anthropomorphism). The results of this study have implications for teaching and learning about AI, including the design of educational resources.

## CCS Concepts

• **Social and professional topics** → **K-12 education**; *Computing literacy*; • **Computing methodologies** → **Artificial intelligence**.

## Keywords

computing education, K-12 education, artificial intelligence, machine learning, conceptions

## Acknowledgments

We are grateful to Google DeepMind who provided funding to undertake our research activities.