Session 6c
Paper

Sparking student curiosity and exploration via computational thinking and computational things

Program text
How can computational thinking (CT) with computational things be used in humanistic subjects to spark students' curiosity in and their exploration of abstract concepts? - A design-based research study

Abstract
Introduction
Intellectual curiosity is the "drive to pursue, enjoy, and engage in learning opportunities" (Reis, s.d.). Curiosity should also drive teachers to experiment with new methods and educational researchers to query how existing theory can inform practice and how practice can inform theory in turn. This paper discusses a study that investigates how computational thinking (CT) with computational things can be used in humanistic subjects to spark students' curiosity in and their exploration of abstract concepts. The study involves two cases with students and teachers from Media Studies and Philosophy at SDU. Designing for situated and embodied learning with CT and computational things form the theoretical framework.

Method
A democratic approach to design-based research is adopted in which researcher and practitioners work together in a 4-phase study: 1) Pedagogical challenges are identified. 2) Interventions are designed to fit the theoretical framework and the challenges. 3) Interventions are tested in 2 iterations followed by data collection (video observations, interviews, student products, field notes) and analysis. 4) Results are studied, design principles and patterns are developed.

Results
A Media Systems Game and idea generation tools have been developed to support students in decomposing and exploring core concepts. The game and tools provide students with tangible representations of abstract concepts and require students to engage in logical thinking and working algorithmically. Preliminary results show that there is potential in learning with CT and computational things. However, some students are unfamiliar with working at this level of decomposition and students add their own steps when working algorithmically or abandon algorithms to engage in abstract discussion.

Discussion
The design process, interventions and possible improvements as well as the allocation of roles and matching of expectations between researcher and practitioners will be discussed.

Author(s)
Inger-Marie F. Christensen, SDU

Literature

Abrahamson, D., & Bakker, A. (2016). Making sense of movement in embodied design for mathematics learning. *Cognitive research: principles and implications*, 1(1), 33.

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated Cognition and the Culture of Learning. *Educational Researcher*, 18(1), 32-42. doi:10.3102/0013189X018001032

Caeli, E. N., & Yadav, A. (2020). Unplugged Approaches to Computational Thinking: a Historical Perspective. *TechTrends*, 64(1), 29-36.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*: Cambridge university press.

Reis, R. (s.d.). Is Intellectual Curiosity a Strong Predictor for Academic Performance? *Tomorrow's Professor Postings*. Retrieved from https://tomorrowsprofessor.sites.stanford.edu/posting/1219