

Intrinsic motivation, curiosity, and learning: Theory and applications in educational technologies

I will leveraged in educational technology applications. First, I will review recent results showing how state curiosity, and more generally the experience of novelty and surprise, can enhance learning and memory retention. Then, I will discuss how psychology and neuroscience have conceptualized curiosity and intrinsic motivation, studying how the brain can be intrinsically rewarded by novelty, complexity, or other measures of information. I will explain how the framework of computational reinforcement learning can be used to model such mechanisms of curiosity. Then, I will discuss the learning progress (LP) hypothesis, which posits a positive feedback loop between curiosity and learning. I will outline experiments with robots that show how LP-driven attention and exploration can self-organize a developmental learning curriculum scaffolding efficient acquisition of multiple skills/tasks. Finally, I will discuss recent work exploiting these conceptual and computational models in educational technologies, showing in particular how intelligent tutoring systems can be designed to foster curiosity and learning in children and used in a real classroom setting.