

What is My Role as a Learner? : Students' Epistemic Agency and Epistemic Consciousness

Science education increasingly positions students as epistemic agents — constructors and evaluators of knowledge in addition to being consumers of it. Whether students take up this role depends on their epistemological framing: their in-the-moment sense of “what is going on here” with respect to knowledge (Hammer & Elby). When students frame an activity as recalling knowledge as propagated stuff, they work to reproduce a “right answer”; when they frame it as figuring something out, they engage in sensemaking — building and revising explanations to resolve a gap in their understanding (Odden & Russ). Epistemic agency, on this view, is exercised through sensemaking within a constructed-knowledge frame.

Yet agency and sensemaking do not guarantee that students become aware of the constructed, provisional character of the knowledge they build. Drawing on Freire’s critical consciousness (*conscientização*), I introduce epistemic consciousness: a reflective, critical awareness of how scientific knowledge is made, whose ways of knowing count, and how learners can recognize and reshape their own framing.

Using design-based research, I examine how these constructs interact in a technology-enhanced classroom built around agent-based computational models (Emergent Systems Microworlds). Analyzing episodes where students explore and co-design models of biological phenomena, I trace shifts from reconstructing settled explanations toward constructing them, and moments where doing science opens into reflecting on the nature of that knowing. I argue that well-designed computational environments can scaffold not only epistemic agency and sensemaking, but the critical epistemic consciousness that makes such agency emancipatory rather than merely procedural.

[Acknowledgement: This abstract is written with the help of an AI tool Claude.]