Situated at a Distance: A Framework for Teaching Reflexive Inquiry through Digital Games

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As science and technology (technoscience) grow increasingly complicit in systemic injustice, there is an urgent need for practitioners to conduct scientific inquiry as a reflexive process. Reflexivity in technoscience entails critically examining how one's position in material, political, and cultural structures of practice relates to their process of scientific inquiry. For example, it can involve examining how one's position as a researcher at a large for-profit corporation affects their framing of research problems. Teaching scientific inquiry as a reflexive process is necessary as it enables one to understand how values and assumptions permeate inquiry, and how one's positionality can embody or transform them. However, teaching it is also a paradoxical challenge: it requires students to be positioned in the structures of practice, while also at a distance from them. Being positioned in practice is necessary because the structures of practice differ significantly from those of education. Simultaneously, being at a distance is also necessary because those structures can bind one's understanding of a problem according to shared cultural norms. This raises two research problems: How do we design educational environments that position students in practice, at a distance? How can these environments support inquiry as a reflexive process?

This dissertation makes two primary contributions towards addressing these research problems. First, I draw upon feminist STS and pragmatist scholarship to propose a framework that

brings one's positionality in structures of distribution, power, and culture into relation with the process of inquiry. The framework explores positionality in four ways: as one's *means*, *status*, *culture*, and *experience* and brings them into relation to three interdependent processes of inquiry: *problematizing*, *hypothesizing-experimenting*, and *resolving*. By providing a systematic means of examining positionality and inquiry, the framework lays the grounds to analyze and develop responses to each question. This, I hypothesize, allows it to function both as an analytical tool to examine educational environments as well as a design space for educational environments that aim to teach scientific inquiry. Second, I hypothesize that digital games can approach these research questions because they can simulate the structures of practice, one's position in them, and the processes of inquiry as they relate to those positions, all at a distance from real practice. I investigate this potential of digital games by using the framework to conduct case studies and design-based inquiry into multiple digital games. This process demonstrated how the framework can be a source of design possibilities for approaching the two research questions. Simultaneously, it also surfaced key strengths and constraints of digital games as environments to support inquiry as a reflexive process. Particularly, I highlight how the procedural, evaluative, and artificial affordances of digital games can support but also constrain them from teaching scientific inquiry as a reflexive process (as stand-alone environments), and how such games can be complemented.