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Designing to support critical engagement with statistics.

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Summary: The purpose of this paper is to describe a trajectory of designing for particular forms of engagement with mathematics. The forms of engagement that were targeted through these design experiments involved making intentional choices about which procedures to leverage in order to support particular claims (what I call *critical engagement*). In particular, this paper presents two rounds of a design cycle of a statistics unit, created in the context of an online, interactive videogame called Quest Atlantis. Examining the design history of the unit, this paper demonstrates how iterative refinements of the unit supported increasing critical engagement with the content, and specifically, the importance of fostering both *intentionality* and experiences of *consequentiality* in the designs. Finally, the paper considers the implications of the lessons learned for this targeted intervention for our understanding of how elements of design support students' mathematical reasoning more generally.

Classification: D20 K43 D53 C33 U73

Keywords: statistics; design-based research; digital games; middle school; problem solving

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