FACILITATING DISCOVERY LEARNING IN THE TABLET ERA: RETHINKING ACTIVITY SEQUENCES VIS-À-VIS DIGITAL PRACTICES

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Reflecting on empirical results from a design-based research pilot intervention, we frame our study as paradigmatic of what may occur when digital devices are introduced into a classroom without anticipating students' preexisting cultural practices surrounding a technological medium. In a previous study (Reinholz et al., 2011) we evaluated a Wii-mote-based design for proportions and we used an interview protocol to guide students through a sequence of activities that implemented our design rationale. We wished to replicate this design in tablet form. However, tablets afford users free access to all interaction features.

The Mathematical Imagery Trainer for Proportion (MIT-P) is an embodied-learning device. Users solve motor-action problems and articulate their solutions prior to the introduction of formal notation. They manipulate two bars (Fig. 1a) that turn green if the bars compare in height by a "secret" ratio (e.g., 1:2). They bootstrap principles of proportional equivalence by developing strategies for making green. Various tools—grid, numerals, and table (Fig. 1b)—scaffold progressive mathematization of these strategies. Users can modify the activity's ratios, feedback, and appearance (Fig. 1c). Three 9th grade students participated in a 25 min. interview (Fig. 1d).

a. b. c. d.

Figure 1: The Mathematical Imagery Trainer for Proportion (MIT–P).
[The app is a free download at https://itunes.apple.com/us/app/mathematical-imagery-trainer/id563185943?mt=8]

The students, all fluent tablet consumers, engaged the medium in ways that inadvertently derailed our intended activity sequence and therefore undermined our design rationale. Scaling up to classrooms (Lamberg & Middleton, 2009), we modified our activity rationale so as to accommodate students' digital practices (see in Lee, 2013; Negrete, 2013).

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