Designing for Embodied Interaction: Integrating Studies of Body Actions that Support Scientific Reasoning

Robb Lindgren, David Brown, Daniel Hoffman

College of Education, University of Illinois Urbana-Champaign

Nathan Kimball & Chad Dorsey

Concord Consortium
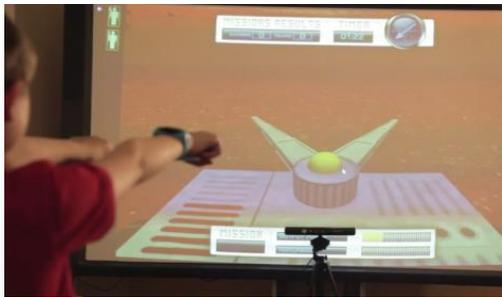
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GestuRe Augmented Simulations for supporting exPlanations (GRASP)

Project goal is to create enhanced web simulations that are responsive to **gestural input** and are supportive of **student explanations**

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Embodied Games for Learning Lab

Builds on existing work on **embodied learning** and science education demonstrating benefits for **technology-cued physicality** (Enyedy et al. 2012; Johnson-Glenberg et al., 2014; Lindgren, 2015)

The ability of students to construct effective explanations of science phenomena is receiving increased attention in national standards (NGSS, 2013)

Design-Based Research (DBR)

- **Several ways in which the DBR approach aligns with this work:**

  - *"...engineer innovative educational environments and simultaneously conduct experiments on those innovations."* **(Brown, 1992)**

  - *"Researchers test the design in authentic settings and gather evidence about the impact of the materials."* **(Bell, Hoadley, & Linn, 2004)**

  - Research takes place through iterative cycles of design, enactment, analysis, and redesign **(Collins, 1992)**

  - DBR research focuses on *"developing a profile or theory that characterizes the design in practice"* **(Barab & Squire, 2004)**

Embodied Learning and DBR

"the design of innovations enables us to create learning conditions that learning theory suggests are productive, but that are not commonly practiced or are not well understood" **(DBRC, 2003)**

The basic premise that learning is constrained and afforded by our embodied activity may widely recognized, but DBR can help transform these broad ideas into specific designs and guiding principles (**example:** *congruency*)
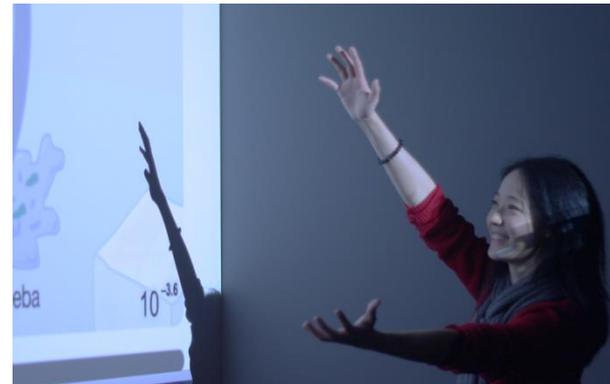
Embodied Learning and DBR (cont.)

- **3 additional reasons why EL needs DBR**

1. Willingness to engage one's body in a learning environments is hyper-context-dependent

2. Embodied learning as a sequestered activity has limited utility; DBR offers a social environment, an audience

3. Understanding embodied learning requires an openness to various sources of data and a creative ways to analyze and integrate these sources

and perhaps vice versa?

# An example case from work in progress

What happens when a syringe with the tip blocked off gets pushed in? Why does it spring back?

Jada uses her fingers and a flat hand to represent air molecules and the plunger

This seemed to be a potential example of what we are calling **Embodied Explanatory Expressions** (EEE)

Next Design Steps: Build the EEE into the simulation interface
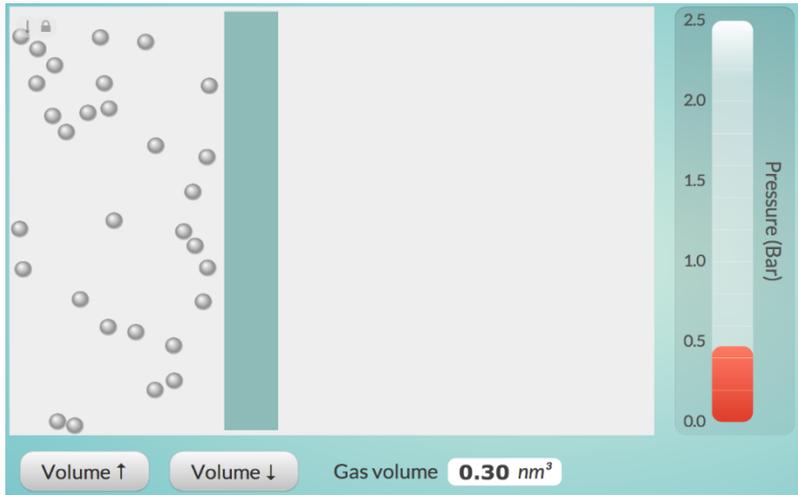
Questions?

Thanks!

Continued conversation welcome!

robblind@illinois.edu

debrown@Illinois.edu