Metaphor-Based Learning of Physics Concepts through Whole-Body Interaction in a Mixed Reality Science Center Exhibit: Supplemental Project Activity (DRL-1417966)

Principal Investigator: Robb Lindgren – University of Illinois at Urbana-Champaign (UIUC)
Co-PIs: Eileen Smith - University of Central Florida (UCF), Guy Garnett (UIUC), J. Michael Moshell (UCF), Charlie E. Hughes (UCF), Shaun Gallagher – University of Memphis
Institutional Partners: Orlando Science Center (OSC) and Museum of Science and Industry (MOSI) in Tampa, FL

SUMMARY OF IMPACT TO DATE

Physics and Space Knowledge

Learners using the full-body version of the metaphor-based simulation scored higher on assessment of physics and space knowledge questions compared to a group who used a desktop version of the simulation, indicating cognitive advantages for embodied interaction and physically making predictions within science simulations.

Attitudes Towards Science

Learners using the full-body simulation also showed higher improvements in questions about their identification and positive feelings about science, supporting productive conversations between children and their parents that frequently led to successful performance. Compared to other studies of museum conversations, we found that a substantial portion of the conversations were based around simulation components and science knowledge.

SUPPLEMENTAL FUNDING SCOPE

Introduction

Supplemental activity explores use of the projection floor as not only an end user interactive, but also a nimble design tool for experience designers to playtest ideas and collect prototype data via interactions with visitors on the public exhibition floor. As we enter the "internet of things," the goal is to be ready as a field to embrace co-authorship, from both the learner, and the designer, perspective.

- experience control
- sensored spaces
- data visualization
- patterns of use
- motivational supports

Waves

Year 3's installation at Orlando Science Center for testing during the Otronicon Festival showed that multiple users worked successfully in the space together, and the Waves Energy content, which included rudimentary "cueing" in the form of text triggered by learner behavior, was seductively intuitive to the participants, and generated much interest from the visitors around the exploring learners.

Control of Learning Experience

Along the large experience floor, control is given and taken in multiple ways by learners working the exhibit together. Those intergenerational learners have their unique point of view when they happen upon an interactive exhibit; can we spur unique connections based on ages present at any one time, and choices of prompts chosen by the educator? Likewise, can we begin to discover how learners in a group might bring up tangential topics of interest because they happened on this exhibit?

- Adaptive experience where educator has a show control board and can improvisationally interact with learners, either visibly, or behind the "wizard's curtain"
- Use as a dynamic prototype "play tool" for experience designers for interaction during the day with museum visitors to formatively evaluate the emerging design for unplanned audiences or explorations.

How much of the foundation for conceptual change and development of scientific habits occurs when the designed experience is under the direct control of the learner?

How/can control of the floor's digital experiences by an informal educator explicitly expand the audience during emergent behavior, and shed insight into experience design that can evolve the experience?

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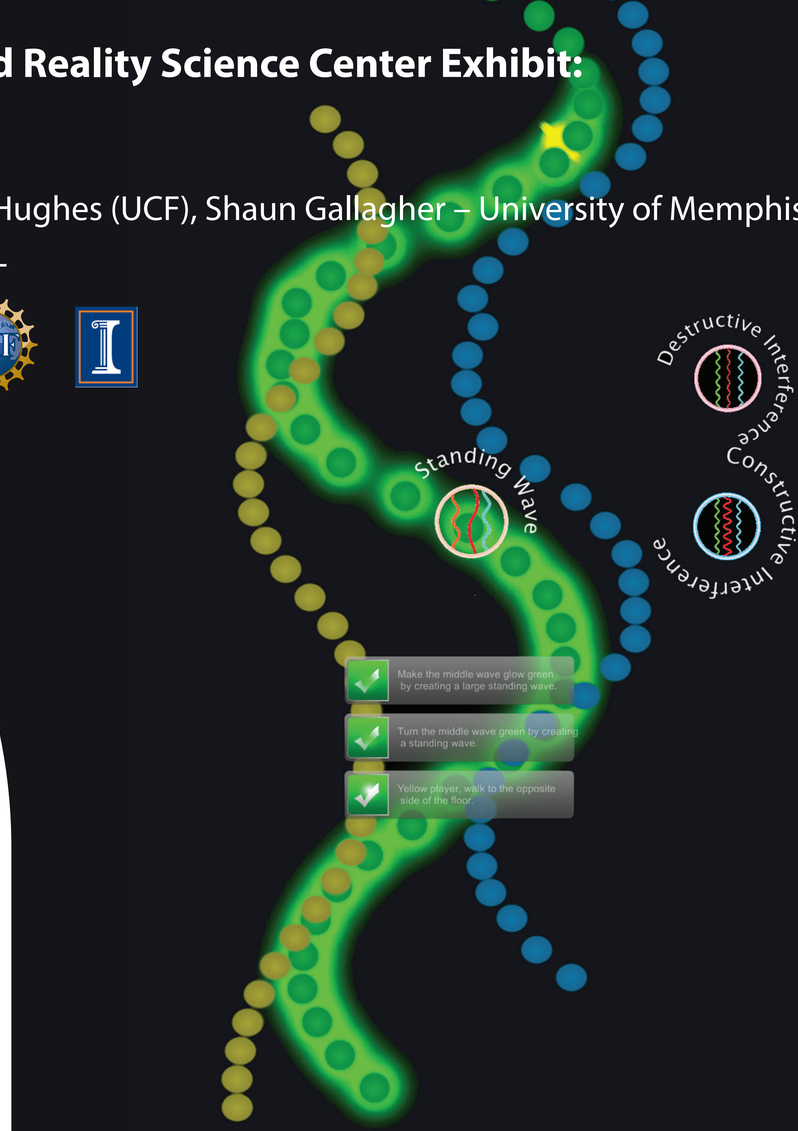

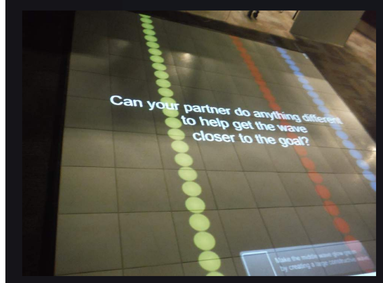

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