Embodiment and Designing Learning Environments

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Abstract: There is increasing recognition amongst learning sciences researchers of the critical role that the body plays in thinking and reasoning across contexts and across disciplines. This workshop brings ideas of embodied learning and embodied cognition to the design of instructional environments that engage learners in new ways of moving within, and acting upon, the physical world. Using data and artifacts from participants' research and designs as a starting point, this workshop focuses on strategies for how to effectively leverage embodiment in learning activities in both technology and non-technology environments. Methodologies for studying/assessing the body's role in learning are also addressed.

Workshop motivation and objectives

An emerging paradigm of research in the learning sciences is examining how the perceptions and actions of our bodies affect the development of new ideas and new ways of understanding in complex disciplines such as mathematics and the sciences (Abrahamson & Lindgren, 2014). Learning scientists have examined how physical actions, such as gestures, performed spontaneously by both students and teachers "ground" cognition in the environment, providing opportunities for reflection and elaboration (Alibali & Nathan, 2012). Likewise, new environments are being designed that either create social contexts to facilitate physical enactment of ideas (e.g., Enyedy, Danish, Delacruz, & Kumar, 2012; Johnson-Glenberg, Birchfield, Tolentino & Koziupa, 2014; Moher, 2008; Price, Sakr, & Jewitt, 2015) or they attempt to elicit specific actions that explicate critical mechanisms or highlight important relationships (e.g., Lindgren, 2015; Manches, O'Malley, & Benford, 2010; Lyons, Slattery, Jimenez, Lopez, & Moher, 2012). Efforts to consider embodiment in the design of learning environments and to guide learners through "tacit and cultural ways of perceiving and acting" (Abrahamson, 2014) are gaining traction in the learning sciences, and effective strategies for designing new environments and new technologies that have these considerations "built in" are beginning to emerge (e.g., see the volume on learning technologies and the body by Lee, 2015).

The objective of this workshop is to bring together researchers who have conducted studies and created designs in environments that engage learners in physical ways, but who may still wish to think deeply about the kinds of prompts, artifacts, and opportunities for reflection involved in their interventions. Starting with their existing data and/or designs, the facilitators aim to assist participants in exploring how connections have or could be made between the learning goals of the design and the physical and perceptual acts being elicited from learners. Workshop participants will be prompted to think about how these actions could be designed more intentionally, and to examine opportunities for learners to develop embodied schemas or other embodied resources that could be leveraged for transfer and preparation for future learning.

After connections between embodied actions and understanding have been made explicit, workshop participants will explore how these links can be turned into frames for assessing both learning and the design of the learning environment. In other words, how can workshop participants transform what we know about expert ways of perceiving and acting into new forms of assessment that emphasize practice and perception rather than the ability to produce canned knowledge? The workshop also will examine ways that emerging data analytic techniques can be used to support more embodied approaches to assessment.

The culminating product of the workshop is a synthesis of some general heuristics for approaching new learning environment designs. As workshop participants critique and discuss and encourage the work that is presented, facilitators will document common threads in the conversation and identify some general guidelines for approaching this class of design problems. These guidelines are to be augmented by several "design cases" that come from workshop participants in the culminating small group activity. These cases, which are selected by the participants and nurtured by the facilitators, will make salient key aspects of the design process. A summary document with these items is made public following the workshop. Participants will end by brainstorming ways to continue the conversation and further their collaboration.

The target audience for the workshop is designers and researchers who either have existing work that includes a physical interaction component to their instructional intervention, or they have well-articulated plans to include such a component in upcoming work.

Workshop agenda

The planned activities for the Embodiment and Designing Learning Environments workshop include:

- *Opening remarks and framing by the workshop organizers.* Having reviewed and synthesized workshop proposals by participants, the co-organizers for the workshop will give an overview to the problem of designing learning environments that consider embodiment, pulling out themes and common challenges that the group attempts to address in the workshop.

- *Brief research presentations.* Each participant will give a short description of their research or design by "acting out" some aspect of their work using as few words as possible. The point of this activity is to highlight the embodied aspects of the design and suggest opportunities for intervention or further examination.

- *Whole-group analysis of spontaneous learner actions.* The co-organizers will present video or other data from authentic learning environments (classrooms, museums, etc.)—including video clips elicited from participants—where physical actions (gesture, object manipulation) occur naturally. Prompted by guiding questions, the group discusses ideas for how the physical actions observed affected communication, reasoning, learning, etc. within the interaction, and what opportunities there might be for augmentation in a future iteration of a designed learning environment. This analysis session concludes with a synthesis of potential design strategies for embodied learning.

- *Whole-group analysis of designed learner actions.* The co-organizers will then present video data from designed learning environments (e.g., structured classroom role-play activities, interviews where students are asked to perform particular actions, interactive technologies with specific control mechanisms, etc.). Some of these clips also come from participants. Prompted by guiding questions, the group discusses ideas for how these activities can be studied and evaluated in order to bring about insights related to learning and the connection with bodily activities. The analysis concludes with a synthesis of potential methods/measures for conducting research on designed environments for embodied learning.

- *Small-group designs around a single case.* Participants are then put into groups of 3 and asked to choose one of their member's designs/research topics for elaboration into a more detailed "case" presentation. Participants work in their groups, using the previous lists of design and research strategies, and apply these to their cases. Groups present their final cases in a short multi-modal presentation. The cases are captured in video and text descriptions by the facilitators so that they can be shared as products of the workshop.

- *Discussion of next steps and ways to keep the conversation going.* The last half hour of the workshop is devoted to discussing with participants ways to turn the workshop into more polished products (a whitepaper, grant proposals, etc.) and how to continue the conversation. Where appropriate, participants and/or facilitators are given assignments to advance these objectives after the workshop is complete.

Workshop outcomes

Given the ongoing maturation of embodiment research in the learning sciences, the Embodiment and Designing Learning Environments workshop serves to both build community among international scholars, synthesize and derive common design principles and guidelines relevant to embodied learning, and to share current knowledge with the broader community of learning sciences researchers and designers. Participants should leave the workshop with thoughtful feedback and recommendations relevant to the learning environments that they study and design. They also should have established some new collaborations that otherwise would not have formed. The success of this workshop will be reflected both in future ICLS meetings and in learning sciences journals through the increased prevalence of papers and articles discussing rigorously designed and researched learning experiences where embodiment is a central theme.

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