

Ideas for Brainstorming

I want to create an Embodied Learning Activity to explore ...

... a system involving interactions or transformations.

Example(s): Charges moving through an electrical circuit with a battery and a light bulb.
Phases of the moon, with light from the sun and motion of the earth and moon.

An embodied learning could involve...

- ... multiple students working through a role-playing activity,
- ... gestures to indicate interactions or transformations, or
- ... students defining ways to indicate interactions or transformations.

... a complex physical structure, or the behavior of a complex structure.

Example(s): DNA, a crystal lattice of atoms

An embodied learning approach could involve...

- ... multiple students working together to “build” the structure, or
- ... multiple students working together to model dynamic properties of the structure.

... something that needs to be viewed from multiple perspectives.

Example(s): molecular structures

An embodied learning approach could involve...

- ... a single student using their body (arms, fists, etc.) to model and play the role of the object,
- ... a single student using gesture to model the object and changes in orientation of the object, or
- ... multiple students taking on roles of “object” and “observer” to consider different perspectives.

... phenomena where the magnitude and/or direction varies at different points

Example(s): wind currents, pressure or temperature gradients

An embodied learning approach could involve...

- ... multiple students at different locations in the room who either use arrows, or use their bodies to indicate magnitude and or direction.
- ... a single student who moves to different location and use arrows, or use their bodies to indicate magnitude and or direction at each location.

... something far too abstract for an embodied learning approach.

Example(s): poetry meter, time evolution of a 2-state complex system

An embodied learning approach could involve...

- ... creating a map from an abstract concept to an embodied action or a gesture.
- ... translating one concept into a motion or movement gesture, and other concepts into contrasting poses or gestures.
- ... an embodied representation that can help students to break down or interpret an otherwise abstract concept in component parts.

References:

- Alibali. Gesture in spatial cognition: Expressing, communicating, and thinking about spatial information. *Spatial Cognition and Computation*, **5**(4):307–331, 2005. http://dx.doi.org/10.1207/s15427633scc0504_2
- Becvar, Hollan, and Hutchins. Representational gestures as cognitive artifacts for developing theories in a scientific laboratory. In Resources, *Co-Evolution and Artifacts*, pg. 117–143. Springer, 2008 http://dx.doi.org/10.1007/978-1-84628-901-9_5
- Beilock and Fischer. From cognitive science to physics education and back. In *Physics Education Research Conference 2013*, pg. 15–18, Portland, OR, July 17-18 2013. <http://www.compadre.org/Repository/document/ServeFile.cfm?ID=13074&DocID=3619>
- Manogue, Gire, and Roundy. Tangible metaphors. In *Physics Education Research Conference 2013*, pg. 27–30, Portland, OR, July 17-18 2013. <http://www.compadre.org/Repository/document/ServeFile.cfm?ID=13088&DocID=3623>
- Morrow. Kinesthetic astronomy: The sky time lesson. *The Physics Teacher*, **38**(4):252–253, 2000. <http://dx.doi.org/10.1119/1.880520>
- Pantidos and Patapis. Kinesthetic transverse wave demonstration. *The Physics Teacher*, **43**(6):344–345, 2005. <http://dx.doi.org/10.1119/1.2033517>
- Pfister and Laws. Kinesthesia-1: Apparatus to experience 1-d motion. *The Physics Teacher*, **33**:214–220, 1995. <http://dx.doi.org/10.1119/1.2344199>
- Reinfeld and Hartman. Kinesthetic life cycle of stars. *Astronomy Education Review*, **7**(2):158–175, 2008. <http://dx.doi.org/10.3847/AER2008036>
- Scherr, Close, Close, Flood, McKagan, Robertson, Seeley, Wittmann, and Vokos. Negotiating energy dynamics through embodied action in a materially structured environment. *Physical Review Special Topics-Physics Education Research*, **9**(2):020105, 2013. <http://dx.doi.org/10.1103/PhysRevSTPER.8.020114>
- Scherr, Close, Close, and Vokos. Representing energy II: Energy tracking representations. *Physical Review Special Topics-Physics Education Research*, **8**(2):020115, 2012. <http://dx.doi.org/10.1103/PhysRevSTPER.8.020115>
- Scherr, Close, McKagan, and Vokos. Representing energy I: Representing a substance ontology for energy. *Physical Review Special Topics-Physics Education Research*, **8**(2):020114, 2012. <http://dx.doi.org/10.1103/PhysRevSTPER.9.020105>
- Zimmerman. Moving poems: Kinesthetic learning in the literature classroom. *Pedagogy*, **2**(3):409–412, 2002.