Energy in action: The construction of physics ideas in multiple modes

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Construction of meaning

People show what they mean in many ways at the same time

Goodwin
“Embodiment,” 2000
Traditional classrooms restrict modes of communication

http://visual.merriam-webster.com/
Traditional classrooms

• Restricted communication among learners
  ▪ Few words
  ▪ Limited gestures
  ▪ Fixed body orientation

→ Restricted formative assessment
Tutorial classrooms: Less restrictive, but still limiting

• Communication less restricted
  ▪ More words by students
  ▪ Room for gestures
  ▪ Flexible body orientation
  ▪ Some use of objects

• Words still dominant

• Use of bodies not encouraged
Energy Theater: lots of modes
Energy Theater: lots of modes

More ways of showing what you mean

- More ways for students to construct and communicate meaning
- More ways for instructors to assess student understanding
Show what’s going on with the energy

Scenario:
Box shoved suddenly across floor.

- Energy flows from hand to box.
- Energy is transformed from chemical to kinetic.

Participants: Elementary teachers in a summer professional development course at SPU
(Pseudonyms = shirt colors)
Look for different ways people are “saying” what they mean

Yellow: Right, we’re all the hands
Blue: We’re all the hands
Yellow: Right
Green: Okay, so we...
Words and what they mean

“As we push, we turn to green…”

- Words indicate what speaker thinks should happen
  - Change from chemical to kinetic
  - Flip cards to show transformation
- “We” has different meaning in the two parts of the sentence
Symbolic objects: energy cards

• Participants communicate by:
  ▪ holding their cards up
  ▪ turning from one card to another
  ▪ looking at each others’ cards

• Consensus (or lack) is visible
  ▪ to participants
  ▪ to instructors
Prosody: rhythm and tone of speech

“As we push, we turn to gree-een…”

• Stress draws attention

• Contour emphasizes “green” – suggests energy form is the focus

• Length of word:
  - Gives time to respond?
  - Encourages others to follow her lead?
Body positions and orientations

Yellow changes her body orientation to hold eye contact with Black → intellectual leadership?

Participants stand in box formation → being the box?
Honing our assessment skills

- In Energy Theater, participants are encouraged to say what they mean in many ways at the same time.
- All these ways are relevant for assessing the learning taking place – for participants as well as teachers and researchers.
- With practice, we can learn to observe and evaluate these ways effectively, in real time.