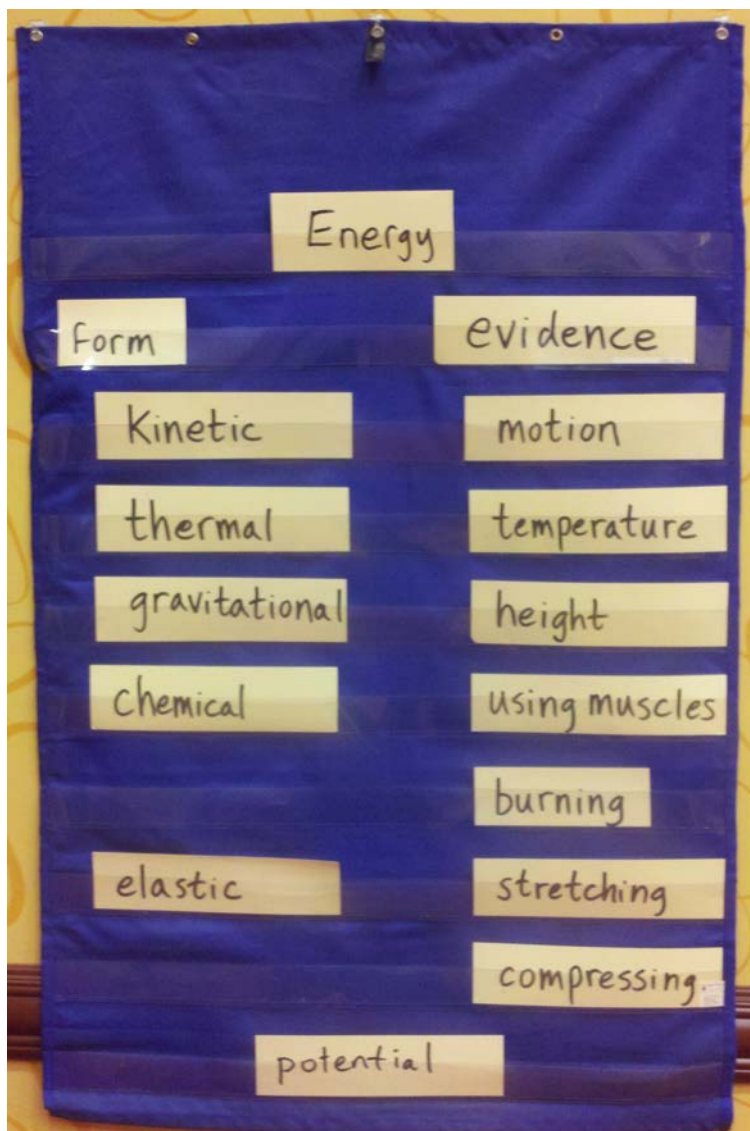


## Workshop Photos

Notes about the use of the word wall:

1. The words are organized conceptually (not alphabetically). In K-12 classrooms, this strategy allows students to use the word wall as a reminder of what the words mean and how they are related.
2. We put the words into the word wall as they came up in the workshop discussion (we did not pre-teach any words). In K-12 classrooms, this strategy allows students to connect new words to meaningful experience they are having with understanding scientific concepts.
3. Note that the evidence given for chemical energy is not exhaustive – these are just the two examples of evidence we discussed.

Word wall

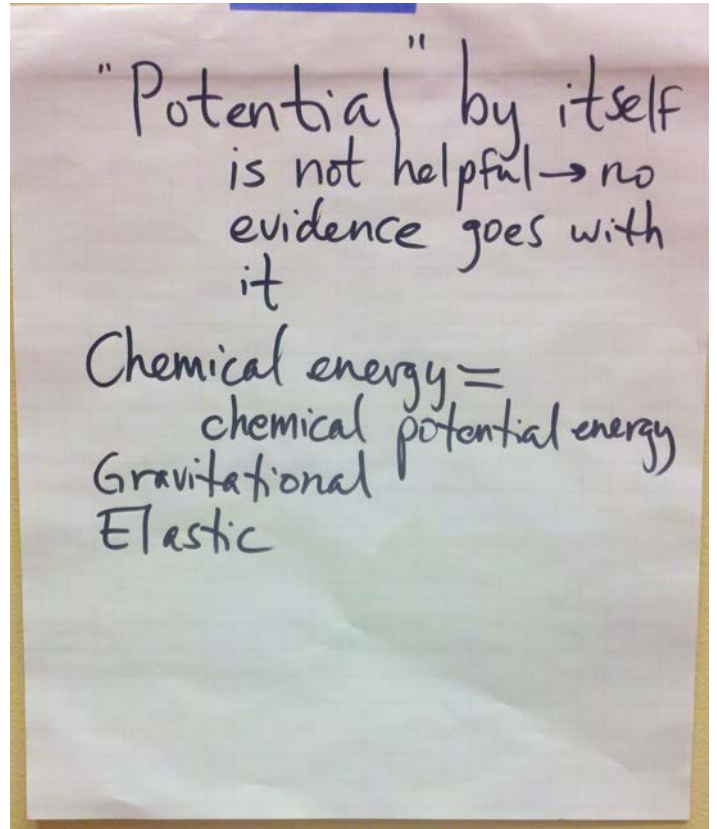


These and other ideas for scaffolding language acquisition writing skills are described in Betsy Rupp Fulwiler's two books, *Writing in Science in Action* (which you may have received when you registered for the STELLAR workshop) and *Writing in Science: How to Scaffold Instruction to Support Learning* (2007).

Notes on the term “potential”:

“Potential”

1. The word “potential” by itself is often used to mean the potential energy an object has because of its height above the ground.
2. We find the word “potential” problematic, because it is often described as “the potential to move” – this does not usefully distinguish between situations where an object may move because it contains some potential energy that can transform into kinetic (e.g., a book held above the floor, which may be dropped → gravitational potential energy transforms into kinetic energy as it falls) and situations where an object may move because another object can



- transfer energy to it (e.g., a box resting on the floor, which may move if someone comes along and pushes it → energy is transferred from the person to the box).
3. We can make the idea of “potential” (or “stored”) energy useful by making it more specific: what is our evidence for stored energy in the object?
    - If the object has a height and can fall → it has *gravitational potential energy* (or just *gravitational energy*)
    - If the object is stretched or compressed and can spring back → it has *elastic potential energy* (or just *elastic energy*)
    - If the object (or set of objects) can react chemically → it has *chemical potential energy* (or just *chemical energy*, or in some specific cases *food energy*)

Notes on diagram:

1. The TEKS for middle school science differentiate between energy “forms” (e.g., kinetic, thermal, sound) and energy “types”: kinetic and potential. This use of the term “types” is specific to the TEKS – neither the scientific community in general nor the national science education standards documents use the term “type” in this way. However, we have found a number of websites that categorize forms of energy in the same general way.

2. To sort energy into these two “types” requires thinking about whether each form is fundamentally related to *motion of objects* (e.g., the thermal energy of a cold-pack changes because the atoms in the cold-pack are made to move faster or slower) or is fundamentally related to *arrangement of objects* (e.g., the gravitational potential energy of a falling book changes because its arrangement with respect to the Earth is changing). Note that light energy does not fit into either of these categories, because it does not have to be in objects – light can travel through empty space.

3. “Mechanical energy” is used in the TEKS but is not defined there. It seems possible that in the TEKS, “mechanical” is used as a synonym for “kinetic,” but we’re not sure this is the case; the authors of the TEKS could also be thinking of “mechanical” as a group of forms, as described below. The term “mechanical energy” is not used much in the scientific community, except in traditionally taught introductory physics courses; when it is used, it refers to a grouping of three specific forms of energy: kinetic + gravitational + elastic. Isolating this group of forms is useful for making up non-realistic problems about roller coasters that have no friction, which can be solved using algebra, but not particularly useful for more realistic scenarios.

Diagram of energy forms, types, groups

