Card Sort: "Sorting out" the big ideas in a curriculum—it's a matter of priorities

Unpacking topics like "earthquakes," "solubility," or "cellular respiration" begins with identifying all the big and not-so-big ideas mentioned in the curriculum. It means seeing how they relate to one another, then figuring out which ideas are at the heart of really understanding the topic. We have a basic practice we use to do this, it's called the *card sort*. This activity is best done, of course with colleagues.

Step 1. Start by taking a section of curriculum that you think will take two to three weeks to teach. Next, as you page through it, note the most prominent ideas that are mentioned in the text. These are often written in bold or used as headings in the teacher's guide. Next get out a dozen or so index cards. Write each of these ideas on a card. Don't use more than 12 index cards; if you do, you have likely bitten off too big a chunk of curriculum to explore in depth.

Step 2. Now lay the index cards on a table and start playing with different arrangements—not linearly, not the order in which you'd instinctively teach them, but rather spread out in two-dimensional space, representing how the *ideas are related* to one another. You can do this by placing some cards closer to others in the table, or you can use another strategy that that makes more sense to you. Most of our teachers prefer to move the more central ideas to the center of a circle and the tangential ideas to the periphery. Take at least 20 minutes to sort and re-sort, thinking out loud with your colleagues until your arrangement is somewhat stable.

Step 3. Now you'll have to ask a question about which ideas have the greatest explanatory power. For example, in a unit on phase change you might see ideas like melting point, evaporation, states of matter, etc.

The key question to ask yourselves is: *Which of these ideas, if your students could understand them deeply, would help explain a number of other ideas on the cards in front of you?* One helpful aid is simply to use a sentence frame:

> "If my students understood [your primary idea] they would really be able to reason about or with these ideas [name at least two or three other ideas] because [describe the explanatory power of your primary idea] "

In our phase change example, which of the ideas mentioned would help students explain or understand the others more deeply? Read on.

Interesting challenges: Two challenges may pop up here, both of which are actually generative for your thinking. One is that you'll realize the biggest idea is *not actually on any of your cards*, meaning that it is not named in your curriculum. This happens more than you might think. If this is the case you have to be gutsy and say "We are going to address the ideas in this curriculum, but we're going to have to inject the core concept

ourselves. In our example, ideas like "melting point" or "states of matter" can't be used in any clear way to explain other ideas, nor can they explain phenomena in the real world, rather they can only describe it in certain cases. But! If we ask if there is some idea more fundamental, something underlying these ideas, we may start to realize that both melting point and states of matter can explained by the making and breaking of intermolecular bonds. So, we get out another index card and voila! It goes in the middle of the table.

The second challenge, also productive, is that you realize the most important ideas are not found on any one card, but is actually about *the relationship between 2 or 3 cards* that is the core concept. Back to our phase change unit, after a bit more discussion we ask "What makes the bonds break?" It's kinetic molecular movement—a kind of energy associated with heat. Time to get another index card out, we'll write "kinetic molecular energy" and put it right next to the "making and breaking intermolecular bonds" card. The pair then, the *relationship between these two ideas* can explain nearly everything in the unit. If your students can understand this, in their own terms, they will have access to powerful ideas, useful in explaining a whole range of natural phenomena.

This is not a process that you should feel closure on in just an hour or so. It's more messy than we've described. Most teachers work with peers on this for an hour or so, then come back a day or two later with fresh insight they had while riding the bus, doing the dishes, or taking a walk. This is part of the same creative process that other professionals use: artists, architects and engineers. Returning to the card sort after the 2nd or 3rd day is when things start to solidify.

Note: Ideas with explanatory power always have conceptual content

This means that following kinds of ideas will *not* form the core of a unit:

- practices such as experimentation, developing hypotheses, or evidence-based arguments
- safety in the classroom
- learning how to calculate things like molarities, how much force is needed to move an object, or where the epicenter of an earthquake is located
- creating and interpreting graphs
- using conceptual tools like Punnett Squares, vector diagrams, or half-life tables
- building technological solutions to everyday problems

We are not saying that these ideas are unimportant, rather we are saying that ideas like methods of gathering data, lab safety, or using equations should always be taught in the context of some larger "big idea" with conceptual content. Ideas like safety, gathering data, or graphing should not be done as exercises outside the context of developing a big conceptual idea. Don't "practice" graphing with students by giving them data that is not connected to a big idea. Research on how students understand skills like graphing and experimentation shows clearly that they learn much more effectively from doing these things in the context of developing a set of big ideas.

This is the work of unpacking the curriculum. You are now starting to understand what you'll teach and why. You will also have mentioned the topics that you are filtering out of the curriculum. These may be in the teacher's guide in bold type, but scientifically they are too peripheral to spend time on. You've made some principled choices that parents, principals, and department peers will appreciate. This is the intellectual work of teaching. This is part of what is meant by rigor.