



systems. Simply draw and label (on a chalk, white, or smart board) a series of expanding Venn Diagrams with a common center that will define the students' physical location. Start with the youngsters themselves, their numbered schoolroom, their school's name, and then, with volunteers chiming in, the school's street address, the town or city, the province or state, the watershed or bioregion, the country, the continent, Planet Earth, the Solar System, Orion's Arm, the Milky Way Galaxy, the Local Group, the Virgo Supercluster, the Universe — and then? At this point, we've had some spirited discussions about what exists

provide a colorful and tangible complement to the verbal explanation of nested systems. Perhaps not surprisingly, the children like to pass these around their tables to admire, take apart, and reassemble. Later, as the youngsters begin to contend with the systems challenge itself, I recommend that they look over the list of entities carefully — and then start with the very biggest phenomenon that they can identify. Next, they should move down to the second largest, and so on. I suggest that they write the names of the very tiny levels sequentially in the margins outside the ellipses (rather than trying to crowd words into the minuscule inner spaces). Finally, they should draw arrows connecting these labels to their particular locations.

I've found that this exercise is very useful for students who have not only learned the science content they've encountered, but who have also moved into the formal operational stage of cognition (as defined by Jean Piaget). Those who are primarily processing at the concrete operational stage find this sorting to be rather difficult. However, by working first in small teams and then, if necessary, completing the schema as a class project, everyone can experience a good degree of success. Those who are not quite developmentally ready for this task may still enjoy transforming their original black and white document into a charmingly decorated page.

Another option, if your students are struggling with this task, is to take a bit of inspiration from James Joyce's *Portrait of the Artist as A Young Man*. In the novel, Stephen Dedalus, the main character, recalls writing his own "Address in the Universe" at the beginning of his geography book. As a class project, you can step your children through this same process, exploring common, every day, humanly-defined, spatially nested locales — as well as some actual

beyond the Universe, with some positing multiverses, and others God or the Great Mystery (and me suggesting that perhaps "the Divine could be both outside and within all of this," thereby introducing the possibility of pantheism). But in any case, we usually conclude by agreeing that whatever is larger than the Universe and whatever words we use to describe this phenomenon, we are all relatively happy and certain that we are alive just now in this classroom at this point in time! This sort of prefatory exercise can be very effective in acquainting children with the "both/and" nature of everyday reality — as well as its intriguing puzzles, the limits of language, and the process of nested classification.

For those students who are able to do this kind of analysis, thinking about natural phenomena in terms of parts, wholes, and inclusive sets can be quite exhilarating. Situating their blossoming empirical knowledge within a larger, culturally appropriate, metaphysical framework can also be a very reinforcing and reassuring development. One of my students, whose family hails from Taiwan, enthusiastically announced that he was going to put his finished illustration up on his bulletin board at home. He thought that it helped him to see how the Chi, which was mentioned often during his Saturday Chinese classes, could be understood in relation to what he'd been learning during his weekday science program.

To conclude, while you probably already know that Systems and Systems Models have been included as one of the seven key components in the Crosscutting Concepts Dimension of the Next Generation Science Standards, the question remains why select this particular systems diagram for use with your classes? Here are a few more reasons. In the first place, it can bring this powerful scientific insight, particularly the multi-level feature of systems theory, directly and