VIEWPOINT

THE SYSTEMS THINKER®
BUILDING SHARED UNDERSTANDING

VOL. 21 NO. 4 MAY 2010

# WEAVING SYSTEMS THINKING INTO THE K–12 CURRICULUM

BY NALANI LINDER AND COLLEEN PONTO

Thanks to the recently revised science and environmental sustainability education standards in the Washington State K–12 system, teachers are now required to teach and assess children's understanding of systems. As parents, systems educators, and Washingtonians, we have been on a learning journey over the last few months to find out more about how we can help support the teaching of systems thinking in our state's classrooms.

In February, we visited the remarkable team at the Waters Foundation in Tucson, Arizona: Tracy Benson, Anne Lavigne, Sheri Marlin, and Joan Yates. They took us to various schools where they have been working with teachers and students to weave systems thinking (ST) and system dynamics (SD) throughout the curriculum.

What an inspiration! We saw:

- Eighth-grade social studies students learning about World War II through the lens of mental models and using the ladder of inference;
- Fifth graders assessing ideas about slavery during the Civil War using stock/flow diagrams; and
- Kindergarteners using behavior over time graphs to look at the changing behaviors of the characters in the story of the gingerbread man.

Perhaps one of the most inspiring sights for us was at Borton Primary, a K-2 magnet school, where systems thinking is integrated where appropriate into the school's curriculum. First- and second-grade teacher Molly Reed has a behavior over time graph on her whiteboard that the students fill out each day about their own patterns of learning. Above the graph hangs a sign that reads, "What do you notice?" This query invites reflection and inquiry, a stepping back to observe patterns and trends—a challenge for adults, too!

Back home in Washington, we have been reflecting on all that we saw in Tucson. Of the many good lessons we took away with us, some of them seem appropriate to share with anyone interested in teaching systems thinking (ST) or system dynamics (SD) to any audience:

- **Don't spend too much effort on convincing skeptics about the value of ST and SD.** Rather, focus your energy on those who are easily intrigued and receptive to the power of this way of thinking.
- **Be open to experimenting with the full array of SD tools.** For example, we were introduced to connection circles in Tucson (found in *The Shape of Change*) and recently experimented with teaching them at a workshop for adults. Participants found them useful for identifying variables and seeing interconnections in a story.
- **Create examples in the area of the audience's expertise,** once people get some of the time-tested systems stories typically used to illustrate concepts (such as a thermostat to show a balancing loop, compounding interest to demonstrate reinforcing loops, and bathtubs to explain stocks/flows). This may take work, but is worth the effort in order to create better understanding and more effective application.

For our part, we are focusing on developing systems thinking lessons within the K–12 science and environmental sustainability curriculum, as those are the two subject areas driving the integration of systems thinking into our state's classrooms. We see our task as helping teachers to learn ST basics so that they can insert systems language and tools into the curriculum they are already using.

Continuing on this journey, we are eager to learn more from the many who have been doing groundbreaking work in systems and education, such as the Waters Foundation, the Creative Learning Exchange, the Cloud Institute, the SoL Educational Partnership, and others—including those who have left us, like Barry Richmond and Dana Meadows, whose ideas continue to inspire and guide.

We expect that the road to statewide implementation of systems thinking in education is long and winding. However, we hope and firmly believe that through the implementation of these standards, Washington's students will learn to make better choices about their own actions in the many systems in which they live. And in a lovely reinforcing loop, adults will be able to witness and learn from students: to pay attention to systems and to ask ourselves what we're noticing, too. ◘

**Nalani Linder** is an independent consultant and workshop facilitator who works with change agents of all ages to help them learn, practice, and apply systems thinking ideas and tools in their schools/organizations, communities, and personal lives. She is currently co-principal of a research study exploring connections between systems thinking and learning preferences.

**Colleen Ponto**, Ed.D., teaches at Seattle University, where she is a core faculty member of the Organization Systems Renewal Graduate Program. OSR specializes in helping adult learners to become designers and leaders of systemic organizational change. Colleen is also an independent educational and organizational consultant; one of her current passions is helping learners of all ages develop their systems thinking skills.