



SYSTEMS THINKING CONCEPTS FOR ENVIRONMENTAL EDUCATION

BY JAIMIE P. CLOUD



The goal of education for sustainability (EFS) is “to develop in young people and adults new knowledge and new ways of thinking needed to achieve economic prosperity, participate democratically, secure justice and equity, and all the while regenerate the health of the ecosystems, the gift upon which all life and all production depend” (The Cloud Institute, 2005). The environmental education (EE) movement has been instrumental in bringing awareness, knowledge, heart, and political capital to the plight and to the beauty of our natural systems and has forced many of us to think more deeply and profoundly about our relationship to nature. What then can the UN Decade for Education for Sustainable Development (2005–2014) and, more specifically, what can we as Educators for Sustainability and others, contribute to the EE community?

Recognizing that EE and EFS are not the same, but do share a common interest in achieving a quality of life for all within the means of nature, I think one of the greatest opportunities that EFS can offer to EE that will strengthen its capacity over the next 10 years is the contribution of the tools, concepts, archetypes, and “habits of mind” of systems thinking and system dynamics education—a core content area of EFS. Although one can teach systems thinking and system dynamics without teaching about sustainability, one cannot do the reverse.

Systems thinking and system dynamics education encourage us to look at the relationships between and among the parts of a system—not just at the parts themselves—and they help us to understand the implications of those relationships over time. We know from ecologists that everything is interconnected to everything else on this planet, and systems theorists and educators have a great deal to teach us about how

to prepare young people (and ourselves) to think and act in light of systems as the context for decision making. One of seven of the dimensions on our *Rubric for a Whole Systems Thinker* entitled

“Understanding of Systems as the Context for Decision Making” measures the extent to which one sees both the whole system and its parts, as well as the extent to which an individual can place oneself within the system. This kind of thinking and acting is critical to environmental educators from an instructional point of view as well as from the point of view of developing partnerships and plans to strengthen the field of EE over the next 10 years. (For more on systems thinking/system dynamics education go to www.clexchange.org and www.watersfoundation.org.)

I will highlight two examples of concepts of systems thinking and system dynamics education—*entry points* and *mental models*—to illustrate their usefulness.

Entry Points: Where Do We Begin?

One very useful concept of systems thinking/system dynamics education is the concept of entry points. The basic idea is this: A system is made up of two or more parts that interact with one another over time. Systems are “nested” in other systems. A relationship, a body, an engine, and a rain forest are all systems. A system is not linear; rather it is more weblike. It is dynamic. There is no one way into a system. For example, if a person is feeling ill, and your goal is to assist in making that person feel well, you might enter into a diagnosis by asking, “Where does it hurt?” On the other hand, another friend might enter by asking, “What did you eat this morning?” Then again, another might ask, “What kinds of materials have you used to renovate your new apartment?” All of those questions are generated by certain experiences, expertise, and interests, and all are interconnected to one another and to the person who is not feeling very well.

If one takes a holistic or “whole systems” approach to the diagnosis, any one of those questions will lead you to the others and to a more comprehensive understanding of the situation.

For many environmental educators, the entry point to their involvement with local, regional, or global sustainability/sustainable development is their love for and connection to the flora and fauna of nature, their understanding of the significance of the

TEAM TIP

Use the idea of “entry points” as a way for people on a cross-functional team to introduce themselves and their perspective on a given issue.



natural systems to life on the planet, or all of these. For others, their interest in sustainable development comes from their love for and connection to the issues of mental and physical human health. Still others are drawn to the entrepreneurial challenge that unsustainability poses to our survival. There are people whose entry point into sustainability is their desire for economic well-being, justice and equity, issues such as human rights, poverty, or climate change, and their sense of intergenerational responsibility, place, or self-efficacy. For some, the entry point is simply and profoundly spiritual. All of those entry points are connected to and interdependent upon one another, and all are critical to the move toward sustainability.

If your ultimate goal is to achieve sustainability—either because of your interest in or passion for something or because of your perspective (“Where you stand depends on where you sit,” Istvan Banyai in *Zoom*, Viking Books, 1995)—it is critical that you understand the concept of entry points. There is no “right place” for an entry point. There is no hierarchy or preferred sequence for an entry point—no “first here and then there.” No matter what your interest, perspective, or entry point, you and your interests are inextricably interlinked to all the other interests, perspectives, and entry points. We are all interdependent on one another and on the natural systems. This way of thinking binds all of us through our common interests, affords us many more allies (in some cases seemingly strange bedfellows), and does not require us to convince one another which entry point is the “right” or “most important” one. The pursuit of self-interest must be considered in light of the context of interdependence.

How might it be beneficial for environmental educators to make use of the concept of entry points? Is it being done by some already?

Mental Models

Another interesting concept of systems thinkers and system dynamicists and educators is that of mental models. A mental model is made up of your values, your assumptions, your education, and your experience. It is a paradigm—a frame through which you understand the world around you. Transcending paradigms requires an experience or set of experiences that compels you to think and see things differently. Another dimension in our *Whole Systems Thinker Rubric* is entitled “Paradigm Shifter.” That dimension measures “the extent to which one recognizes mental models and paradigms as guiding constructs that change over time with new knowledge and applied insights.” If you “accept that things are the way they are because that is the way they have always been” (a description of the poorest degree of quality of a paradigm

shifter on our rubric), then you are possibly working with some dated mental models. “Resources are unlimited on Earth and nature is a stock of resources to be converted to human purpose” is a mental model that many economists and strip miners are still employing today. “Everything revolves around the Earth—and by extension, us” was the mental model of the Church of Rome before Copernicus proved otherwise in 1543 AD (or until 1992 when the Church of Rome conceded that Copernicus might have been right).

Mental models give rise to goals, structures, rules, delays, and parameters, according to Donella Meadows in “Twelve Leverage Points to Intervene in a System.” They are the sources of human systems, and open-minded people can update/shift their mental models when the

need arises, thus allowing the possibility of new, more elegant systems to emerge. The pedagogy of paradigm shifting is rooted in experiential, learner-centered approaches to teaching and learning. Master paradigm shifters are

- able to expose and examine mental models;
- able to evolve/alter/improve mental models and paradigms when proven necessary;
- skilled at communicating the value of the new mental model and paradigm;
- able to demonstrate vigilant attention paid to our habitual patterns of thinking (mental models, paradigms, unquestioned assumptions, resignations, etc.); and
- able to hold the tension of paradox and controversy without trying to resolve it quickly, and will be decisively influential on our ability to “be on the turn” toward a sustainable future.

Shifting paradigms “when proven necessary” is the work of educators for a sustainable future. A few of the germane mental models that we have uncovered in our work, and those that have proven to be “necessary to shift” in order to move toward a sustainable future, include “the Titanic syndrome,” “the zero-sum game,” and “the social trap.”

The Titanic Syndrome. This mental model goes, “We are going down anyway—so I [and my family] might as well go first class.” If you imagine the kinds of goals, structures, rules, and behavior that arise out of this mental model, you can begin to understand the problem. If, on the other hand, you value “intergenerational responsibility” and you understand the necessity of taking responsibility for the fact that the well-being of future generations is largely dependent upon the choices and decisions you make (as well as the choices and decisions of others) during your life-

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time, and of choosing, designing, planning, making decisions, and acting in ways that will benefit the “seventh generation,” then you can also imagine the kinds of goals, structures, rules, and behaviors that will arise from that mental model.

What is the goal? Which mental models will drive the structures, rules, and behaviors designed and applied to reach it?

The Zero-Sum Game. The “zero-sum game” (Saul Stahl, *A Gentle Introduction to Game Theory*, American Mathematical Society, 1999) is the type of game in which there are winners and losers. If your mental model for a game—even the “big enchilada” game of life—is based on the winner/loser paradigm, then when playing a game, any game, you always play to win. Who wants to be a loser? If, however, your mental model for a game is the “non zero-sum game” in which the players are interdependent, then you know that the only way to win that game is if everyone wins. The structure is different, the rules are different, and therefore, if you want to “win” the game, the behavior is different.

The Social Trap. This mental model goes: “It doesn’t make any difference what I do—because “Nobody else is doing it” or “Everybody else is doing it, so why shouldn’t I?” You stand on your chair at a concert to get a better view, but before you know it, everyone is standing on a chair. You have the same view as before, but now you work harder for it. This social trap, like the Tragedy of the Commons, arises when what holds true for the members of a group, taken separately, does not hold true of the group taken together. The opposite of a social trap is collective action. Just as locks are made to keep honest people honest, we live in communities in which we are mutually responsible for one another and for the group of which we are a part

(Robert Costanza, “Social traps and environmental policy,” *Bioscience*, 37(6), 1987).

Conclusion

In 1949, Aldo Leopold wrote in *A Sand County Almanac* that “All ethics so far evolved rest upon a single premise: that the individual is a member of a community of interdependent parts. His instincts prompt him to compete for his place in the community but his ethics prompt him to co-operate (perhaps in order that there may be a place to compete for).”

Given the goals of EE, which mental models will drive the structures, rules, and behaviors designed and applied to reach them?

For sustainability educators, environmental educators, and others, these and many, many other concepts, tools, and archetypes of systems thinking and system dynamics education and the other core content, competencies, and habits of mind that characterize EFS will improve, enhance, and contribute to your work and your life. Come over, the water is fine. ■

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