Characteristics of a System

Source

The information below is summarized from the Association for Educational Communications and Technology’s Division on Systemic Change, hosted on the Penn State web site.

What is a System?

Our understanding of how systems work must begin with a basic idea of what a system is. We use the word in everyday conversations, in phrases like "nervous system," "legal system," "school system," or even "cooling system." Simply put, a system is a collection of parts that interact with each other to function as a whole.

The Hierarchy of Systems

In general, any given system is composed of other systems of about the same level, which together comprise the larger system. Thus, a particular protein molecule might contain atoms of carbon, hydrogen, oxygen, and nitrogen; an economy is made up of people, land, buildings, machines, plants, dairy herds, and so on; the solar system is made up of the sun, the planets and their moons, and many, many asteroids, comets, and other bits of debris. (Kauffman, 1978).

Can One System be a "Piece" of Another System?

Yes. We have seen that systems are composed of interrelated parts. When one of these parts is itself a system (i.e., that part consists of two or more interrelated parts), we call the smaller system a subsystem and the larger system its suprasystem. And that larger system, of course, can be a subsystem of a still larger system.

Examples: Social Systems

One of the most complex forms of a system is the social system. Because these systems are composed of individual human beings--who often in turn comprise one or more levels of subsystems--these systems are also among the most unpredictable.

This added dimension of unpredictability leads social systems to have unique types of feedback loops. For example, unlike members or components of nonhuman systems, particular members of a social system may elect to intentionally violate its norms. When this happens, the mechanism that engages to correct this disturbance is a negative feedback loop. This mechanism may simply involve ostracism--or, for more serious offenses, the criminal justice system may become involved. In either case, negative feedback triggers a reaction that acts to isolate the offender, negating the source of the disturbance.

Another example comes from a more specific social system: education. Our public educational systems are ultimately accountable to the political mechanism of the society they serve: in a
democracy, this may take the form of public election of a school board. In other forms of
government, schools may be subject to a governmental review of their curriculum. In either case,
if the operation of the school drifts outside the bounds of what is acceptable to the community it
serves, its control mechanism acts as a negative feedback loop--detecting this divergence and
restoring public accountability.

Note: There are other interesting links on this web site related to systems theory. We
recommend:

- What is a system?
- Can one system be a piece of another system?
- How do you transform education through systemic change?