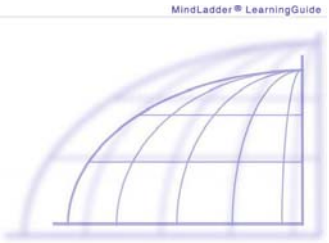

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T-15: Lattice-type Thinking

The previous knowledge construction function (T-14) covers the establishment of relationships between pieces of information. Lattice-type thinking covers the establishment of relationships between relationships: It uses relationships as its building blocks. Lattice-type thinking is widely used and required to understand, construct and manage systems.

Systems often exist within systems and are called subsystems. Both natural and man-made systems and subsystems abound. The human being consists of organ systems (e.g. heart, lungs, kidney, liver, brain) that interact with one another and with many others systems (e.g. the nervous, the endocrine, and the immune system). Countries set up systems of government that can include divisions of labor and checks and balances (e.g. the legislative, the executive and the judicial branches of the US system of government). Countries develop economical systems. Life on Earth can be seen as a system ('eco-system') where numerous relationships combine to produce more or less favorable conditions for humans, animals and plants. Our globe is part of the solar system.

To develop this knowledge construction function orient your students to the characteristics of systems and systems thinking: All systems consist of parts that belong to a whole. A change in a part is a change of the whole. The whole is changed through incremental changes of its parts. Open systems can interact with other systems. Interactions can produce new or 'emergent' properties. Emergent properties make the whole greater than the sum of its parts. Chemical compounds provide familiar examples of the phenomenon of emergent properties. For example, kitchen salt (sodium chloride, NaCL), has properties unlike either of its component parts.

Work with your students to identify examples of systems both man-made (e.g. the school system, the family system, production systems, aquariums) and natural (e.g. atoms, cells, ant colonies, atmospheric systems). Examine how changes in one relationship within a system may impact on other relationships in that system. The development of this knowledge construction function empowers learners both to search for and to understand complexity (see also T-21).

Have your students identify systems at school (e.g. the school bus system, the food service system, the heating/cooling system, the library system, the hallway pass system, the grading system). Have your students clarify and discuss how the systems they choose to investigate are structured. Together with your students create hypothetical situations that involve changing a part of a system. For example, delay by one hour the time the school busses pick students up in the morning, close all but one of food lines in the cafeteria, turn off the heating/cooling system at 10:00AM, cut the library budget in half, limit hallway passes to one per student per week, add a new grade to the grading system. Have your students examine the impact of such changes on the systems they investigate and how a change in just a single part can affect the entire system and other systems that interface with it. Use the investigation of what happens to systems when their parts change to develop this knowledge construction function and prepare students to think about systems as they acquire content knowledge across the curriculum. The students' own knowledge construction functions form a system which they can investigate and come to more fully understand as they learn how to learn (see C-9).