Getting to Got It!
Helping Struggling Students Learn How to Learn.

DVIA Parent Workshop

March 16, 2013

Cognitive Structures

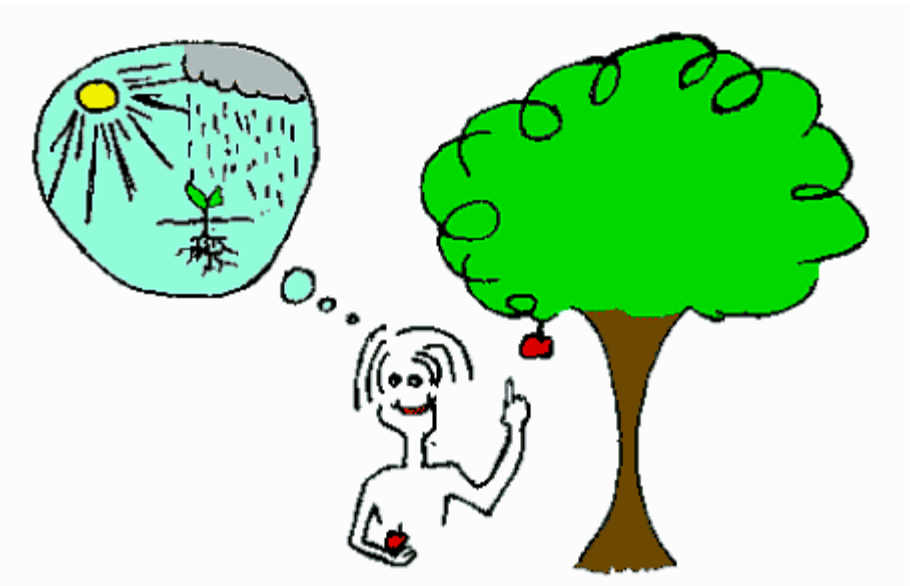
What are they? Why do they matter?

Students use cognitive structures to process information and create meaning

- making connections
  - finding patterns
  - identifying rules
- abstracting principles

Making Connections

Cognitive structures help students make connections with prior knowledge and experience by bridging from the known to the unknown. It is very important to ask students what sense they make of information we share with them.



Finding Patterns and Relationships

Cognitive structures help students compare, analyze, and organize information into patterns and relationships.

All learning is based on relationships; that is, something has meaning when compared and contrasted with something else.

Formulating Rules

Cognitive structures help students formulate rules that make processing information automatic, fast, and predictable.

When students notice relationships that are always or nearly always the same, they do not have to expend time or energy to think about them. They can divert their mental resources to new learning instead of constantly relearning the same things.

Abstracting Generalizable Principles

Cognitive structures help students abstract generalizable principles that apply or transfer to situations other than the original learning context.

- *To abstract* means to draw out or separate from a specific object or instance.

- A *generalizable principle* is the critical essence or fundamental guiding certainty that clarifies understanding and can be applied to diverse situations.

For example, a high school sociology class studies a series of documents on social justice, and students generalize that the rights of individuals and the rights of society need to coexist in a delicate balance of power. This principle can be applied to many different historical and social settings as well as personal choices, economics, politics, literature, and the arts, just to mention a few. Many students never reach this step, because they know they can get good grades in school by just memorizing specific content. They are rarely challenged to identify generalizable principles to help them understand other information or situations in real life.

So, what's the problem?

We assume these operate automatically.

Often, neither the struggling students nor their teachers are aware of what lies behind the students' failure.

Those who do get by typically do so by using memorization or imitation strategies. Although these tricks can help students find right answers, using them gets students no closer to experiencing the joy and excitement of deep understanding. ***They get no closer to developing metability.***

Recognition

The most effective way to mediate is to be attentive, listen, and ask students to help us understand how they make connections in their own minds.

Ask the following types of questions:

- What do you see (or hear, feel, smell, taste)?
- What does that remind you of?
- What do you notice?
- How would you describe this to someone who is not here?

If they feel safe, without fear of being made fun of or feeling stupid, they will continue to ask questions. After answering questions and explaining things to students, ask them to describe in their own words what they understood from what they heard.

“train”

:to give the discipline and instruction, drill, practice, etc., designed to impart proficiency or efficiency.

- training
- trained
- retrain
- retrained

They cannot recognize having seen it before unless they are reflectively aware when they look at it the first time.

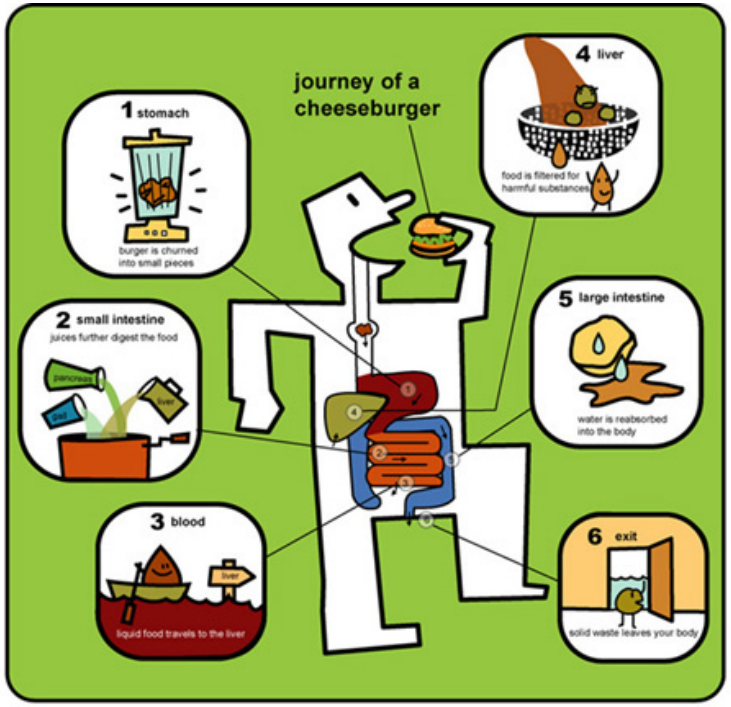
Memorization

Getting the right answers is more important than understanding.

Imitation: preliminary form of memorization, but is hindering if not fully developed

Imitating is often confused with learning.

Our memory isn't a file cabinet. It's more like the digestive system.



Information needs to be processed to be remembered. Integrated information is more likely to be remembered and accessible than disconnected bits of data. Research is showing that several different parts of the brain are activated to reconstruct memories personal meaning.

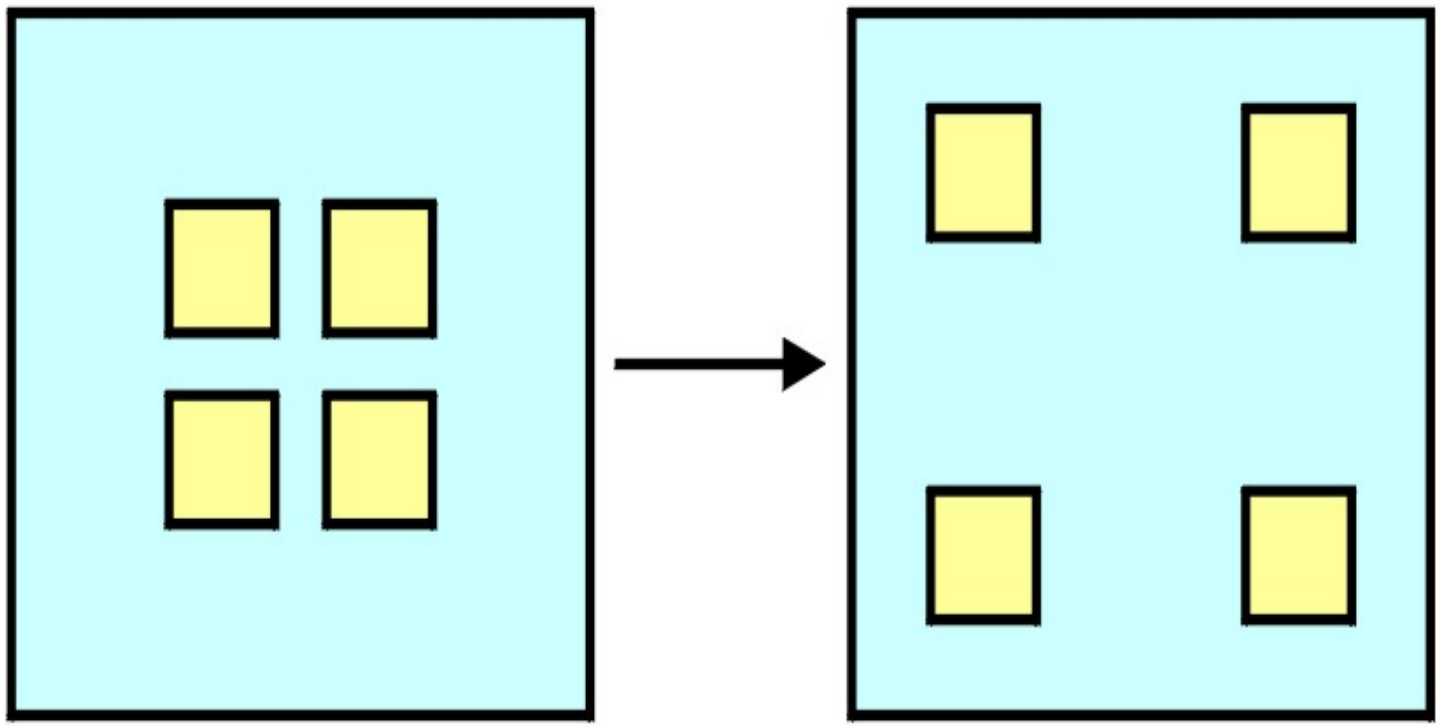
Conservation of Constancy

- http://www.youtube.com/watch?v=N5G_2VUo8p4

- http://www.youtube.com/watch?v=gnArvcWaH6I

- Amount
- Length
- Number
- Area
- Volume
- Weight

Conservation of…



- “Students who lack the ability to use this cognitive structure are easily confused and fail to benefit from their experiences. ***Because their perceptions are limited to concrete sensory data and literal interpretations, they try to force information to fit into preconceived notions rather than processing to learn, create, and change. This makes abstract thinking and planning very challenging.*** They have difficulty transferring information from one situation to another and discerning relevance because disconnected bits of data appear to be equally important. “ (page 47)

How can these be classified?

- Cheerios box
- Lemon
- Apple
- Captain America toy

Classification

- Involves identifying, comparing, and ordering information or data to create meaning based on relationships of parts to each other and parts to the whole.

- They need to reflect on and visualize sensory information to make it their own; recognize a fit with prior knowledge and experience so they can memorize this information for ready recall; and use conservation of constancy to compare how the variables of items are alike and different.

Spatial Orientation

Spatial orientation is a cognitive structure that helps individuals identify and compare where objects and places are in relationship to each other and to oneself.

To understand space, students have to be aware of several things:

•Boundaries that define and differentiate one object from another.

•Relationships between and among objects.

•The difference between material objects and mental images.

•Types and characteristics of space.

Four Types of Space

Material
physical, material things that have three-dimensional form, occupy space, and are perceived by the senses

Representational
uses lines or edges to define two-dimensional shapes and symbols. Drawings, diagrams, lines, paintings, photos, and videos use shapes to represent or stand for persons, places, things, and ideas.

Abstract
mental images to transcend physical limitations when representing spatial relationships. For example, when planning a trip, we can mentally map going from one place to another. This ability to abstractly represent and manipulate spatial relationships is faster and more efficient than using physical or symbolic space.

Virtual
social or personal norms to identify spatial relationships. For example, "personal space" is a virtual boundary defined by social or cultural norms. Technology creates virtual environments to simulate reality.

Characteristics of Spatial Orientation

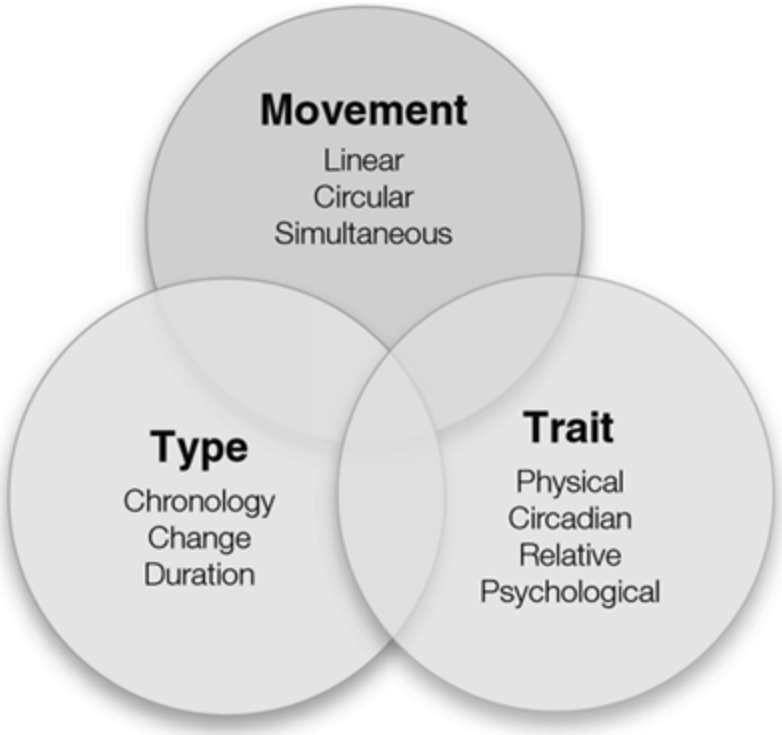
Location
the placement or position of items in space

Direction
Direction identifies orientation toward a point of reference in both three-dimensional and two-dimensional space.

Distance
define intervals of separation between and among objects. In physical space, distance is the size of the gap between two objects or persons. We use lines, words, symbols, illustrations, graphics, and diagrams to represent distance

Perspective
This requires using a specific point of reference to identify distance and position within a personal field of vision. Perspective includes material, representational, abstract, and virtual space based on (1) who is seeing, (2) what is being seen, and (3) where the person is focusing (focal point).

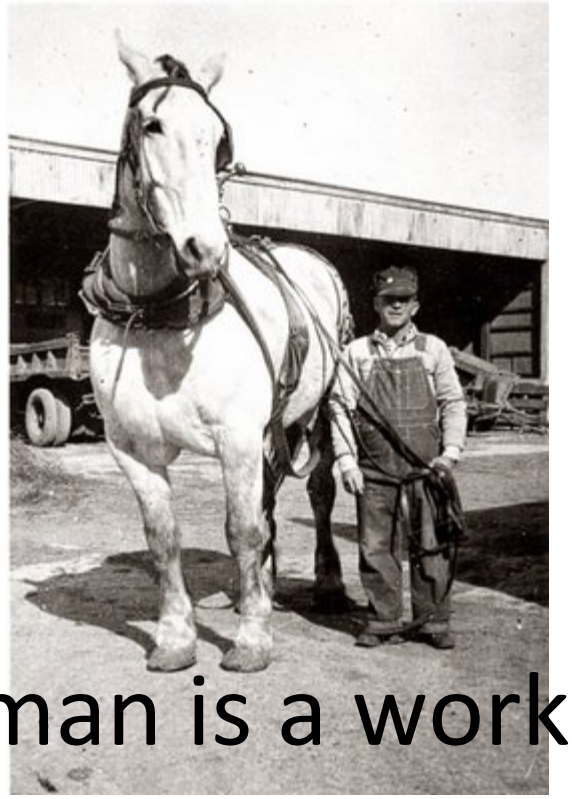
Temporal Orientation



Each of these categories is related to physical, representational, abstract, or virtual space (Chapter 6). That is, we can use temporal orientation in relation to our physical and sensory world. We can represent it through drawings, diagrams, words, music, and other symbol systems. We can mentally visualize and manipulate temporal information at an abstract level. We can project virtual time through simulations and cultural or generational relationships.

Metaphorical Thinking

making sense of information by comparing one thing to another using figurative language



The man is a workhorse.

Creative students often express their understanding as a metaphor. We can use their responses to assess their comprehension, clarify misunderstandings, and encourage discussion.

When we use metaphors to present lessons, we stimulate visualization. This helps students develop their ability to learn, create, and change.

Our understanding, acceptance, appreciation, and encouragement of metaphorical thinking will make it much easier to access the capabilities of creative students.

The Spiritual Dimensions of Learning

Each of us has a set of personal beliefs about spiritual matters. These beliefs are the basis of unspoken assumptions and biases that motivate actions, decisions, and thought patterns.

Concept Motifs

abstract entities that embody the integrated processing of the mind, emotions, and will

Concept motifs are to the spirit what food is to the body. The soul—mind, emotions, and will—processes available data using cognitive structures to integrate prior knowledge and experience, values, beliefs, and emotions. Once a judgment is made about a particular bit of data, the input, processing, and output are synchronized into a concept motif.

Concept motifs are permeated with values, beliefs, and feelings. Many times, instantaneous and intuitive judgments form motifs with very little input or processing. As we become more reflectively aware, we can more effectively use our cognitive structures and suspend judgment to carefully gather and process more data before forming concept motifs.