PENNSTATE

Logical Organization of Concepts

There are a number of methods that students can use for Logical Organization of Concepts including:

1. Construct concept maps
2. Logical sequencing of concepts
3. Organized lists
4. Drawn pictures to explain concepts.

Appropriate Student Level: Any Level
Suggested Class Size: 3 – 100+
Ease of Use Rating: Easy – Moderate

Activity Description:

1. **Concept Maps** –The concept map is designed to show relationships between ideas and how they all relate to the stated main idea often represented by a number of shapes centered around a 'Main Idea'. The Main idea can be assigned or determined by the students.

   "The present technique emphasizes the arrangement (and rearrangement) of sticky notes (for concepts and concept links) on a large surface (e.g., chalkboard, chart tablet, bulletin board, wall surface) rather than other alternatives such as computer software. In the classroom context, the general concept-mapping technique allows optimal involvement by the class, with guidance from the instructor." (Romance & Vitale, 1999)

   Read more about concept maps at: http://cmap.coginst.uwf.edu/

   For more information and examples of concept maps:

   Daley, Barbara J; Shaw, Christine R.; Balistrieri, Toni; Glasenapp, Kate; Piacentine, Linda; (1999) "Concept maps: A strategy to teach and evaluate critical thinking" Journal of Nursing Education; 38 (1)

   Plotnick, Eric;(2001) "A graphical system for understanding the relationship between concepts"
   Teacher Librarian; 28(4); pg. 42

   Robinson, William R. (1999) "A view from the science education research literature: Concept map assessment of classroom learning" Journal of Chemical Education: 76(9); pg. 1179

   Romance, Nancy R.; Vitale, Michael R.; (1999) "Concept mapping as a tool for learning: Broadening the framework for student-centered instruction" College Teaching: 47(2); pg. 74

2. **Logical Sequencing of Concepts** – Students must show how the concepts would be shown in a sequence from simplest to most complex, in a hierarchical manner. This exercise is designed to demonstrate to students how concepts interrelate and build on each other and the order in which one must learn these concepts to best understand how they work. This sequence can be shown in a written or graphic format.

The sequencing can be done in small or large groups of students. The 'problem' or leading concept must have sequential steps or ideas. The steps should be obvious or resources should be available to help students discover the answer on their own. By helping students understand the sequential order of why things happen may encourage a deeper understanding of the more complex concepts.

Stephens, Pamela Geiger. ; Shaddix, Robin K. (2000) "Sequencing events: exploring art and art jobs." Arts & Activities v. 127 no3 pp. 52-3
Alderson, Charles; Percsich, Richard; Szabo, Gabor (2000) "Sequencing as an item type", Language Testing, 17(4) pp. 423-447

3. **Organized Lists** – Similar to sequencing of concepts but a list can be used with just one concept. The instructor may present one concept and the students can break it into its individual parts and sequence the parts in a way that is logical. This is commonly done in writing. "In the attempt to produce an organized list, students will encounter frequent and repeated patterns." (Muckerheide, H. Mogill, A. Mogill, 1999)

   Diagramming sentences is a good example of an organized list. Students break a sentence into the parts. The parts can simply be the subject and predicate or be more complex to include each word and every part of speech. The list can help students see errors clearly and/or ways to improve the sentence.

   Organized lists can not be used in isolation. They must be part of a full 'problem solving' curriculum that provides students with tools and strategies that can optimize understanding.

   "I previously taught problem solving as an isolated lesson, often giving a lecture about problem-solving strategies. I described a list of strategies that students could use to solve problems: draw a picture, make an organized list, guess and check, and so on. These strategies represented the problem solving that we would practice, but they were no more meaningful to my students than memorizing steps to perform algebraic manipulations.

   I eventually developed a project that enables my students to experience these strategies. They construct their own understandings of the problem-solving strategies instead of merely writing them in their notebooks. My students begin to research the problem-solving process itself, uncovering and defining strategies that they can subsequently use to solve problems, as well as exploring the impact that attitude has on problem solving." (Miller, 2000)

   Cynthia, Barb (1997) "Problem solving does not have to be a problem", The Mathematics Teacher, 90(7); p. 536
   Lorch, Robert Frederick (1995) "Effects of organizational signals on text processing strategies", Journal of Educational Psychology, 87, p. 537
   Miller, Catherine M. (2000) "Student-researched problem-solving strategies", The Mathematics Teacher, 93(2); p. 136

Muckerheide, Paul; Mogill, Helen; Mogill, A Timothy; (1999) "In search of a fair game", Mathematics and Computer Education, 33(2)

4. **Drawn Pictures** – "A picture is worth 1000 words" – this is true for newspapers and student work. Many talented students can use simple pencil and paper or complex computer graphics programs to express their individual or collaborative understanding on any number of given concepts. Allow students the freedom to express ideas, you may be surprised with what you get!

   Concept maps, logical sequencing of concepts, organized lists or drawn pictures are a good way for students to analyze information. These methods demand that students consider how the basic ideas break down and relate to one another. The maps or pictures can be drawn by hand or use graphics software for better presentation.

   The students may do their project individually to share with others or as pairs or small groups creating just one map. The purpose of the concept is to force students to think of new ways to express ideas. Students are often required to write a paper to convey their understanding of the concepts. Concept maps, logical sequencing of concepts, organized lists or drawn pictures are another way for students to learn. The difference is that students don't 'normally' think this way; it will take analysis and synthesis of ideas to create a presentable product.

References:

Lord, Thomas R. (1999) "A comparison between traditional and constructivist teaching in environmental science" The Journal of Environmental Education. 30(3); pg. 22

Novo, Bernard L. (1999) "Study strategies for narrative texts: PORPE and annotation" Journal of Developmental Education, 23(2); pg. 24

Romance, R. "Concept mapping as a tool for learning; Broadening the framework for student – centered instruction" College Teaching, 47(2); pg. 74

The Core Competencies are:

1. Writing, speaking and/or other forms of self-expression
2. Information gathering, such as the use of the library, computer/electronic resources, and experimentation or observation
3. Synthesis and analysis in problem solving and critical thinking, including, where appropriate, the application of reasoning and interpretive methods, and quantitative thinking
4. Collaborative learning and teamwork
6. Activities that promote the understanding of issues pertaining to social behavior, scholarly conduct, and community responsibility
7. A significant alternative competency for active learning designed for and appropriate to a specific course