Clarifying with Concept Maps

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The best instruction is...

- **Effective** - facilitates learners’ acquisition of the prescribed knowledge, skills and attitudes
- **Efficient** – requires the least possible amount of time necessary for learners to achieve the objective
- **Appealing** – motivates and interests learners, encourages them to persevere in the learning task
- **Enduring** – encoded in long-term memory, accessible and applicable in the future

Does Concept Mapping meet these?
From Wikipedia

Concept mapping is a technique for visualizing the relationships among different concepts. A concept map is a diagram showing the relationships among concepts. Concepts are connected with labeled arrows. The relationship between concepts is articulated in linking phrases, e.g., "gives rise to", "results in", "is required by," or "contributes to".

The technique of concept mapping was developed by Joseph D. Novack and his research team at Cornell University in the 1970s as a means of representing the emerging science knowledge of learners.

It has subsequently been used as a tool to increase meaningful learning in the sciences and other subjects as well as to represent the expert knowledge of individuals and teams in education, government business, and healthcare.

http://en.wikipedia.org/wiki/Concept_map
Concept maps have their origin in the learning movement called constructivism. In particular, constructivists hold that learners actively construct knowledge. This stresses the importance of prior knowledge in being able to learn new concepts. "The most important single factor influencing learning is what the learner already knows. Ascertain this and teach accordingly."

**Key References:**
Four major categories of concept maps

"Spider": Organized by placing the central theme or unifying factor in the center of the map. Outwardly radiating sub-themes surround the center of the map.

"Hierarchical": Presents information in a descending order of importance. The most important information is placed on the top. Distinguishing factors determine the placement of the information.

"Flowchart": Organizes information in a linear format.

"Systems": Organizes information in a format which is similar to a flowchart with the addition of 'INPUTS' and 'OUTPUTS'.

http://classes.aces.uiuc.edu/ACES100/Mind/c-m2.html
Student-Prepared Concept Maps

Can be used to:
• Gain insight into the way learners view a scientific topic or clinical topic;
• Examine the valid understandings and misconceptions learners hold; and
• Assess the structural complexity of the relationships between concepts.

Faculty-Prepared Concept Maps

Can be used to organize their ideas in preparation for instruction, as a graphic organizer during class, and as a way to encourage learners to reflect on their own knowledge and to work together and share their understandings in collaborative group settings.

Basic Components of a Concept Map

- **Nodes or “bubbles”** that contain
  - Nodes branch and create hierarchy

- **Links** Create relationships
  - Links can go to one node
  - Forms cross links between nodes

- **Hierarchical**
  - Branching represent different levels

- **Layout**
  - Top-down: linear
  - Center-out
*Taxonomy of Learning

- Recall-Facts of CC and History
- Analysis-Connecting labs to CC and Symptoms
- Inference-Differential Dx
- Comparison-EBM and Clinical Guidelines
- Evaluation-Treatment and Management

* Which taxonomy of learning selected influences the complexity of the mapping
Concept Map Applications

- Learning Content (self-directed)
- Teaching Content
- Fostering Thinking
- Measuring Analytical Thinking
- Designing a Lecture
- Analyze Case Vignettes/Questions
Concept Map Construction

- Make a list of concepts; use outline format
- Pull items to be grouped and connect from broad to more narrow
- Connect subtopics
- Look for cross-links
- Fine tube
Concept Mapping Advantages

- Active: give students something to “look into” vs “look at”
- Reveals gaps in understanding
- Promotes active discussion
- Develops focus
- Reveals individual or group differences in learning
Diabetes Mellitus
Type I versus
Type II

- Type I (juvenile)
  - usually occurs before 25 y
  - moderate genetic component
    - absolute requirement for insulin
    - autoimmune destruction of b-cells
      - common symptoms: polyuria, polydipsia, polyphagia
      - acute outcome: ketoacidosis

- Type II (adult)
  - usually occurs after age 40
  - strong genetic component
    - relative hypoinsulinemia, insulin elevated
    - increased insulin resistance
      - common symptoms: variable
      - acute outcome: hyperosmolar coma
Example

Myoglobin
- found only in muscle
- binds O₂
- contains heme
- similar tertiary structures
- all α-helical
- compact spherical
- no globin-globin communication
- high affinity for O₂ in tissues

Hemoglobin
- found only in red cells
- O₂ transport
- tetramer
- quaternary structure
- globin-globin communication
- low affinity for O₂ in tissues
- compact structure