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?

A Brief History of Concept Mapping

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.

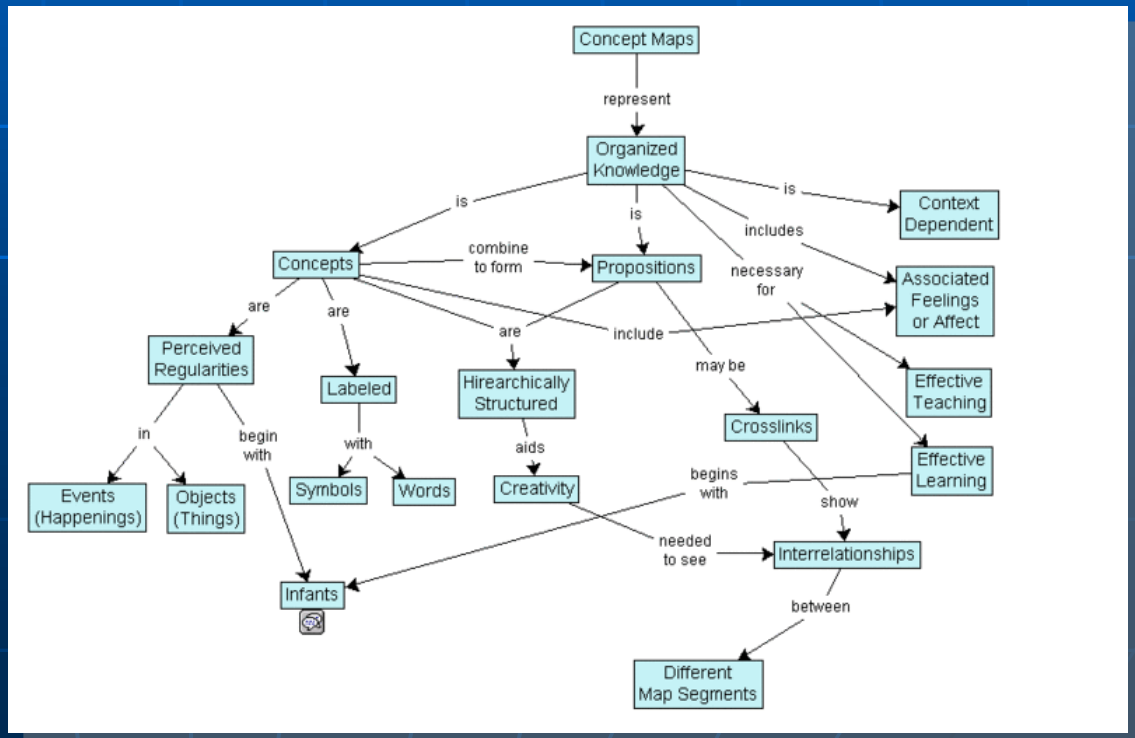
http://en.wikipedia.org/wiki/Concept_map

A Brief History of Concept Mapping

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."

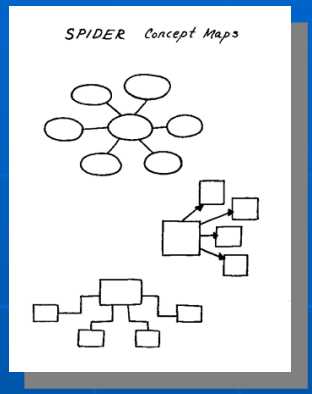
Key References:

- Ausubel, D., *Educational Psychology: A Cognitive View*, Holt, Rinehart & Winston, (New York), 1968.
- Novak, J.D. & Gowin, D.B., *Learning How to Learn*, Cambridge University Press, (Cambridge), 1984.

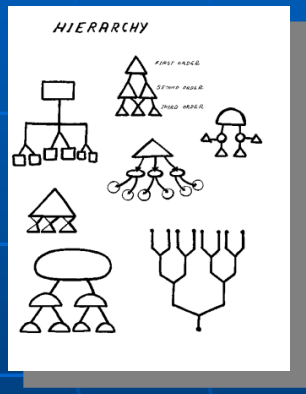


Uses for & Types of Concept Maps

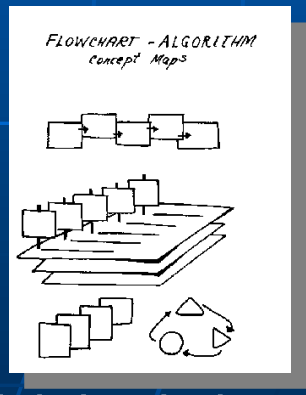
Four major categories of concept maps



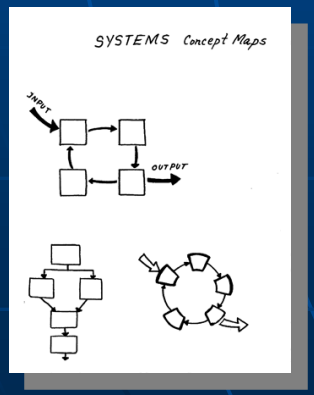
"Spider": Organized by placing the central theme or unifying factor in the center of the map. Outwardly radiating sub-themes surround the center of the map.



"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

Concept Mapping

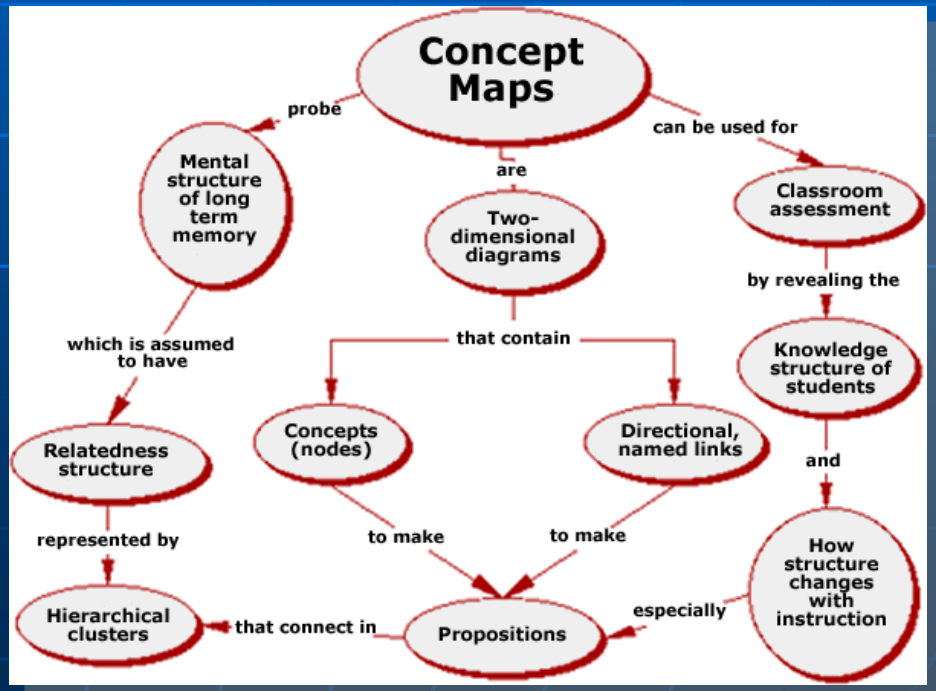
Student-Prepared Concept Maps

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.



http://www.flaguide.org/cat/minutepapers/conmap7.php

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

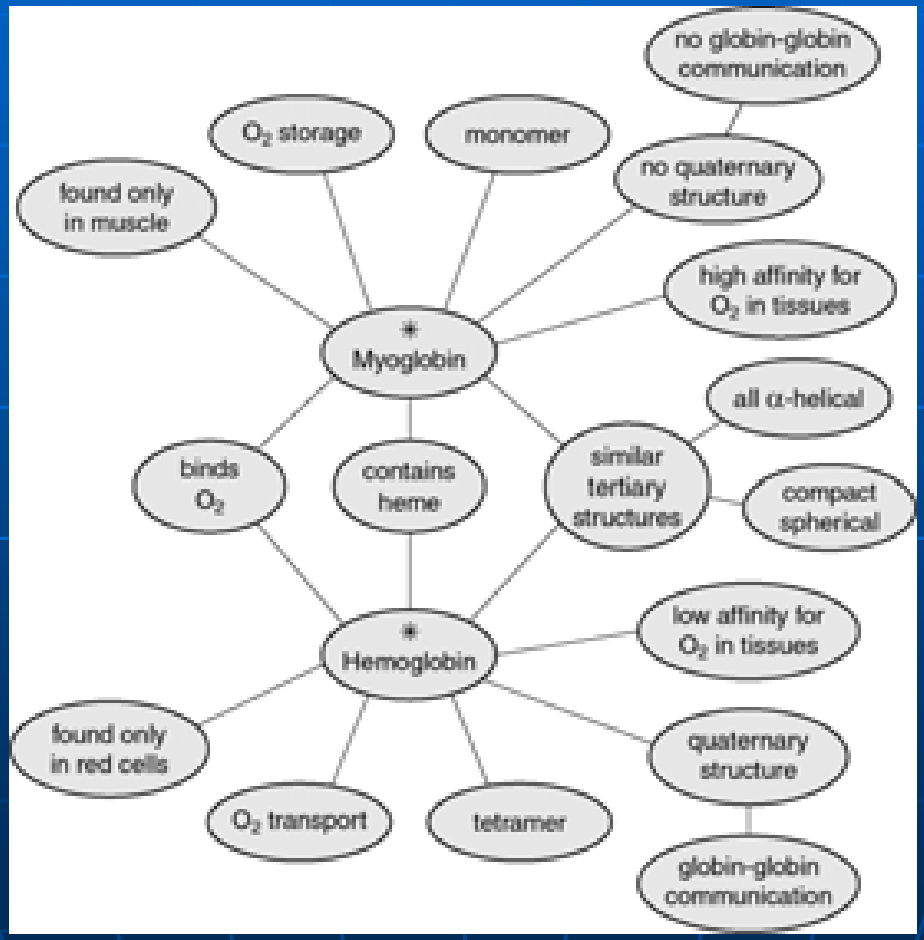
Concept Map Construction

- 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

Example


no globin-globin communication
O_2 storage
monomer
no quaternary structure
found only in muscle
high affinity for O_2 in tissues
Myoglobin
all α-helical
binds O_2
contains heme
similar tertiary structures
compact spherical
Hemoglobin
low affinity for O_2 in tissues
found only in red cells
quaternary structure
O_2 transport
tetramer
globin-globin communication

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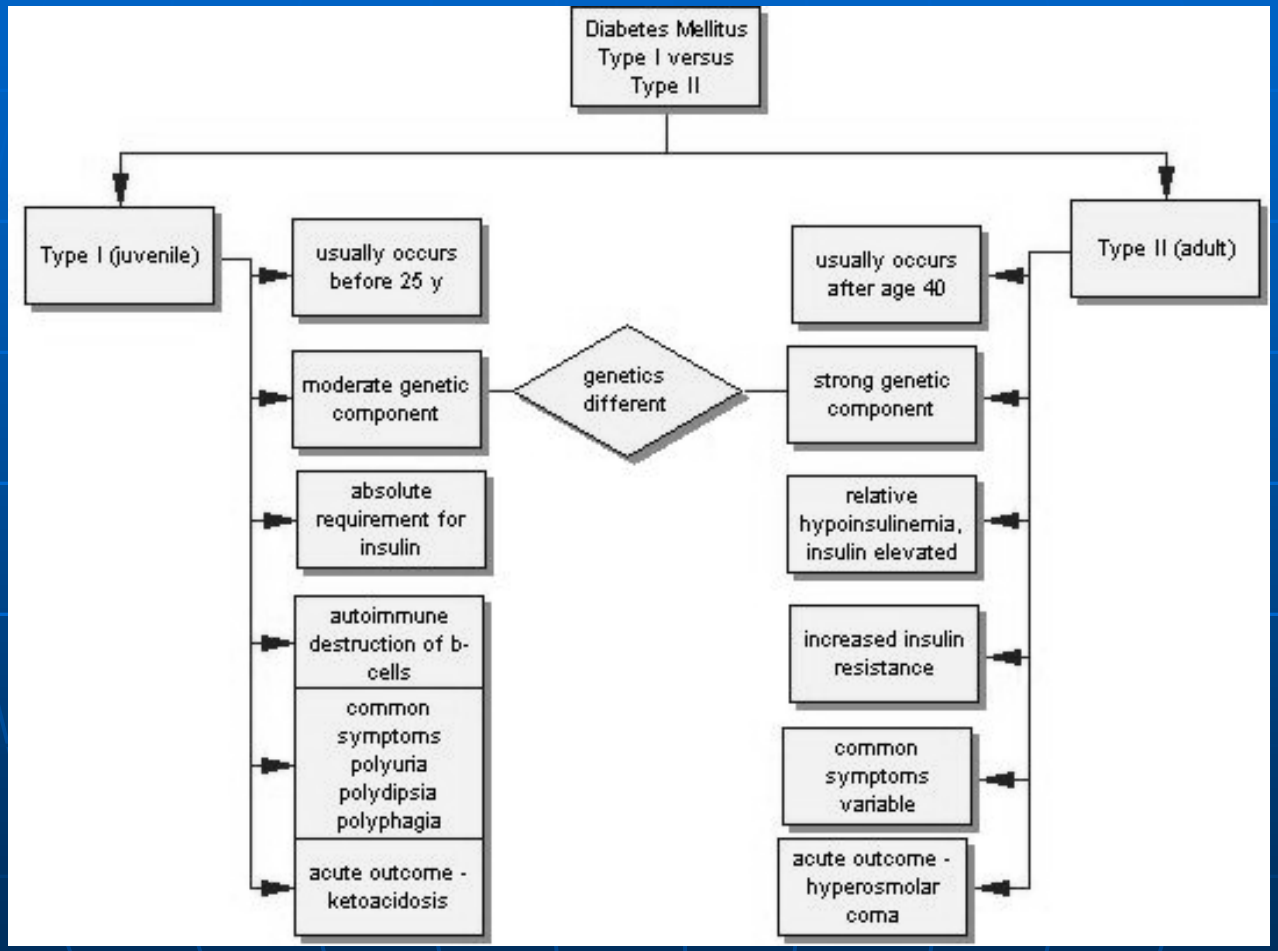
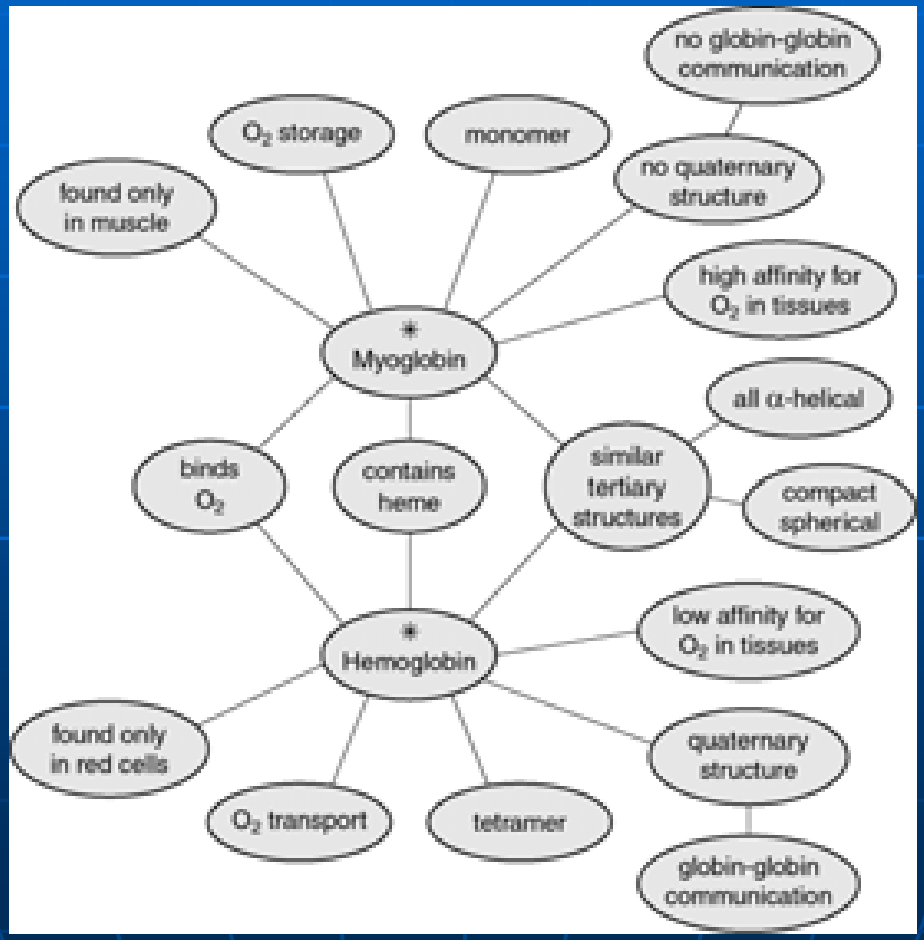

Diabetes Mellitus
Type I versus
Type II
Type I (juvenile)
usually occurs
before 25 y
moderate genetic
component
absolute
requirement for
insulin
autoimmune
destruction of b-
cells
common
symptoms
polyuria
polydipsia
polyphagia
acute outcome -
ketoacidosis
genetics
different
Type II (adult)
usually occurs
after age 40
strong genetic
component
relative
hypoinsulinemia,
insulin elevated
increased insulin
resistance
common
symptoms
variable
acute outcome -
hyperosmolar
coma

Example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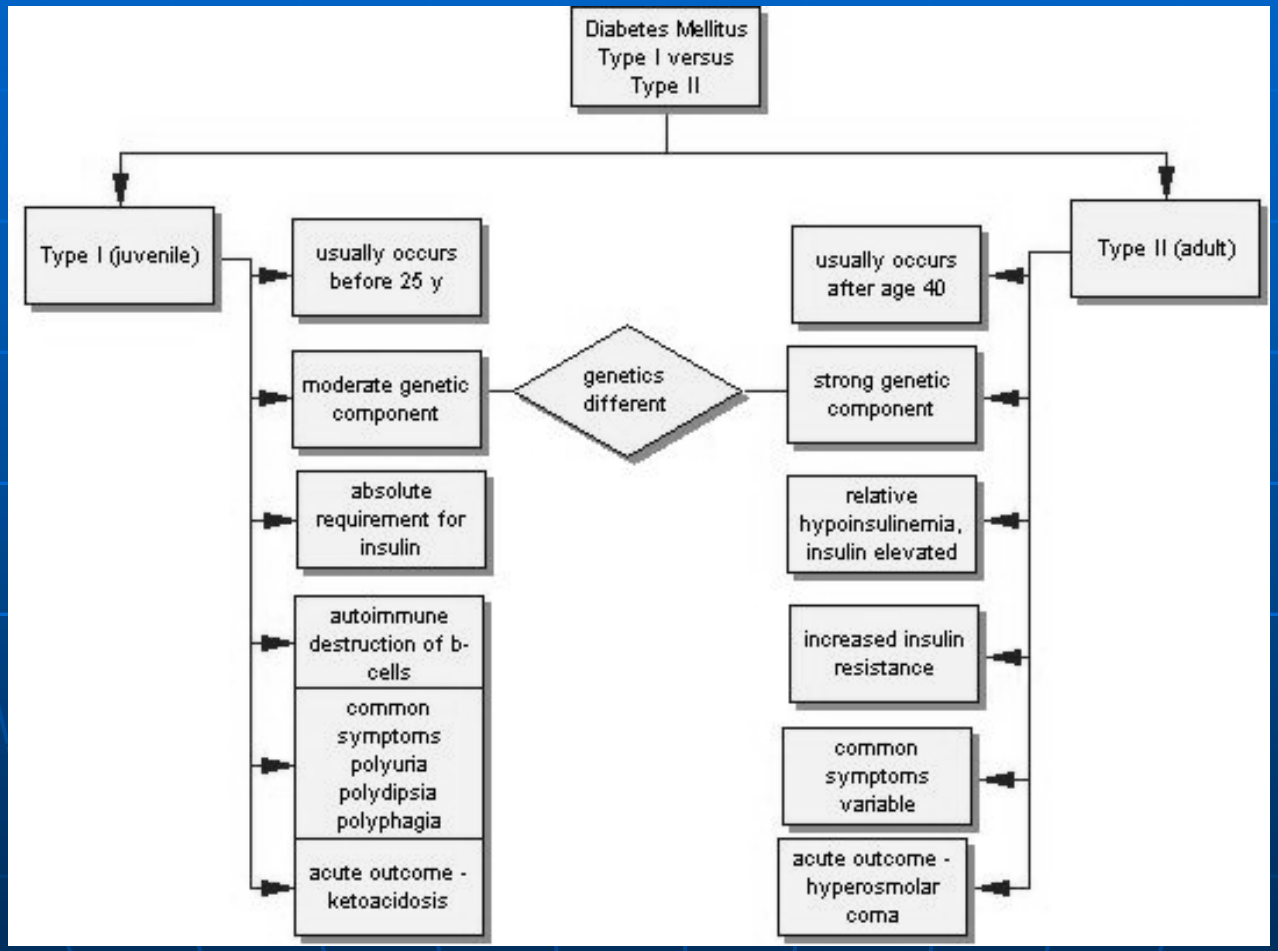
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