

# Concept Mapping - A Tool For Teaching Integrative Thinking

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(<http://www.ttuhs.c.edu/SOM/Success/>)  
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## Itinerary

- Helping Linear Learners (Introduction)
- "Concept Map" Defined
- Anatomy Of A Concept Map
- Concept Map Construction
- Concept Map Applications
- Barriers To Utilization
- Recommendations And Cautions
- Advantages

30 slides

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## Helping Linear Learners

- Failing students that "knew" the material.
- Problem: Help linear learners find relationships.
- Solution: Teach them to concept map their reading.
- Results: Dramatic.
- Lesson Learned: Help students learn "how" to learn in addition to "what" to learn.

30 slides

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## "Concept Map" Defined - 1

- ... tool for organizing and representing knowledge, or
- A reading method, or
- An active learning method, or
- A "living" document, or
- A type of knowledge representation, or
- A visual representation of an individual's knowledge structure, or...

30 slides

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## Concept Map Defined - 2

- Also called
  - Network diagrams (or concept diagrams)
  - Knowledge maps
  - Bubble diagrams
  - Mind maps®
- But, they are not "cognitive maps."
  - Term used by cognitive scientists
  - Mental encoding used in storage and retrieval

30 slides

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## Concept Maps - Basic Anatomy

- Nodes, or "bubbles" that contain concepts.
  - Many nodes branch; creates a hierarchy
  - Some nodes are lists; compatible with memorization
- Concept links create relationships; may contain descriptive text
  - Some links can converge on one node
  - Some links form cross-links between branches.

30 slides

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## Concept Maps - Advanced Anatomy

- Hierarchical -
  - Branch points represent levels in a hierarchy
  - Map hierarchy correlates with cognitive hierarchy
  - Compare to Quellmalz taxonomy (similar to Bloom's; proposed by Edys Quellmalz, SRI)
- Alternate layouts
  - Top-down (preferred by linear learners)
  - Center-out

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## Quellmalz Taxonomy - Context

- **Recall** - "just the facts ma'am"
- **Analysis** - how are things grouped together?
- **Comparison** - how are groupings related?
- **Inference** - what can be concluded from comparisons? [diagnosis]
- **Evaluation** - what is predicted from our conclusions? [clinical treatment and management]

30 slides

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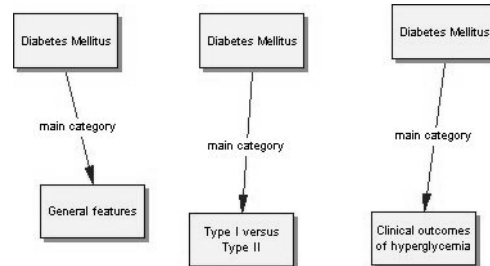
## Mapping Complexity

- **Recall** - nodes and links
- **Analysis** - grouping (produces hierarchy)
- **Comparison** - cross-links between groupings
- **Inference** - can be mapped as possible causes and outcomes
- **Evaluation** - can be mapped as a treatment decision tree or contingency pathways

30 slides

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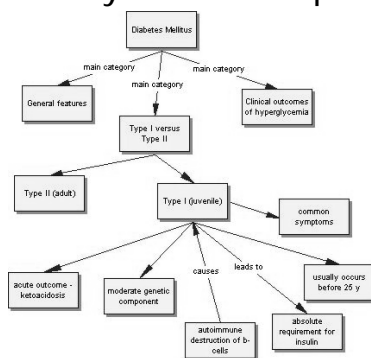
## Recall Level Map(s)



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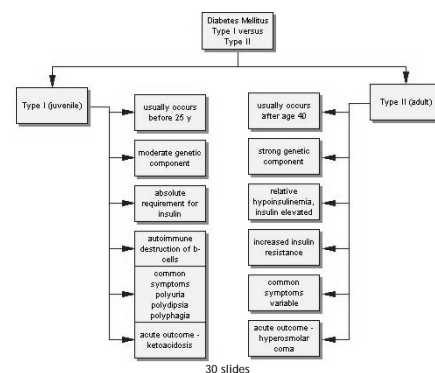
## Analysis Level Maps



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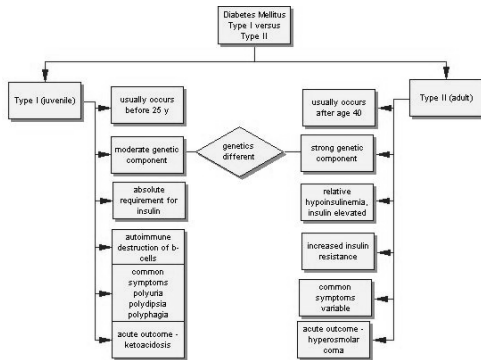
## Comparison Level Map



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## Comparison Level Map Crosslinked



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## Concept Map Construction

1. Make a list; create a simple outline
2. Pull Grouping items from list and connect them together; highest item is broadest concept.
3. Continue to connect subtopics to include details; look for convergence
4. Look for cross-links; powerful for developing integrative thinking.
5. Review maps on a weekly basis by verbalizing them; fine tune problem areas.

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## Concept Map Applications - 1

- Learning course content
  - Lecture notes
  - Reading assignments
  - Self-directed small group discussions
- Teaching course content
  - Lecture preview
  - Lecture summary
  - Teacher-directed small group discussions

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## Example: Lecture Summary



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## Concept Map Applications - 2

- Teaching thinking
  - Illustrating relationships
  - Presenting learning issues in PBL meetings
- Measuring analytical thinking
  - Scoring a map for a PBL session
  - Critical thinking in residents; West, et al., JAMA 2000, 284:1105-1110.
    - Links, 2 pts; Branches, 5 pts; Crosslinks, 10 pts

30 slides

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## Concept Map Applications - 3

- Designing lectures
  - Reveals more complex concepts
  - Suggests ways of illustrating
- Analyzing case vignette questions
  - Side-to-side diagram
  - Patient data on left; answer choices on right
  - Potential for developing diagnostic skills

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## Recommendations and Cautions - 1

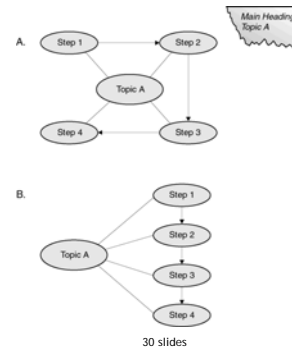
### ➤ Teaching

- Build maps from scratch; verbalize thinking.
- Always construct “top-down” or “side-side” - avoid “center-out.”
- Never provide a complete map.
- Individual help: First, ask to see maps, then discuss.
- Offer to review maps with students to verify that maps are “correct.”

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## Center-Out vs. Top-Down



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## Recommendations and Cautions - 2

### ➤ Advice for students

- Students construct their own maps.
- Several different maps may be correct.
- Group discussion fills in maps and deepens learning
- Don't use maps you haven't personally created.
- Use colors, shapes, different size paper, white board with sticky notes, etc.

30 slides

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## Concept Mapping Advantages

- Gives students something to look for.
  - Active: “look for”
  - Passive: “look at”
- Reveals gaps in understanding
- Promotes discussion
- Convergent thinking; develops focus
- Reveals individual differences in learning

30 slides

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## Advantages for Myers-Briggs Types

### ➤ Sensing types (linear learners)

- Reveals hierarchies
- Reveals relationships

### ➤ Intuitive types (integrative learners)

- Increase time on task (reduces distraction)
- Increase retention of details

30 slides

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## Appendix

- Novak, J.D. and Gowin, G.B., 1984. Learning How to Learn. Cambridge: Cambridge University Press.
- Edmondson, K. 1994, Academic Medicine 69(2), 108-110.
- <http://cmap.ihmc.us/>
- [http://www.fed.cuhk.edu.hk/~johnson/misconceptions/ce/learn/concept\\_map.htm](http://www.fed.cuhk.edu.hk/~johnson/misconceptions/ce/learn/concept_map.htm)
- [http://www.fed.cuhk.edu.hk/~johnson/misconceptions/concept\\_map/cmapguid.html](http://www.fed.cuhk.edu.hk/~johnson/misconceptions/concept_map/cmapguid.html)

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