

Concept Maps: What the heck are these?

Concept maps are tools for organizing and representing knowledge. They include concept words, usually enclosed in a box, and the relationships between them defined by linking words on lines.

What's a concept?

Joe Novak defines "concept" as a perceived regularity in events or objects designated by a label. Think of the concept "Dog" in your mind, what do you see? You might see a prototype shape (head, four legs etc) and typical examples (terrier, collie, sheepdog) and even be able to explain it (give a definition) in words. The label for most concepts is a word, although sometimes we use symbols such as + or %. A "proposition" is when two concepts are connected with a linking line and words to form a meaningful statement. Figure 1 shows an example of a concept map that describes the structure of concept maps and illustrates the above characteristics.

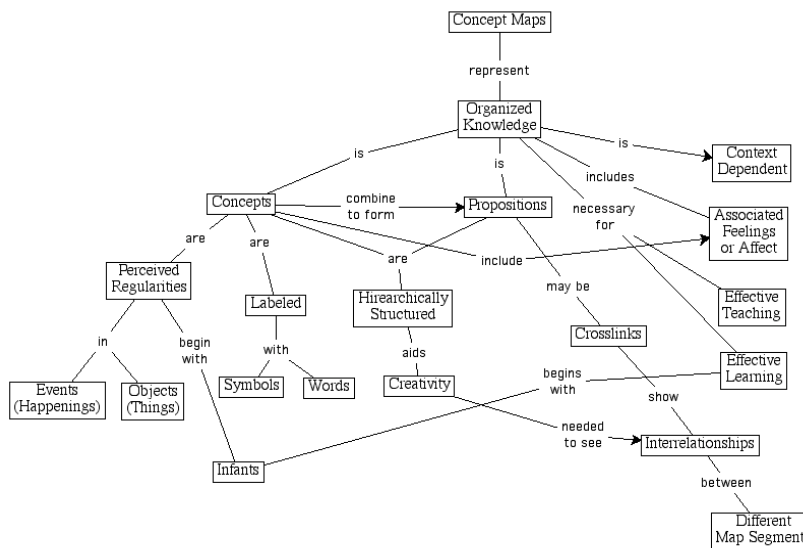


Figure 1 A concept map about concept mapping

There are three features of concept maps that are important: the hierarchical structure that is represented in a good map, the concise accurate linking words and long cross-links interrelating distant words.

Hierarchy: In a concept map the concepts should be represented in a hierarchical fashion with the most inclusive, most general concepts (i.e. Animals) at the top of the map and the more specific, less general concepts (i.e. Dogs) and specific examples (i.e. my terrier named Spot) arranged hierarchically below. At the bottom, specific examples or actual images of events or objects that help to clarify the meaning of a given concept. When scoring a map's hierarchy one evaluates whether the author of the map understands fundamental ideas like: not all animals are dogs and not all dogs are terriers named Spot.

Valid links and linking words: Concise accurate linking words or phrases are very important to demonstrate the relationship between concepts in a map. The author of the map shows their level of understanding by the type of words and the number of different links they create. More valid links in a concept map are rewarded by more points.

Cross-links: Another important characteristic of a concept map is the inclusion of "cross-links." These are long connections (propositions = linking lines with linking words) between concepts in different domains of the concept map. Cross-links help us to see how some domains of knowledge represented on the map are related to each other. In the creation of new knowledge, cross-links often represent creative leaps on the part of the knowledge producer and garner more points.

How to construct a good concept map

1. Once a question or topic for the new concept map has been selected, the first step is to identify the **key concepts** that apply to this domain. Then create a **list** in rank order from the most general, most inclusive concept, to the most specific, least general concept.

2. The next step is to construct a preliminary draft by **arranging** the concepts to show hierarchy and connections. Move concept words around to create a structure of top, middle and bottom level words and several domains or areas for each subtopic.

3. Add **linking lines** that directly connect concept words you know to have relationships. Then add **linking words** to each line to define the relationship. You may use more than one word to define the relationship, but later as you learn you should revise your words to be no more than two or three good accurate linking words/ a short linking phrase. Figure 2 shows a list of concepts for making a concept map to address the question, "What is a plant?" After a preliminary map is constructed, it is always necessary to revise this map. Good maps usually undergo three or more revisions.

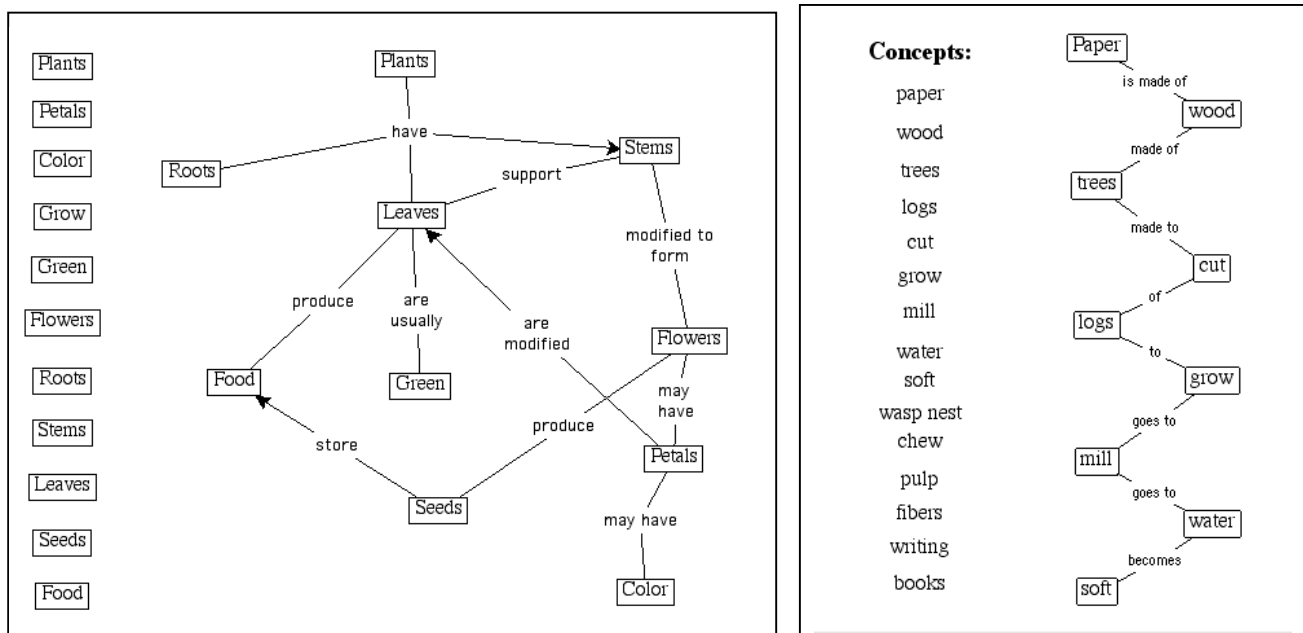


Figure 2 Create a good balanced concept map (left, A) and not a linear string map (right, B).

4. Advanced techniques for higher scores

After a preliminary map is constructed, **cross-links** should be sought. These are links between different domains of knowledge on the map that help to illustrate how these domains are related to one another. Finally, the map should be revised, concepts positioned in ways that lend to clarity, and a "final" map prepared. It is necessary to be selective in identifying cross-links, and to be as precise as possible in identifying linking words that connect concepts. In addition, one should avoid "sentences in the boxes" since this usually indicates that a whole subsection of the map could be constructed from the statement in the box. **String maps** or (sentence maps) illustrate either poor understanding of the material or an inadequate restructuring of the map. Figure 2 also shows an example of a string map. To verify all links are valid check to be sure that each proposition can stand alone. If it requires nearby propositions in order to make sense, like what can occur see in a string map it is not valid (i.e. in Figure 2B, the propositions "logs-to-grow" and "cut-of-logs" etc are not valid).

Scoring: Various grading systems can be used to score a concept map, but most are similar to this:

Hierarchy -where the concepts are placed in the appropriate top/middle/bottom 1/3 of the map: (up to 3 pts)

Validity of Propositions -Evaluate each pair of concepts: (#Valid links - #Invalid links) x 1/2 point

Cross links - Cross links travel far across a map or return upwards: #Valid crosslinks x 1/2 point

Overall Gestalt rating for creativity- thoughtfulness - relevance of organization as well as words chosen (up to 2pts)