

Classroom Assessment Techniques: Concept Maps

Concept Maps

A concept map is a graphical representation of a student's knowledge about a topic (Zeilik and others, 1997; McClure and other, 1999). Concept maps are pictorial essays, a method of illustrating the principal concepts of a lesson from the main points. They include the supporting information that indicates how a student has organized his/her ideas. Good concept maps force their creators to challenge their own understanding and to build a strong foundation for information that follows. A poorly constructed map allows a reviewer to quickly identify gaps in logic or comprehension. Concept maps will vary from person to person, no two will be alike. They allow for creative thinking in their construction. Concept maps have two principal components (Fig. 1):

1. Terms or concepts - often presented in boxes;
2. Directional links (arrows) and linking phrases (prepositions) - that connect the terms.

How to make a Concept Map

1. **Choose a specific topic.** For example, a map that illustrates the characteristics of one rock type will be more straightforward to generate than one that tries to show the features of all the major types of rocks. If the topic is too broadly defined it will involve too much information and any sense of organization or structure may be lost.
2. **Select a few key terms.** Identify 3-6 primary terms that you can use to form the spine or center of the concept map.
3. **Organize the key terms.** Place the key terms in a logical order starting with the most significant term. Draw arrows between terms and write a brief phrase to link the terms together (Fig. 1).
4. **Choose secondary terms.** Identify any additional terms that are related to the key terms.
5. **Organize the secondary terms.** Draw arrows from key terms to the relevant secondary terms and include a linking phrase (Fig. 1). Continue to add terms and linking phrases until the topic is complete.
6. **Add cross-links** from one part of the concept map to another. Creating cross-links between initially discrete sets of terms illustrates the recognition of broad connections within a topic.

Concept maps identify the relationships between components and therefore correspond to synthesis in Bloom's taxonomy. The number of levels in a concept map can be readily counted. The terms are joined by logical linking phrases appropriate for the topic. To speed formal assessment the maps can be readily evaluated as good, average, or poor. Alternatively, one can construct a formal scoring scheme (see caption, Fig. 1). McClure and other (1999) assessed a variety of grading strategies and found the most accurate method scored each concept pair (two concepts and the linking phrase).

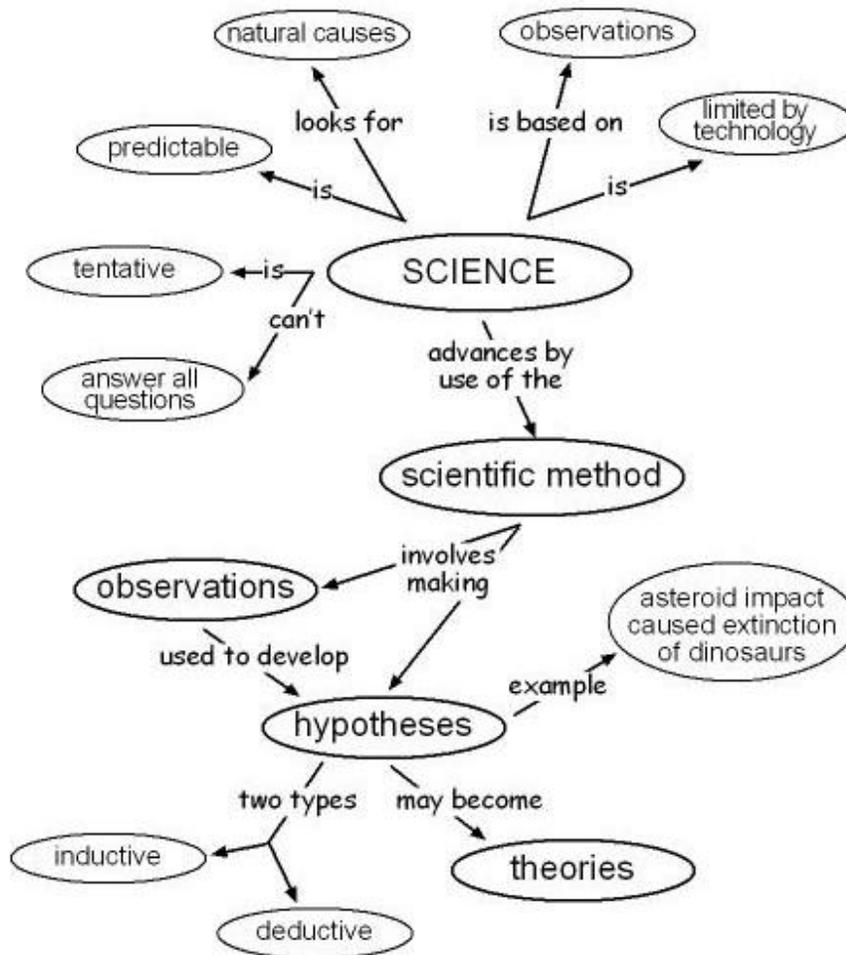


Figure 1. A simple concept map that illustrates the relationship between the elements of the scientific method. One potential scoring scheme would award 5 points per hierarchical level (4 levels present); 1 point for each reasonable linking phrase between adjacent points (13 links). Using this scheme the concept map would earn 33 points.

References

- McClure, J.R., B. Sonak, and H.K. Suen, *Concept map assessment of classroom learning: reliability, validity, and logistical practicality*. *Journal of Research in Science Teaching*, 1999, **36**(4): p. 475-492.
- Zeilik, M, C. Schau, N. Mattern, S. Hall, K. Teague, and W. Bisard, *Conceptual astronomy: A novel model for teaching post-secondary science courses*. *American Journal of Physics*, 1997, **65**, p. 987-996.