

SEMANTIC TAXONOMY

Conéctate al Conocimiento Panama, 2008

The semantic rubric is a tool to evaluate semantic content of concept maps. In applying this tool, it is essential to be able to read the concept map in a way that makes sense. This usually means that the concept map has a topological level of at least 3; that is, it does not contain long texts and does not lack linking phrases. When a concept map does not meet the requirements to be evaluated semantically, it is given a total score of 0 and assigned to the category of “unevaluated” concept maps.

In evaluating the semantic content of a given concept map, the following aspects must be taken into account:

- The author’s personal context: age, educational level, cultural background, etc.
- The evaluator’s personal context: educational level, cultural background, etc.
- The pedagogical context in which the map was created: If a concept map is based on specific learning experiences (e.g., readings, videos, plays, experiments, field trips), the instructional setting and content must be taken into consideration in applying the various criteria.

A word of caution is in order. This tool was designed to provide a reasonable guide to concept map content evaluation in the context of Panama’s Conéctate al Conocimiento Project. Occasionally, strict adherence to the scoring rubric will not necessarily result in the fairest or wisest evaluation of a concept map’s content. Thus, in using it, it is important to keep in mind the ‘spirit’ of the various criteria, in addition to their exact wording.

CRITERION # 1: Concept relevance¹ and completeness

Note: *Relevance and completeness is determined in relation, first, to the **root concept**; second, to the **focus question** (if there is one and the root concept is related to it); and third, to the **concepts closest to the root concept** (if there is no focus question or the root concept is not related to the focus question).*

- 0 pts. The map contains very few concepts and/or most concepts are irrelevant, redundant or not well-defined (e.g., “characteristics” instead of “physical characteristics”); additionally, there is an excessive use of examples² (one third or more of the map’s concepts are examples).
- 1 pts. One half or more of the map’s concepts are relevant and well-defined, but **many important concepts are missing**; and/or there is an excessive use of examples (one third or more of the map’s concepts are examples).
- 2 pts. Most concepts are relevant and well-defined, but **some important concepts are missing**. Appropriate use of examples (less than a third of the map’s concepts are examples).
- 3 pts. All concepts are relevant and well-defined; **no important concepts are missing**. Appropriate use of examples (less than a third of the map’s concepts are examples).

CRITERION # 2: Propositional structure: propositions as “semantic units”³

Note 1: *In the case of examples, it is permissible to use linking phrases such as: “like”, “for example”, “such as”, etc.*

Note 2: *In applying this criterion, the key point to keep in mind is whether the concept map provides **sufficient evidence** that the author understands the notion of “proposition as a ‘semantic unit’”. This is particularly relevant if the concept map contains a small number of propositions (examples are not counted) and/or does not contain second or higher level propositions.⁴*

- 0 pts. Fewer than half of the propositions are well constructed.
- 1 pts. Half or more of the propositions are well constructed.
- 2 pts. All propositions are well constructed, with the possible exception of 1 or 2.

CRITERION # 3: Erroneous propositions (misconceptions)

Note 1: *Apply only to non-subjective propositions.*

Note 2: *Erroneous propositions resulting from incorrect propositional structure are not considered.*

- 0 pts. Concept map contains more than 2 erroneous propositions.
- 1 pts. Concept map contains 1-2 erroneous propositions.
- 2 pts. Concept map contains no erroneous propositions.

CRITERION # 4: Dynamic propositions⁵

Note 1: *In applying this criterion, emphasis is on the dynamic nature of propositions, rather than on correct propositional structure; hence, non autonomous propositions are counted.⁶*

Note 2: *This criterion is independent of criterion # 3; that is, erroneous dynamic propositions are counted.*

- 0 pts. The map contains no dynamic propositions of any kind, only static propositions.
- 1 pts. The map contains only **non-causative** dynamic propositions.
- 2 pts. The map contains 1-2 **causative** dynamic propositions.
- 3 pts. The map contains more than 2 **causative** dynamic propositions or 1-2 **quantified causative** dynamic propositions.
- 4 pts. The map contains more than 2 **quantified causative** dynamic propositions.

CRITERION # 5: Quantity and quality of cross-links⁷

Note: *In applying this criterion, emphasis is on the presence of cross-links rather than on correct propositional structure; hence, non autonomous propositions are counted.*

- 0 pts. The map contains cross-links, but they are all erroneous (false).
- 1 pts. The map contains no cross-links.
- 2 pts. The map contains cross-links which establish correct (true) relationships. However, they are redundant or not particularly relevant or illustrative.
- 3 pts. The map contains 1-2 correct, relevant and illustrative cross-links, **with different linking phrases**. However, based on the concepts present in the concept map, important and/or evident cross-links are missing.
- 4 pts. The map contains more than 2 correct, relevant and illustrative cross-links, **with different linking phrases**. However, based on the concepts present in the concept map, important and/or evident cross-links are missing.

- 5 pts. The map contains more than 2 correct, relevant and illustrative cross-links, **with different linking phrases**. Based on the concepts present in the map, no important or evident cross-links are missing.

CRITERION # 6: Hierarchical organization of concepts (OPTIONAL)

Note: This will depend on the context of the concept map as well as the focus question.

- 0 pts. “Poor” hierarchical organization of concepts.
1 pts. “Acceptable” to “Good” hierarchical organization of concepts.
2 pts. “Very good” to “Excellent” hierarchical organization of concepts.

Maximum score = 16 points (18 if criterion #6 is included)

Levels:	Unevaluated	0
	Very low	1 – 5
	Low	6 – 8
	Intermediate	9 – 11
	High	12 – 14
	Very high	15 – 16 (or 15 – 18, if criterion #6 is included)

NOTES

¹ A concept is considered irrelevant if: 1) it is not related to the topic under consideration; or 2) though related to the topic, it does not contribute substantially to it. One way to decide whether a concept is relevant is to think of removing it from the map and ask whether this alters the map’s content significantly (in relation to the root concept and the focus question). If the answer is “no”, it is quite likely that this particular concept is not relevant to this map.

² Examples are specific instances or occurrences of concepts. For instance, “Chagres River” is an instance of the concept “river”. Examples are usually joined to concepts by linking words such as: “for example”, “like”, “such as”, among others.

³ A **binary proposition** is a triad which: 1) has the structure CONCEPT + LINKING PHRASE + CONCEPT; 2) is a unit of meaning; that is, it makes sense; and 3) is autonomous, i.e., it is not a fragment or continuation of a larger idea.

Most propositions are triads; however, there are situations in which three or more concepts may be needed to state the desired relationship. Such cases must be recognized, so as not to confuse with an incorrect propositional structure.

⁴ A proposition is **second level or higher** if the proposition begins at any concept other than the root concept.

⁵ **Dynamic propositions** involve: 1) movement, 2) action, 3) change of state, or 4) dependency relationships. They are subdivided into **non-causative** and **causative** dynamic propositions. In causative propositions, the cause may be found in one of the concepts, while the effect may be found either in the other concept or in the linking phrase. Causative propositions may be **quantified**. Quantified propositions explicitly indicate the manner in which a certain change in one concept induces a corresponding change in the other concept. Examples of each of the above types of propositions follow.

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- Examples of non-causative dynamic propositions: *Roots absorb water, herbivores eat plants, digestive system breaks down food products, living beings need oxygen, some plants serve as medication, heat melts ice.*
 - Examples of causative dynamic propositions: *Electric charge generates electric fields, reproduction allows continuity of species, cigarettes may produce cancer, independent journalism strengthens credibility, exercise decreases risk of developing diabetes, rule of law attracts foreign investment.*
 - Examples of quantified causative dynamic propositions: *Increased transparency in public affairs discourages corruption, under-activity of the thyroid gland (hypothyroidism) decreases body metabolism, increased quality of education contributes to greater national development.*

Static propositions, on the other hand, serve only to describe characteristics, define properties and organize knowledge. They are generally associated to linking phrases such as: “is”, “are”, “have”, “possess”, “are made up of”, “are classified into”, “are divided into”, “contain”, “live in”, “are called”, “is located in”, “likes”, etc.

- Examples of static propositions: *Sun is a star; means of transportation include land transport means; Panama is located in Central America; animals may be vertebrates.*

⁶ Example: *Photosynthesis transforms solar energy which is trapped by leaves* In this case, the second proposition *solar energy which is trapped by leaves* does not have an entirely correct propositional structure since it is not autonomous; however, it contains a dynamic linking phrase which takes precedence in this criterion.

⁷ In concept maps containing only one root concept, a **cross-link** is a proposition joining two concepts in such a way that they form a closed circuit.