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Concept Map Rubrics

Concept maps are generally graded or evaluated with rubrics. Rubrics are scoring tools that use a predetermined set of standards to assess criteria that are complex and subjective; they articulate in writing the criteria and standards that an instructor will be using to evaluate student work. Rubrics can help link graded criteria to learning objectives, can help relate assignments to course content, and can help make grading criteria transparent. For these reasons, it is often a good idea to share your rubric with your students. Rubrics generally take one of the two forms seen below. The first analyzes certain traits by predetermined criteria, and the second analyzes the entire product by predetermined characteristics:

Trait	High Score	Criteria
	Medium Score	Criteria
	Low Score	Criteria
Spelling	10 points	Paper has no spelling errors
	8 points	Paper has 1 spelling error
	5 points	Paper has two or more spelling errors

High score	Characteristics
Medium score	Characteristics
Low score	Characteristics
"A" paper	• Adequately states and defends argument • Appropriate citations • Counterarguments are identified and adequately answered
"B" paper	• Has an argument with some weakly defended points • Mostly appropriate citations • Not all counterarguments are answered
"C" paper	• Incorrect factual statements • Mostly non-scholarly citations • No counterarguments

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Bartels' Scoring Rubric for Concept Maps[1]

Concepts and Terminology

3 points	Shows an understanding of the topic's concepts and principles and uses appropriate terminology and notations
2 points	Makes some mistakes in terminology or shows a few misunderstandings of concepts
1 point	Makes many mistakes in terminology and shows a lack of understanding of many concepts
0 points	Shows no understanding of the topic's concepts and principles

Knowledge of the Relationships among Concepts

3 points	Identifies all the important concepts and shows an understanding of the relationships among them
2 points	Identifies important concepts but makes some incorrect connections
1 point	Makes many incorrect connections
0 points	Fails to use any appropriate concepts or appropriate connections

Ability to Communicate through Concept Maps

3 points	Constructs an appropriate and complete concept map and includes examples; places concepts in an appropriate hierarchy and places linking words on all connections; produces a concept map that is easy to interpret
2 points	Places almost all concepts in an appropriate hierarchy and assigns linking words to most connections; produces a concept map that is easy to interpret
1 point	Places only a few concepts in an appropriate hierarchy or uses only a few linking words; produces a concept map that is difficult to interpret
0 points	Produces a final product that is not a concept map

[1] Adapted from (Bartels, B. H. (1995). Promoting mathematics connections with concept mapping. *Mathematics Teaching in the Middle School, 1*(7), 542-549.)

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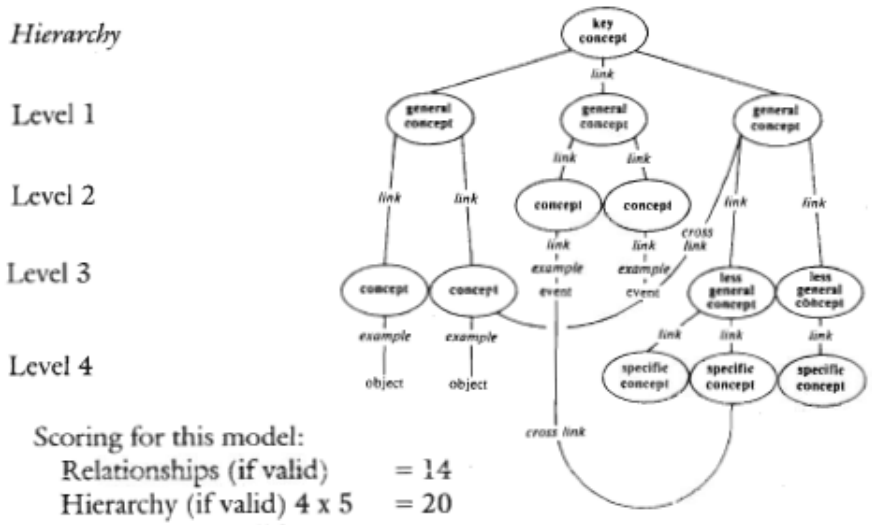
Novak and Gowin's Scoring Criteria for Concept Maps[2]

1. *Propositions*. Is the relationship between two concepts indicated by a connecting line and linking word(s)? Is the relationship valid? For each meaningful, valid proposition shown, score 1 point.
2. *Hierarchy*. Does the map show hierarchy? Is each subordinate concept more specific and less general than the concept drawn above it (in the context of the material being mapped)? Score 5 points for each valid level of the hierarchy.
3. *Cross links*. Does the map show meaningful connections between one segment of the concept hierarchy and another segment? Is the relationship shown significant and valid? Score 10 points for each cross link that is both valid and significant and 2 points for each cross link that is valid but does not illustrate a synthesis between sets of related concepts or propositions. Unique or creative cross links might receive special recognition or extra points.
4. *Examples*: Specific events or objects that are valid instances of those designated by the concept label can be scored 1 point each.
5. In addition, a criterion concept map may be constructed, and scored, for the material to be mapped. Then divide the students' scores divided by the criterion map score to give a percentage for comparison. (Note that some students may do better than the criterion and receive more than 100%.)

Scoring Model



Scoring for this model:

Relationships (if valid)	= 14
Hierarchy (if valid) 4 x 5	= 20
Cross links (if valid and significant) 10 x 2	= 20
Examples (if valid) 4 x 1	= 4
	58 points total

[2] Adapted from (Novak, J. D., & Gowin, D. B. (1984). *Learning how to learn*. New York: Cambridge University Press.)

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Cronin et al's Evaluation of a Concept Map[3]

Concepts	Concepts are objects, events, situations, or properties of things that are designated by a label or symbol.	Score 1 point for each concept that is connected to at least one other concept by a proposition.
Groupings	Groupings are the ways concepts can be linked or joined together. There are three types of groupings: 1. Point groupings: a number of single concepts emanating from one concept 2. Open groupings: three or more concepts that are linked in a single chain 3. Closed groupings: concepts that form a closed system (a loop)	Scoring of groupings: 1. Point groupings: 1 point for each concept in the group 2. Open groupings: 2 points for each concept in the group 3. Closed groupings: 3 points for each concept in the group
Hierarchy	Concepts on a map can be represented as a hierarchical structure in which the more general, more inclusive concepts are at the top of the map; the specific and exclusive concepts are at the lower end of the map	Concept hierarchy is based upon the extent that concepts are present in "assigned levels" (as designated by the instructor). Four points are given to each concept correctly assigned to a level, 2 points for each concept on a level one-removed from an assigned level, and no score for concepts that are on a level two- or more-levels removed from the assigned level
Branching	Branching of concepts refers to the level of differentiation among concepts, that is, the extent the more specific concepts are connected to more general concepts	Score 1 point for each branching point that has at least two statement lines
Proposition	Relationships between concepts are represented by connecting word(s) and phrases written on the line joining any two concepts. • A Simple Proposition is a simple English word or phrase • A Scientific Proposition is a phrase or statement that is composed of technical or scientific word(s).	• Simple Propositions score 1 point for each word or phrase; give a half for repeated use of Simple Propositions • Scientific Propositions score 2 points for each proposition. Give 1 point for repeated use of Scientific Proposition

[3] Adapted from (Cronin, P. J., Dekker, J., Dunn, J. G. (1982). A procedure for using and evaluating concept maps. *Research in Science Education, 12*(1), 17-24.)

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University of Minnesota's Concept Map Assessment Rubric[4]

criteria	Excellent	Good	Adequate	Marginal	No credit; is unacceptable to review
structure	non-linear structure that provides a very complete picture of your ideas	non-linear structure that provides a complete picture of your ideas	non-linear structure that provides a picture of your ideas	non-linear structure that shows some relationships between ideas	inappropriate structure
relationships	relative importance of ideas is indicated and both simple and complex relationships are very effectively mapped	relative importance of ideas is indicated and relationships are very effectively mapped	relative importance of ideas is indicated; relationships are mapped	importance is evident but not very distinctive; relations are somewhat clear but lacking	no differentiation between ideas; no evidence of meaningful relationships
exploratory	map shows complex thinking about the meaningful relationship between ideas, themes, and the framework	map shows effective thinking about the meaningful relationships between ideas, themes, and the framework	map shows definite thinking about relationships between ideas, themes, and the framework	map shows some thinking about relationships between ideas, themes, and the framework	thinking process is not clear
communication	information is presented clearly and allows for a high level of understanding	information is presented clearly and allows for a good level of understanding	information is presented clearly and allows for a basic level of understanding	information is presented and some understanding can be gained	information is not clear, very difficult to understand

[4] University of Minnesota digital media center. (2004). Concept map [assessment rubric]. Retrieved on December 20, 2007, from http://dmc.umn.edu/activities/mindmap/assessment.pdf

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Mueller's Classroom Concept Map Rubric[5]

Legible—easy to read and free of spelling errors	No (0-1)		Yes (2)	
Accurate—concepts used accurately	Many inaccuracies (0-2)	A few inaccuracies (3-4)	No inaccuracies (5)	
Complete—sufficient number of relevant concepts and relationships	Limited use of concepts/relationships (0-2)	Some use of concepts and/or relationships (3-4)	Sufficient number of concepts and relationships (5)	
Sophisticated—finding meaningful connections between relevant concepts	Little or none (0-1)	Few meaningful connections made (2-4)	Some meaningful connections made (5-7)	Meaningful and original insights demonstrated (8)

[5] Mueller, J. Concept map rubric. Retrieved on December 20, 2007, from http://jonathan.mueller.faculty.noctrl.edu/240/conceptmaprubric.htm

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NCSEC Concept Map Rubric[6]

	Exemplary 4	Exceeds Standard 3	Adequately Meets Standard 2	Below Standard 1	Student Score
Organization	• Well organized • Logical format • Contains main concepts • Contains an appropriate number of concepts • Map is "treelike" and not stringy • Follows standard map conventions	• Thoughtfully organized • Easy to follow most of the time • Contains most of the main concepts • Contains an adequate number of concepts • Follows the standard map conventions	• Somewhat organized • Somewhat incoherent • Contains only a few of the main concepts	• Choppy and confusing • Contains a limited number of concepts	_____
Content	• Linking words demonstrate superior conceptual understanding • Links are precisely labeled	• Linking words easy to follow but at times ideas unclear • Links are not precisely labeled	• Linking words are clear but present a flawed rationale • Links are not labeled	• Difficult to follow • No links	_____
Cooperation	• Worked extremely well with each • Respected and complemented each others ideas	• Worked very well with each other • Worked to get everyone involved	• Attempted to work well with others • At times "off task" and not everyone was actively involved	• Little or no teamwork	_____

[6] National Computation Science *Education Consortium* Louisiana Team 11. (2000). Rubric 4: Concept Map. Retrieved on December 20, 2007, from http://www.ncsec.org/team11/RubricConceptMap.doc