Concept Mapping Biological Topics

Activity Type
Groups of students create concept maps on either flip chart paper or the white board.

Time Needed
30-50 min

Purpose
Concept mapping is a technique that allows students to visualizing the relationships among different concepts. A concept map is a diagram showing the relationships among concepts. Concepts are connected with labeled arrows, in a branching hierarchical structure. The relationship between concepts can be articulated in linking phrases, e.g., "gives rise to", "results in", "is required by," or "contributes to." In creating a concept map without notes, students must generate from memory as many words or ideas relating to a concept as possible. It also allows the instructor to assess how well students see the ‘big picture’.

Abstract
<table>
<thead>
<tr>
<th>Activity</th>
<th>Time</th>
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<tbody>
<tr>
<td>Introduce concept mapping, draw simple example</td>
<td>5-10 min</td>
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<tr>
<td>Students create word list</td>
<td>5-10 min</td>
</tr>
<tr>
<td>Groups create maps</td>
<td>20 min</td>
</tr>
<tr>
<td>Groups present to class. Instructor points out appropriate connections</td>
<td>10 min</td>
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Supplies
- Flip-chart paper and a variety of sharpies and markers OR
- White board markers

Pre-class prep
Choose appropriate topics for students to make concept maps from:
- Most topics that span several lectures are complex enough to work with mapping, or
- Pick a single molecule that appears in several different lectures, and see if students can find all the examples of its mention.

In Class
(5-10 minutes) Introduce the idea of concept mapping to the class; it is likely that this will be the first time most students have been introduced to this thinking tool. It may be useful to have a sample concept map to show the class, or produce a simple concept map on the board by polling the class for words and ideas related to a simple class topic, or something general like ‘studying’.

(5-10 minutes) Instruct students to make a list of all words, phrases, and ideas related to the concept they are going to map. Ask students to rank their words from most general to most
specific, or most important to least important. The most general or most important concepts should then be the ones added to the concept map first.

(20-30 minutes) Have students make their concept maps, and explain that they should connect concepts from their list with labeled lines indicating the relationship between the two concepts.

(5-10 minutes) Have students present their concept maps to the class, and focus attention on appropriate connections between concepts.

**Things to Ask or Emphasize**
- Encourage students to include a lot of branching and put special emphasis on cross-linking concepts in one area of the map with those in other areas.
- Emphasize that "neatness doesn't count" and that they may re-draw their maps as often as they wish.
- Remind students that a concept map is a distinctive representation of their own understanding, and that individual components on their maps may or may not be scientifically accurate, but there is a large set of ways to organize and represent what they know.
- Remind students that concept maps may be a very helpful way to study; they can be used to condense many pages of textbook verbiage into a succinct summary of what the author presents.

**Typical Mistakes**
If students are not instructed to make a word/idea list before constructing the concept map, the concept map can be a frustrating exercise as it can be difficult to enter words into an organized concept map if they are recalled after the map has already been started.

**Comments**
- It is not recommended that you provide a partially-filled-out concept map. The usefulness of the map comes from students creating their own connections. If you provide them with a fill-in-the-blank map, the activity changes to one where they are trying to figure out what you want the connections to be.

Note: the following sample is just the BEGINNING of a concept map for cloning a gene.
Sample concept map for topic: Cloning a Gene

- AMPR
- ANTIBIOTIC RESISTANCE GENE
- PALINDROMIC
- SELECTABLE MARKER
- RESTRICTION SITE
- ORIGIN OF REPLICATION
- VECTOR
- RECOMBINANT DNA MOLECULE
- PLASMID

NEED

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