

Subject Area: Science

Grade Levels: K - 12

Title of Instructional Strategy: Concept Mapping

Description: Concept mapping is a graphical representation of the relationship among terms. Concept mapping is used to take the student's prior knowledge and allows them to connect to new information at their own developmental level. It can also be used to brainstorm new ideas individually or in varying size cooperative groups. There are four different types of maps that can be used depending on the topic of discussion, linear (food chain), circle (water cycle), hub or spoke (based on one major concept), tree (family tree). This is a visual learning strategy that will help enhance the students understanding of the connection between concepts.

References:

1. Kinchin, Ian M. (2000). Concept mapping in biology. *Journal of Biological Education*, 34(2), 61-69.
2. Vanides, Jim, Yin, Yue, Tomita, Miki, & Ruiz-Primo, Maria Araceli (2005). Teaching strategies – using concept maps in the science classroom create an exciting learning environment and help monitor students' understanding with the use of concept maps. *Ophthalmology clinics of North America*, 18(2), 27-32.
3. Gallenstein, Nancy, L. (2005). Never too young for a concept map. *Science and Children*, 43(1), 44-51.
4. Newlin, Elizabeth, L. Concept maps for science. *Encyclopedia of Educational Technology*. Retrieved August 26, 2007, from <http://coe.sdsu.edu/eet/articles/sciencemaps/index.htm>.

***Conditions:** Concept maps are not just for upper elementary or only used to help the students excel in reading and writing. In reality, concept maps have shown to be beneficial for early learners. Data has shown that the use of concept mapping for all

students from preschool, elementary, and even high school is beneficial. It gives them an opportunity to see how their prior knowledge relates to new concepts with logical connections the way they see it in their own mind. The reason that concept maps can be used with all ages is because they can be designed to fit any child's developmental level. An individual with a higher developmental level may only use words. When students are younger a concrete level is more appropriate so pictures and objects can be used. The students could then arrange the objects or pictures to create their concept map. Each of the main points on the concept map can be connected by paper arrows, string, yarn, and pipe cleaners for the more kinesthetic learners.

Concept Maps are also very valuable for teachers because they are excellent evaluation tools. The maps can be use as pre and post assessment to student organization of thoughts and allows the student to show their understanding. The maps are also a great tool for the teacher because it makes the student look at the big picture instead of allowing the child to see each topic as its own entity. This is critical in science because no concept should be looked at in isolation but rather as part of the whole. This understanding derives from the theory that prior knowledge helps develop meaningful learning, which is when it is understand that concepts already possessed can be tied in with known knowledge.

Concept mapping can be developed using collaborative learning. Using this style allows the student to work together to achieve a common goal. As the students develop the map, the other student will be able to discuss if each link to the map is valid. This also teaches the student to work in groups because before they can make a new link on the concept maps all members have to agree on how every thing is connected.

* **“How-To” Information:**

- The first step in concept mapping is selecting a few terms from the curriculum unit you are working on. Depending on the age group, the teacher may want to choose pictures to go along with the words selected.
- Review with the class what has been discussed in their science lesson. During this time the teacher will take “key concepts in new knowledge and relate them to concepts in the student's existing knowledge.”
- Using a traditional concept map (hub or spoke), the main term selected will sit in a circle at the center of the page. Take the example of the Ocean. Put the word Ocean in the center of the paper or on the board.
- From there, the teacher will pose questions about the ocean. “What types of things do you see in the ocean? Every idea the student comes up with get put into a circle with a line connecting to the center circle. Those are all of your sub-topics. For the younger students you could use string, yarn, pipe cleaners, or straws to connect the pictures.
- Each sub-topic has details that are represented with more lines and circles.

Using concept maps allows students to see the connections between terms, organize their thoughts and then reflect what they have learned. It is also a better way to store and retrieve information.

***Implications:** Concept mapping integrates literacy and science by giving a starting point for writing about Science. Concept maps let teachers know how much the student understands by utilizing it as a pre and post test. In concept mapping, the student must think about the science terms being learned; organize their thoughts and put them in

order. By using concept maps, some of the small details can be lost because the student is only focusing on the larger picture. They are not designed for problem solving or for comparing students' work. Although this is a great learning strategy for students, it can cause more work for the teacher because he/she will have to go back and make sure the student has all the major concepts listed in their map. This strategy is also very versatile because it can be used in both large and small group depending on how well the student works.

***Examples:**

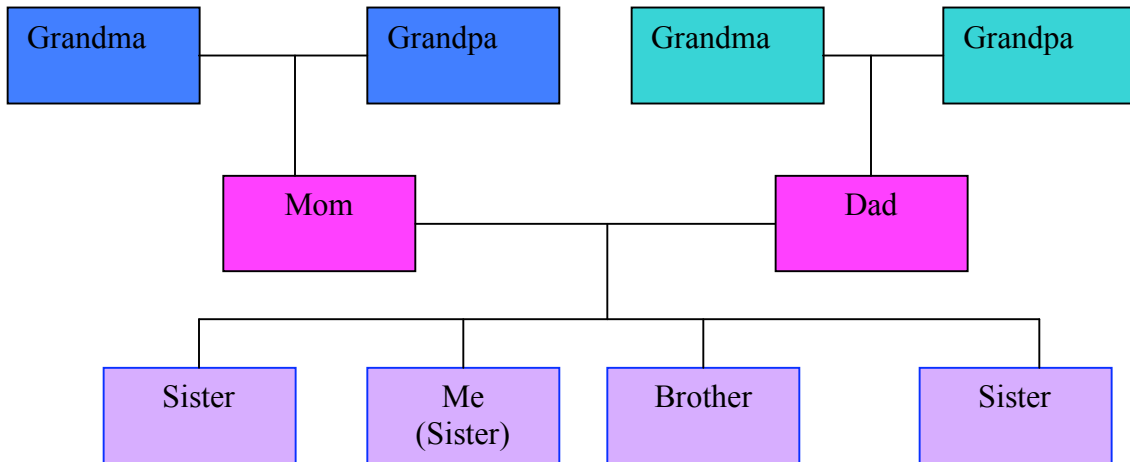
- *Tree concept map* starts with the first level and every concept attaches to the bottom of that first level. (See Appendix A1 for example)
- *Circle concept map* consists of each item working in a clockwise fashion. Each concept relates to the next. (See Appendix A2 for example)
- *Linear concept map* has a beginning and an end. It starts with one concept and proceeds in a straight line until the end. (See Appendix A3 for example)
- *Hub or Spoke concept map* is designed around one central theme. There are sub-topics connected to the main theme.

EIU Candidate Names:

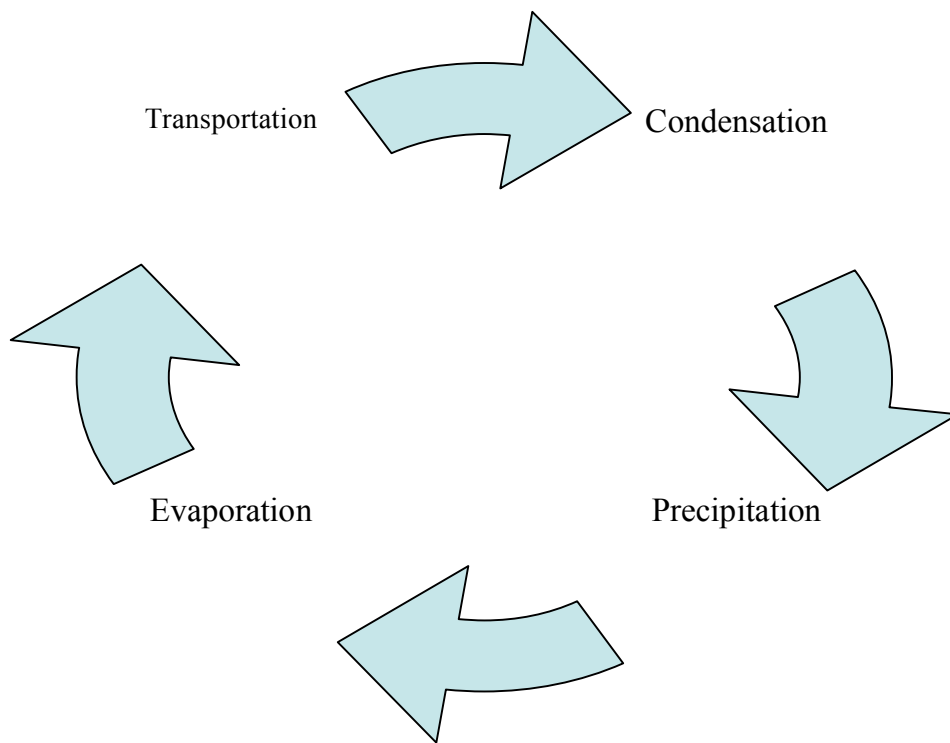
Rachelle Parr
Laura Buchanan
Christine Kuspa
Katie Weathers
Jacy Brasher
Garment Jelley

Appendix A

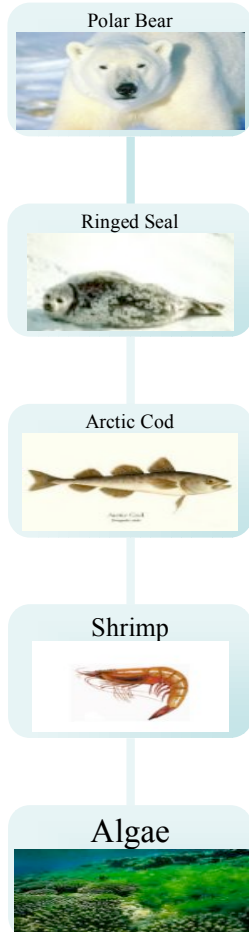
A1. Tree Concept Map



A2. Circle Concept Map



A3. Linear Concept Map



A4. Hub or Spoke Concept Map

