



CONCEPT MAPPING : STUDENT FRIENDLY AND A USEFUL TOOL FOR SCIENCE EDUCATION

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ABSTRACT

It is today's need to guide the student about the meaningful learning, so they can be able to memorize the things in the better way. The main object of imparting education is to turn out intelligent Citizens, who appreciate and enjoy the beauty and wonders of nature. To make the citizens efficient in all walks of life, Science concepts need to be mastered and a good learning should be able to apply their knowledge in day to day situation. Concept map is one such important strategy that evolved as it careful tool in leading students towards meaningful learning. Concept map are special representation of Concepts and their inter-relationships that are intended to represent the knowledge structures that humans save in their minds. This article is been addressed to students with the meaning of concept map, Its importance in science education and even featured with few and easy steps to develop a Concept Map

KEYWORDS : Concept Mapping, Science education, Importance of Concept Mapping, Key Concepts.

INTRODUCTION :

In the present era, children are taught in a rigid, formal and stereotype way. Education is perceived as a process. We are in the new millennium. We live in an increasingly technological society at a time when information is rapidly expanding and changing. "We face changes in families and perhaps in children themselves because technology has changed learners' characteristics. Sensory overload from constant media bombardment is one possible cause" (Green,1995:3), changes in the society have affected what students need to know and to do to get and keep jobs. Government authorities as well as business and industry have become more proactive and are demanding changes in schools.

It is today's need to guide the students about the meaningful learning, so they can be able to memorize the things in the better way. The main object of imparting education is to turn out intelligent citizens, who appreciate and enjoy the beauty and wonders of nature. To make the citizens efficient in all walks of life, science should form an essential part of the curriculum as it is the only subject which affords knowledge of certain facts and laws and helps in achieving the main object of education and therefore science should emerge as something alive, and exciting.

However, condition in schools is not promising. Student find science subject as abstract and conceptual in nature. Many new concepts are introduced to students at school age. Students consider the different concepts as isolated element of knowledge. Due to lack of integration, student find it difficult to form concepts (Brandt et al., 2001) and it is essential that they understand . Teaching science in middle school is both rewarding and demanding. It creates an exciting learning environment with a rich science curriculum that engages all students. Ausubel (1968) describes meaningful learning as the establishment of non- arbitrary relations among concepts in the learners mind. Novak and Symington (1982) devised concept mapping as a cognitive tool to promote meaningful learning.

In this article the questions like "What does Concept Map mean? ; What is the importance of Concept Map in Science Education? and steps for the construction of Concept Map are addressed.

WHAT DOES CONCEPT MAP MEAN ?

Concept Mapping is a process which involves the identification of key Concepts in a domain of knowledge and the organization of these concepts into a hierarchical arrangement. It is a system of teaching and learning that is both consistent with the structure of scientific knowledge. Concept maps are special representations of concepts and their interrelation ships that are intended to represent the knowledge structures that humans store in their mind. (Jonassen, Biessner, and Yacci, 1993).

In 1980, Professor Joseph D. Novak developed an important teaching strategy called as Concept Maps. It is one of the most useful tool in leading students towards meaningful learning. Concept Map can also be described as an important innovative strategy, technique / tool of integrated Science teaching. In past students have learned to take notes in linear form, whether copying them from the teacher or creating their

own. This approach can be useful to some students', but it is not as clear to other students' and does not have as many possibilities as concept mapping provides.

Concept map is a useful tool in leading students towards meaningful learning

1. It is a diagrammatic representation, which shows meaningful relationship.
2. It generates ideas.
3. Helps to communicate complex ideas.
4. It provides a visual image of the concepts.
5. Can be readily revised at any time when necessary.
6. It makes learning an active process.

Concept maps can be constructed by using graphic organizers or visual learning tools such as Inspiration software.

IMPORTANCE OF CONCEPT MAP IN SCIENCE EDUCATION :

Science have emerged as something alive and therefore exciting. However, condition in school is not promising. Students find science subject as abstract and conceptual in nature. Many new concepts are introduced to students at school age and it is essential that they understand all required concepts to make science learning meaningful. Ausubel (1968) describes meaningful learning as the establishment of known arbitrary relations among concepts in the learner's mind. Novak and Symington (1982) devised concept mapping as a cognitive tool to promote meaningful learning.

Concept mapping is a learning strategy that students finds useful in understanding complex ideas and clarifying ambiguous relationships. It is a two-dimensional representative of the relationship between key ideas in a topic (Ajaja 2009.p.73)

Concept Mapping is a method to visualize the structure of knowledge. Instead of describing all concepts and their relations in text one may choose to draw a map indicating concepts & relations in a graph or a network. Concepts map may save thousands of Semantic Wrangling. Using pictures in Concept Maps allow participants with varying backgrounds to show their visions.

In the above context, the present study was selected to compare the achievement in science by concept mapping over the traditional method.

STEPS TO DEVELOP A CONCEPT MAP :

Concept mapping can be a helpful meta-cognitive tool, promoting understanding in which new material interacts with the students existing cognitive structures. The interaction of new and existing knowledge explicit to both teacher and student. This is described as meaningful learning. A Concept map is an attempt to make explicit model, so that it can be revived with others. Organization of knowledge should facilitate learning by making the material to be earned more predictable & so reducing the learning effort required. The construction of concept maps is an excellent way of helping to

organize knowledge and so its help in understanding. Following steps should be considered while designing the concept map for classroom teaching. To develop a Concept Map four major steps are involved-

- Ist Step - To list down the key concepts
- IInd Step - Setting the order of the Concepts
- IIIrd Step - Connecting the Concept with linking words
- IVth Step - Finalizing the Concept Map

Ist Step- To List down the key Concepts

As a part of the curriculum development process, the selection of concepts, competencies and example on which to build concept map is the main requirement of the content. Choosing which concepts to build and that require assessing what are worthy of both time and energy will create the desired impact. The most important terms selected from the topic, to be taught must be noted down. These major terms or concepts should be written down. For example, if the topic is plant, so some of the key concepts will be: root, shoots, leaves, flowers, fruits, etc. Here the largest possible list of the key concepts should be generated.

Key concepts: Plant, Roots, stem, seeds, flower, fruit, food, sunlight, green, water, mineral

IInd Step- Setting the order of the Key Concepts

After selecting the major key Concepts, the concepts must be arranged in a hierarchial order in such a way that all the key concepts can be read easily. Keeping in mind the higher categories, groups and sub groups should be created. Within the sub groups the closely related key concepts should be placed nearer to each other, showing the relationship between them.

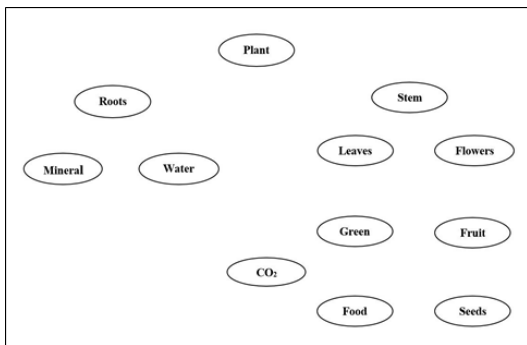


Fig. 2: Step II- Setting the key concepts in an order

IIIrd Step- Connecting the key concepts with linking words

This step involves connecting the concepts using linking words. Care must be taken while assigning the linking words between the two key concepts. To connect the two key concepts a line with an arrow should be drawn and on this connecting line, words or short phrases should be mentioned to specify the relationships between the two key concepts. These linking words or short phrases expresses the relationship between two concepts. One should try several possible linking words ,while linking two concepts, in an attempt to construct the clearest, most easily understood preposition in each case. Figure 3 shows few linking words added to the key concepts from Figure 2.

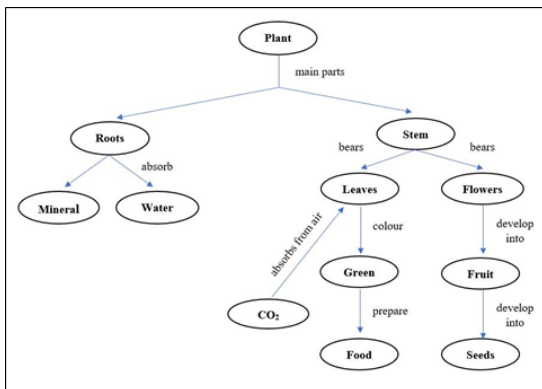


Fig.3: Step III- Linking words are added to key concepts

Here care must be taken, that the linking words between the two concepts form a preposition, that makes a sense and should be a meaningful unit. Even, the care should be taken that long sentences should not be included in the concept map.

IVth Step- Finalizing the Concept Map

Once the preliminary map is constructed, it is advisable to revise the map at this stage. In this stage one can rearrange sections to emphasize organizations and appearance. Where ever necessary some key concepts can be moved around, added, removed and redefined. After the preliminary map is built, cross- links should be sought. Cross-links are links between the groups and the sub groups on the map which helps to illustrate how the groups and sub groups are related to each other. It helps the students to recognize that all concepts are in some way related to each other, and so it is necessary to be selective in identifying cross-links and to be as precise as possible in identifying the linking word that connect key concepts.

Finally, the arrangement of the key concepts should be in such a way that it conveys better understanding. Here, one can be creative by using different colours, fonts and shapes for the construction of concept map, as shown in Fig. 4.

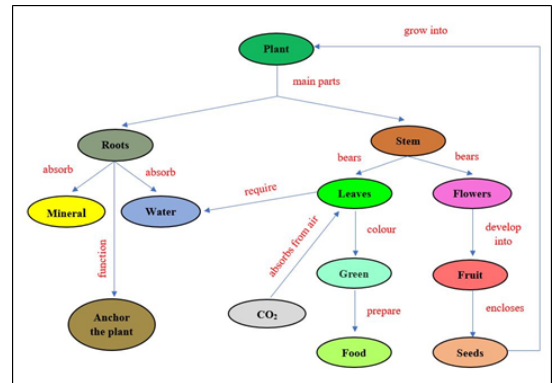


Fig.4: Step IV- Completed Concept map about Plants

USES OF CONCEPT MAPS :

The philosophy upon which concept mapping is based is David Ausubel's theory of meaningful learning as contrasted with note learning. Ausubel (1968) initiated the constructivist theory where he believed that students are not vessels to be filled with a lot of notions, but that they create & develop their own knowledge in an active organized in a top- down fashion and that students relate new information to previous knowledge contain in their cognitive structures. Concept Maps provides variety of useful features like-

- It is not only a learning tool but also an evolution tool, thus encouraging students to use meaningful-mode learning patterns.
- Concept maps are also effective in identifying both valid and invalid ideas held by students.
- Concept maps can be as effective as more time consuming clinical interviews for identifying the relevant knowledge a learner possess before and after instruction. (Edwards and Fraser, 1983)
- Concept maps are used to stimulate the generation of ideas and are believe to aid creativity. It is also sometimes used for brainstorming and used to communicate complex ideas.
- It provides different features that make it possible for teachers to use concept maps for a variety of the tasks that students perform (Canas & Novak, 2005)
- Concept maps gives an opportunity to students, to think about the connections between the science terms being learned.
- Concept maps improves clarity of thoughts.
- It improves memorization and achieve deeper understanding.
- It enhances clarity of relations
- Concept map serve as a structural overview or listening guide for note-taking and can help to keep students on task during teacher – centered learning

CONCLUSION :

Concept maps serve as a visual indication of the students conceptual understanding and misconceptions. it encourages larger participation of the students and reduces the burden on working memory. Following the steps for construction of concept map, reflects students' knowledge

about what do they know or they don't. It helps in discovering what does each student know and can be achieved in the classroom using concept maps.

Thus we see that concept map is not only a powerful tool for capturing, representing and achieving knowledge of individuals, but also a powerful tool to encourage meaningful learning and to create new knowledge.

Construction of concept map and its uses are of critical importance for the learners to be successful in their studies.

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