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Various Techniques of applying Picture Concept Mapping as an Evaluation Tool at the Primary Level

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Introduction

Concept mapping is a graphical tool for organising and representing knowledge. It includes concepts, usually, enclosed in circles or boxes of some type and the relationship between two concepts, which is indicated by a connecting line. Words written on the connecting line, referred to as 'linking words' or 'linking phrases', specify the relationship between the two concepts. Can concept mapping be applied as an evaluation tool at the primary level? This research paper inquires about that.

Concept maps are represented in a hierarchical fashion. Most inclusive and general concepts are kept at the top of a map and specific ones are arranged below. Specific examples of events or objects may be added to the concept maps. They help in clarifying the meaning of a given concept but these are not included in ovals or boxes.

Concept mapping is based on Asubel's (1963) 'Assimilation Theory of Learning'. The fundamental idea in this theory is that learning takes place by the assimilation of new concepts into propositional framework held by a learner.

According to J.D. Novak (1990), concept mapping is powerful for the facilitation of meaningful learning. It serves as a template, which helps organise knowledge and structure it, even though the structure is built piece-by-piece with small units of interacting concepts and propositional frameworks. Many learners and teachers are surprised to see how this tool facilitates meaningful learning, permits utilisation of knowledge in new contexts and retention of the same for a long period.

H.M. Shailaja, *Director*, School of Education, Rani Chennamma University, Belgravia, Karnataka, in her work 'Effect of concept mapping strategy in physics on achievement

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and attitude of students' published in *Indian Educational Review* (2009) shares that most of the students (93.5 per cent) agree that concept mapping is useful in understanding a concept. Majority of the pupils feel that concept maps help in seeing the relationship between concepts. More than two–third students opine that concept mapping is useful in remembering the content. Around 60 per cent say concept maps help them ascertain a relationship between subordinate and super ordinate concepts. A total of 62.5 per cent students feel that group concept mapping is easier, while 37.5 per cent consider individual concept mapping to be so.

Process of Concept Mapping

The process of concept mapping involves three steps.

Start with the main idea, topic or issue

A helpful way to determine the context of a concept map is to choose a 'focus question', something that needs to be resolved or a conclusion that needs to be reached. This will help with the hierarchical structure of the concept map.

Determine the key concepts

Find the key concepts that connect or relate to the main idea and rank them. Put general inclusive concepts first, and then, link them with more specific ones.

Finish by connecting concepts, creating linking phrases and words

Once the basic links between concepts are established, add cross links that connect the concepts in different areas of the map to further illustrate their relationship and strengthen students' understanding and knowledge of the topic.

It is important to recognise that a concept map is never complete. After a preliminary map is constructed in the mind, it is necessary to revise it. Other concepts can be added to this. Concept maps are, usually, the result of at least three revisions. This is one reason why using computer software is helpful. Concept map can also be a class effort, using a projector, where all students can give their opinions and participate in the construction of the map. There is a growing body of research, which shows that when students work in small groups and cooperate to learn the subject, there are positive cognitive and affective outcomes (Berk, 1995).

Vygotsky (1978) introduces the idea that language and social dialogue can support learning, especially, when members of a social group are in the same Zone of Proximal Development (ZPD). He describes ZPD as that level of understanding for a given subject where the learner can progress on one's own, with minimal support from a tutor.

Preszler (2004) says that when students work cooperatively in groups and use concept maps to guide their learning, significant and greater learning takes place.

At the primary level, a teacher can teach concept maps to the students based on pictures. The teacher can

use some picture cutouts and colour pencils, and paste those cutouts on a chart paper. The teacher can draw lines and cross links with colour pencils, and can also write connecting words using markers. An example of picture concept map is shown in Fig. 1

Application of Picture Concept Mapping Technique as an Evaluation Tool at the Primary Level

This technique can also be used for evaluation. The teacher can make use of the following techniques for this purpose.

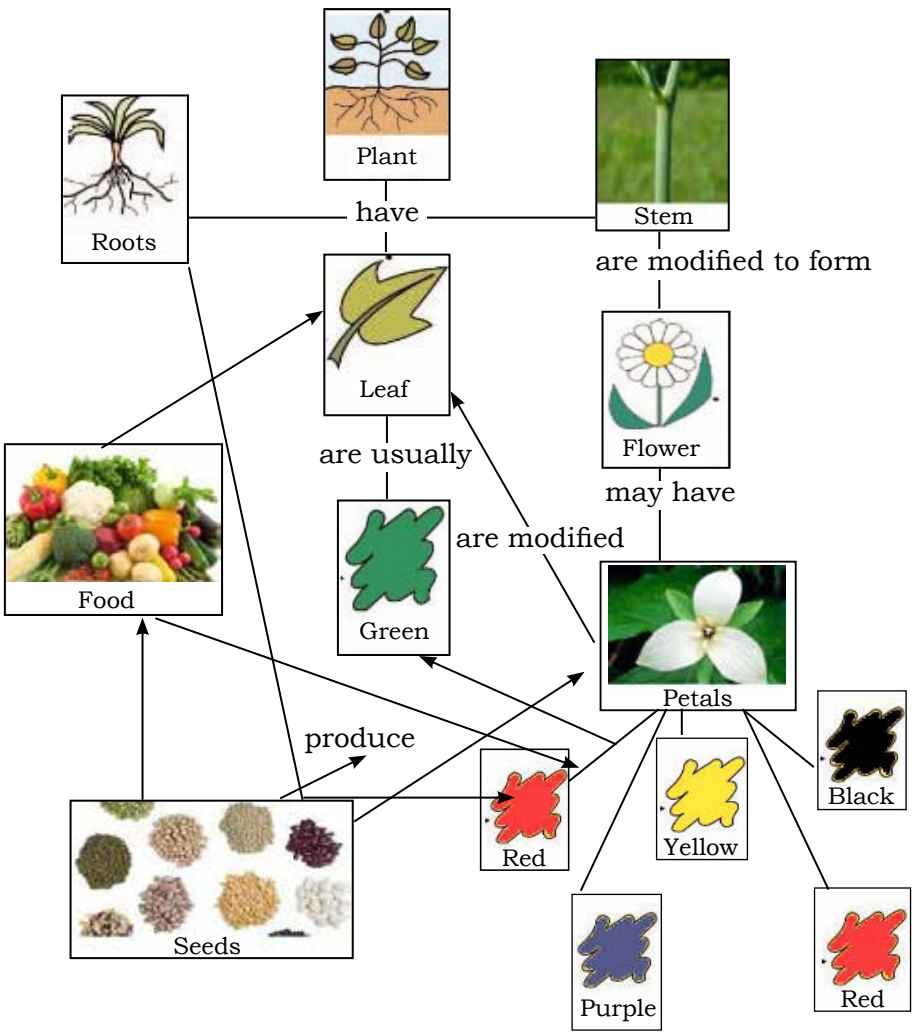

Fig. 1: An example of picture concept map for the 'structure of a plant'

Linkages and linking words missing technique

The teacher can paste the picture cutouts on the chart paper and ask the students to draw linkages and write the linking words with colour pencils as shown in Fig. 2.

Picture missing technique

Another technique may be 'picture missing technique'. Some pictures may be missing from a map. But it may be complete otherwise. The students may be asked to stick the missing pictures in the blank spaces (see Fig. 3).

There is a concept map for the 'structure of a plant', in which linking words and lines are missing. Complete it by adding these words and drawing lines with the help of a marker.

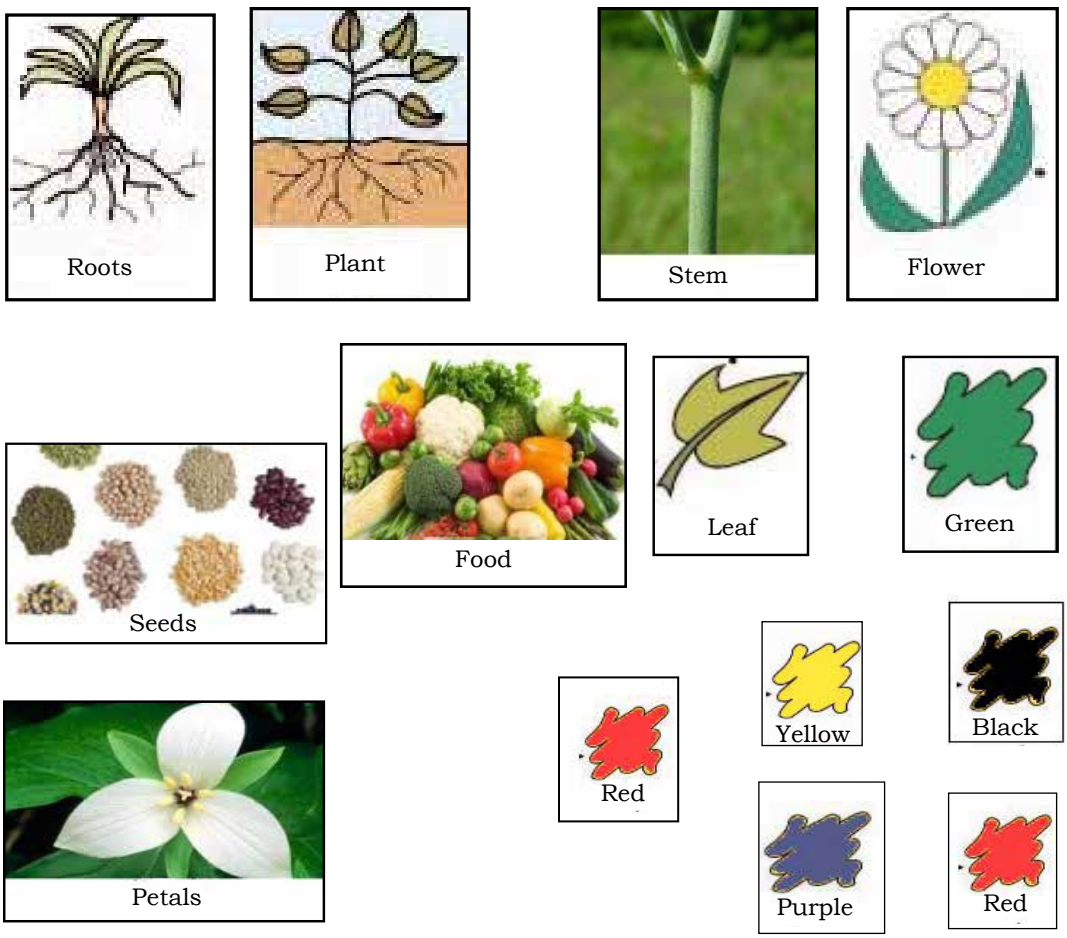

Fig. 2: Linkages and linking words missing technique

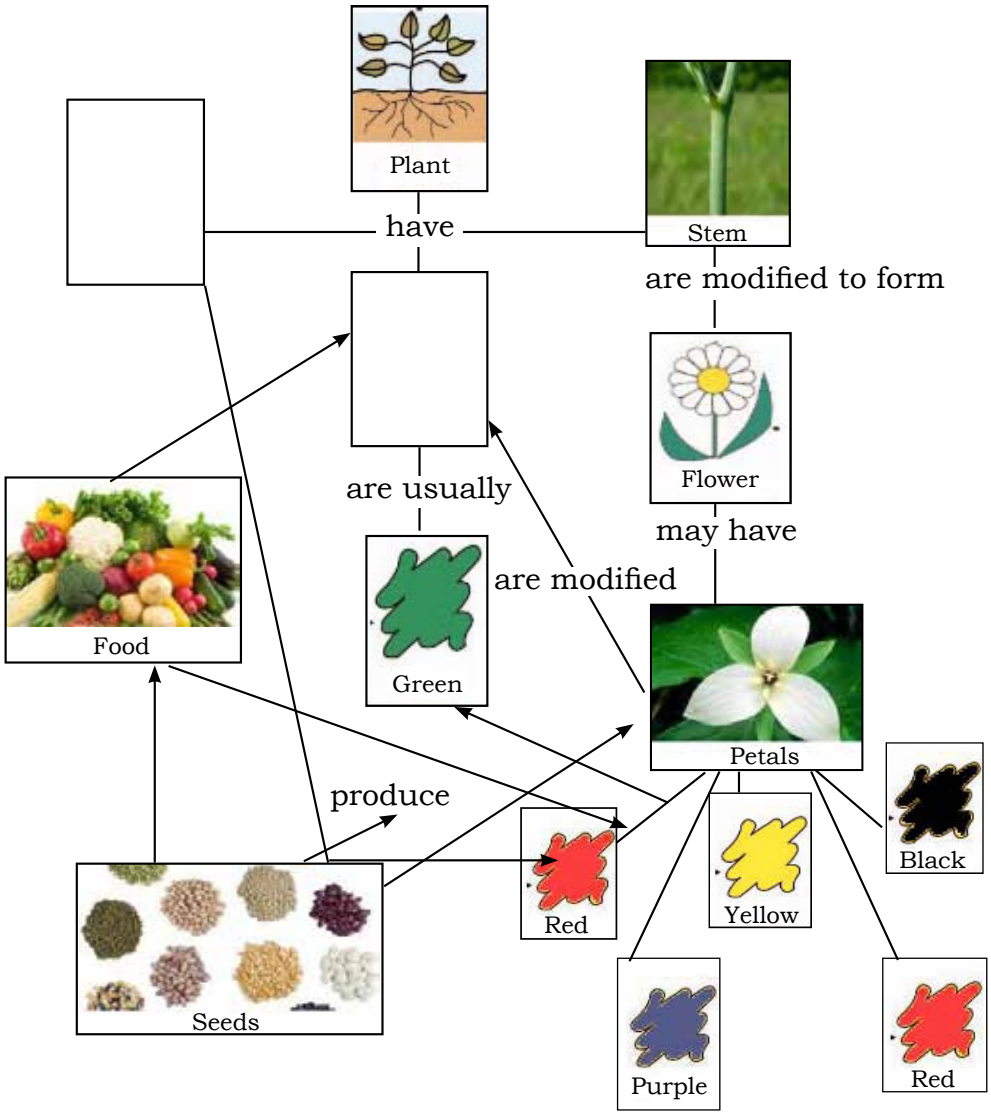

Fig. 3: Picture missing technique

Picture rearranging technique

Another technique is that all pictures may be placed at wrong places in the concept map and the students may be asked to rearrange the pictures, putting them at their respective places, else the map may not be complete. An example of this is shown in Fig. 4.

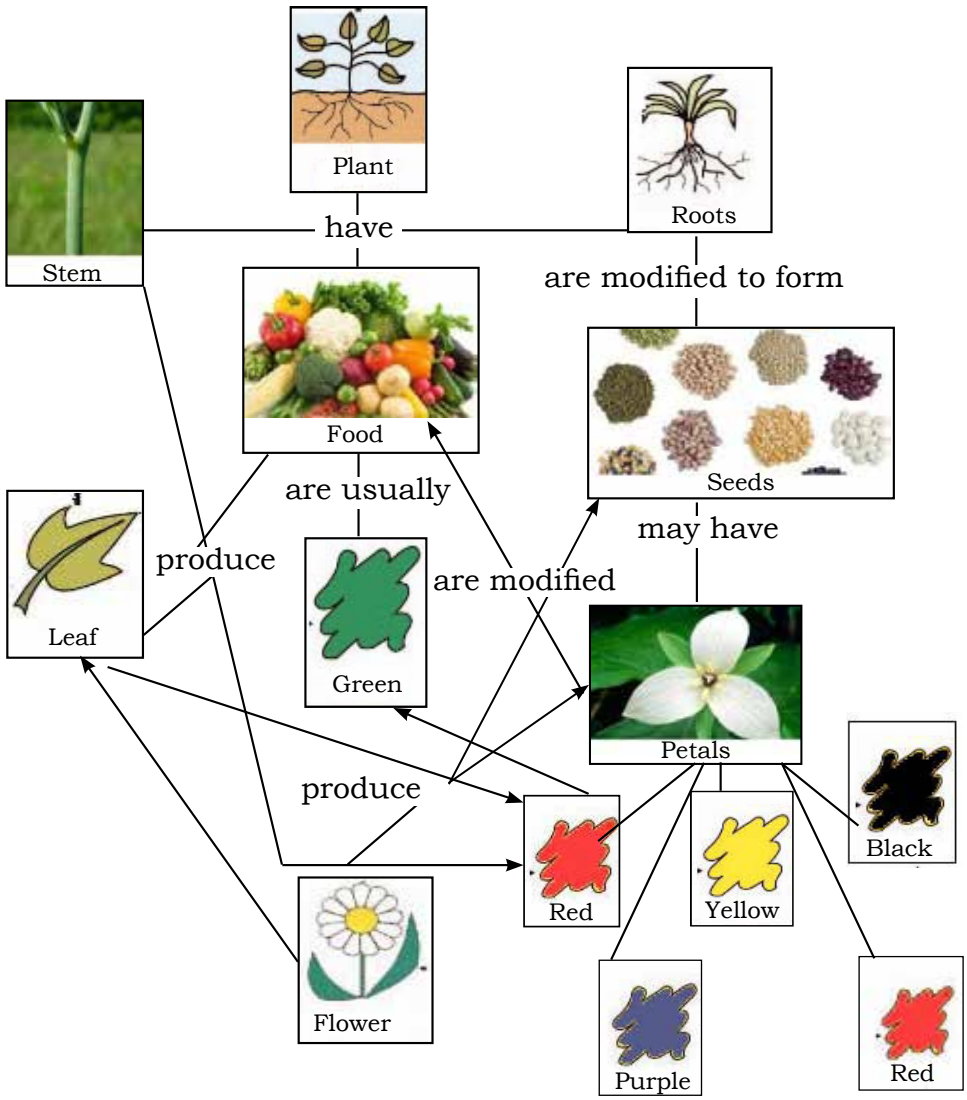

Fig. 4: Picture rearranging technique

Complete picture map construction technique

The teacher can also evaluate the students with complete picture map construction technique. The teacher can give the picture cutouts and a chart paper to the students with a focus question written on it and ask them to prepare a picture concept map. An example for this technique is shown in Fig. 5.

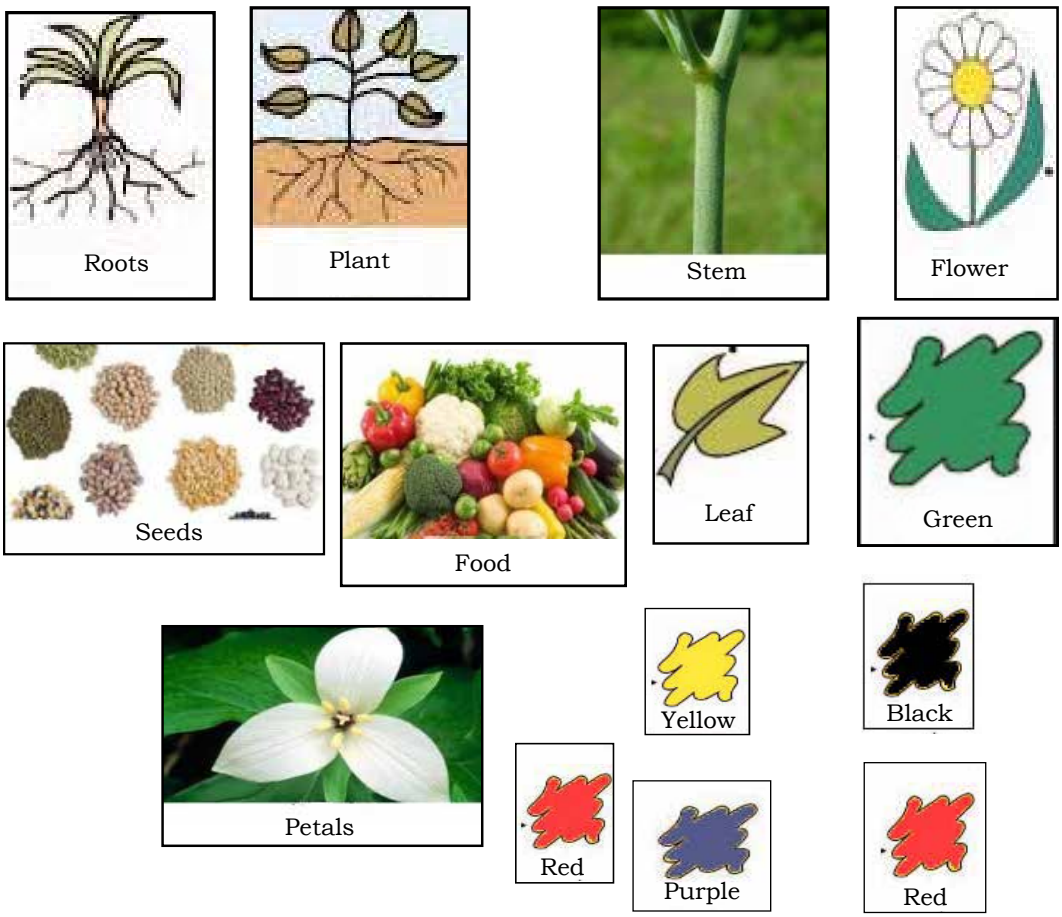

Fig. 5: Complete picture map construction technique

Concept mapping method can also be used as an assessment tool. In concept mapping, we can identify the difference in the students' knowledge, which is not possible in the conventional questionnaire method. It is easier to understand the knowledge of the students with concept maps than with ordinary tests (Katrin Soika, Pritt Reiska and R. Miksen, 2012). Concept maps can be used for formative assessment too (Trumpower and Sarwar, 2010). Using concept maps with written examination is a reliable instrument to test and evaluate mathematical knowledge. To evaluate concept maps, we need certain dimensions of measuring.

Canas, et al. (2006) developed a topological taxonomy for evaluating created concept maps. Topological levels were defined based on five criteria. They are as follows.

- recognition and using concepts
- presence of linking phrase
- degree of ramification
- hierarchical depth

Conclusion

If evaluation technique is applied at the primary level, it can help the teachers understand whether the students have grasped the content or not, and if they have understood interrelationships well. If not, why. Accordingly, the teachers can re-plan the teaching–learning process. Not only this, the technique can also be helpful for those students, who have writing problems and do not achieve high grades because of this. As students need to write little in this technique, they can perform academically better. Also, the content is presented in a systematic way. Hence, it makes the presentation attractive. Besides other evaluation techniques, concept mapping evaluation technique can be applied at the primary level. However, more researches need to be conducted to judge the reliability and validity of this technique. We will have to train our present and prospective teachers in this technique. For this, we will have to include concept mapping in the curriculum of teachers' training programmes, such as B.Ed., BTC, etc. We will also have to organise seminars and workshops on this technique and publish books on the same. Besides, we will have to spread knowledge about this technique by publishing articles in journals and magazines.

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