

CONCEPT MAPPING - AN INSTRUCTIONAL STRATEGY

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ABSTRACT

Concept Mapping unlike conventional method is an instructional strategy that can help the students learn meaningfully whatever is taught to them without taking refuge to rote learning. In this paper, the nature of concept mapping, and how this strategy can be meaningfully employed at all levels of education have been dealt with. The paper also gives some guidelines to teachers regarding the activities they should take while teaching through concept mapping in the classroom. Apart from being an instructional strategy, it has got certain educational implications which have been briefly dealt with in this paper. This novel strategy can be further developed for instruction by conducting further researches. Therefore, a brief survey has been made regarding what research activities have already been done in this area, and, the scope of future research.

1. INTRODUCTION :

Meaningful learning is the goal of instruction at all levels. Human brain commits to its memory all information in meaningful patterns. They are never stored in haphazard manner. In almost all educational institutions no effort is made in the class to make learning meaningful. Enormous quantity of information is poured out directly from the printed texts to the young minds. The success of the student is determined by the extent of his ability to commit the material to his memory by

rote learning. The student has to spend considerable amount of time and energy for committing the material to memory. As a result when the examination is over, most of the students forget almost everything they have learnt. In this context, educational technology has come out successfully with an innovative teaching - learning strategy to help the learners learn meaningfully whatever is being taught to them without taking refuge to rote learning. This new innovation is termed as CONCEPT MAPPING.

2. CONCEPT MAPPING - AN INSTRUCTIONAL STRATEGY :

When things are properly learnt, material learnt forms meaningful patterns in the minds of students. Here in this map, meaningful relationships between concepts are formed in the form of propositions. Quite early in childhood, children learn concepts by discovery learning. Later, most concept meanings are learnt through a composite of propositions in which the concept to be acquired is embedded. In this sense, concept map is a schematic device for representing a set of concept meanings embedded in a framework of propositions. These maps make clear to both students and teachers, the small number of key ideas they must focus on for any specific learning task. After a learning task has been finished these maps can provide a summary of what has been learnt (Appendix).

3. NATURE OF CONCEPT MAPPING :

A widely used teaching, learning and knowledge-creating tool is the concept map. Concept mapping is a metalearning strategy based on the **Ausubel - Novak - Gowin theory of meaningful learning** (Ausubel, Novak and Hanesian, 1978, Gowin 1981, Novak 1977, Novak and Gowin 1984). It is related to a host of theoretical principles as previous knowledge subsumption, progressive differentiation, cognitive bridging and integrative reconciliation.

For making a concept map, one must have the ability to relate salient concepts to a general superordinate concept. Concepts may be defined as regularities in objects or events designated by some label, usually a term. Concepts can be connected with linking words to form

proposition (e.g. turtles are classified as reptiles, sucrose tastes sweet etc.).

4. STRATEGIES FOR INTRODUCING CONCEPT MAPPING IN POLYTECHNIC AND UNDERGRADUATE CLASSES :

4.1 Assumptions for making Concept Maps :

- The students who come to the polytechnic level classes must have already possessed the ability to distinguish between objects, events and concepts.
- They can distinguish between concept words and linking words, i.e. linking words are used together with concept words to construct sentences that have meanings.
- They can distinguish between proper nouns and concept words, i.e. proper nouns are names of specific people, places, events or objects.

4.2 Activities to prepare students for Concept Mapping :

- (i) Keeping these assumptions in mind, the teacher can construct a few short sentences on the board to illustrate how concept words plus linking words are used to convey meanings. Examples are, the dog is running, there are clouds and thunder etc.
- (ii) Ask students to construct a few sentences of their own and identify the concept words and tell whether each is object or event and they may also be asked to identify the linking words.

4.3 Concept Mapping Activities :

Select a particularly meaningful paragraph or two from the text book or other printed material and ask the students to read carefully the passage given and to identify the concepts necessary

for understanding the meaning of the text. List the concepts on the board as they are identified. Discussion should be initiated with the students to identify the concept which is most inclusive idea in the text and most important.

Put the most inclusive concept at the head of a new list of rank ordered concepts. List the next most general, most inclusive concepts, working through the first list until all concepts are rank ordered. Differences in the ranking of concepts may occur. It is possible because there are different ways to see the meaning of the text. One way of ranking alone can be considered at a time.

Now the construction of the map can be started keeping the rank order list as a guide to build a concept hierarchy. Have students help in choosing good linking words to form the proposition shown by the lines of the map.

The best way for making a concept map suggested by Gowin is to have students write concept words and linking words on paper rectangles and then arrange these rectangles as the students get new insight on the map organization.

5. EDUCATIONAL APPLICATIONS :

5.1 For Fostering Creativity :

Students and teachers who construct concept maps often remark that they recognize new relationship and therefore, new meanings. In this sense, concept mapping can be a creative activity and may help in fostering creativity. In addition, these are found to be effective tools for showing misconceptions in our understanding to see significant meaning between concepts.

5.2 For Negotiating Meanings :

Here, negotiation connotes learning the meaning of a piece of knowledge by dialogue, exchange, sharing and sometimes compromise sharing meaning is a cognitive aspect of learning which cannot be equated with the process of blood transfusion. Here meaning alone is shared and not learning which is an individual responsibility.

5.3 For Developing Social Skills :

It is suggested that concept mapping as an instructional strategy should be carried out through team work. As a by-product of this instructional strategy, social skills are also developed in students.

5.4 For Exploration of what the Learner Already Knows :

In concept mapping, there is always sharing of meaning of related concepts. While preparing concept maps. Students bring something of their own for negotiating. They are not a blank tablet to be written on or empty vessel to be filled with. Whatever the students have learnt before, needs to be used to acquire new learning. Making concept mapping as a cooperative endeavour where teacher and student need to recognize the value of prior knowledge and explore them suitably for preparing a concept map.

5.5 For Mapping Learning Route :

Suppose we want to make a journey by road from Chandigarh to Delhi, one can assume that one normally would start with taking national map of India first and find where these two places are located in the map. Later, one will take the individual maps of the northern region connecting Chandigarh to Delhi. Similarly, when teacher has to teach a small topic, student should know the relationship of that lesson to the topic

and that topic to the subject and the subject to the course. Thus, separate concept maps at the course, subject, topic and lesson levels can be prepared to give the students an idea where he has been and to where he will be going and how he will get there when a topic is taught to him.

5.6 For Extracting Meaning from Text Book :

Learning to read effectively presents a dilemma to our students. Many a time, words and phrases are hard to read when they have little or no meaning, still reading is a powerful means to learn meanings. Concept mapping can help to break through the meaning impasse.

5.7 For Planning a Paper or Exposition :

While writing a paper we often come across with a difficulty of 'paralysis of expression'. Concept mapping can eliminate this difficulty. To begin with, list a few concepts or propositions one wants to include in a paper. Usually, in a few minutes a brief concept map can be constructed with all the ideas. Later additions, modifications, and transformation can be done to make a detailed concept map, but these initial jotting down of concepts and ideas would certainly give a guideline for writing a paper or an article. What has been said about papers also applies to preparation of posters, notices, exhibits etc.

5.8 For Curriculum Developments :

Posner and Rudnitsky (1986) have used the idea of concept mapping and have divided planning into three question areas : (a) what is to be learnt ? (b) why is to be learnt, ? and (c) how will the learning be facilitated ? The use of concept maps can help teachers develop curriculum that is hierarchically

arranged, integrated, and conceptually driven. Figure 4 shows a concept map of the curriculum development process.

6. RESEARCH STUDIES CONDUCTED IN THE AREA OF CONCEPT MAPPING :

Concept mapping was invented at Cornell University by Novak and the members of his research group (Stewart, Van Kirk and Rowell, 1979). Later on, large number of studies have been conducted by various researchers in the field of science, both at the primary and high-school levels. e.g. Bogden (1977) and Diekhoff and Diekhoff (1982) compared student generated concept maps to ideal teacher - constructed maps. In some research student maps have been scored for the correctness of the relationship portrayed (Bogden, 1977, Novak and Gowin, 1984). This approach suggest that there is an inherent structure of the discipline which teachers can convey to their students. Recent research student in science education have emphasized the need to understand how learners constructs knowledge through experiences with physical phenomena (Smith and Neale, 1989). Beverbach and Smith (1990) illustrated how concept mapping can be useful in describing students evolving construction of knowledge in a particular subject area and in promoting reflection. Okebukola and Jegede (1988) found that students in a predegree biology course who were working together cooperatively on the concept mapping tasks where found to attain meaningful learning better than students working individually. Cullen, J. (1990) found that concept maps have great potential for helping students to learn chemistry.

Jegede, Alaiyemola and Okebukola (1990) found concept mapping significantly more effective than the traditional/

expository teaching strategy in enhancing learning in biology. In addition, it apparently reduces students' anxiety towards the learning of biology. Menon and Dutt (1993)'s findings support the stand that concept mapping is more effective teaching strategy for IXth class biology students.

7. CONCLUSIONS :

Concept mapping has been applied in a variety of ways in Science and Technology education. It has wide implications to instructional planning, development, implementation and evaluation, research interviews etc. By using it a teacher can bring about meaningful learning where rote learning predominates. Concept map as an instructional strategy shows great promise for a "quantum leap" in improving the Quality of education at all levels. However, much work is yet to be done to use it as an instructional strategy by the teachers in polytechnics. It looks a difficult task for a novice like automobile driving frightening to begin with but thrilling when learned properly.

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(See Map on next page)

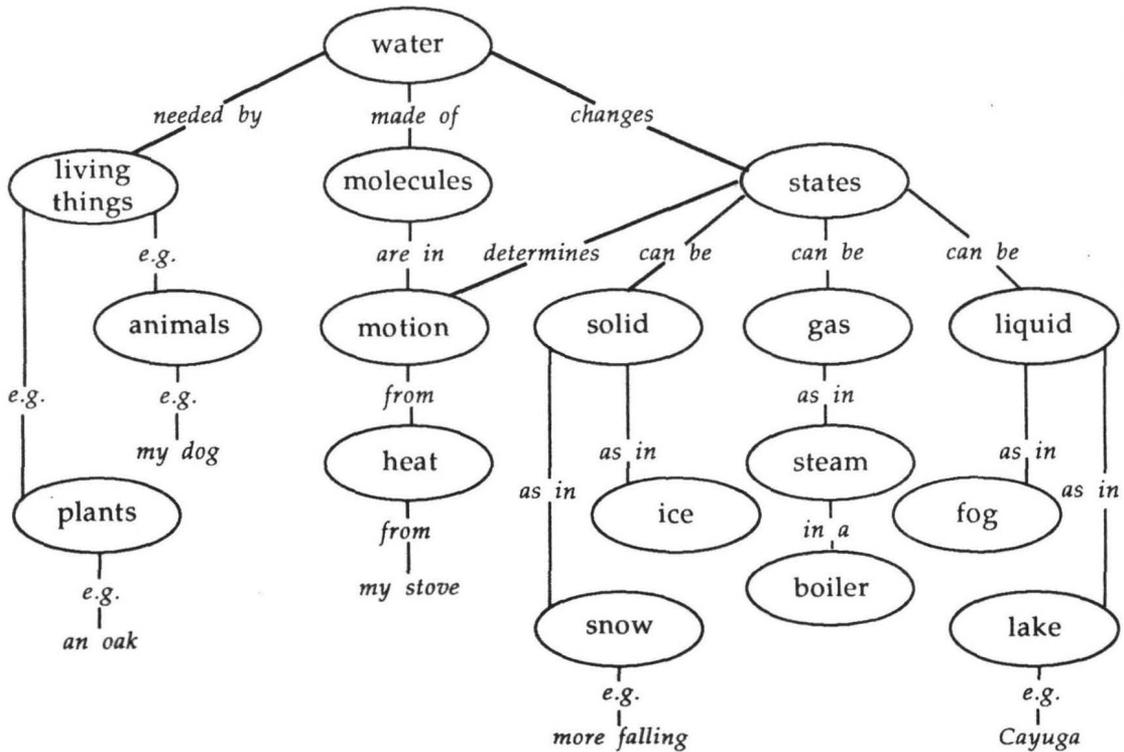


FIG. 1 : A concept map for water showing some related concepts and propositions. Some specific examples of and objects have been included (in Roman type outside ovals)

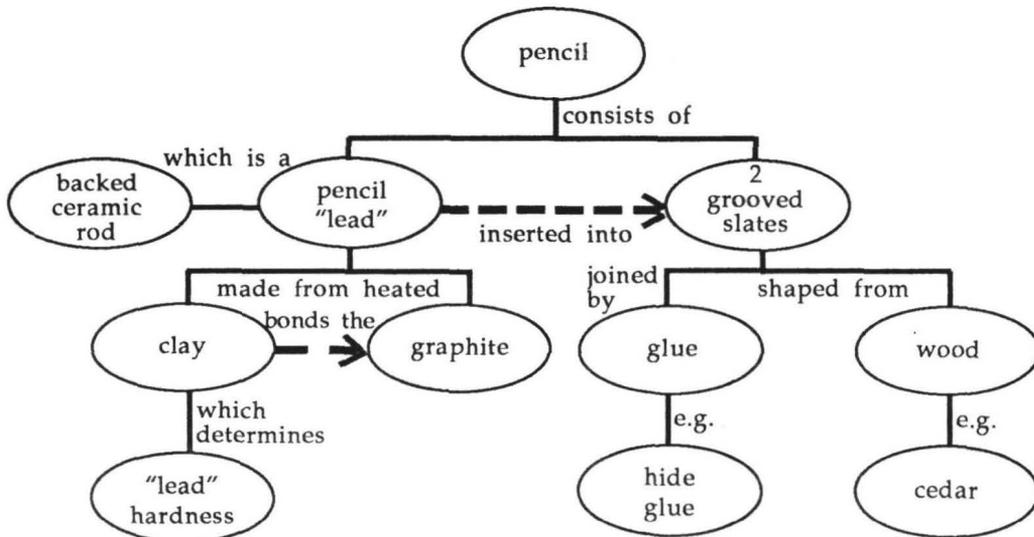


FIG. 2 : Concept map on the designs of the pencil constructed to show most of the graphic conventions employed in concept mapping. ★