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EFFECT OF CONCEPT MAPPING ON RELATIONSHIP BETWEEN CONCEPTUAL UNDERSTANDING OF SCIENCE AND INTEREST IN SCIENCE OF VIIIth CLASS STUDENTS

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ABSTRACT

The study described in this paper is designed to assess the effectiveness of use of the concept mapping on relationship between conceptual understanding and interest in science of VIII class students in Government and Private schools of Delhi. Concept mapping is a schematic device for representing a set of concept meanings embedded in a framework of propositions. The study was conducted under natural settings and without disturbing the ratio of two sections- experimental and control, of eighth class from both the schools. In the control class, the teaching approach was primarily teacher orientated, that is the teacher used the lecturing method in sequencing the instructional activities. In the case of the experimental class, the concept mapping strategy of teaching was adopted to teach the same content. The results of this study indicated that the experimental group students showed more interest in science. The relationship between conceptual understanding and interest in science was found to be positive but not significant.. Findings of this study will be useful towards the implementation of concept mapping as an instructional strategy in science classroom for enhancing students' interest in science.

Keywords: *Concept, Concept mapping, Relationship, Interest in Science, Conceptual understanding.*

Introduction

The direct methods of teaching science do not engage pupils' previous knowledge actively. As a result, instead of understanding the concepts of science students learn them by rote memorization taking them as fragments of information without viewing the whole picture of the relationship between each of the concepts. The whole process leads to not assimilating the concepts into their long-term memory due to lack of understanding of concepts. When the students do not have the understanding of the concepts they often try to avoid the subject while not developing interest in that vary subject.

For understanding science concepts and use them practically, we expect learners to develop interest in the science. Students attain new knowledge in necessary depth and preserve this knowledge for a long period of time after instruction if they have taken it interestingly. So there is a challenge for science educators to teach this subject in such a manner adopting an effective strategy that can develop understanding and interest among students side by side.

Concept mapping was pioneered by Novak and Gowin (1984) taking David Ausubel's (1963,1968) theory of meaningful learning. They made two–dimensional hierarchical diagrams which illustrate the relationships between and among individual concepts and named them concept maps. The basic concept map developed by them illustrates a hierarchy of concepts where more specific and less inclusive concepts are linked together by valid and meaningful propositions and therefore are listed under the broader, more inclusive concepts. The propositions, along with arrows indicating the direction of the relationship help to develop the connections between linked concepts more precisely.

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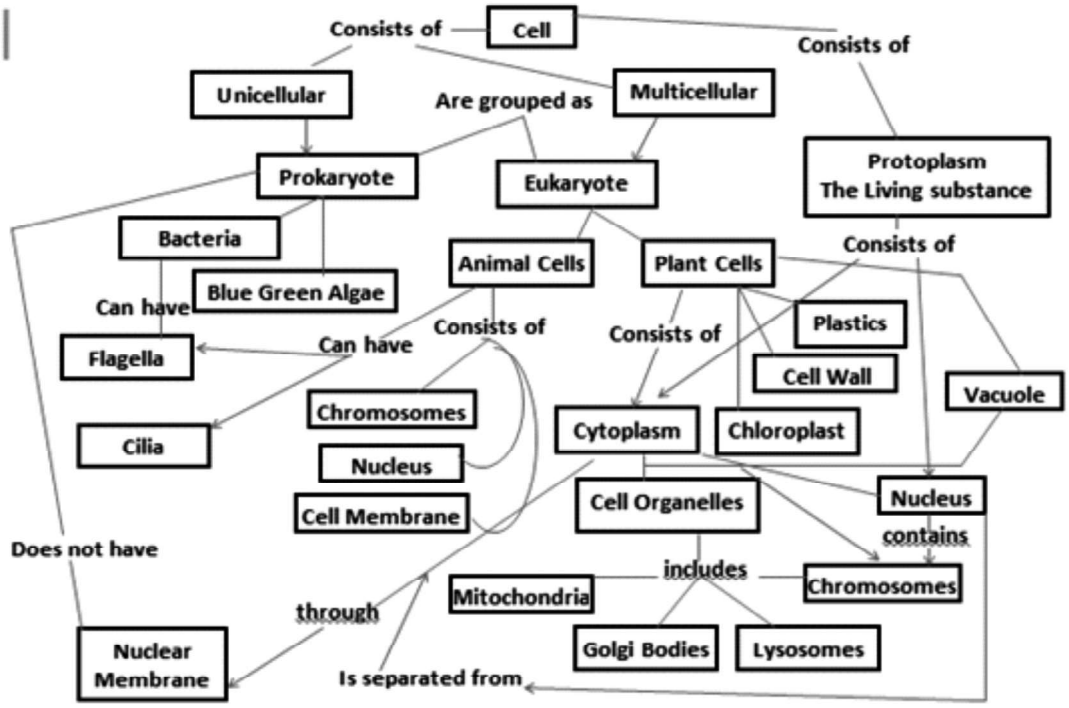

Fig 1 :Concept Map of Cell
Source: Self-constructed

Concept mapping is based on the constructivist theory where the learner constructs his own knowledge incorporating his previous knowledge. Concept mapping has been applied at all levels of learning and instruction in areas of science education as well as in other subjects too. Gulati (2005) studied "A Comparison of Inquiry-based Teaching through Concept Maps and Traditional Teaching in Biology". The study investigated the affective outcomes and academic achievement of 140 IXth grade learners in six intact biology classes by comparing concept mapping to traditional methods of teaching. The Quasi experimental design compared the experimental group who constructed concept maps and control group who received traditional instruction. Groups with concept mapping scored significantly better than those with traditional methods. Brown (2009) studied "High School Biology: A Group Approach to Concept Mapping."The study was conducted at three different academic levels of biology class to find the effect of individual and group concept mapping on students' conceptual understanding. It was found that the constructing concept maps in small groups can significantly increase the knowledge gained by lower level students. Bascones (1985) investigated "Alternative Instructional Systems and The Development of Problem &Solving Skills in Physics". The aim of the study was to test the effect of Concept Mapping on students' problem solving in physics. The teaching process used in this study was based on Ausubel's (1968) theory of meaningful learning. Concept Mapping exercises, while the control group had traditional instructional methods. The results showed large effects in favor of the treatment group on every test administration and at all ability levels. Czerniak et al. (1998) studied "The Effect of collaborative Concept Mapping on Elementary Pre-Service Teachers' Anxiety, Efficacy, and Achievement in Physical Science" The study was conducted on elementary pre-service teachers. It was designed to test if the addition of Concept Mapping to instruction in a physical science course would improve increased achievement, decreased anxiety for learning physical science, and decreased general (trait) anxiety. There is no

enhancement in self-efficacy for teaching physical science. Mustafa (2013) "Effects of Teaching Chemistry using Concept Maps on Students' Achievement in School Chemistry in India and Turkey." The sample comprised of 200 students of two different central schools of New Delhi and 200 students of two different state schools of Gaziantep. It was concluded that concept mapping could be used by teachers as an effective teaching strategy in IX. Class chemistry education. Teaching through concept mapping is equally effective in terms of overall achievement, understanding and problem solving ability of students in chemistry in India and Turkey. Marangos (2007) investigated "Effectiveness of Concept Maps in Economics: Evidence from Australia and USA." Concept mapping was incorporated in the teaching material in both courses at different countries and, at the end of the semester; the students completed a survey regarding the use, effectiveness and accessibility of concept maps. Lambiotte(1992) studied "Multi Relational Semantic Maps" and compared Concept Mapping and lecture Method on secondary school students. It was found that students with more well established schemas for the circulatory system when given knowledge through Concept Mapping treatment, Concept Mapping found more effective than lecture method. Gao (2007) Studied "Collaborative Concept Mapping: An Instructional Strategy ToFoster Both Individual Learning And Group Knowledge Construction." It was found that the collaborative concept mapping is a potential effective instructional strategy to facilitate learners in both group knowledge construction and individual learning.Kwon(2008) studied "The Comparative Effect of Individually-Constructed vs. Collaboratively-Constructed Computer-Based Concept Maps. One hundred and sixty one students completed the entire study. Using prior science performance scores to assure equivalence of student achievement across groups, students were assigned to three groups: a self-selected study strategy group, an individual-concept mapping group, and a collaborative pairs – concept mapping group. Collaboratively and individually-constructing computer-based concept maps had equally positive effects on seventh grade middle school science concept learning as measured on a comprehension test. However, the students who collaboratively constructed concept maps created significantly higher quality concept maps than those who individually constructed concept maps indicating deeper conceptual understanding.

Concept mapping shows promise in improving the quality of science education and is a potentially valuable learning and revision tool as well as a teaching device in the science educators' toolbox. It has the potential to improve overall achievement, understanding, problem solving, and reasoning abilities of the learners. But negligible studies have been conducted to see the effect of concept mapping to see its role in enhancing interest in science or any other subjects in relation to conceptual understanding. This is why this comparative study has been conducted.

Statement of The Problem

Effect of concept mapping on relationship between conceptual understanding of Science and interest in science of VIIIth class students

Objectives of The Study

1. To examine the level of conceptual understanding of VIIIth class students when taught through concept mapping.
2. To measure the level of interest in science of 8th class students when taught through concept mapping.
3. To find the relationship between interest in science and conceptual understanding of science of VIIIth class students when taught through concept mapping.

Hypotheses

1. There is an average level of conceptual understanding of science of VIIIth class students when taught through concept mapping.
2. There is an average level of interest in science of VIIIth class students when taught through concept mapping.
3. There is no significant relationship between interest in science and conceptual understanding of science and of VIIIth class students.

Design of The Study

Non-Equivalent Post-test Only Design research method is adopted for the present study.This type of design has two randomly assigned groups: an experimental group and a control group. Neither group is pretested before the implementation of the treatment. The treatment is applied to the experimental group and the post-test is carried out on both groups to assess the effect of the treatment or manipulation. This type of design is common when it is not possible or required to pretest the subjects.

Sample

Table 1.1
School-wise distribution of the sample

Sr. no.	Name of the School	Type	Experimental Group	Control Group	Total
1.	Sarvodaya Vidyalaya No. 3	Government	35	35	70
2.	MG Vidya Niketan	Private	35	35	70

Tools Used

1. Conceptual Understanding Test (self –constructed)
2. Science Interest Test by L.N Dubey and Archana Dubey

Analysis and Interpretation of The Data

Hypothesis-I

There is an average level of conceptual understanding of science of VIIIth class students when taught through concept mapping.

To find the performance of students of government and private schools on conceptual understanding test of science, scores were distributed among four levels viz. Third Division, Second Division, First Division and Distinction.

Table: 1.2
Level of Conceptual Understanding of Science of 8th Class Students in Private and Government school when taught through Concept Mapping

Scores	Division	Number of Students		Total
		Private School	Government School	
0-39	III	0 (0 %)	2 (6%)	2 (3%)
40-59	II	9 (26%)	16 (45%)	25 (36%)
60-74	I	21 (60%)	15 (43%)	36 (51%)
75-100	Distinction	5 (14%)	2 (6%)	7 (10%)

Table 1.2.1shows that only 3% students got third division, 25% students got second division, 51% students attained first division and 10% students secured distinction. It is resolved that 61% performed above average. Hence the hypothesis **"There is an average level of conceptual understanding of science of VIIIth class students when taught through concept mapping"** is not accepted**.**

Hypothesis-II

There is an average level of interest in science of VIIIth class students when taught through concept mapping.

To assess the level of interest in science of experimental groups of government and private schools; the pre-test and post-test scores were analyzed and categorized in Low, Average and High levels of Interest in science.

Table: 1.3
Post-test scores of total no. of students of Experimental Groups of Government and Private School

	Government school		Private School	
Level	**Pre- Test (No. of Students)**	**Post- Test (No. of Students)**	**Pre- Test (No. of Students)**	**Post- Test (No. of Students)**
Low	15 **43%**	04 **11%**	15 **43%**	06 **17%**
Average	18 **51%**	19 **54%**	15 **43%**	17 **48%**
High	02 **6%**	12 **34%**	05 **14%**	12 **34%**
Total	**35**	**35**	**35**	**35**

Table 1.3 clearly indicates the decrease in no. of students in low level of interest in science and a fair increase in number of students in average and high level of interest in science of government and private schools. This clearly shows the efficacy of concept mapping in enhancing level of interest in science. Hence, the hypothesis **"There is an average level of interest in science of VIIIth class students when taught through concept mapping"** is not accepted.

Hypothesis-III

There is no significant relationship between interest in science and conceptual understanding of science of VIIIth class students.

To test this hypothesis Pearson's product moment coefficient was applied tofind the relationship between conceptual understanding and interest in science of VIIIth class students. On the basis of data, following information has been drawn out. The result is being reported in table 1.4

Table: 1.4
Correlation between Interest in Science and Conceptual Understanding of Science in Government School

Variables	Calculated Value of 'r'	Degree of freedom	Inference
Interest in Science		68	0.23
Conceptual Understanding	0.12		

Not significant at 0.05 level

From the results in table 1.4, it is evident that correlation between conceptual understanding and interest in science of 8th class students in government school is 0.12 for 68 df,the table value of 'r' is 0.23 which is higher than the calculated value. Though there is positive relation between conceptual understanding and

interest in science but it is too little to be significant at 0.05 level.

Table : 1.5
Correlation between Interest in Science and Conceptual Understanding of Science in Private School

Variables	Calculated Value of 'r'	Degree of freedom	Inference
Interest in Science		68	0.23
Conceptual Understanding	0.14		

Not significant at 0.05 level

From the results in table 1.5; it is apparent that correlation between correlation between conceptual understanding and interest in science of VIIIth class students in private school is 0.14 for 68 df, the table value of 'r' is 0.23 which is higher than the calculated value. Though there is positive relation between conceptual understanding and interest in science but it is too little to be significant at 0.05 level. Thus the hypothesis **"There is no significant relationship between interest in science and conceptual understanding of science of VIIIth class students"** stands accepted.

The reason behind this may be that due to the competition in all the fields parental pressure has been increased over the students to achieve better results in science and to make career in science whether the child has interest in that field or not. Due to these factors students attain good scores and get admissions in reputed institutions without having interest in science subject.

Conclusion

- On the basis of performance on conceptual understanding test of Science four levels viz. Third Division, Second Division, First Division and Distinction were constituted. Only 3% students got third division, 25% students got second division, 51% students attained first division and 10% students secured distinction. It is concluded that 61% students performed above average. Hence, it can be concluded that concept mapping influenced learners in more positive ways. It makes them active learners in many ways. Firstly, it helped the students in developing higher levels of understanding. Secondly, this achievement found to be helpful in developing a "hunger" for learning in them.
- To assess the level of interest in science of experimental group of government and private schools; the pre-test and post-test scores were analyzed and categorized in Low, Average and high levels of Interest in science. In government school 43%, 51% and 6% students were placed in low, average and high levels of interest in science respectively in the pre-test of Science Interest Test. In the post-test 11%, 54%, 34% were placed in low, average and high levels of interest in science respectively.
- Though there is positive relation between conceptual understanding and interest in science in both the schools but it is too little to be significant at 0.05 level. The researcher has not explored the reason behind this but the possible reason may be that due to the competition in all the fields parental pressure has been increased over the students to achieve better results in science and to make career in science whether the child has interest in that field or not. Due to these factors students attain good scores and get admissions in reputed institutions without having interest in science subject.

Educational Implications

- The present study has the implications for the science teachers and teaching of science.

1. Conceptual understanding deficit students who are placed in IIIrd and IInd levels of understanding need to be given remedial teaching and causes need to be explored to bring them at higher level of conceptual understanding.
2. As assumed that innovative strategy can be implemented to create interest has worked here to enhance interest in science.
3. Concept mapping has not worked really well in case of relationship between conceptual understanding and interest in science. May be in future this particular group will develop

interest in science in consonance with conceptual understanding.

4. Through concept maps, teachers are able to access learners' knowledge and reveal unique thought processes and also surface misconceptions harboured by the learner.

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