

# Concept Mapping Strategy and Students' Achievement in Chemistry at Secondary Level

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## **Abstract**

Science education helps a child to understand the world in which they live and to apply scientific principles in their daily life. Science education must enable one to lead a worthwhile life by inculcating in him desirable scientific habits, interest, attitudes and skills. For this appropriate learning experiences in science must be provided. Learning of chemistry helps one to develop a spirit of inquiry, creativity, objectivity, problem solving and decision making skills. To accomplish this learners must be made to construct their own knowledge and ideas in learning. Concept mapping strategy is a powerful learning tool in the facilitation of meaningful learning. It allows recalling, remembering and effectively managing large blocks of information at a time and also in the utilization of the knowledge in new contexts. They can also enhance student learning by connecting new concepts to concepts the student is already familiar with. Concept mapping has a remarkable impact on student achievement in science classes. In this study Concept Mapping Strategy and Students' Achievement in Chemistry at Secondary Level the investigator followed a pretest post test single group experimental design. The sample of the study consisted of 35 students of Standard IX of St Mary's CGHS, Ernakulam and found that Concept mapping strategy improves student's achievement in Chemistry,

## **Introduction**

Science literacy is an essential need for all young children. Through Science education, children come to understand the world in which they live and learn to apply scientific principles in their ways of thinking and living. The rapid advancement of science and technology in the 21<sup>st</sup> century and the increasing need for scientists and technologists have made it all the more important to provide for Science based education in schools. UNESCO'S International Educational Commission (1972) has recommended to make Science and Technology an essential components in any educational enterprise. The function of Science Education today is not merely to supply some amount of scientific knowledge to the student, but to develop in him desirable scientific habits, interests, attitudes and skills which would help him to lead a full and worthwhile life. To attain these objectives, we have to provide them appropriate learning experiences in Science. Learning of Chemistry aims at inculcating in the learner a spirit of inquiry, creativity, objectivity, stimulate a deep interest in the world, and develop problem solving and decision making skills, and an abiding environmental consciousness. However the ongoing method of teaching chemistry is not sufficient to achieve above said objectives. It is necessary to refine and improve the

teaching methods and instructional techniques to realize the fullest potentialities of individual learner. Learners need to be made to construct their own knowledge and ideas in learning because they are the architects of their own learning and construct their own knowledge (Ausubel, 1969). Concept mapping strategy is a powerful learning tool in the facilitation of meaningful learning because it serves as a template to aid in the organization and structuring of knowledge. It allows recalling, remembering and effectively managing large blocks of information at a time and also in the utilization of the knowledge in new contexts..

### **Need and Significance of the study**

Learning Science needs deeper, creative and critical thinking skill. Research has shown that students lack the necessary knowledge and skills in Science and technology to function in the modern world at a time when there is increasing demand for scientifically literate individuals. In order to satisfy the existing needs of science education innovative teaching strategies should be adopted in our classrooms. The abstract and highly conceptual nature of Science seems to be particularly difficult for students and teaching methods and techniques do not seem to make the learning process sufficiently easy for students. These problems are quite serious in Chemistry, which is widely perceived as a difficult subject because of its specialized language, mathematical and abstract conceptual nature, and the amount of content to be learned. Learning Chemistry needs a deeper, more durable and more transferable thinking. Most instruction in Chemistry focuses on helping students to gather information about scientific principles. Interest in chemistry should be developed adopting variety of methods and models by the teacher (Dictionary Education, Carter V Good).

In science education, concept map has been widely recommended and used in a variety of ways. Concept maps can be used to communicate concepts and connections to students, assess student understanding (e.g., how well they see the big picture), study for an exam, take notes, diagram a paper or course, and document the flow of ideas. They can also enhance student learning by connecting new concepts to concepts the student is already familiar with. Concept mapping has a remarkable impact on student achievement in science classes (Askin Asan 2007).

Hence the investigator decided to find the effect of concept mapping strategy on the achievement in chemistry of students at secondary level.

### **Review of literature**

Greene P. (2011) conducted a study on Concept Mapping and the Science Achievement of Third Grade Students. The purpose of this quantitative study was to examine the relationship between concept mapping and science achievement. The research questions addressed in this study examined whether a significant difference exists the concept mapping (treatment) and the traditional (control) groups on post test scores and on test scores across time and group. A statistically significant difference was found within subjects

Okoye, N S.; Okechukwu, Rose N. (2010) investigated the effect of concept mapping and problem-solving teaching strategies achievement in biology among Nigerian secondary school students. The result of the study showed that the experimental group performed significantly better than the control group and that gender does not affect students achievement in biology in general.

Thomas B. K. and Thakur G.R. (2009) conducted a research project to determine the effects of pictorial concept mapping on the achievement of VIII standard students in the topic of sources of energy. The results showed that concept mapping has a noticeable impact in student achievement in science education. Students showed a positive attitude towards using pictorial concept mapping in teaching.

### **Statement of the problem**

The investigator stated the problem as Concept Mapping Strategy and Students' Achievement in Chemistry at Secondary Level.

### **Definition of Key Terms**

#### **Concept Mapping Strategy:**

Concept mapping is a teaching learning strategy in which information is represented in the form of charts, graphic organizers, tables, flowcharts, Venn Diagrams, timelines, or T-charts.

#### **Achievement in Chemistry:**

It refers to the total scores obtained by an individual as measured in the test constructed in Chemistry.

#### **Secondary School Level**

It is the school level recognized by government of Kerala providing instructions to students at terminal stages of school curriculum (VIII, IX, X)

#### **Objective of the study**

To study the effectiveness of concept mapping on achievement in chemistry of students at secondary level

#### **Hypotheses of the study**

There will be a significant difference in the pretest and post test mean scores of the students after administering the Concept Mapping Strategy.

#### **Methodology**

A pretest post test single group experimental design was used for the study. A pretest was first given to the students followed by the administering of concept mapping strategy and a posttest was then administered. The scores tabulated and analyzed for the test of significant difference.

#### **Sample for the study**

The study was conducted among the Secondary School Students consisting of 35 students from IXth Standard of St.Mary's CG H.S. Ernakulam.

#### **The tools used for the study**

The following tools prepared by the investigator were used for the present study.

1. Lesson transcripts based on Concept mapping for teaching Chemistry
2. Two compatible achievement tests in Chemistry for IXth Standard Students

#### **Statistical techniques used for the study**

1. Mean
2. Median
3. Standard deviation

## 4. Test of significance of difference between means (t-test)

**Analysis**

The Mean median and standard deviation of the pretest and post test scores were found .Table1 shows the values of the descriptive statistics.

Table1: Mean Median and Standard Deviation of the Pretest and Posttest Scores

	Pretest	Posttest
Sample Strength	35	35
Mean	5.1	18.6
Median	6	19
Standard deviation	1.3	3.1

From the table it can be seen that the mean of the post test scores 18.6 is much higher than the pretest score 5.1. The standard deviation value of 1.3 and 3.1 of the pretest and post test scores reveal that the group is homogeneous. The test of significance difference was then done. Table2 reveals the t value thus obtained

Table2: Test of Significance difference between pretest and post test scores of the Students at Secondary level

	Pretest	Posttest	't' value
Sample Strength	35	35	23.7590*
Mean	5.1	18.6	
Standard deviation	1.3	3.1	

From the table it is clear that the calculated t-value 23.759 is much greater than the table value 2.65 for df (64) at 0.01 level. So it can be concluded that the mean of post test scores of students differ significantly from the pretest scores. So the Concept mapping technique is effective in enhancing achievement of chemistry among secondary school students.

**Result and Finding**

The study has shown the relative effectiveness of the Concept mapping strategy in improving student's achievement in Chemistry, hence

1 Teachers of Science subjects should adopt the Concept mapping technique in their teaching to improve students' achievement

2. Science teachers should be thorough with the theoretical aspects of concept mapping for the successful implementation of this strategy in class rooms.

3. The curriculum planners should incorporate the concept mapping strategy and other innovative teaching methods to make teaching and learning more effective and meaningful
4. Government should organize capacity building programs for Secondary School science teachers in the effective use of Concept mapping technique through organization of workshop, seminars and conferences.

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