A STUDY OF EFFECTIVENESS OF CONCEPT MAPPING IN INTEGRATED SCIENCE

Neetika A. Gaikwad

Research Scholar, Janardhan Rai Nagar Rajasthan Vidyapeeth University,

Udaipur, Rajasthan.

Abstract: This paper presents an exploratory study that investigated the effectiveness of Concept Mapping on the achievement of IX standard students in the topic of 'Human Nervous System'. The study was conducted with 120 students at a secondary school in Pune. The students were tested with teacher constructed pre-test and post-test containing multiple, one word and descriptive questions. The descriptive questions were mainly based on understanding and application level. After the pre-test, the control group was taught by the traditional method of teaching and experimental group was exposed to Concept Mapping techniques. After completing the treatment, students of both the groups were given the post-test. Test scores were analyzed for any statically significantly difference in the scores. The results from the present study indicate that Concept Mapping has a noticeable impact in the student achievement in science education. Students showed a positive attitude towards using Concept mapping in teaching.

Keywords: Concept Mapping, integrated science, science education, attitude towards Concept Mapping

INTRODUCTION:

Education is one of the potent instruments in the development process. Science Education being an important component of the education system should contribute in the solution of the country by developing desirable understanding skills, abilities and attitudes. Science is an important subject in school education because it develops logical thinking, scientific attitude, creativity and knowledge about our environment and technological developments. Science education imparted in our school plays a vital role in the development of individuals and in turn of the nations.

To remember information longer and to be able to use it more effectively, one needs to move that information into his \ her long-term memory. Concept Mapping is a learning strategy that students find useful in understanding complex ideas and clarifying ambiguous relationship. It is a two-dimensional representation of the relationship between the key ideas in a topic. Concept mapping has been defined as a 'Meta-learning', the development of which can be traced to the well-known work of Ausubel, Novak and Crowin.

Based on Educational psychology theories of how we organize information, Concept maps are hierarchical with broader more general items at the top and more specific topics arranged in a Cascade below them. Concept mapping helps to understand ideas by showing the connections to other ideas. It not only identifies the major ideas of interest from a chapter or year class notes but also shows the relationships among the ideas.

The researcher feels teaching methods which are used in science teaching are not effective to teach science concepts and experimented with Concept map technique to teach science subject to Std. Ninth students.

OBJECTIVES:

The objectives of the study are:
i) To observe the effect of Concept mapping based teaching strategies.

ii)To compare the achievement of concept mapping method over the traditional method of teaching.

HYPOTHESIS:

The hypothesis constructed for the study are:
i) Concept mapping technique helps the students to learn the concepts in science.
ii)There is no significant difference between the achievement of the students taught by concept map technique & traditional method.

METHODOLOGY:

a) Method of research:
The Experimental method was used to find out the effectiveness of Concept Mapping in integrated science.

b) Research design:
The Equivalent Pre-test Post-test group design will be the research design for this study.

c) Population:
Population of the present research study will be including all Standard Ninth students off Maharashtra State Board schools of Pune district.

d) Sample:
One hundred and twenty students of Std. Ninth were selected from The Good Samaritan School, Pune, for the present study.

e) Research tool:
1) <u>Lesson Plans</u>: Lesson plans were prepared based on Herbartian method by Herbert Spensor on the topic "Human Nervous System." of IX standard.
2) <u>Concept Maps</u>: Based on the topic " Human Nervous System'' from Std. IX science textbook, the researcher developed a Concept Map.
3) <u>Pre- test</u>: Pre- test was prepared to measure student's pre-requisite knowledge on the topic "Human Nervous System''
4) <u>Achievement Test</u>: The post – test was prepared to measure student's achievement. The six levels of Bloom's taxonomy (Bloom 1969) were used to make sure that the items were at the different levels of objectives. The post- test contains multiple, one word and descriptive questions which were mainly based on understanding and application level questions like "Which part of the human brain is responsible for the imbalance of the body?" or "why some people are unable to take spontaneous decision?"

TREATMENT:

This study was conducted over a ten days period during regular classes that met for forty-five minutes each day. A total of 120 students were randomly divided into two groups: The Experimental Group and the Control Group. The researcher used equivalent pre-test post-test group design for the present study. The unit selected for the study was "Human Nervous System." Control group was taught by using traditional method which includes five steps viz., presentation, comparison, association, generalization and application. Experimental group was taught by using Concept map (shown in Figure 1). This group was introduced to the topic by asking developmental questions. The questions based on previous knowledge of the topic was asked to the students and the teacher gradually developed the topic. Along with the teacher, the Concept map was constructed on the board by taking active participation of the students. Before teaching both experimental and

control group, a pre-test was given to assist their previous knowledge. After teaching the topic a post-test was given to both Experimental and Control group to measure their achievements.
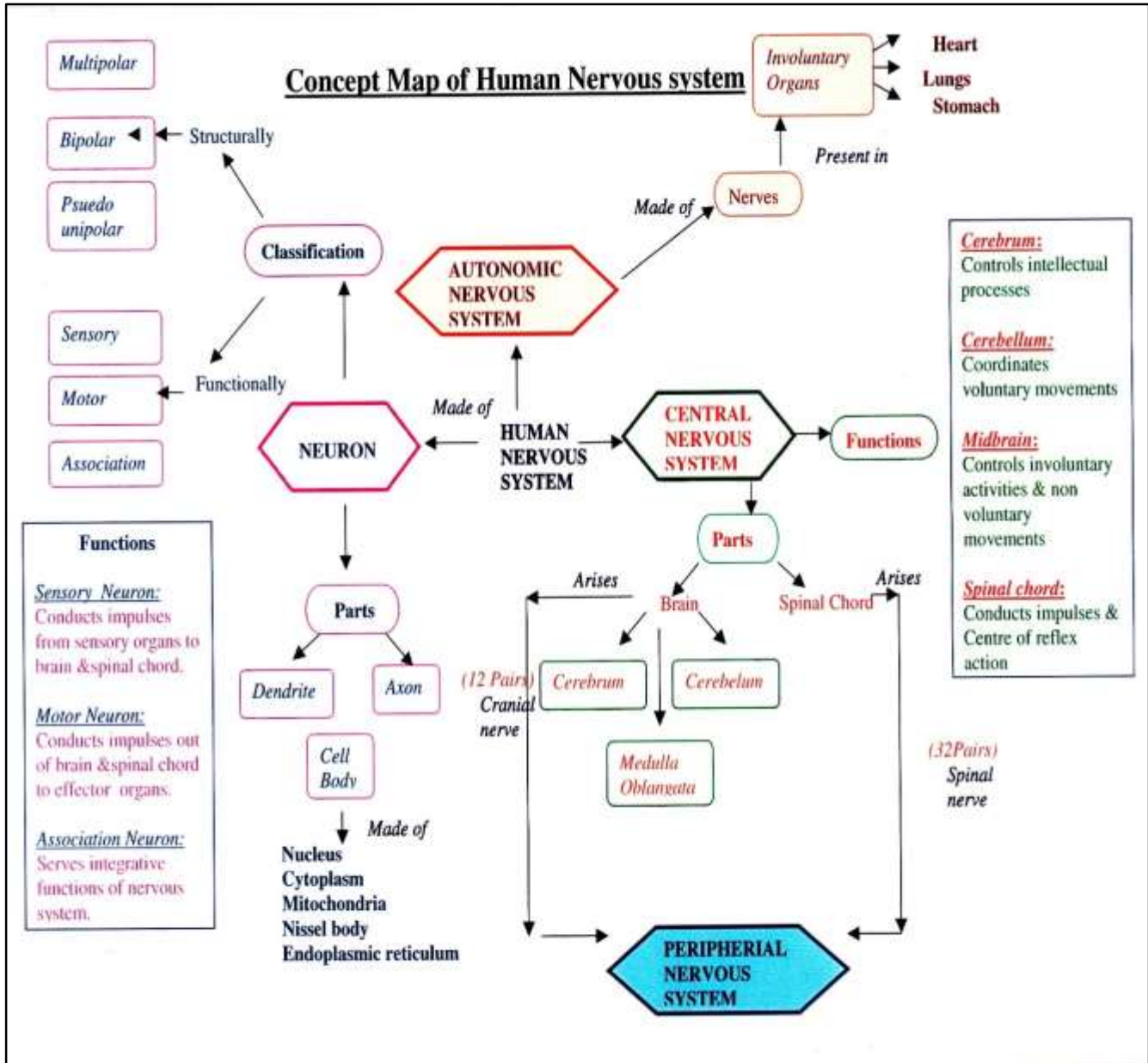

Figure 1: Concept map representing Human Nervous System

ANALYSIS AND INTERPRETATION:

Objective I:
To observe the effect of Concept Mapping based teaching strategies.
The pre-test means scores of Experimental and Control Group were calculated and interpreted, shown in table no.1.

Table 1 : Comparison of mean scores of pre-test of Experimental and Control group.

Group	Nos.	Mean
Experimental	60	13.896
Control	60	13.895

The above table shows that there is no significant difference been observed between both the groups, which proves that both the groups have same entry level.

Table 2: Comparison of mean scores of post-tests of Experimental & Control group.

Group	Nos.	Mean
Experimental	60	18.675
Control	60	14.325

Table 2 shows a noticeable difference between the mean scores of Experimental and control group and the difference between the mean score is 4.350.

Analysis: The difference in the mean scores of pre-test and post-test of both the groups proves that after the treatment the experimental group has shown significant difference which can be stated that the treatment has a positive impact on the experimental group students. Thus, it can be said that the concept map method is an effective tool for understanding the concepts of science subject.

Objective II:
To compare the achievement of concept mapping method over the traditional method of teaching.

Table 3: Analysis of post-test scores of Experimental and Control group.

Group	Nos.	Mean	SD	t-value
Experimental	60	18.6	4.657	5.370
Control	60	14.325	4.052	

Analysis: After the analysis of post-test of both the matched group the t-value observed is 5.370 which is higher than the expected t-value of 2.048 (Best & Khan, 2003). This significant difference in t-value shows that experimental group is differentiately affected due to the teaching done by using the concept map method.

MAJOR FINDINGS OF THE STUDY:

The following conclusions were found on the basis of the results and their interpretation-
1) A significant difference was observed as the effect of concept map method and traditional method of teaching science.

2) There is a significant difference in the achievement of the students taught by concept mapping based teaching and traditional method with highly differentiable t-value.

HYPOTHESIS ANALYSIS:

1) The difference in the means scores of pre-test and post-test of both the groups proves that, the treatment has a positive impact on the experimental group students. Thus, it can be said that concept map method is an effective tool for understanding the concepts of science subjects. Hence the null hypothesis is rejected.
2) The post- test result of experimental and control group shows the significant difference in the achievement of the students taught by concept mapping base of teaching as compared to the traditional method of teaching.

SUMMARY:

According to the achievement points obtained at the end of the study concept mapping has resulted in meaningful learning for the experimental students. The Concept mapping was found to be more influential in the students success than the traditional method. The Experimental Group students enjoyed science learning through concept mapping and this helped them to capture their quickly evolving ideas and organize them for meaningful learning.

Another finding arising from the present study is that there was a significance difference in the post-test score of experimental and control students with respect to their learning style. Thus, it could be concluded that Concept Mapping help the students to develop meta cognitive skills which resulted in better achievement.

CONCLUSION:

The findings provide evidence that teaching through Concept map positively influences science concept learning which can be facilitative. It helps in gaining better comprehensive understanding of learning information. This study provided some insights into the use of concept mapping in teaching of science. It provided significant results. Concerning its effects on different learning. Moreover, the results showed that concept mapping helped how achievers to achieve high scores in the topic "Human Nervous System". Finally, student exhibited positive attitude towards using Concept maps served to clarify the links between the new and old knowledge, giving an opportunity for the learners to internalize the concepts.

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