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Effectiveness of Cognitive Mapping in Learning Science on Boys and Girls of Secondary School

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Students understanding of science have always been of considerable importance in the area of science education research at school level. It tries to focus on issues such as tools to aid understanding, conceptual understanding, tools for evaluating understanding, individual knowledge structure of students so on and so forth. Cognitive map is one such tool that is used to elicit understanding the subject thoroughly as well evaluating knowledge and teaching- learning process success in a given domain. Cognitive maps are two- dimensional hierarchical and node-like diagrams that depict knowledge. This paper presents a view of using cognitive mapping as tool for enhancing students' knowledge structure and understanding and learning process in science on boys and girls. This study used two different methods of evaluation- achievement test and cognitive map test- for evaluating understanding in both boys and girls.

Key words: - Cognitive mapping, learning science, secondary school, Boys and Girls

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Introduction

The Cognitive Mapping is a gadget for speaking to the conceptual structure of a subject order in a two dimensional structure, which is comparable to a guide. A concept, as characterized by Novak, is normality in items or occasions assigned by a particular mark. Cognitive Mapping is a strategy for speaking to information in charts. Information diagrams are systems of concepts. Systems comprise of hubs (focuses vertices) and connections (arcs edges). Hubs speak to concepts and that of connections speak to the relations between concepts.

Concepts and connections are named. Connections can be none, unit, or bi-directional. Concepts and connections might be ordered, they can be essentially affiliated, indicated or isolated into classes, for example, easy-going or worldly relations. Consequently Cognitive Maps are diagrammatic portrayals which show important connections between concepts as recommendations. Suggestions are at least two concept marks connected by words which give data on connections or portraying associations between concepts.

Cognitive Maps compose information into a progressive structure in which subordinate concepts are subsumed under super ordinate concepts. Repetition learning would be only a progression of recommendations that are remembered, yet not identified with one another. With Mapping, new concepts and recommendations are associated into an entire test significant system.

As a research and assessment apparatus in science instruction, Cognitive Mapping is 20 years of age. The system which became out of work by Novak (1972) and his alumni students at Cornell University was initially planned as a vehicle for investigating important learning procured through sound instructional exercise guidance in grade school science. Since that time it has been embraced by numerous instructors who have utilized it at all levels

in finding and testing, instructional plan, and educational program advancement and all the more as of late as a meta cognitive guide in helping students 'figure out how to learn' (Novak 1990).

From Ausubel's (1968) absorption hypothesis of cognitive learning, Novak and his partners worked with the possibility that new concept implications were gained through osmosis into existing concepts/propositional structures. Given the extra thoughts from Ausubel's hypothesis, that cognitive structure is sorted out progressively and that most new learning happens through subsidiary or correlative assumption of new concept implications under existing concept/propositional thoughts, he built up the possibility of various levelled portrayal of concept/propositional systems. He (Novak 1977) and his partners later depicted as cognitive maps. Composed or spoken messages are essentially straight arrangements of concepts and recommendations. Interestingly, information is put away in our brains in a sort of various levelled or holographic structure. When we produce composed or spoken sentences, we should change data from a various levelled to a direct structure.

Since the potentialities of cognitive maps in science education research are vast, a study has been conducted to check the effectiveness, feasibility of cognitive map as learning tool in science learning to enhance the positive results.

Objectives

1) To measure effectiveness of cognitive mapping in learning science in boys and girls.

Hypothesis

H01: There will be no significant difference between mean cognitive mapping test scores of girls students and boys students.

H02: There will be no significant difference between post achievement test scores of boys students and girls students of control group.

H03: There will be no significant difference between post achievement test scores of boys students and girls students of experimental group.

Sample

A sample is some part or subset of a bigger body exceptionally chose to speak to the entirety. Testing is the procedure by which this part is picked. Testing at that point is taking any part of a populace or universe as illustrative of that populace. By watching the attributes of the sample, deductions can be made about the whole populace from which it is drawn.

For the selection of school, researcher has used **purposive sampling.**

This was done on basis of school which sets in all the criterion of population of schools based in Gandhinagar and availability of required amount of time period for conducting experimental programme.

For the selection of sample from the population of Ninth standard students, researcher has used **Simple Random cluster sampling Technique**

For this purpose result of standard 8 sciences, students were arranged in decreasing order. Out of 66 Students 33 students of odd number were involved in control group while rest 33 student of even number were involved in experimental group.

Sample of the Study

Table 1: Sample of Study

Control Group	33 students	19 Boys	14 Girls
Experimental Group	33 students	19 Boys	14 Girls
Total number of students	66 students		

Research Method

Experimental group	-	$T1_E$	X	$T2_E$
Control group	-	**$T1_C$**	-	**$T2_C$**

In the experimental research the plan utilized is "The Two Group Pre-Test Post Test Control Group Experimental Group Planning".

Where $T1_E$ and $T1_C$: Pre test scores

$T2_E$ and $T2_C$: Post test scores

X : Treatment (Module)

\- : No treatment (Traditional method)

Research Tool

The tool used for current experimental study is teaching programme based on cognitive mapping strategy and traditional method.

The programme for implementation on both control and experimental group was prepared for 22 hours each based on the split-up syllabus and time distribution given by CBSE-Delhi.

Expert opinion was taken from 5 experts of various universities and 5 experts from CBSE based school science teachers.

Similarly, achievement test for both control and experimental group was prepared based on paper pattern guidelines given by NCERT and CBSE for standard ninth following same marking scheme.

Data Collection and Analysis

Pre-test of Achievement test was done on both experimental and control group. Cognitive mapping teaching programme was implemented on experimental group for 22 hours.

Traditional method teaching was implemented on control group for 21 hours.

After the treatment on both control and experimental group post-test of Achievement test was taken.

In the present study, the researcher has used parametric statistical technique since it fulfils the conditions for parametric statistical analysis. The parametric statistical techniques used in the present study are the 't' test.

Findings

As per the above study, it was found that

H01. There will be no significant difference between mean cognitive mapping test scores of girls' students and boys students.

Experimental Group Cognitive Mapping Test	N	Mean	M1-M2	SD	SED	critical-Ratio	Level Of Significance
Boys	19	192.10	13.17	17.74	8.144	1.61	Not Significant
Girls	14	178.92		26.39			

According to table ,Cognitive Mapping Test in experimental group, 19 boys students having mean score 192.10 and standard deviation 17.74, while in cognitive mapping test in experimental group 14 girls student having mean score 178.92 and standard deviation 26.39. For experimental group, difference between mean score of boys students and girl students on cognitive mapping test was 13.17. Score of critical-ratio for difference between mean score of cognitive mapping test and post achievement test of experimental group obtained 1.61So the null hypothesis 'There will be no significant difference between mean cognitive mapping test scores of girls students and boys students' is accepted.

For Experimental group difference of mean score of cognitive mapping test on boys and girls was not found significant.

H02: There will be no significant difference between post achievement test scores of boys students and girls students of control group.

Control Group post achievement test scores	N	Mean	M1-M2	SD	SED	critical-Ratio	Level Of Significance
Boys	19	40.05	3.94	5.21	2.13	1.84	Not Significant
Girls	14	36.11		6.61			

Control Group post achievement test scores, 19 boys students having mean score 40.05 and standard deviation 5.21, while 14 girls student having mean score 36.11 and standard deviation 6.61. For Control group, difference between mean score of boys students and girl students on post achievement test was 3.94. Score of critical-ratio for control group difference between mean score on post achievement test of boys students and girl students obtained 1.84. So the null hypothesis 'There will be no significant difference between post achievement test scores of boys students and girls students of control group' is accepted.

For control group difference of mean score on post achievement test of boys and girls was not found significant.

H03: There will be no significant difference between post achievement test scores of boys students and girls students of experimental group.

experimental Group post achievement test scores	N	Mean	M1-M2	SD	SED	critical-Ratio	Level Of Significance
Boys	19	42.94	2.15	3.73	1.74	1.23	Not Significant
Girls	14	45.10		5.70			

Experimental Group post achievement test scores, 19 boys students having mean score 42.94 and standard deviation 3.73, while 14 girls student having mean score 45.10 and standard deviation 5.70. For experimental group, difference between mean score of boys students and girl students on post achievement test was 2.15. Score of critical-ratio for experimental group difference between mean score on post achievement test of boys students and girl students obtained 1.23. So the null hypothesis 'There will be no significant difference between post

achievement test scores of boys students and girls students of experimental group' is accepted.

For experimental group difference between mean score on post achievement test of boys and girls was not found significant.

Conclusion

From the above results it can be concluded for the above study that,

1) Cognitive mapping is a good strategy in teaching science as well as in learning science for both girls and boys.

2) Cognitive mapping can be used as tool for evaluation in summative as well formative pattern in science for both girls and boys

Learning science can be done through thought provoking process rather than a process where rote learning and dull ways are taken up.

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