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Effect of Concept Mapping Strategy on Students' Cognitive Processes and Academic Achievement in Life Science

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ABSTRACT

The main findings of the study are: 1.A strong relationship is established between cognitive process and academic achievement. 2.Concept mapping as an instructional strategy must have significant effect on acquisition of concept in Life science. 3.Concept mapping as an instructional strategy must have significant effect on cognitive process . Reduce exam phobia and increase their confidence. The present study was conducted to study the effectiveness of using concept maps in Life-science among IX grad.

1. Introduction

Concept maps is a two dimensional body of knowledge. Construction fosters meaningful learning and positive attitude towards the school & subjects. Concept map is a map showing the interrelationships among concepts. Concept maps depict an understanding of the relationship between concepts and enhance meaningful learning. Meaningful learning depends upon how the subject matter is organized. This leads to meaningful learning of concepts & hence enhanced performance on concept learning outcome. This pattern leads to both the quantitative and qualitative increase in the learner's knowledge. In a concept map, the more effective interrelationship among concepts is drawn, the more meaningful learning takes place .

2. Variables

Independent Variable: The independent variable that was used in the present study is Concept Maps. The variable was manipulated to study the effect on achievement in Life-science. The experimental group was taught through Concept Maps.

Dependent Variable:The dependent variable or the criterion variable that was use in the study is achievement in Life-science. This variable may also be termed as moderator variable as they include the variable that could have a moderating affect on the treatment. The students were scored on this variable before and after the treatment in the group, this variable was measured twice during the study i.e. first before the beginning of the treatment (pre-test stage), then after completing the treatment. (Post-test stage).

3. Objective:

- To study the effect of concept mapping on learning and acquisition of Life science concepts.
- To study the effect of teaching through concept mapping on academic achievement of students in Life science concepts of boys and girls .
- To study the change, if any, in relationship between cognitive process and academic achievement after teaching through concept mapping in Life science .

4. Hypothesis :

- H1 : There will be no significant effect of Concept mapping as an instructional strategy on learning and acquisition of Life science concepts.
- H2: There will be no significant effect of concept mapping as an instructional strategy on academic achievement of Life science concepts of boys and girls.
- H3: There is no significant change in relationship between cognitive process and academic achievement after teaching through concept mapping in Life science.

5. Methodology

This study based on experimental setting. Keeping this in mind, it will be use Pre test Post- test Matched pair design to conduct this study.

6. Population:

In the present study, the term population refers to all the Class IX students studying in Bengali medium Government schools, Birbhum District of West Bengal. The accessible population will comprise both boys and girls studying in Class-IX in Birbhum District of West Bengal.

SAMPLE

Sl. No.	Groups	Total no. of Students
1	Experimental Group	60(Male 30 +Female30)
2	Control Group	60(Male 30 +Female30)
	Total	120(Male 60 +Female60)

Age Group: 14- 15 years

7. Tool used:

Measuring Tools: - In order to collect the relevant data the following tools will be used by the researcher.

- Science Achievement Test (SAT) –To be Developed by the researcher

- Student's Cognition Test – To be Developed by the researcher
- Intelligence Test – i. Mixed type group test of Intelligence (Verbal &Non-verbal) By Dr.P.N.Mehrotra

8. Statistical techniques used :

The statistical techniques employed for interpreting the data were : 1. Mean 2. t-test

9. Analysis and interpretation of the data:

Objectives 1 : To study the effect of concept mapping on learning and acquisition of Life science concepts.

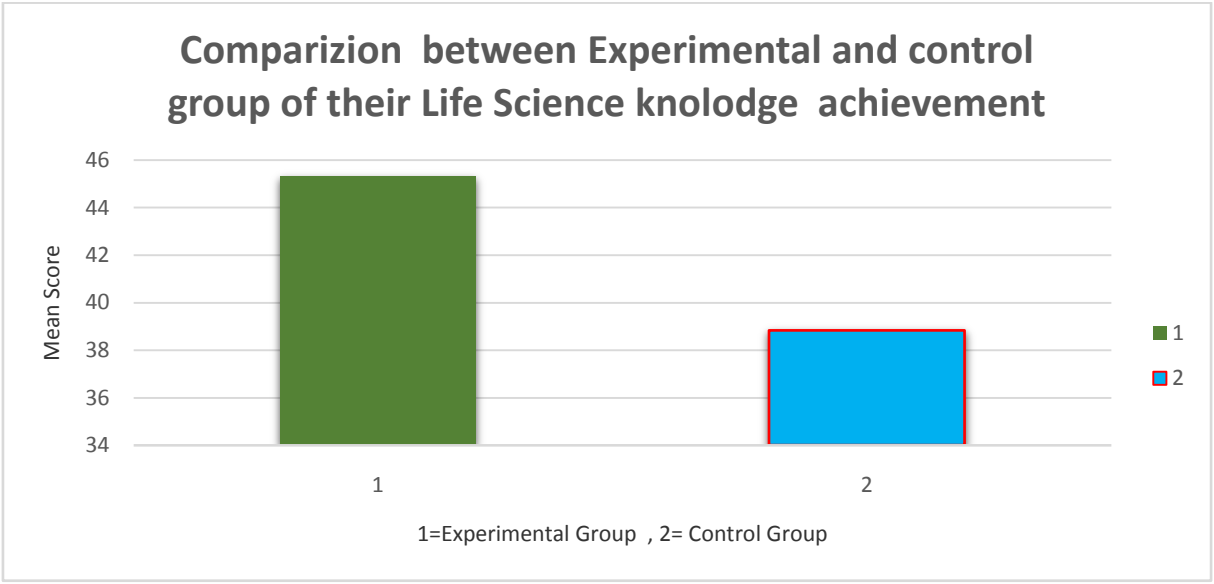
H1 : There was be no significant effect of Concept mapping as an instructional strategy on learning and acquisition of Life science concepts.

Pre-test

	N	M	S.Dc	SEd	t	Level of Significant
Experimental	60	5.6	1.4	0.25	0.06	0.01(No Significant Difference)
Control	60	5.7				

Post-test

	N	M	S.Dc	SEd	t	At 0.01 Level of Significant. The table value
Experimental	60	45.31	1.96	0.35	18.08	2.66
Control	60	38.83				



***Interpretation*:**

It is observed that the t value is 18.08 which is significant at 0.01 level. It indicates that mean scores of students liking of Experimental and Control groups differ significantly. In this context the 1st null hypotheses is rejected.

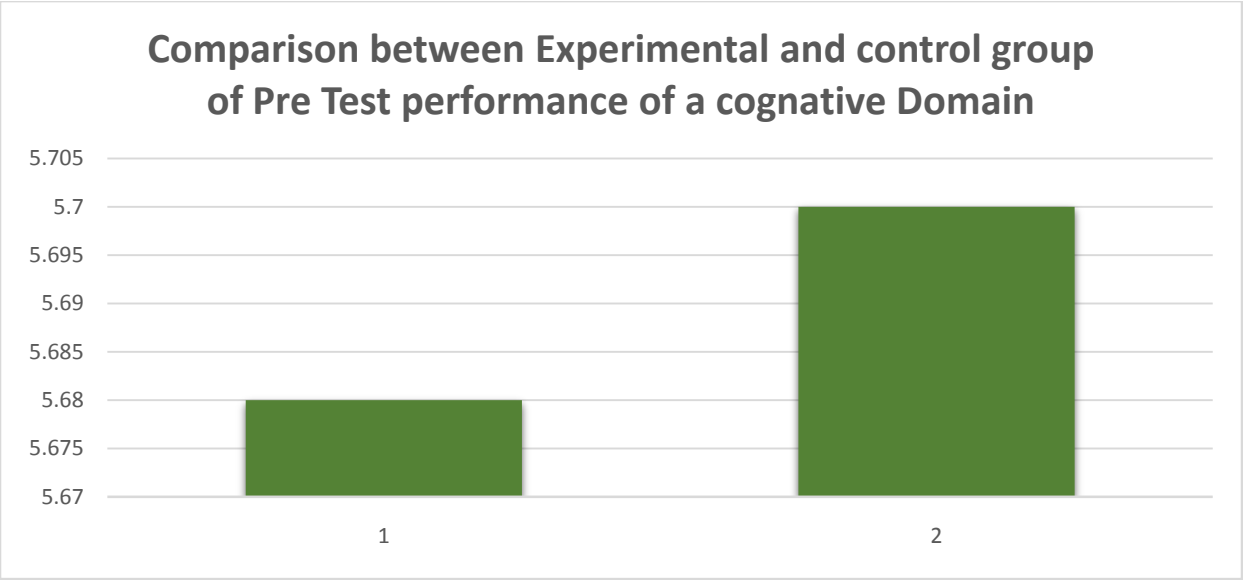
Further it can be seen that mean score of students liking of Experimental group was found to be significantly superior to control group. It may therefore be said that students of Experimental group were found to have significantly higher in context of acquisition of Life science Concepts liking in comparison to students of Control group.

Objective 2: To study the effect of teaching through concept mapping on academic achievement in Life science.

H2: There was being no significant effect of concept mapping as an instructional strategy on academic achievement of Life science concepts of boys and girls.

COMPARISON BETWEEN EXPERIMENTAL AND CONTROL GROUP of PRE TEST
Pre Test

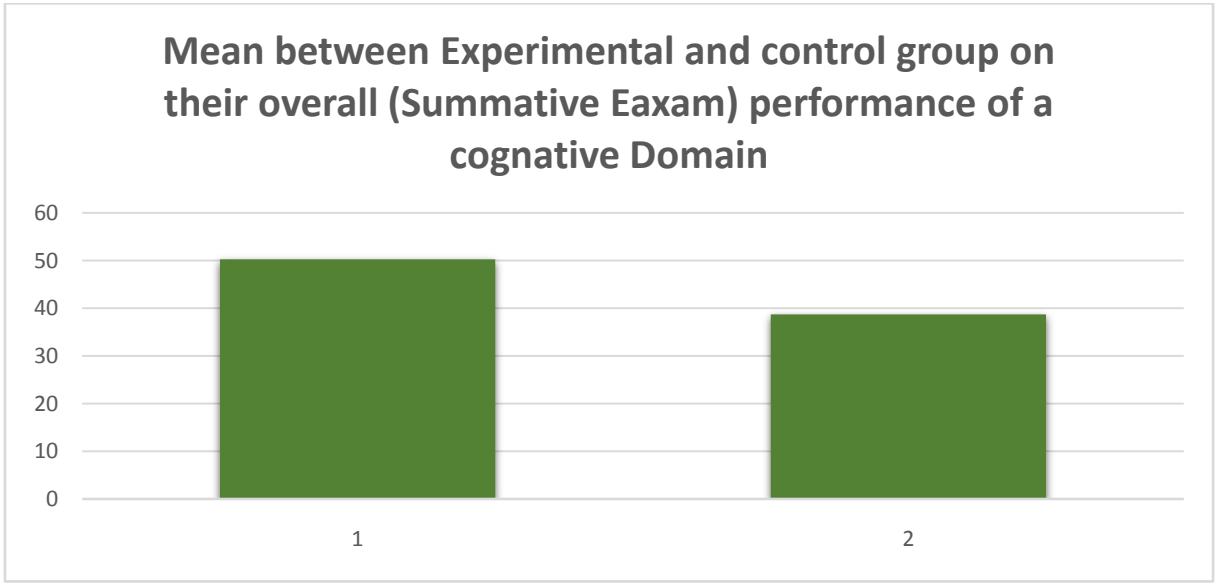
	N	M	S.Dc	SEd	t	At 0.01 Level of Significant. The table value
Experimental	60	5.68	1.40	0.25	0.06	2.66
Control	60	5.7				



COMPARISON BETWEEN EXPERIMENTAL AND CONTROL GROUP OF POST TEST

Post test comparison :

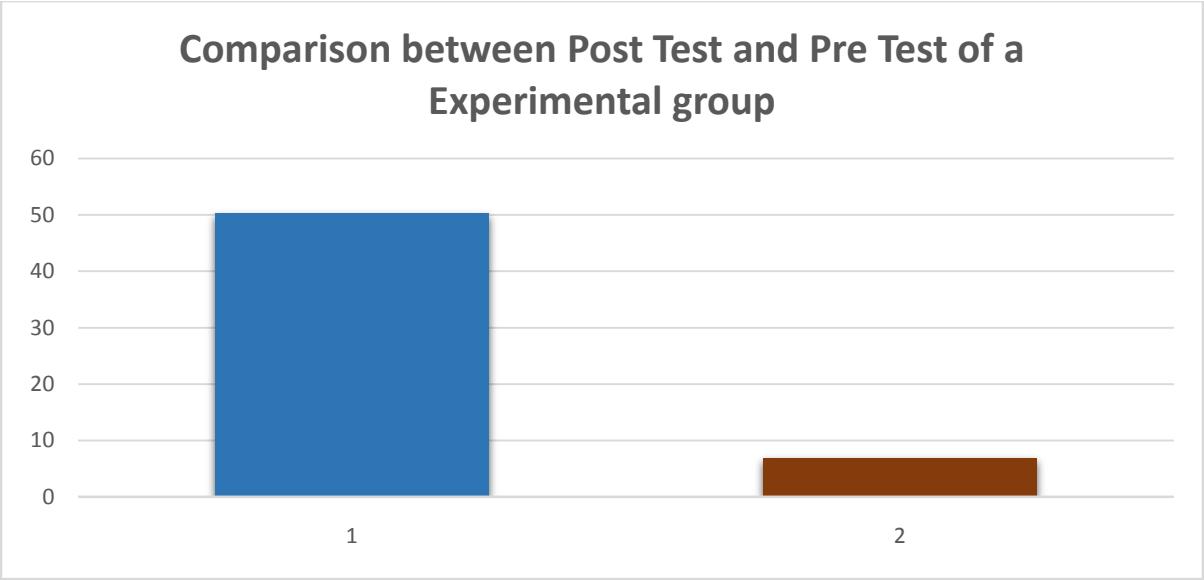
	N	M	S.Dc	SEd	t	At 0.01 Level of Significant. The table value
Experimental	60	50.23	18.37	3.35	3.42	2.66
Control	60	38.73				



It is observed that the t value is 3.42 which is significant at 0.01 level . It indicates that mean scores of students liking of Experimental and Control groups differ significantly. In this context the 2nd null hypotheses is rejected.

COMPARISON BETWEEN **Post Test and Pre Test** (Experimental Group)

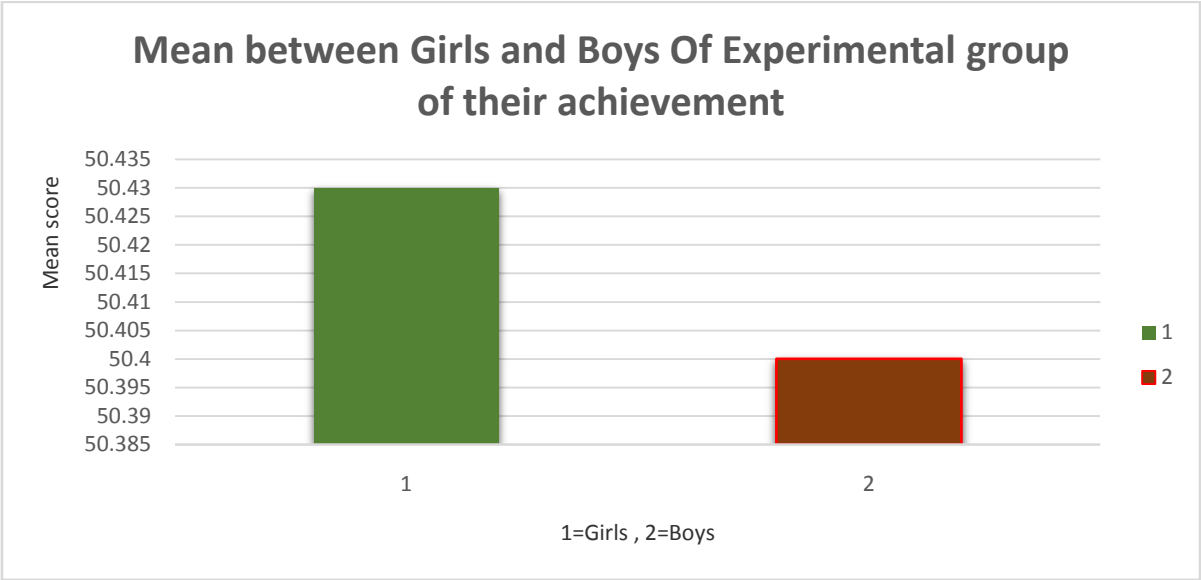
	N	M	S.Dc	SEd	t	At 0.01 Level of Significant. The table value
Post Test	60	50.23	1.65	0.30	143.19	2.66
Pre Test	60	6.85				



It is observed that the t value is 143.19 which is significant at 0.01 level. It indicates that mean scores of students liking of Post Test and Pre Test differ significantly of the Experimental group. In this context the 2rd null hypotheses is rejected.

COMPARISON BETWEEN GIRLS AND BOYS OF EXPERIMENTALGROUP ON THEIR ACHIEVEMENT

	N	M	S.Dc	SEd	t	At 0.01 Level of Significant. The table value
Girls	30	50.43	1.89	0.48	0.06	2.66
Boys	30	50.40				



***Interpretation*:**

It is observed that the t value is 0.06(within Experimental group boys and girls) , 0.67 (within control group boys and girls) which is not significant. It indicates that mean scores of students (Boys and Girls) within Experimental and Control groups are equally significant. So it was found that effects of concept mapping as an instructional strategy on learning and acquisition of Life science concepts between boys and girls was not be significant differ.

So it can be seen that mean score of students liking of Concept mapping instructional strategy was found to be significantly effective. So we say that concept mapping as an instructional strategy must have significant effect on acquisition of concept in Life science.

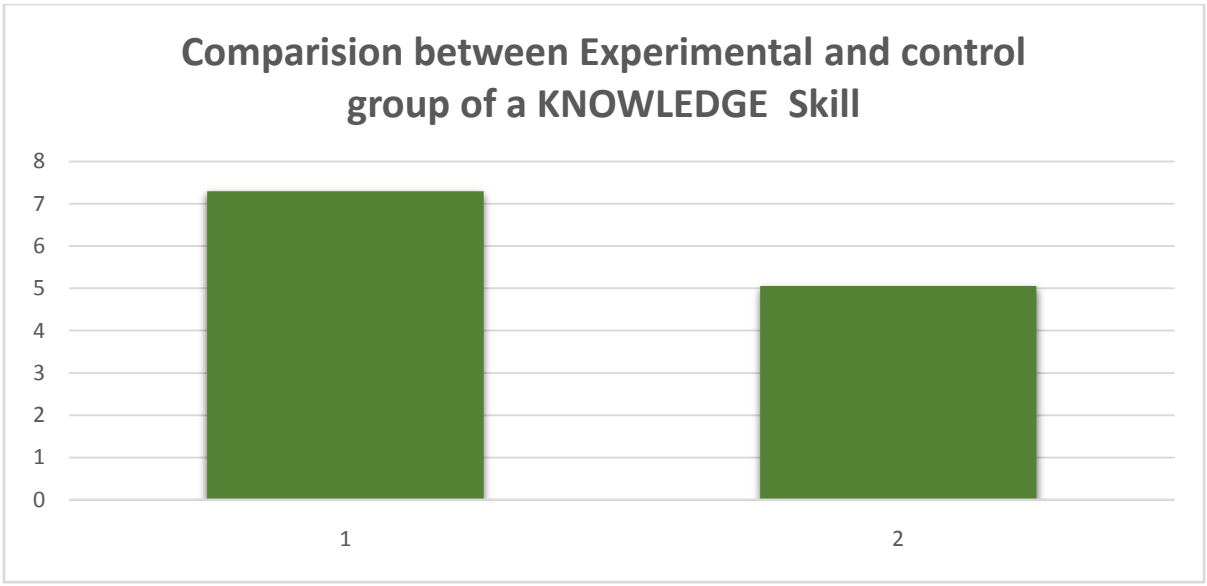
Further it can be seen that mean score of students liking of Experimental group was found to be significantly superior to control group. It may therefore be said that students of Experimental group were found to have significantly higher in context of Control group and therefore a strong relationship is established in case of academic achievement. Concept mapping has a significant effect of as an instructional strategy on academic achievement of Life science concepts of boys and girls.

Objectives 3: To study the change in relationship between cognitive process and academic achievement after teaching through concept mapping in Life science.

H3: There is no significant change in relationship between cognitive process and academic achievement after teaching through concept mapping in Life science.

COMPARISON BETWEEN EXPERIMENTAL AND CONTROL GROUP WITH REGARD TO **KNOWLEDGE SKILL**

	N	M	S.Dc	SEd	t	At 0.01 Level of Significant. The table value
Experimental	60	7.3	1.02	0.03	6.55	2.66
Control	60	5.06				

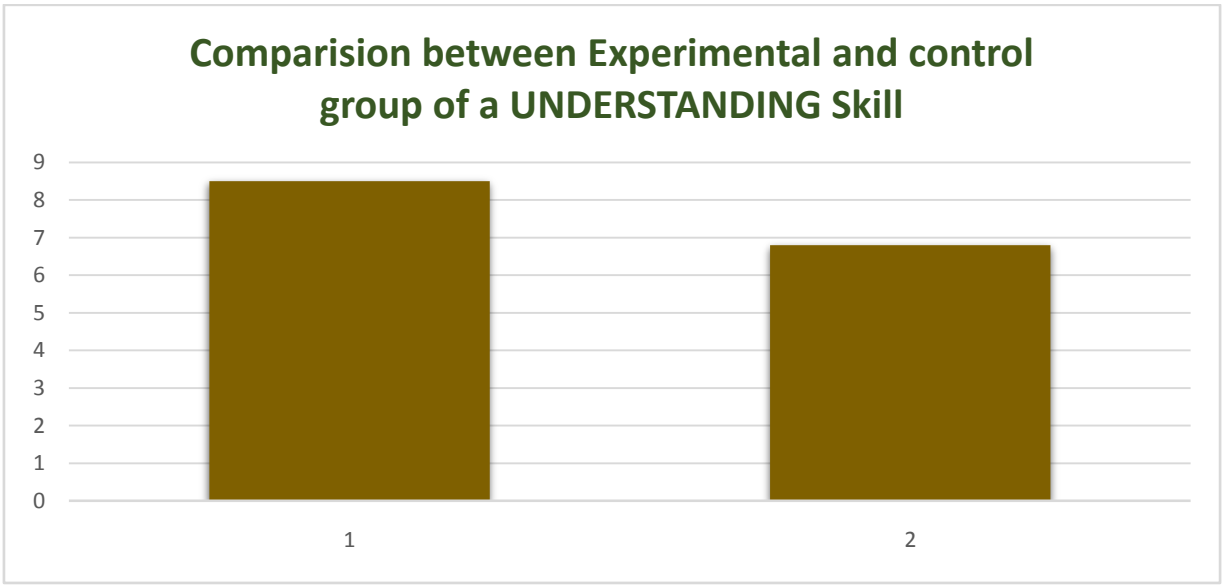


It is observed that the t value is 6.55 which is significant at 0.01 level . It indicates that mean scores of students liking of Experimental and Control groups differ significantly. In this context the 3thnull hypotheses is rejected.

Further it can be seen that mean score of students liking of Experimental group was found to be significantly superior to control group. It may therefore be said that students of Experimental group were found to have significantly higher in context of KNOWLEDGE liking in comparison to students of Control group .

COMPARISON BETWEEN EXPERIMENTAL AND CONTROL GROUP WITH REGARD TO **UNDERSTANDING SKILL**

	N	M	S.Dc	SEd	t	At 0.01 Level of Significant. The table value
Experimental	60	8.5	0.95	0.17	9.77	2.66
Control	60	6.8				

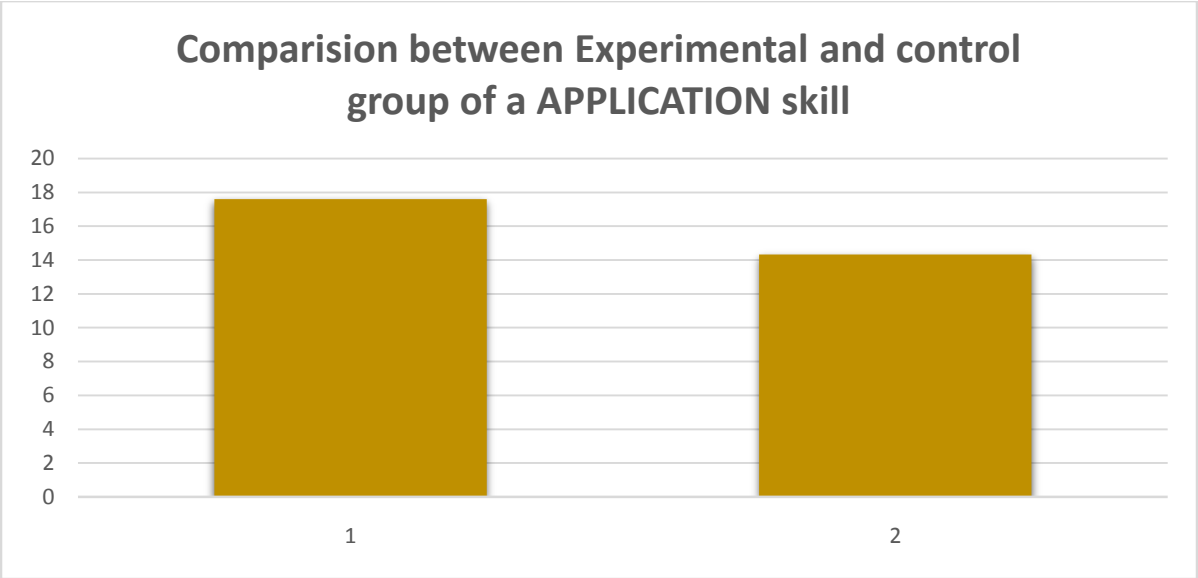


It is observed that the t value is 9.77 which is significant at 0.01 level. It indicates that mean scores of students liking of Experimental and Control groups differ significantly. In this context the 3th null hypotheses is rejected .

Further it can be seen that mean score of students liking of Experimental group was found to be significantly superior to control group. It may therefore be said that students of Experimental group were found to have significantly higher in context of application domain liking in comparison to students of Control group.

COMPARISON BETWEEN EXPERIMENTAL AND CONTROL GROUP WITH REGARD TO **APPLICATION SKILL**

	N	M	S.Dc	SEd	t	At 0.01 Level of Significant. The table value
Experimental	60	17.6	1.30	0.23	13.71	2.66
Control	60	14.33				

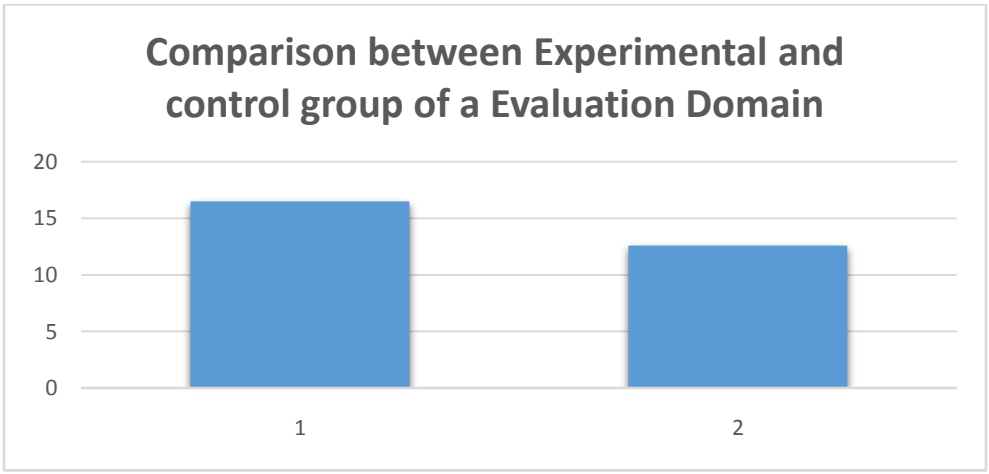


It is observed that the t value is 13.71 which is significant at 0.01 level. It indicates that mean scores of students liking of Experimental and Control groups differ significantly. In this context the 3th null hypotheses is rejected.

Further it can be seen that mean score of students liking of Experimental group was found to be significantly superior to control group. It may therefore be said that students of Experimental group were found to have significantly higher in context of analysis domain liking in comparison to students of Control group.

COMPARISON BETWEEN EXPERIMENTAL AND CONTROL GROUP WITH REGARD TO **EVALUATION SKILL**

	N	M	S.Dc	SEd	t	At 0.01 Level of Significant. The table value
Experimental	60	16.5	1.47	0.26	14.49	2.66
Control	60	12.6				



It is observed that the t value is 14.49 which is significant at 0.01 level. It indicates that mean scores of students liking of Experimental and Control groups differ significantly. In this context the 3th null hypotheses is rejected .

Further it can be seen that mean score of students liking of Experimental group was found to be significantly superior to control group. It may therefore be said that students of Experimental group were found to have significantly higher in context of analysis domain liking in comparison to students of Control.

10. Findings :

1. It can be seen that mean score of students liking of Experimental group was found to be significantly superior to control group. It may therefore be said that students of Experimental group were found to have significantly higher in context of Knowledge liking in comparison to students of Control group.
2. It can be seen that mean score of students liking of Experimental group was found to be significantly superior to control group. It may therefore be said that students of Experimental group were found to have significantly higher in context of Understanding liking in comparison to students of Control group.
3. It can be seen that mean score of students liking of Experimental group was found to be significantly superior to control group. It may therefore be said that students of Experimental group were found to have significantly higher in context of Application liking in comparison to students of Control group.
4. It can be seen that mean score of students liking of Experimental group was found to be significantly superior to control group. It may therefore be said that students of Experimental group were found to have significantly higher in context of Evaluation liking in comparison to students of Control group.
5. It can be seen that mean score of students liking of Experimental group was found to be significantly superior to control group. It may therefore be said that students of Experimental group were found to have significantly higher in context of Overall Summative performance in Cognitive domain liking in comparison to students of Control group and therefore a strong relationship is established between cognitive process and academic achievement.
6. It can be seen that mean score of students liking of Concept mapping instructional strategy was found to be significantly effective . So we say that concept mapping as an instructional strategy must have significant effect on acquisition of concept in Life science.
7. It can be seen that mean score of students liking of Experimental group was found to be significantly superior to control group. It may therefore be said that students of Experimental group were found to have significantly higher in context of overall performance and academic achievement liking in comparison to students of Control group.
8. It may therefore be said that student of Treatment group were found to have significantly higher students liking in comparison to control group in respected of gender.
9. Concept mapping as an instructional strategy takes little longer time Hence, there is a need for reduction of the syllabus load
10. It was established that there is a strong relationship between cognitive process and academic achievement.

11. Conclusion:

The focus of the study was the effect of concept mapping on cognitive processes and academic achievement in science. The analysis of the data shows that there is a significant difference between the control and experimental group for the variables under study. Hence the overall effect of concept mapping as a pedagogical tool was positive and assisted students in their overall performance reducing their mental pressure and increased their revel of confidence.

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