Effect of Concept Mapping Through Discussion on Concept Construction of VIII Class Students

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I.   Introduction

The quality of education that teachers provide to student is highly dependent upon what teachers do in the classroom. Thus, in preparing the students of today to become successful individuals of tomorrow, science teachers need to ensure that their teaching is effective. Teachers should have the knowledge of how students learn science and how best to teach. The NCF (2005) recommends school curriculum which help learners to become constructors of knowledge and emphasizes the active role of teachers in the relation of process of knowledge construction. Learners construct their knowledge (constructivist paradigm) and are engaged in the process of learning and the teachers' role is to engage them in the process of learning through well-chosen tasks and questions, active engagement, debate, discussion, application and reflection leading to theory building and creative ideas and concepts. A paradigm shift from rote memory to learning by understanding.NCF 2005 emphasize the process of learning and child's way of learning and thinking i.e. using constructivist philosophy. So teacher should adopt such type of teaching-learning approaches those promote the meaning-making process of the learner and unable her/him to reformulate the new information, restructure their existing knowledge and reorganize their conceptual schemes through encouraging cooperative learning and sharing of thoughts. In the light of the above discussion the investigator thought of investigating the effect of constructivism in classroom situation. Investigator adopted concept mapping and discussion method as a constructivist teaching - learning approach and lecture cum demonstration method as a traditional teaching - learning approach to find out the answer of the problem. The major constructivist such as Dewey, Montessori, Piaget and Vygotsky were failed to support significant reforms in education because these could not translate constructivist perspectives into educational practice. In 1978, Driver and Easley published an article which states that interventions provided in the classroom can help children to construct their own concepts. They believed that learners construct knowledge on the basis of their prior knowledge and personal experience. Thereafter a number of studies were conducted by Posner (1982), Driver (1989), Novak (1993) and others on 'how children construct knowledge' and 'how teacher can provide interventions to help children to construct their own concepts'.

Design Of The Study

Present investigation design is experimental in nature. The two groups (parallel groups) experimental design was selected for data collection of the investigation. Two parallel groups were equalize on the basis of their previous performance record and through the pre-test method. Both the groups were teaching through two different teaching-learning approaches i.e. constructivist and traditional approach. These teaching-learning approaches adopted to teach three chapters of science subject one each from Physics, Chemistry and Biology at VIII grade students.

Research Questions

1. What is the difference among performance of students teaching through constructivist and traditional teaching-learning approaches.
2. What is effect of constructivist and traditional teaching-learning approaches on the performance of students?

Objectives of the study:

1. To investigate the differences in performance of students after acquainted with constructivists and traditional teaching-learning approaches.
2. To identify the effect of constructivist and traditional teaching-learning approaches on performance of students.

Procedure: Groups of VIII class students are divided on the basis of their previous class performance and pre-test scores of the students of science subject. To nullify the internal and personal effect a pretest was prepared and administered before giving the different treatments to both the groups. After equalized the groups one group was considered as control group and another was experimental group. Group A or control group was teaching

with traditional teaching learning approach (lecture cum demonstration method). Group B or experimental group was treated with constrictivist teaching-learning approach. In the constrictivist approach the investigator adopted discussion and concept mapping techniques as the teaching-learning approach for group B or experimental group. After teaching with different teaching-learning approaches post-test was administered on both the groups and students' performance was evaluated on it.

Sample: In the present study sample has been taken from the school affiliated to the Rajasthan Board of Secondary Education, Ajmer. Class VIII of a secondary school is selected as a sample. One secondary school named Kamla Nehru Girls Secondary School, Hatundi is selected as sample of the study. There were twenty four students in class VIII in session 2013-2014.

Tools and techniques: Two achievement tests were constructed by the investigator separately for pretest and post-test. First achievement test or pretest is prepared from those two chapters of science which students have already completed with by their science teacher. Score of pretest is used to divide and equalize the experimental and control groups of the study. Second achievement test was constructed and administered after using the both teaching-learning approaches). This achievement test was constructed for 100 (one hundred) marks including objective type, short answer type and explanatory questions.

II. Field Work

STEP 1: The selected twenty-four students of VIII class were divided into two equal groups 12 (twelve) each. Group A -control group and Group B-experimental group were administered with-a pretest to record the existing level of achievement. Students' previous class marks (result) were also considered to divide and equalize the groups.

STEP 2: Three lessons were selected and taught for three weeks to Group-A following the traditional method and Group-B with constructivist approach, i.e., concept mapping through discussion.

STEP 3: On completion of instruction in two different teaching-learning approaches a post test was conducted to ascertain the achievement levels among two groups.

Statistical Techniques: Mean and t-test was computed to find out the significance of differences between experimental and control groups on the basis of students' performance. Results of analysis are presented through tables and graphs.

ANALYSIS AND INTERPRETATION:

Table 1: Mean scores, pooled variance and t-ratio between score of the students of experimental and control group intheir pre-test performance

S. No.	Group	N	Mean Scores	Pooled Variance	t-Ratio	Level of Significance
1	Experimental	12	13.66			Not Significant
2	Control	12	12.50	5.07	0.299	

Mean Scores

Mean Scores	

	Experiment	Control
Mean Scores	13.66	12.5
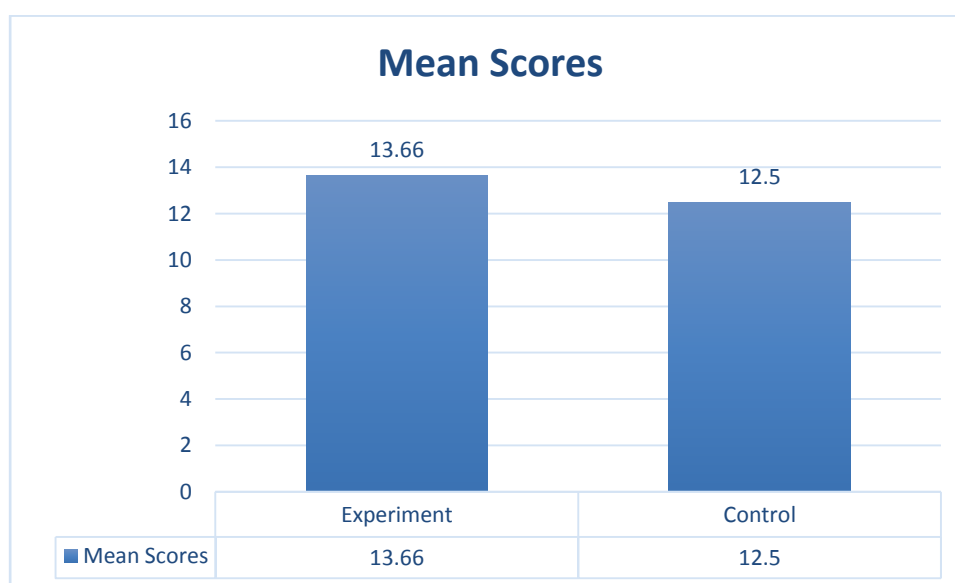
The table and graph shows that the observed mean scores of experimental and control group students on pre-test before treatment are 13.66 and 12.50 respectively. The pooled variance of scores between these two group students is 5.07. It can be concluded that scores obtained on total performance by experimental group students is somewhat higher as compared to the control group students before treatment. The 't'-value of these group scores is 0.229, which is not significant at any level of significance. Hence, the difference between two mean scores is by chance. Therefore these experimental and control group students have similar performance before treating them different teaching-learning approaches and there is no significant difference in performance of students related to experimental and control group before treatment.

Table 2: Mean scores, pooled variance and t-ratio between score of the students of experimental and control group in their objective type post-test performance

S. No.	Group	N	Mean Scores	Pooled Variance	t-Ratio	Level of Significance
1	Experimental	12	28.75			
2	Control	12	18.33	4.07	2.56	0.05
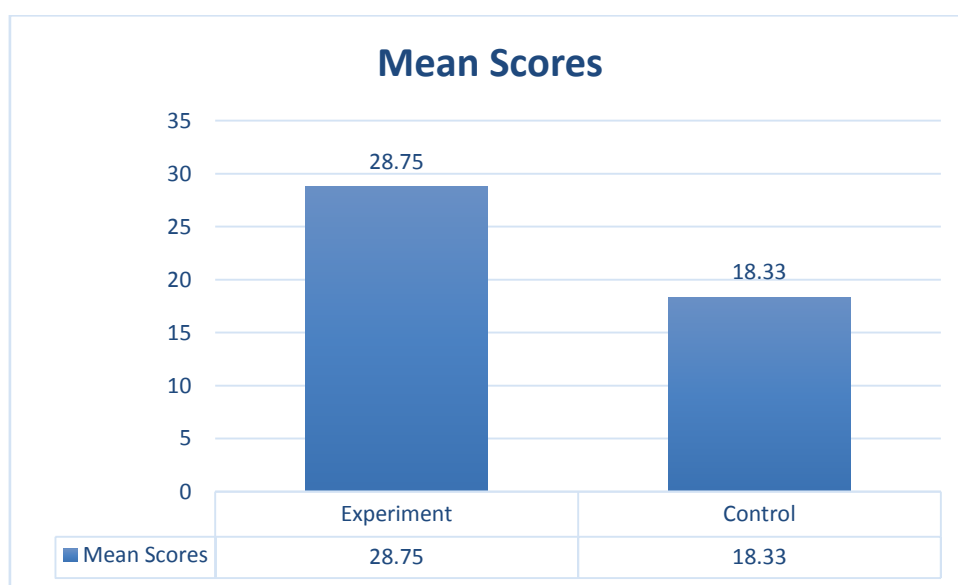
The table and graph shows that the observed mean scores of students of experimental group and control group are 28.75 and 18.33 respectively on objective type test of performance. It can be concluded that the mean scores of experimental group students are higher as compared to control group students. The 't'-value of comparison between means of the above group students is 2.56, which is significant at .05 level at 22 degree of freedom. Hence it can be inferred that there is significant difference between performance of experimental group students and control group students on objective type assessment after treating them with different teaching-learning approaches. Therefore the students teaching with constructivist approaches like concept mapping and discussion have higher performance than the students teaching with traditional approach i.e. lecture cum demonstration in their objective type achievement test.

Table 3: Mean scores, pooled variance and t-ratio between score of the students of experimental and control group in their essay type post-test performance

S. No.	Group	N	Mean Scores	Pooled Variance	t-Ratio	Level of Significance
1	Experimental	12	21.16			
2	Control	12	12.16	3.898	2.30	0.05
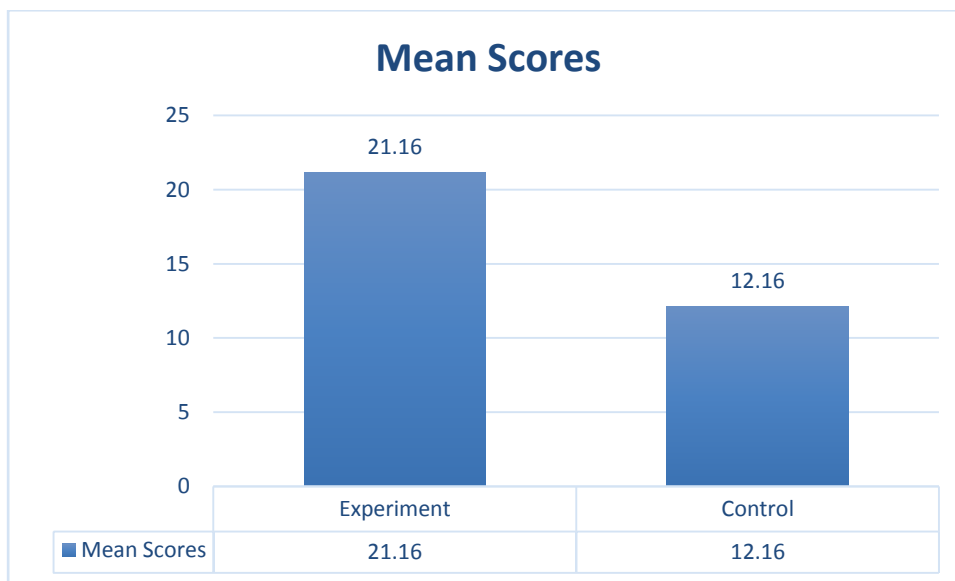
Mean Scores

Above table and graph indicatesthat the mean scores of experimental group students is 21.16 which are teaching with constructivist approach, whereas the mean scores of control group students is 12.16 which are teaching with traditional teaching-learning approach. The mean scores of experimental group students' performance are higher than the performance of control group students on essay type post-test.The 't'-value of comparison between these two mean scores of students is 2.30 on the essay type post-test. This 2.30 value is significant at .05 level of significance. Hence it can be concluded that there is significant difference between the performance of experimental group students and control group students on subjective assessment after treating them with two different approaches. Therefore the students which are treated with constructivist teaching-learning approach have significantly higher performance than the students treated with traditional approach on essay type test.

Table 4: Mean scores, pooled variance and t-ratio between score of the students of experimental and control group in their total performance

S. No.	Group	N	Mean Scores	Pooled Variance	t-Ratio	Level of Significance
1	Experimental	12	49.91			
2	Control	12	28	7.13	3.07	0.01
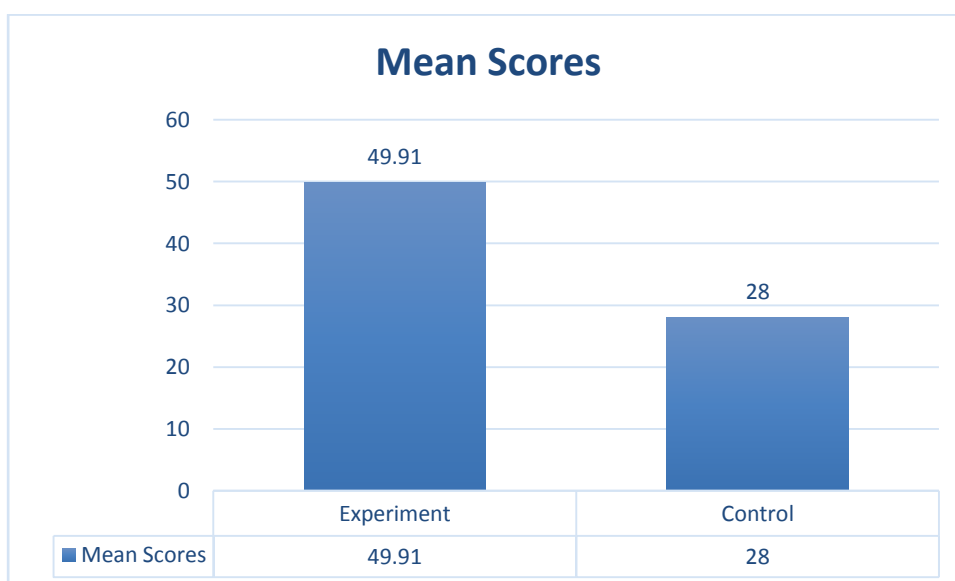
Mean Scores

The table envisages that the calculated mean score of experimental group students are 49.91 whereas the mean scores of control group students are 28 on their total performance of post-tests. The observed mean value of experimental group students are higher than that of the control group students.The 't'-value after

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comparison between means of experimental and control group is 3.07, which is significant at .01 level at 22 degree of freedom. Hence it can be inferred that there is significant difference between total performance of above two groups after teaching them with different teaching-learning approaches i.e. constructivist and traditional approaches. Therefore, it can be interpreted that students teaching with constructivist approach have higher performance than the students teaching with traditional approach of teaching and learning.

III. Findings
➢ There is no significant difference between performance of students related to experimental group and control group before providing them different treatment, because the experimental and control group students have almost same performance before treating them different teaching-learning approaches.
➢ There is significant difference between the objective-type, subjective-type and total performance of experiment group students and control group students after teaching them different teaching-learning approaches. The students taught with constructivist approach have higher performance than the students taught with traditional approach of teaching and learning.

IV. Conclusions
It was observed that the students treated the constructivist approach of teaching and learning have higher performance than the students teaching with traditional approach of teaching and learning whereas the students of both groups have similar performance before treating them to two different teaching-learning approaches.

Responses of the students which were treated with traditional teaching-learning approaches were less in number, mostly taken from text-books, repeated, concluded without reason, sometimes irrelevant, similar and not varied in nature, used bookish language and mostly based on memorization of concepts as presented in the text-books whereas responses of experimental group students who were treated with constructivist teaching-learning approaches reflected that their concepts were more in number, more clear understanding of the concept, able to relate concepts to environmental situation, able to link concept more clear and comprehensive in nature, varied, relate them with areas of life, differentiate concepts in different aspects, linked knowledge systematically to draw conclusion.

V. Implications
➢ Educational objectives should be based on the constructivist curriculum for school students and accordingly their evaluation system needs changes in the process and techniques of evaluation.
➢ There is need to suggest teaching-learning methods and techniques in a constructivist classroom for different social cultural environment.
➢ There is need to suggest programmes and guidelines for constructivist paradigm shift by the educationist and policy planners of educational system.
➢ There is need to prepare constructivist teacher educators and to organise seminar, workshops and programmes for preservice and in-service teacher education.
➢ There is need to modify our curriculum oriented teacher training to teacher oriented training especially in pre-service teacher education programmes.
➢ There is need to prepare constructivist teachers and trained them in constructivist teaching-learning approaches.

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