

Research Study on 5E Approach and Conventional Classroom Teaching On VIII Standard C.B.S.E. Students in Biological Science

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Abstract: This is a Quasi-experimental study; here the conventional method adopted for teaching biological science to class VIII C.B.S.E. students was compared with teaching them through an innovative 5E constructivist approach. In order to accomplish these, two groups were formed, namely experimental and control. A non randomized Pre-test and Post-test design was used in the present study, two sections of VIII standard students were selected as experimental and control group of total 80 students in the two sections of the class. The sampling design is Purposive cluster sampling, where in a class as a whole was considered without causing disturbance to the intactness. Experimental group was taught through the 5E approach developed by the investigator and control group was taught through the conventional method. Statistically “t” test was used to find out the difference. The result of 5E constructivist approach of teaching had positive effect on the achievement of students in biological science. Thus, teaching through the 5E constructivist approach is significantly effective than that of the conventional method of teaching in improving the achievement of VIII standard C.B.S.E. students of biological science.

I. OBJECTIVES

The objectives considered for the present study were:

1. To develop 5E approach based innovative lesson plans in biological science for selected unit Micro organisms: Friend and Foe of to VIII standard C.B.S.E. students.
2. To develop an achievement test for promoting the concept on Micro organisms: Friend and Foe unit among VIII standard C.B.S.E. students.
3. To study the effectiveness of 5E approach on the selected unit of VIII standard C.B.S.E. students achievement in biological science.
4. To compare the achievement of selected unit of VIII standard C.B.S.E. students with respect to 5E constructivist approach and conventional teaching in the subject of biological science.
5. To compare the mean gain achievement of two groups of C.B.S.E. learners on the unit Micro organisms: Friend and Foe in biological science when taught with conventional and 5E constructivist approach after the experimental treatment.

II. HYPOTHESES OF THE STUDY

The hypotheses were formulated taking the objectives into consideration. The hypotheses formulated were:

1. There is no significant difference in the Pre-test scores of the two groups of C.B.S.E. VIII standard student's on the achievement in biological science.

2. There is no significant difference in the Post-test scores of experimental and control group on the selected unit of VIII standard C.B.S.E. students taught with 5E constructivist innovative approach and conventional method of teaching on the achievement in biological science.
3. There is a significant difference in the mean and mean gain of conventional method of teaching and 5- E constructivist approach teaching on the achievement of the selected unit of VIII standard C.B.S.E. students in biological science.
4. There is a significant mean gain in the Pre-test and Post-test achievement of two groups of C.B.S.E. learners on the unit Micro organisms :Friend and Foe in biological science when taught with conventional and 5E constructivist approach after the experimental treatment.

III. METHODOLOGY AND PROCEDURE OF THE STUDY

Size of the sample: subjects of the study were the students of class VIII of Sri Venkateswara Bala Kuteer School, Shyamala Nagar, Guntur City, Guntur District, Andhra Pradesh, private English medium C.B.S.E. school, A.P. Two sections of total 80 VIII standard students were selected as 40 experimental and 40 control groups. 80 students in the class, with 22 girls and 18 boys in experimental group, 16 girls and 24 boys in control group respectively. Selection was done on the basis of the unit test marks conducted by the school subject teacher. Purposive cluster sampling technique was used.

Tool used for the study: For the present investigation, self made tool-Achievement test was prepared on the unit Micro organisms: Friend and Foe of biological science of VIII standard C.B.S.E. students and used in the study by the investigator to find the relative effectiveness of conventional method of teaching and 5E constructivist approach on the two group of learners of VIII standard C.B.S.E. students in biological science.

Design of the study:

S. No.	Stage	Control Group	Experiment Group
1.	Pre-testing	Achievement on the unit Micro organisms: Friend and Foe in biological science taught by their class teacher.	Achievement on the unit Micro organisms: Friend and Foe in biological science taught by their class teacher.
2.	Treatment	Teaching the unit Micro organisms: Friend and Foe in biological science by the investigator in the class through Conventional method.	Teaching the unit Micro organisms: Friend and Foe in biological science by the investigator in and out of the class through innovative 5E Constructive Approach.
3.	Post-testing	Measurement of achievement on Micro organisms: Friend and Foe unit in biological science.	Measurement of achievement on Micro organisms: Friend and Foe unit in biological science.

Study was carried out in three stages as follows.

Stage-1: Development of plans and try out of tool like achievement test and lesson plans for the unit Micro organisms: Friend and Foe in biological science for instruction and evaluation.

- ❖ **Conventional method of teaching:** After the selection of the content, the content analysis was done to identify the objectives and development of the lesson plan for conventional teaching for the unit Micro organisms: Friend and Foe in biological science for VIII standard C.B.S.E. students of control group by the investigator.
- ❖ **5-E Constructivist Approach based innovative teaching:** After the selection of the content, the content analysis was done to identify the objectives and development of the 5-E approach based lesson plan for 5E constructivist innovative teaching for the unit Micro organisms :Friend and Foe of biological science for VIII standard C.B.S.E. students of experiment group by the investigator.

Stage-2: The students of experimental and control groups were selected on the basis of their unit test marks conducted by the school achievement test which was administered on both the groups as Pre-test by the researcher where the students were taught by their subject teacher. Quasi experimental design was employed with a purposive sample in the form of two

intact sections of class VIII of the same school. 40 students of the experimental group were taught by the constructivist innovative 5E approach by the researcher and the 40 control group was also taught by the researcher (teacher educator) through conventional method of teaching taking the unit Micro organisms: Friend and Foe. The total duration of the implementation of the study to both the groups was 12 days.

Stage-3: Post achievement level of the students of experimental and control group were measured using the achievement test which was designed by the teacher educator (investigator). The achievement test was prepared by the investigator for the unit Micro organisms: Friend and Foe in biological science of VIII standard. The objectives of the achievement test comprised of knowledge, understanding, application and skill based. The test consisted of a total number of 16 items of 50 marks. It was administered to both the experimental and control group of the 80 students of VIII standard C.B.S.E. students of two sections of 40 experimental and 40 control groups to know the relative effectiveness of the 5E constructivist innovative based teaching over the conventional method of teaching.

IV. STATISTICAL ANALYSIS

The Mean, Standard Deviation, Critical Ratio were used to analyze the raw scores and to extract the findings. Both descriptive and inferential statistics were employed for the analysis of the data. The descriptive statistics and mean were used. Inferential statistics such as t-test was computed to find out the significance of differences on the achievement of experimental and control groups. Pre-test and Post-test scores of experimental and control groups were obtained through an achievement test on the unit Micro organisms: Friend and Foe which was analyzed and described by using descriptive and inferential statistics. The data was analyzed and described by using descriptive and inferential statistics.

Hypothesis 1:

1. There is no significant difference in the Pre-test scores of experimental and control group on the selected unit of VIII standard C.B.S.E. student's taught with conventional method on the achievement in biological science.

Table 1: Pre-test achievement scores of experimental and control group taught through the conventional method.

S.No.	Groups	Sample	Means	Standard deviation	"t" value
1.	Experimental	40	35.31	5.99	0.68
2.	Control	40	34.57	3.39	

Not significant at 0.01 level

The Pre-test scores of experimental and control groups were obtained through an achievement test on the unit Micro organisms: Friend and Foe taught by their class teacher and were analyzed and described by using descriptive and inferential statistics. The mean of pre-test scores of both the groups were computed and are presented in the table. From the data given in the table 1, it is inferred that there was no significant difference in the achievement scores on the unit Micro organisms: Friend and Foe of experimental and control group in the Pre-test i.e. before the experiment they were similar. The "t" test was employed and its value was 0.68. So, it is concluded that there was no significant difference in the Pre-test scores of experimental and control group on the selected unit of VIII standard C.B.S.E. student's taught by their class teacher on the achievement in biological science.

Hypothesis 2:

There is a significant difference in the Post-test scores of experimental and control group on the selected unit of VIII standard C.B.S.E. student's taught with 5E constructivist innovative approach and conventional method of teaching on the achievement in biological science.

Table 2: Post-test achievement scores of experimental and control group taught through the 5E constructivist innovative approach and conventional method of teaching.

S.No.	Groups	Sample	Means	Standard deviation	"t" value
1	Experimental	40	48.37	4.62	*5.45
2	Control	40	37.86	11.31	

**significant at 0.01 level*

The data presented in the table 2, shows that mean Post-test scores of the experimental group(48.37) is higher than the mean post-test scores of the control group(37.86) with a mean difference of (+10.51).It means, the mean gains for experimental group was higher than the control group in achievement scores on the unit Micro organisms :Friend and Foe. The obtained “t” value (*5.45) is found to be statistically positive and significant at 0.01 level of significance. So, the difference substantially is in favor of the experimental group to indicate that the VIII C.B.S.E. students’ achievement on Micro organisms: Friend and Foe unit was influenced positively and significantly by 5E constructivist innovative approach of teaching.

Hypothesis 3:

There is a significant difference in the conventional method of teaching and 5 E constructivist approach teaching in the mean gain achievement of the selected unit of VIII standard C.B.S.E. students in biological science.

Table 3: Mean and Mean gain achievement scores of experimental and control group taught through conventional method and 5E constructivist innovative approach

S. No.	Groups	Sample	Mean		Mean Gain
			Pre –test (1)	Post –test (2)	Mean gain achievement (2)-(1)
1.	Experimental	40	35.31	48.37	+13.06
2.	Control	40	34.57	37.86	+3.29

In the table 3, data was analyzed for the total achievement test scores for both the groups. The mean of pre-test scores were computed and presented in the table. The data presented shows positive mean gain achievement scores for the experimental group (+13.06). It was inferred that for the experimental group the mean of Post-test scores is higher than the mean of Pre-test scores, with a very high significant difference.

It was inferred that for the control group the mean of Post-test scores is higher than the mean Pre-test scores ,with a significant gain.(+3.29) The data shows that there is a significant gain in the achievement of the selected unit of VIII standard students in biological science. Hence, it is inferred that 5E constructivist innovative approach proves useful in teaching and learning.

Hypothesis 4:

There is a significant mean gain in the pre-test and post-test achievement of two groups of C.B.S.E. learners on the unit Micro organisms :Friend and Foe in biological science when taught with conventional and 5E constructivist approach after the experimental treatment.

Table 4: Mean and Mean gain achievement scores of experimental and control group taught through conventional method and 5E constructivist innovative approach after the experimental treatment.

S. No.	sample	Groups	Test	Mean	Standard deviation	Mean gain	“t” value
1.	40	Experimental	Pre -test	35.31	5.99	+13.06	10.97*
			Post -test	48.37	4.62		
2.	40	Control	Pre -test	34.57	3.39	+3.29	1.76
			Post -test	37.86	11.31		

*Significant at 0.01 level

In the table 4, data was analyzed for the total achievement test scores for both the groups after the experimental treatment. The mean of Pre-test scores and Post test scores of experimental group was computed, where the Post –test mean (48.37) is higher to the Pre-test mean (35.31) taught through 5Econstructivist innovative approach. The data presented shows

positive mean gain achievement (+13.06) for the experimental group. It was inferred that for the experimental group the mean of Post-test scores is higher than the mean Pre-test scores, with a very high significant difference as the “t” value is (10.97*) at 0.01 level of significance.

The control group Post-test mean (37.86) is higher than the mean of Pre-test (34.57). The data shows that there is a significant gain (+3.29) in the achievement of the selected unit of VIII standard students in biological science. It was inferred that for the control group, the mean of Post-test scores is higher than the mean Pre-test scores, with no significant difference at 0.01 level of significance as the “t” value is (1.76).

This indicates that teacher should teach the concept with more examples related to their daily life situation, use more teaching aids and teaching material, and have discussion session to enhance the learner’s ideas in the classroom.

Hence, it is inferred that 5E constructivist innovative approach proves useful in teaching and learning as the teaching is in and out of the classroom with the involvement of the student’s activities.

V. EDUCATIONAL IMPLICATIONS AND DISCUSSIONS

1. Pupil preferred group activities in which they had a scope to share their knowledge among peers and construct and reconstruct their knowledge.
2. In 5E constructivist approach teacher’s role is to encourage the learning and reflection process in the students. This type of teaching gives emphasis on spiral curriculum where they continuously reflect on their earlier learning experiences, student find their ideas gaining in complexity and power, and they develop increasing strong ability to integrate new information to the already learnt knowledge.
3. This 5 E constructivist approach gives freedom to discover, ask questions, etc. to the child and a number of learning experiences can be provided in this approach, where the child learns to construct his own knowledge through hands-on-experience activities earlier experience and so on. This is a child-centered and learner-centered where the children are given opportunity to explore and discover things on their own.
4. This type of innovative constructivist approach is taught inside and outside the classroom where the student is learning through his own experience adding new strategies, exposing to the environment and experiencing the reality.

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