CONSTRUCTIVISM BASED LEARNING STRATEGY IN ENHANCING THE SCIENCE PROCESS SKILLS OF THE STUDENTS OF SECONDARY SCHOOLING

Research Paper

ABSTRACT

The present study examines the effectiveness of constructivism based learning strategy in enhancing the science process skills of students. It made use of simple random sampling in selecting 50 students from 5 schools around Karaikudi, Sivagangai District. Data analysis involved the use of mean, S,D,t' test and correlation to investigate the difference between means. From the statistical findings it is concluded that the Constructivism Based Learning Strategy enhance the science process skills of the students and gender has no influence over it. There is also a significant relationship between science process skills and achievement in science of the students. Hence it is concluded that the strategy has a significant role in improving the process skills of the students.

INTRODUCTION

Integrated Science Curriculum - An introduction (NCERT 1982) states "A set of unique procedures are common to all the disciplines of science, they do not change with time. One can practise these processes as part of daily life. For this reason a science curriculum and teaching learning techniques must stress more on these processes than products of science". The knowledge of the product is useful in understanding the process of science and for concretizing the process. But understanding the process is useful both for daily life as well as in furthering scientific knowledge. Chisman and Pant (UNESCO 1969) declared that all the projects all over the world emphasize, children doing science and developing process (Intellectual and manipulative skills) rather than acquiring only encyclopaedia information. Hence an appropriate science teaching technique should focus on the developing process then on the products of science.

Constructivism is a combination of philosophical and psychological principles which argues that knowledge is constructed by an experience. It is basically a theory based on observation and scientific study about how people learn. It says that people construct their own knowledge and understanding of the world, through experiencing things and reflecting on those experiences. It clearly describes the formation of knowledge and skills of man through the processes of 'assimilation' and 'accommodation', where 'assimilation' incorporates the new experiences into an already existing framework without changing that framework 'Accommodation' is the process of reframing one's mental representation of the external world to fit new experiences. Apart from these, this theory has suggested a number of innovations to classroom practices. When we look at experience deeper, it is nothing but acquiring skills by an interaction. Constructivism in the classroom promotes active learning processes. Therefore, the investigator felt it is necessary to find out the effectiveness of constructivism based learning approach in enhancing science process skills at the secondary level.

SIGNIFICANCE OF THE STUDY

Today's learners have to be competent to face the different challenges in their future. The learner's knowledge with the expected skills projects them to be employable. These skills can be inculcated and strengthened through

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different strategies of learning. Constructivism is an approach which provides opportunities to the learners to construct and develop knowledge on their own. Major focus in constructivism is towards the development of the various skills through different strategies. This approach is focused towards the process rather than the product. Before the application of any new strategy in the existing system of education it needs empirical verification. Hence, it is essential to study the efficacy of the constructivism approach in enhancing science process skills among the secondary school learners in order to establish its empirical validity.

OBJECTIVES OF THE STUDY

- To find out the effectiveness of constructivism based learning approach in enhancing science process skills of the secondary students.
- To find out if there is any significant difference between boys and girls in the mean scores of science process skills.
- To find out if there is any significant difference between the students who scored below 50 marks and the students who scored above 50 marks in science process skills.
- To find out the relationship between science process skills and achievement in science of secondary school students.

METHODOLOGY

The investigator used the experimental method for the present investigation in which the single group experimental design was employed to find out the effectiveness of constructivism based learning approach in enhancing science process skills of secondary schooling children.

SAMPLE

A total of 50 students studying IX standard in schools around Karaikudi constitute the sample of the present study. Ten students each from five schools were randomly selected with the inclusion of variables and objectives.

TOOLS

1. A questionnaire of "test for science process" at secondary level (pre test and post test)
2. Standardised constructivists 5 E model approach developed by RUGGERIO was used as an approach.
3. The quarterly marks of the students were considered for achievement in the science subject.

STATISTICAL TECHNIQUES

Statistical techniques such as mean, standard deviation, 't' test and Pearson product moment correlation were used for arriving at empirical findings.

ANALYSIS AND DISCUSSION

Hypothesis – 1

There is no significant difference between pre test and post test scores of the students in science process skills.

Table 1

DIFFERENCE BETWEEN PRE - TEST AND POST - TEST SCORES OF THE STUDENTS IN SCIENCE PROCESS SKILLS

S. No	Science Process Skills	Pre test		Post test		Calculated 't' value	Remark at .05% level
		Mean	SD	Mean	SD		
1	Observing	33.7	3.26	42.96	2.66	7.42	S
2	Comparing	35.66	3.17	43	2.72	8.64	S
3	Classifying	26.42	3.37	47.6	1.73	39.19	S
4	Quantifying	22.98	5.2	45.32	2.68	30.37	S
5	Hypothesizing	27.38	4.06	47.14	1.67	38.87	S
6	Experimenting	30.41	4.15	47.52	3.52	43.87	S
7	Measuring	25.48	3.09	46.28	2.48	46.79	S
8	Inferring	20.94	3.37	44.72	2.72	43.97	S
9	Predicting	22.98	5.25	45.34	2.68	30.37	S

(At 0.05% level of significance, df = 48, the table value of 't' is 2.00)

The difference between pre test and post test scores of the total sample was calculated through 't' test. Since there is significant difference between pre test scores and post test scores of the students in all the selected skills, it is inferred that constructivism based learning strategy improves science process skills among the students.

Hypothesis – 2

There is no significant difference between boys and girls in the scores of science process skills through constructivism based learning strategy.

Table 2

DIFFERENCE BETWEEN BOYS AND GIRLS IN THE SCORES OF SCIENCE PROCESS SKILLS THROUGH CONSTRUCTIVISM BASED LEARNING STRATEGY

S.No	Gender	N	Mean	SD	Calculated 't' value	Remarks
1	Boys	25	41.45	6.15	1.1	NS
2	Girls	25	42.82	6.16		

(At 0.05% level of significance, df =48, the table value of 't' is 2.00)

It is inferred from the above table that there is no significant difference between boys and girls students in the enhancement of science process skills. Hence it is concluded that constructivism based learning approach enhances the science process skills without gender influence.

Hypothesis – 3

There is no significant difference between the students who scored above 50 marks and those who scored below 50 marks in the science subject in the mean scores of science process skills through constructivism based learning strategy.

Table 3

DIFFERENCE BETWEEN THE STUDENTS WHO SCORED ABOVE 50 MARKS AND THOSE WHO SCORED BELOW 50 MARKS IN THE SCIENCE SUBJECT IN THE MEAN SCORES OF SCIENCE PROCESS SKILLS THROUGH CONSTRUCTIVISM BASED LEARNING STRATEGY

S.No	Group	N	Mean	S.D	Calculated 't' value	Remark
1	Students who secured below 50 in science	25	41.43	2.8	0.93	NS
2	Students who secured above 50 in science	25	42.25	3.41		

(At 0.05% level of significance, df=48, the table value of 't' is 2.00)

It is inferred from the above table that there is no significant difference between students who scored above 50 and those who scored below 50 marks in science subject in science process skills. Hence it is concluded from the statistical information that constructivism based learning approach influences in enhancing science process skills among low achievers in science too.

Hypothesis - 4

There is no significant relationship between science process skills and students' achievement in science subject.

Table 4

RELATIONSHIP BETWEEN SCIENCE PROCESS SKILLS AND STUDENTS' ACHIEVEMENT IN SCIENCE SUBJECT

S.No	N	Σx	Σy	Calculated 'r' value	Remarks
1	50	718	3584	0.349	S

(At 0.05% level of significance, df= 48, the table value of 'r' is 0.273)

It is inferred from the above table that there is a significant relationship between science process skills and achievement in science. Hence, it is believed that science process skills have an influence in the achievement of the students in science subject.

FINDINGS

- Constructivism based learning strategy enhances the science process skills among the secondary learners.
- Gender has no influence in enhancing science process skills through constructivism based learning approach.
- There is no significant difference between high and low achievers in science subject which indicates that constructivism based learning approach has an influence in enhancing science process skills among low achievers too.
- Science process skills and achievement in science of the students have significant relationship between each other. Hence, it is concluded that enhancement in science process skills is equally proportionate to achievement in the science subject.

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It is evident from the above table that the Tamil and English medium students do not differ significantly in their awareness of Chemistry laboratory safety practices. Medium does not play a role in creating awareness of safety practices. Hence hypothesis 3 has to be accepted.

FINDINGS

- There is no significant difference between government and corporation school XI standard students in their awareness of Chemistry laboratory safety practices.
- Comparing the knowledge of Chemistry laboratory safety practices of XI standard boys with that of girl students, boys have higher mean value of 45% whereas the mean value of the girls is only 43%. This may be due to the fact that boys are more responsible, regular and clear about safety practices.
- Comparing the knowledge of Chemistry laboratory safety practices of Tamil and English medium students, surprisingly they both have same amount of knowledge in this subject which is also found to be very low.

1.15 CONCLUSION

This paper deals with the statistical analysis like mean and t-value in finding the significant difference between gender, type of school, medium of instruction of the students regarding awareness of safety practices. Pupils must be made aware of hazards involved in any experiment they do and in the interest of both safety and efficiency, be taught to work systematically.

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