



Study of the Effectiveness of Constructivist Teaching Approach on Academic Achievement of Biology Subject

¹Dinesh Chand Gupta, ²Dr. Rajani Chopra

¹ Research Scholar, Department of Education, Suresh Gyan Vihar University, Jaipur

² Supervisor, Department of Education, Suresh Gyan Vihar University, Jaipur

Abstract

Through the presented research, the effectiveness of constructivist teaching approach on the academic achievement of biology subject of senior secondary level students has been studied. The experimental research technique has been employed as the research method in the work that has been provided. As a sample for the research study, 45 students of Class 11 Biology subject from Gangapur city of Rajasthan state were selected. A self-made BAT Questionnaire consisting of 35 multiple choice questions was used to collect quantitative data. After analysis of quantitative data, it was found that there is a significant difference between the means of pre-test and post-test of BAT of class 11 students at 0.05 significance level. This makes it clear that constructivist teaching approach has an impact on the academic achievement of class 11 students. After the analysis of qualitative data, the same conclusion was reached that students learn certain concepts of biology effectively with the help of constructivist teaching approach and they find it

easy and interesting to learn them in this way and the knowledge learned remains permanent for a relatively longer period of time. Overall, this research study concludes that constructivist teaching approach has a positive impact on the academic achievement of biology subject of senior secondary level students.

Key words: Constructivist teaching approach, academic achievement, effectiveness.

Introduction

Constructivism is interpreted from different perspectives in different fields. In the field of education, the meaning of constructivism includes learning ideas, teaching and scientific knowledge (Matthews, 1999). Constructivism is a type of epistemology, which describes the nature of knowledge and the method of acquiring it from a specific perspective. Constructivism believes that knowledge is not objective but knowledge is subjective, which is created by the person himself

(Harnard, 1982). According to the constructivist learning ideology, before learning new ideas, the learner tests them on the basis of the pre-established ideas present in him. If these new ideas match his previous ideas, then he learns them quickly and if these ideas are in conflict with the pre-established ideas. If the ideas do not match, the learner faces difficulty in learning these ideas (Colburn, 2003).

There are several constructivist methods, with two main branches: those based on psychological theories of learning (Fosnot, 1996) and those based on philosophical theories of learning (Von Glaserfeld, 1996). These ideas tried to provide an explanation for constructivism as a human learning theory. According to science educator Bentley (1996), radical constructivism and social contextual constructivism are the most well-known. According to Loving (1997), a different science instructor, constructivism comes in several forms, ranging from the personal to the radical to the social to the critical. Constructivism is social or cognitive, according to Fosnot (1996), however Stahl and Casteel (1997) supported it from an information constructivist standpoint.

The National Curriculum Framework - 2005 (NCF,2005), developed for school education in India by the National Council of Educational Research and Training, places a strong emphasis on the constructivist understanding of teaching and learning. A child's life in school and life outside of it should be integrated, according to the NCF (2005), because a child's bookish knowledge or learning might cause a divide between the home, community, and school. This study aimed to compare constructivist teaching tactics to traditional teaching strategies in order to determine which was more successful for meaningful learning in any subject area. One method that can help all students produce and communicate actual information in a range of contexts is constructivist learning.

Review of Related Literature

Correspondence: Dr. Rajni Chopra, Department of Education, Suresh Gyan Vihar University, Jaipur

Corresponding author. E-mail addresses: rajni.cjopra@mygyanvihar.com

- Andhale, Bhausahab Sopan (2022) studied on the impact of a constructivist approach on seventh-grade students' academic achievement in history. The study's goals were to examine the constructivist approach, create a lesson plan for seventh-grade history students using this method, and compare the pre- and post-test results of the groups based on the constructivist approach for improving academic achievement in history among seventh-grade students. The study's conclusion showed that posttest respondents thought the constructivist approach to improving historical achievement among seventh-standard students was superior than the pre-test approach. There is a little difference in the mean pre-test scores between the experimental and control groups.
- Beura, Mihir Kumar (2021) studied on A quasi-experimental study examining the efficacy of the constructivist approach in teaching mensuration at the secondary school level. Using a quasi-experimental methodology and the 5Es paradigm, this study aims to quantify the constructivist approach's efficacy using the Mensuration Achievement Test (MAT). The findings demonstrated that using a constructivist teaching style had a favorable impact on students' academic performance and increased their level of interest and motivation throughout the trial. It is clear that the constructivist approach to education is a more suitable and successful way to teach, and it also helps pupils become more intelligent and creative.

Objective

- To study the effectiveness of constructivist teaching approach on the academic achievement of biology subject of senior secondary level students.

Hypothesis

- There is no significant difference between the mean score of pre-test and post-test scores of academic achievement of biology subject of senior secondary level students when taught with the help of constructivist teaching approach.

Research methodology

Experimental method has been used in the presented study. In the presented research study, students of class 11 Biology subject of Gangapur City have been included as the population. For the sample, 45 students of class 11 were selected on whom pre and post-test were conducted.

Research Tool

While developing the Biology Achievement Test, a primary draft of a questionnaire consisting of 65 questions was first prepared. With the help of subject experts, necessary improvements were made in the primary draft of the questionnaire, a secondary draft of the questionnaire consisting of 50 questions was prepared by removing some questions from it and adding some new questions. The secondary format of BAT (Biology Achievement Test) was administered to 130 students of Biology subject of class 11 and data was collected to determine the difficulty level of each question. As a result, a final BAT consisting of 35 questions was obtained. The 35 multiple-choice questions on a self-made biology accomplishment exam questionnaire were utilised to gather quantitative data for the research project that is being presented.

To assure the validity of the Biology Achievement Test, the researcher collaborated with subject matter experts during its creation. The test-retest technique was used to assess the reliability of 60 Biology class 11 students in a senior high school. The results showed that the reliability was 0.76. For every right response on

the biology accomplishment question, students received one mark, and for every incorrect response, they received zero. Ten students participated in unstructured interviews to gather qualitative data, which helped to better elucidate the quantitative data.

Procedure of Research

The research was implemented in the four stages that follow –

- In this phase of research implementation, BAT was administered to all 45 members of the group and data was collected.
- In this phase of research implementation, all the members of the group were given the opportunity to learn some concepts of biology like soil erosion, causes of soil erosion and its prevention for 1 hour every day for 16 days With the assistance of constructivist teaching approach.
- In this final step, data was collected by again administering the BAT to all the group members.

Analysis and Interpretation of data

The experimental research technique has been employed as the research method in the work that has been provided. A self-made biology accomplishment exam questionnaire with 35 multiple-choice questions was used to get quantitative data from students. Ten students were interviewed informally to gather qualitative data, which helped to further elucidate the quantitative data's conclusions. In the current study, certain analytical techniques were used to examine the qualitative data while the mean, standard deviation, product moment correlation, and t-test were used to analyse the quantitative data.

The quantitative data obtained in the presented research has been analyzed using the above

statistical techniques and then discussed as follows:

Test	N	M	SD	'r' value	df	't' value	Level of significance
Pre-test	45	12.37	2.07	0.30	44	18.52	Significant
Post-test	45	24.71	4.63				

Analysis & Interpretation

Through analysis of the aforementioned table, it can be ascertained that the members of the chosen group had pre-test mean scores of 12.37 and 2.07, respectively, and post-test mean and SD of 24.71 and 4.63, respectively. The coefficient of correlation between the individuals of the two groups' scores is 0.30. At the 0.05 significance level, the t test value between the two tests is 18.53, which is greater than the 44 degrees of freedom tabulation value of 2.014. Consequently, our null hypothesis—that there is no discernible change in the means of the academic success scores on the pre- and post-tests for biology among SSC students—is rejected. Since the null hypothesis is disproved, we may conclude that, when SSC biology students are taught using a constructivist teaching technique, there is a substantial difference between the means of the pre- and post-test scores of academic attainment.

Educational Implications

The significance of educators disseminating knowledge creation has been highlighted in the National Curriculum Framework, 2005. Students actively create their own understanding based on previously held beliefs and now available resources. As a result, while teaching scientific subjects, techniques that include students'

interests, skills, needs, and prior knowledge should be used. Experiences should be prioritised together with the actions they led. Because the constructivist teaching method is based on this idea, it can be used to the teaching of science additionally other disciplines at all educational levels, making the process of learning new material both engaging and simple. In comparison, knowledge ought to be more durable.

Conclusion

The researcher's investigation of both quantitative and qualitative data connected to the issue led to the following conclusions:

- A notable change exists between the group of participants' pre- and post-test means, suggesting that the constructivist teaching style enhances biology instruction.
- Constructivist education helps students understand a variety of biological concepts in an efficient manner.
- Learning becomes simple and efficient with this technique as Students are offered the opportunity to learn based on their own experiences.
- To sum up, this research indicates that the use of constructivist teaching methods improves

senior secondary biology students' academic performance.

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