

CHAPTER - V

FINDINGS, DISCUSSIONS, SUMMARY, IMPLICATION, SUGGESTIONS AND CONCLUSION

5.0.0 INTRODUCTION

The results, summary, implications and conclusions presented in the current chapter are based on the previous chapter. The chapter four presented data analysis, results and interpretations. Objective-wise interpretation of results and the related discussions are presented, below, under different headings in this chapter. Summary, implications and suggestions for further studies are also being part of this chapter.

Objective-wise findings and interpretation of results with discussions have been presented in this section under different sub-headings.

5.1.0 FINDINGS OF THE STUDY

Objective-wise findings are presented in Chapter – IV, under different sub-headings. Findings flow from the interpretation of data presented in the previous chapter. Findings of the present study are presented, below.

1. The Learning Progression of Students of Experimental group is higher than that of Control group students of class IX of Balangir district, Odisha.
2. The Attitude towards Science of Students of Experimental group is nearly Similar to that of Control group students of class IX of Balangir district, Odisha.
3. There is a significant effect of Treatment (Constructivist Approach) on Achievement in Science of Class IX students as compared to traditional method.
4. There is a no significant effect of Gender on Achievement in Science Subject of Class IX students.
5. There is no significant interaction effect of Treatment and Gender on Achievement in Science Subject of Class IX students.

5.2.0 LEARNING PROGRESSION IN SCIENCE OF CLASS IX STUDENTS

Learning progressions are ordered descriptions of students' understanding of a given concept. In this paper, we describe the iterative process of developing a force and motion learning progression and associated assessment items Alicia c. Alonzo & jeffrey t. Steedle (2008). Fensham, P. (1994) said that, progression in school science

curriculum: A rational prospect or a chimera-*Research in Science Education*, states that, Science in schooling has for the first time been recently considered as a verified whole for the 10 or 12 of its compulsory years, rather than for a limited sector of schooling or for a particular group of students. This has also been occurring as part of a wider review and plan for the whole curriculum of schooling. John T. Avella, Mansureh Kebritchi, Sandra G. Nunn, Therese Kanai, in their study, “*Learning Analytics Methods, Benefits, and Challenges in Higher Education: A Systematic Literature Review*” found that Higher education for the 21st century continues to promote discoveries in the field through learning analytics (LA). Ojha, N.C., Arya, R. & Shekhar, R. (2015) investigate Constructive approach and traditional approach of teaching english to class vi in terms of achievement: a comparative study. *Pedagogy of Learning*, The objectives of the study were to find the “*effectiveness of the constructivist approach in terms of the achievement in English*”. *Constructivist classroom activities for Biology learning*. In his study he states that - Constructivism is buzz word widely used in paradigm of teaching-learning. Constructivism emphasises how the learner constructs knowledge from experience, which is unique to each individual. In the present paper the areas of discussion are 1) historical background of constructivism and its importance. 2) Role of mentor and learner in constructivist science classroom. 3) An attempt is made to prepare a lesson plan for science teachers based on 5E’s model (one of the models of constructivism) on the topic ‘Images formed by concave lenses. This sample lesson plan will facilitate the science teachers in the implementation of constructivism in their classroom. The results of the present investigation are an outcome of the comparison of two types of methods used to teach the students those are Constructivist Approach and Traditional method of teaching. Consequently, it may be concluded that Constructivist Approach used as a teaching strategy led to the results observed in this study.

5.3.0 ATTITUDE TOWARDS SCIENCE OF CLASS IX STUDENTS

The Constructivist Approach was found to be ineffective in terms of Attitude towards Science of Students with Attitude scores. This finding was supported by Lamar (2014). Lamar (2014) The investigator among other things in this study finds that educational level of Students is not essentially a dominant factor in religiosity and that as the educational level of the Students increases their modernization also increases. The educational level of Students is not a dominant factor in science attitude. The

educational levels of Students did not play a dominant role in the development of science attitude of their children. Freeman (1997) investigates the relationship of Attitude towards Science with Achievement in Science. The analyses of the data express that there was a no significant correlation of student Attitude towards Science with their Achievement. It was concluded that Achievement in Science was affected by Attitude towards Science Williams, Kumari Shanta, Sarah (1983) did a study of the *Attitude of high school pupils towards General Science and its relationship with achievement in subject*. The result reveals that pupils 'achievement was poor in general science. The attitude of high school pupils towards science and science education in Tamil Nadu was generally favourable but there was a wide disparity. The results of the present investigation are an outcome of the comparison of Attitudes of students towards Science between two groups of students studying through different methods those are Constructivist Approach and Traditional method of teaching. Consequently, it may be concluded that Constructivist Approach and the Traditional Method of Teaching used as teaching strategies led to the results observed in this study. Therefore, it may be stated that Attitude of Students towards Science was independent of their achievement in Science.

5.4.0 EFFECT OF TREATMENT ON ACHIEVEMENT IN SCIENCE OF CLASS IX STUDENTS

The effect of Treatment on Achievement in Science of Class IX students was found significant by taking their Previous year scores of Achievements in Science as a covariate. Therefore, it may be said that Constructivist Approach made a significant difference in the Achievement in Science of Class IX students. The study by Alonzo, A. C., & Steedle, J. (2009) supported this finding. Interactive process of developing a force and motion learning progression and associated assessment items. We report on a pair of studies designed to explore the diagnosis of students' learning progression levels. First, they compare the use of ordered multiple-choice (OMC) and open-ended (OE) items for assessing students relative to the learning progression. OMC items appear to provide more precise diagnoses of students' learning progression levels and to be more valid, eliciting students' conceptions more similarly to cognitive interviews. Second, they explore evidence bearing on two challenges concerning reliability and validity of level diagnoses: the consistency with which students respond to items set in different contexts and the ways in which students interpret and use language in responding to items. As predicted, students do not respond consistently to similar

problems set in different contexts. Students were taught through Constructivist Approach, constantly, throughout the interventions to make conscious improvements. After forty-five days of interventions, a significant difference was observed when compared to the Control group of the study. Therefore, it may be stated that Constructivist Approach made a significant difference in the Achievement in Science of Class IX students as compared to Traditional method of teaching.

5.4.1 Effect of Gender on Achievement in Science of Class IX Students

The effect of Gender on Achievement in Science of Class IX students was not found significant when their previous year scores of Achievement in Science was taken as covariate. This finding was supported by McComack and McLead (1988) did not find any sex, difference among university students and their course grades, aptitudes and high school averages. Binaimah (1989) found that the 2nd grade students demonstrated no sex difference in achievement level, classroom participations and career expectations. The sex difference, however, emerged by 6th grade. Fridler and Tamir (1990) analyzed 40 studies published between 1982-1987. They concluded that (a) in elementary school there was no sex difference, (b) sex difference in achievement existed at the end of Junior High School, (c) boys achieved higher than girls in physics in senior school stage, (a) girls were more oriented toward Biology and Botany and boys toward Physics and Zoology, (e) girls had more positive attitude toward practical work. Rose et al. (1996) found no significant interaction between gender, SAT score and study practices among 72 male and 125 female undergraduates. Another study by Livesey and Intili (1996) reported that boys performed better than girls in problem solving when cues were provided but not when cues were absent. In sum, it may be stated that the area of sex difference in achievement is full of contradictory findings. The obtained results seem to vary with the changing psychosocial, demographical and attitudinal parameters of the sample. It seems impossible to draw a categorical conclusion from it. Therefore, it may be said that Gender did not produce a significant differential effect on the Achievement in Science of Class IX students when their previous year scores of Achievement in Science was taken as covariate.

5.4.2 Interaction of Treatment and Gender on Achievement in Science of Class IX Students

The interaction between Treatment and Genders on Achievement in Science of Class IX students was not found to be significant when their previous year scores of

Achievement in Science was considered as covariate. The results indicated that the Boy and Girl Students were benefitted to the same extent with the both modes of teaching. Gender was not noticed in the said interaction of. But, the mean Achievement scores of Students with different Genders of Experimental group were higher than the mean Achievement scores of Students with different Genders of Control group. The mean Achievement in Science of Girl Students of Experimental group was higher than the Boy Students belonging to Control group. The mean Achievement of the Students did not differ much. Therefore, it can be said that the effect of Treatment on Achievement in Science language is independent of the Genders of students. This result shows that no significant interactional effect of Treatment and Gender was found in the present study.

5.5.0 TO SUM UP

5.5.1 INTRODUCTION

Learning is a process through which child acquire new modes of behavior or change in the existing mode of behavior. Changes in behavior that are brought by physical maturation or growth do not fall under learning. Learning is what we acquire through efforts after birth. We know, we feel and we do and in three domains (cognitive, affective and psychomotor) of behavior, change occur due to learning. In other words, we can get new knowledge, form attitude and master in skill through learning. In essence of learning, three basic assumptions are held to be true. First, learning can visualize by a change in behavior. Second, the environment shapes behavior. And third, the cause and reinforcement are central to explaining the learning process.

5.5.2 STATEMENT OF THE PROBLEM

A Study of Learning Progression in Science of Class IX students of Balangir District, Odisha.

5.5.3 RATIONAL OF THE STUDY

Khan, S. H. (2014) said cognitive constructivism-based strategy in science developed and tried out by the investigator could help the students in their understanding the science concepts with better clarity. The incorporation of cognitive constructivists views in the development of the strategy material enhances the students' skills like reading, thinking, questioning, sharing, understanding and reproduction. The cognitive

constructivism-based learning strategy in science helps teachers also to apply the same in their day-to-day teaching process and also enable them to prepare the learning packages in other topics of science. The text book writers, curriculum planners and policy makers in education in general could be benefited much from the findings of this research. The newly developed cognitive constructivism-based learning strategy maximizes the chances for learning by doing. This strategy enhances the science process skills and as an effect of that the scientific way of thinking is promoted among the learners. The strategy gives technological orientation to the learners.

Alicia c. Alonzo & jeffrey t. Steedle (2008). was made to study the effectiveness Learning Progression through constructivist approach in Indian context at secondary school level to find out whether this method would improve the students understanding of nature of science, demonstrate a superior understanding of basic science concepts, use and understand basic processes of science better, can apply science concepts and processes in new situations, have more positive attitudes of science, science study and science teachers, develop better science process skill including observing, reasoning, inferring, interpreting, proposing solutions, and predicting consequences, have more complete views of the nature of science.

Attitude towards science, according to **Sekar and Mani (2013)** refers to the "disposition of mind for or against scientists, scientific activity and learning of science" and has predominantly affective orientation. On the other hand, scientific attitude is "the cognitive attitude or belief about thinking and has also affective and behavioural aspects" **Freeman (1997)**. Around 20 scientific attitudes namely; empiricism, determinism, a belief that problems have solutions, parsimony, scientific manipulation, skepticism, precision, respect for paradigm, a respect for power of theoretical structure, willingness to change opinion, loyalty to reality, aversion to superstition and an automatic preference for scientific explanation, a thirst for knowledge, an "intellectual drive", suspended judgment, awareness of assumptions, ability to separate fundamental concepts from the irrelevant or unimportant, respect for quantification and appreciation of mathematics, an appreciation of probability and statistics, an understanding that knowledge has tolerance limit and empathy for the human condition by **Lamar (2014)**.

So, the present study has a great need and significance for the development of students with the help of ICT integration in the classroom. It helps both the teacher and student

in preparation for teaching and learning. It enables to apply different strategies and tools for the development of teaching learning outcomes. This study will enable us to know how Learning Progression helps to enhance the learning outcomes of students in biological science classroom. It will also help to know about the effectiveness of teaching with Constructivism in achieving students learning competencies and capabilities. To the researcher's knowledge there are limited number of studies focused on Learning Progression at secondary level and if done not in investigator's area. So, the investigator decided to undertake the study.

5.5.4 OBJECTIVES

1. To study the learning progression in science of class ix students of Bolangir district.
2. To study the attitude towards science of class ix students of Bolangir district.
3. To study effect of treatment, gender and their interaction on achievement in science of class ix students of Bolangir district by taking their previous year Achievement in Science as covariate.

5.5.5 HYPOTHESIS

1. There will be no significant effect of Treatment on Achievement in Science of Class IX students when their previous year score of Achievement in Science was taken as covariate
2. There will be no significant effect of Gender on Achievement in Science of class IX students when previous years' Science score is taken as covariate
3. There will be no significant interaction of Treatment and Gender on Achievement in Science of class IX students when previous years' Science score is taken as covariate

5.5.6 METHODOLOGY

In the present study, Experimental design was employed where Non-equivalent control group design was employed for the study.

5.5.7 DESIGN

The experimental-design is most important in experimental research work, in which conclusions can be derived from the observed data through systematic analysis. Thus, the selection of the experimental strategy was planned systematically. In the present study effectiveness of independent variable, method of teaching (two levels): (1) Constructivist teaching method (2) traditional teaching method was required to be checked on dependent variable (achievement), thus the researcher decided to use two groups post-test design. Science Attitude Scale developed by Dr. (Mrs) Avinash Grewal (1984) was selected for the present study to measure Attitude towards Science.

5.5.8 SAMPLE

As the present study was experimental one, the researcher had decided to select one school from the population. The researcher selected stratified random sampling technique in the selection of school. One school of Bolangir city was selected for the present study: Odisha Adarsha Vidyalaya, Muribahal for the experiment.

5.5.9 TOOL

The present study used the following tools and measures.

1. Academic Achievement Test.
2. A test of measuring Attitude towards Science.

The Achievement test in Science was developed by the investigator. Science Attitude Scale developed by Dr. (Mrs) Avinash Grewal (1984) was selected for the present study to measure Attitude towards Science.

5.5.10 PROCEDURE OF DATA COLLECTION

The data collection was done basically in three ways, that are as follows-

1. Achievement test was conducted to see the learning progression in science in both the section of class IX. Section A was control group students and section B was experimental in design where controlled group was taught in traditional teaching while experimental group was taught by special content in science (constructivist teaching method). 100 marks questions including MCQs, true-false statements, fill in the blanks questions and match the pair questions. Test was given parallel to

both the groups. Tests was evaluated by the researcher and marks were given to each answer paper and data was collected.

2. "Science Attitude Scale" developed by Dr. (Mrs) Avinash Grewal (1984) was selected for the present study to measure Attitude towards Science. After the detailed about the paper instructed to students of both the sections of class 9 were given responses in 15 minutes. Researcher later evaluate the scoring as per the guidelines and data was collected.
3. The annual examination marks of standard eight of science subjects of the sample, which were collected from the school before the experiment with the permission of the head of the school. Marks were collected for control group and experimental group students. The said scores were considered as the pre-achievement of the sample.

5.5.11 STATISTICAL TECHNIQUE

1. Mean
2. Standard deviation
3. Percentile
4. Coefficient of variation
5. 2 X 2 factorial designed ANCOVA of unique size will be used for the analysis of data.

5.5.12 FINDING

The finding from the research are The Learning Progression of student taught trough the Constructivist Approach was higher than the students taught through the Traditional Method of Teaching, The Attitude towards Science of students taught trough the Constructivist Approach was nearly similar to the students taught through the Traditional Method of Teaching, There is a significant effect of Treatment (Constructive Teaching) on Achievement in Science Subject of Class IX students as compared to traditional method, There is no significant effect of Gender on Achievement in Science Subject of Class IX students and There is no significant interaction effect of Treatment and Gender on Achievement in Science Subject of Class IX students. From the interpretation of results, we can conclude that The Treatment is effective for the Progress of Student ignoring their Gender.

5.6.0 IMPLICATIONS

The implications of this study are for direct class room teaching as well as for the teacher education programme. Some of the major implications visualized are as follows.

- The strategies used, in this study, may be used by the class room teacher in teaching different subjects other than Science.
- The components used in this study may be used, separately or combined, for teaching Subjects other than Science.
- The lessons developed, in this study, may be used by the teacher of Science.
- Teacher should be trained to develop instructional material on the lines of the lesson plans presented in this study.
- Teachers should be trained to teach through the constructivist approach. These lesson plans may be used as models for imparting training to the teachers as well as to the teacher-educators.

5.7.0 SUGGESTIONS FOR FURTHER STUDIES

Taking into Consideration the Present studies and its findings, the following studies may further be conducted

- ❖ The study may be conducted by taking the different samples of different classes of different level taking into consideration the other cognitive and psychomotor variables.
- ❖ Studies may be conducted in e-content, developed by different agencies for starting its effectiveness.
- ❖ Studies may be conducted for making comparisons of different methods by taking selected variables.
- ❖ Studies may be conducted in the area of inclusive education and studying the effectiveness of this approach in terms of Cognitive and other demographic variables.
- ❖ Studies may be conducted Including learning style as an independent variable with Gender and Treatment.
- ❖ Studies may be conducted using different treatments other than Constructive approach.
- ❖ Inclusion of other mental health variables such as, self-esteem, self-concept etc.

may enrich the understanding of the phenomenon, presently studied.

- ❖ *Cross-cultural differences and regional differences can be studied in relation to the present problem since the cultural differences may influence the shaping of one's gender role identity as well as its impact on achievement performance.*
- ❖ *Inclusion of other socio-economic levels like lower and higher income groups may bring interesting differences in the obtained results, since gender role development and its operation may be different for these social groups.*
- ❖ *Study habit is an important factor while studying the academic achievement of an individual. There are many researches works available taking the study habit and academic performance together.*

5.8.0 CONCLUSION

This study attempts to know the effect of Constructive Approach on Student's Learning, to calculate their progress in learning, to know if there is any deference in their Attitude towards Science and if Gender of a student affects its achievement or not. Constructivist approach is effective in improving the achievement in the subject concerned. It was also experienced during the study that this approach was not only effective in cognitive development but also effective in interpersonal development. From the above finding it was concluded that the Treatment that means Constructive Approach is effective in increasing Student's achievement in Science but it has no effect on their attitude towards Science. Gender also plays a very negligible role in case of Student's Achievement in Science.

The field of education has undergone a significant shift in thinking about the nature of human learning and the conditions that best promote the varied dimensions of human learning. As in psychology, there has been a paradigm shift in designed instruction: from Behaviourism to Cognitivism and now to constructivism. Certainly, one of the most influential views of learning during the last two decades of the 20th century is the perspective known as constructivism. Although by no means an entirely new conceptualization of learner and the process of learner (roots can be traced to John Dewey and progressive educators, to Piaget and Vygotsky and to Jerome Bruner and discovery learning), constructivist perspectives on learning have become increasingly influential in the past twenty years and can be said to represent a paradigm shift in the epistemology of knowledge and theory of learning. The curriculum and evaluation standard for school education. National Curriculum Framework (NCF), prepared by

working group of NCERT (2008). does also highlights the importance of introducing constructivist approach in education system. Constructivism is basically a theory based on observation and scientific study — about how' people learn. It says that people construct their own understanding and knowledge of the world, through experiencing things and reflecting on those experiences. Thus, learning progression through Constructivism impact in a great function in school curriculum and reflected through students' performances now a days.