CHAPTER-V

FINDINGS, CONCLUSION, EDUCATIONAL IMPLICATIONS, ACTION PLAN AND SUGGESTIONS

“No part of a study is more important than any other part, since a defect in any part will automatically affect the whole study. If, however, one part can be singled out as all important, it is the section which states the conclusion, for this is the section that presents what the study has to contribute to the advancement of education as a science.”

-Mouley

After the analysis and interpretation of the data, the Researcher has been reached in the position to arrive at main findings of their researcher. For the purpose, the researcher devoted this chapter to the main findings, conclusion, educational implications and suggestions for further research. These have been discussed in different heading in this chapter.

V.1. FINDINGS:-

Results of data analysis and its interpretation have been given in the previous chapter. This chapter deals with the discussion of the results in relation to achievement of objectives of the study and testing of the hypothesis formulated for this study, the rationale behind various results obtained and the like. These findings are the results of data analysis obtained by Analysis of Variance (ANOVA) followed by t-test. Hypothesis wise findings are discussed as follows:

1. Hypothesis – I :- “Significant difference would not be observed on the scholastic achievement scores for three method of teaching i.e.
Advance Organizer Model (AOM), Biological Science Inquiry Model (BSIM) and Traditional Method (TM).”

For the purpose of testing such hypothesis researcher applied advanced statistics i.e. ANOVA (F-test) followed by t-test for analyzing the scores collected after treatment. From the result of data analysis, the null hypothesis has been rejected. It shows that there is a significant difference between the achievement in Biology of the student of all three groups taught through Advance Organizer Model (AOM), Biological Science Inquiry Model (BSIM), and Traditional Method (TM) respectively. It clearly shows the better effect of Advance Organizer Model (AOM), Biological Science Inquiry Model (BSIM) than the Traditional Method (TM) on achievement in Biology of secondary school students.

2. **Hypothesis – II :- “Significant difference would not be observed between the scholastic achievement scores obtained from students of two Intelligence groups (High & Low) taught through different method of teaching i.e. Advance Organizer Model (AOM), Biological Science Inquiry Model (BSIM) and Traditional Method (TM).”**

This hypothesis has also been tested by ANOVA (F-test) and t-test, finally it has been rejected. The rejection of this hypothesis concludes that significant difference between the achievements in Biology of the student of two Intelligence groups (High & Low) taught through different Teaching Methods of teaching i.e. Advance Organizer Model (AOM), Biological Science Inquiry Model (BSIM) and Traditional Method (TM). High Intelligence group students achieve better in Biology in comparison to Low Intelligence group students taught through Advance Organizer Model (AOM), Biological
Science Inquiry Model (BSIM), and Traditional Method (TM) respectively.

3. **Hypothesis – III** :- “*Significant difference would not be observed between the achievements of High & Low Socio-Economic Status (SES) students taught through different Teaching Methods i.e. Advance Organizer Model (AOM), Biological Science Inquiry Model (BSIM) and Traditional Method (TM).*”

   This hypothesis has been rejected. The rejection of the hypothesis indicates that there is a significant difference between the achievements in Biology of High and Low Socio-Economic Status groups of students, taught through Advance Organizer Model (AOM), Biological Science Inquiry Model (BSIM), and Traditional Method (TM) respectively. Advance Organizer Model (AOM), Biological Science Inquiry Model (BSIM), and Traditional Method (TM) are more effective on High Socio-Economic Status group students in comparison to Low Socio-Economic Status group students for better achievement in Biology.

4. **Hypothesis – IV** :- “*There would not be significant effect of interaction between two levels of Intelligence (High & Low) and different Teaching Methods i.e. Advanced Organizer Model (AOM), Biological Science Inquiry Model (BSIM) and Traditional Method (TM) on the scholastic achievement.*”

   This null hypothesis has also rejected and concludes that there is a significant effect of interaction between the achievements in Biology of groups made on the basis Intelligence (i.e. High & Low) taught through different teaching methods i.e. Advance Organizer Model (AOM), Biological Science Inquiry Model (BSIM) and Traditional Method (TM) respectively.
5. **Hypothesis – V:** “There would not be significant effect of interaction between two levels of Socio-Economic Status (High & Low) and different teaching methods i.e. Advanced Organizer Model (AOM), Biological Science Inquiry Model (BSIM) and Traditional Method (TM) on the scholastic achievement.”

This hypothesis has been rejected by testing with ANOVA & t-test. This indicates that there is a significant effect of interaction between the achievements in Biology of High and Low SES groups of students, taught through Advance Organizer Model (AOM), Biological Science Inquiry Model (BSIM) and Traditional Method (TM) respectively. Advance Organizer Model, Biological Science Inquiry Model and Traditional Method are more effective on High Socio-Economic Status group students in comparison to Low Socio-Economic Status group students for better achievement in Biology.

6. **Hypothesis-VI:** “There would not be significant effect of interaction between two levels of Intelligence (High & Low), two levels of Socio-Economic Status (High & Low) and different Teaching Methods i.e. Advanced Organizer Model (AOM), Biological Science Inquiry Model (BSIM) and Traditional Method (TM) on the scholastic achievement.”

By the testing of this null hypothesis with the help of advanced statistics (i.e. ANOVA & T-test), It has been rejected, and concluded that significant interactional effect have been observed between various independent variables i.e. Intelligence (High & Low) & Teaching Methods (AOM, BSIM & TM); Socio-Economic Status (High & Low) & Teaching Methods (AOM, BSIM & TM); Intelligence (High & Low) & Socio-Economic Status (High & Low) & Teaching Methods (AOM, BSIM & TM).
V.2. CONCLUSIONS:-

On the basis of findings drawn through the testing of the related hypothesis, the following conclusion have been washed out –

1. Advance Organizer Model (AOM) and Biological Science Inquiry Model (BSIM) both are more effective in Biology Teaching than Traditional Method (TM). From the mean value of these two Teaching Methods i.e. Biological Science Inquiry Model (BSIM) and Advanced Organizer Model (AOM); Biological Science Inquiry Model (BSIM) has been found more effective than the Advanced Organizer Model (AOM) in Biology Teaching for the students of Class IX. From this view, it is concluded that technology plays a good role in teaching of any subject. By the using of Technology–Oriented Methods, a teacher can teach his subject effectively and a student can learn any lesson permanently.

2. Advance Organizer Model (AOM), Biological Science Inquiry Model (BSIM), and Traditional Method (TM) are more effective on High Intelligence group students in comparison to Low Intelligence group students for better achievement in Biology. It has been concluded from this view that Intelligence is effective Psychological factor for permanent learning. Intelligent students have learned any contents early and effectively of any subjects. This finding of the research has indirectly revels that Intelligence is the main factor for effective learning in biology.

3. Advance Organizer Model (AOM), Biological Science Inquiry Model (BSIM), and Traditional Method (TM) are more effective on High Socio-Economic Status group students in comparison to Low Socio-Economic Status group students for better achievement in Biology. It
has been concluded from this view that Socio-Economics Status (SES) of any students has played a good role in effective and permanent learning of Biology. Its reason may by this that the students belong to high Socio-Economic Status family can obtained all types of the facilities related to teaching and learning process than the Low Socio-Economic (SES) Students. Family Environment has also played a good role in condition. Due to this reason High Socio-Economic Students (SES) learn more effectively and permanently than Low Socio-Economic Status Students.

4. An achievement of High & Low Intelligence group students in Biology has also been effected by the interactional effect of different teaching methods i.e. Advance Organizer Model (AOM), Biological Science Inquiry Model (BSIM) and Traditional Method (TM) respectively.

5. Achievement of High & Low SES group students in Biology has also been effected by the interactional effect of different teaching methods i.e. Advance Organizer Model (AOM), Biological Science Inquiry Model (BSIM) and Traditional Method (TM) respectively. Advance Organizer Model, Biological Science Inquiry Model and Traditional Method are more effective on High Socio-Economic Status group students in comparison to Low Socio-Economic Status group students for better achievement in Biology.

6. Significant interactional effects have been observed between various independent variables i.e. Intelligence (High & Low) & Teaching Methods (AOM, BSIM & TM); Socio-Economic Status (High & Low) & Teaching Methods (AOM, BSIM & TM); Intelligence (High & Low) & Socio-Economic Status (High & Low) & Teaching Methods (AOM, BSIM & TM).
V.3. EDUCATIONAL IMPLICATIONS:-

The basic objective of educational research is to improve by implementing finding of the research. Therefore, if a research study does not have point of implications mentions separately, it is not consider as research work of education. Keeping this significant factor in mind the researcher has mentioned following implications of her research findings.

1. Models of teaching need to be introduced for teaching Biological Science as they have significant effect in bringing desirable development among students' achievement in Biology. This is also supported by the finding that certain models are more appropriate for particular subjects.

2. The study has implication for education to suggest how these models of teaching (especially Biological Science Inquiry Training Model) could be used to teach effectively and tell which behavioral changes they promote.

3. Since student when exposed to these two alternative models of teaching showed differential effectiveness on achievement in Biology. Students could be facilitated in enriching their achievement in Biology by using such model (s) of teaching.

4. Teachers can make their instructions more meaningful while teaching Biological concepts through Advance Organizer Model and Biological Science Inquiry Training Model and clarify contents making it more effective.

5. Science for All and ‘Scientific Literacy’ are matters of great concern today for all nations especially the under developed and developing countries like India. These need systematic and comprehensive strategies for creating a congenial learning environment for teaching
processes in Biological Science. Models of teaching, if used as teaching strategies can be an effective mode as they are alternative to ‘learning by doing’ or even child centered approach. Learning biological science through them becomes an interesting and lively activity. In these models students are encouraged to evolve the whole lesson.

6. School need to shift their emphasis from passive answer absorbing to active answer seeking, from rigid daily programmes to active answer seeking, from rigid teacher dominated classroom to child directed and group activities and from memorizing to problem awareness and problem solving. As such models studies herein and their discernible impact has an important bearing in the present context; even Passi (1991) and Gagne (1978) have strongly supported this related implication for education.

7. There is a need to create several sided models of teaching that are multidimensional and that help to isolate components of competence to be developed among students and even act upon them.

8. Another important bearing of this study is Learners respond differently to different or a variety of educational environments, contents remaining the same; teacher is an organizer and responsible for an order in the social system.

9. The study has shown that these models have an incremental effect in the classroom when used e.g. to select learning experiences, distinguish individual difference, develop desirable skills, bring about attitudinal changes, specify maxims and the like besides developing mental process and creativity.
10. These models of teaching referred to in the study have an important role in bringing about enrichment in teaching process; they could serve as instructional approaches to manage the classroom activities according to predisposition of the learners in order to achieve a variety of educational objectives. Certain models are more appropriate to particular pupil need.

11. Equality of learning opportunity can be a more meaningful goal of education rather than equality of learning outcomes. Such a goal suggests that teachers must find ways of giving each child the help and encouragement he needs. A learning environment must be created during teaching where models of teaching play an important role specially the Advance Organizer Model and Biological Science Inquiry Model.

12. Model of teaching are easily applicable to all boards’ (Hindi & English medium) students because they are based on no other technology except technology of developing instructional materials and therefore indigenous models are available for providing alternative instructional channels within existing classroom and school structure.

13. Models of teaching approach aims at specifically integrating the content and methodology skills in relation to specific instructional objectives. Therefore, for their effective use, a study like the present one is very important. The use of models of teaching involves formulation of objective, content organization, sequencing, analysis, presentation and the like.

14. Teachers at pre-service stage as well as in-service state need to be trained in model of teaching, specially the Advance Organizer Model and Biological Science Inquiry Model so that they are able to develop
tasks in their subjects according to these models. Effective use of a variety of models enhances professional growth and development (Brady, 1985).

15. Teachers also need to be trained in application of these models appropriately according to the need in their classrooms. Only appropriate strategy at the right hour is most effective. Even high creative potential can be fruitfully exploited through them.

16. Advance Organizer Model, Inductive Thinking Model and Biological Science Inquiry Model can be applied with equal efficacy to develop achievement in Biological Science to the students of Science group students of all sections.

17. The findings of the study imply that it is highly desirable to teach Biology through Advance Organizer Model and Biological Science Inquiry Model while developing achievement in Biology. Biological Science Inquiry Model is more effective in developing problem awareness ability. Such considerations can be equally vital for designing instructional materials which is a major source of learning for students.

18. Teacher education programmes in India should incorporate training for a variety of models of teaching so that tomorrow’s teachers are more rational and flexible in selection and use of teaching strategies suitable to pupils’ characteristics and their needs.

V.4. ACTION PLAN:-

In the present days, with a rapidly changing educational scenario, the role of teacher and teaching are changing fast wherein he is enshrined with the responsibility of promoting fruitful learning and stimulating the students by adopting appropriate strategies. Process skills are finding a prominent
place in the system and so is development of mental processes, including scientific creativity and scientific temper. Science education is spreading its roots deeper and deeper in the name of scientific literacy, encroaching into the whole educational system touching all disciplines. Thus, the present study has this scientific race having interest in research and innovation in the field of teaching biological science and do not want to lag behind in this technologically developing world. This study can give contribution to society in teaching learning process for biological science education in particular and other disciplines in general regarding the relevant aspects of issues; for teachers, teacher educators, administrators, research workers, curriculum developers and not the least, the students. Models of Teaching would be useful to the student and Teachers, if -

1. An opportunity would be given to the students to think carefully about new ideas, problems and questions being considered valid by class.

2. Curriculum of different classes would be changed according to the requirements of the society.

3. Teachers of the related schools would also be trained in developing the lesson plan of different Teaching Models of related subject.

4. Classroom environment would also be changed according to the conditions.

5. Some Academic Staff Colleges would be started by our govt., for the purpose of training our teachers’ in this field.

6. Necessary contents should be included in the Teachers’ Training Programme as a separate paper.

7. Maximum special talks on the Models of Teaching would be given by the eminent educationist in U.G., P.G. and In-Service Teachers’ Training Programme.
V.5  SUGGESTIONS FOR FURTHER RESEARCH:-

In India, Science education and models of teaching with development of mental processes, their integration in classroom and in the process of teacher training have remained almost completely unexplored. Only negligible numbers of studies have been attempted in this direction, many linked questions and issues remain unanswered while a lot of research studies need to be attempted to solve them.

Based on the research experience of the present investigator as well as the process of experimentation, treatment, responses of the subjects, details of the ongoing process, findings of the study, their need and environment prevailing in Indian classrooms and schools, some of the suggestions for further research in the area of models of teaching are identified as follows:

1. The study may be replicated for various grade levels and for different content areas in science to confirm the generalisability of the results and conclusions of the study.

2. Researches need to be conducted to study the feasibility in terms of cultural milieu and teacher acceptance, of different models of teaching (bringing these models of teaching to classrooms) so that with certain modification they can be effectively and frequently used.

3. Variables like pupil’ cognitive level, variability of schools, student’ background, conceptual level, environment factors, creative potential and the like can be studied in relation to models of teaching.

4. There is need to synthesize biological science research, in relation to teaching of discipline in order to summarize findings, assess the consistency of findings and resolve the contradictions across studies in models of teaching specially information processing models as they are more concerned with pedagogy.
5. Affective and psycho motor domains need to be further explored as desired effect of teaching through these models of teaching.

6. Application of models of teaching to education of various disadvantaged groups, handicapped, the gifted and the like may be helpful.

7. Studies can also be undertaken to study various information processing models in relation to the development of ten common core components that need to be developed at elementary state, according to National Policy on Education, 1986.

8. Effect of models of teaching on individual learners as regards their methods of teaching to Individual Differences may also be studied.

9. Studies may also be undertaken to see the effect of training through peer counseling a new model of teaching and subsequently its impact in the classroom.

10. Student’ interest or willingness to study through various models of teaching can also be probed and their effect on motivation may also be studied in a longitudinal manner.

11. Curriculum planners can study and evolve plans of studies or organization of content areas in various subjects at elementary level on the lines of these models of teaching.

12. Advance Organizer Model and Biological Science Inquiry Model can be tested and validated against variables of different domains on which the models have been found effective.

13. More instructional and nurturant effects of Advance Organizer Model and Biological Science Inquiry Model should be evolved for their wider applications. Other models of teaching also need to be studied on the same lines.
14. Models of teaching also need to be studied as regard to different levels of organizational structure like nursery, primary, elementary, secondary or senior secondary.

15. Objective of teaching biological science at elementary and senior secondary stage also need to be studied in relation to models of teaching their differential effectiveness for applicability also need to be studied.

16. The teacher behaviour under the three models of teaching studied here in also needs to be analyzed from the transcripts of the lessons transacted using these three strategies.

17. Possibility of replacing the methods of teaching by appropriate models of teaching for different subjects may also be worked out through researches and then introduced in pre and in-service teacher education programmes.