Chapter-VII

CONCLUSIONS,
EDUCATIONAL
IMPLICATIONS AND
SUGGESTIONS
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7.1 INTRODUCTION

The preceding six chapters of this study dealt with Introduction, Models of Teaching, Reviews of Related Studies, Design of the Study, Analysis of the Data and Interpretation of Results and Discussion. It might be recalled that the present study was undertaken with the following main purposes:

1. To study individual effectiveness of Concept Attainment Model, Inductive Thinking Model of teaching and Traditional Method of teaching on the criterion variables Reasoning Ability, Scientific Creativity and Attitude Towards Science

2. To study the differential effects of the above models on Reasoning Ability, Scientific Creativity, Attitude Towards Science and students’ Achievement in Science

3. To study the relative effectiveness of Concept Attainment Model, Inductive Thinking Model of teaching and Traditional Method of teaching on the criterion variables Reasoning Ability, Scientific Creativity, Attitude Towards Science and students’ Achievement in Science

In order to observe how far these purpose have been served, this chapter includes the outcome of the experiment based on the findings of the study or
by testing the hypotheses as per objectives formulated for the study and results or conclusions drawn from them. Since the study was conducted in actual classroom situation, it has specific implications for classroom teaching. Hence implications of this piece of research for all those who are concerned with the process of education are listed in various capacities and few suggestions for further research in this field and related fields. This chapter has been sub-divided into three parts:

- Conclusions
- Educational Implications
- Suggestions For Further Research

7.2 CONCLUSIONS

The results have been drawn keeping in view the objectives formulated for the study and by testing of hypotheses formed thereafter. Major conclusions of the study drawn out of the forgoing chapters, presented in accordance with the objectives are as follows:

7.2.1 Individual Effectiveness

1. Concept Attainment Model of teaching was found effective in developing Reasoning Ability among the students (Hypothesis - H₀₁).

2. Inductive Thinking Model of teaching was found suitable to enhance the Reasoning Ability among the students (Hypothesis - H₀₄).

3. Traditional Method of teaching was not found to be able to bring significant development in the ReasoningAbility among the students (Hypothesis - H₀₇).

4. Concept Attainment Model of teaching was found effective in fostering Scientific Creativity among the students (Hypothesis - H₀₂).
5. Inductive Thinking Model of teaching was found to promote the Scientific Creativity among the students (Hypothesis - H₀5).

6. Traditional Method of teaching could not bring development in the Scientific Creativity among the students (Hypothesis - H₀8).

7. Concept Attainment Model of teaching was found effective to promote favourable Attitude of the students Towards Science (Hypothesis - H₀3).

8. Inductive Thinking Model of teaching was found to promote favourable Attitude of the students Towards Science (Hypothesis - H₀6).

9. Traditional Method of teaching was not able to promote favourable Attitude of the students Towards Science (Hypothesis - H₀9).

7.2.2 Relative Effectiveness

1. Concept Attainment Model, Inductive Thinking Model of teaching and Traditional Method of teaching has differential effects on Achievement in Science of IX class students as a result of the treatment (Hypothesis– H₀10).

These differential effects have been further studied for pairwise comparison.

2. Concept Attainment Model of teaching and Inductive Thinking Model of teaching did not differ in effectiveness in improving the Achievement of IX students in Science and therefore are said to be equally effective in improving the Achievement in Science (Hypothesis – H₀11).

3. Concept Attainment Model of teaching was found to improve the Achievement of IX class students in Science than Traditional Method of teaching. Thus, the Concept Attainment Model is superior to the Traditional Method of teaching in terms of students' Achievement in Science (Hypothesis – H₀12).
4. Inductive Thinking Model of teaching is superior to the Traditional Method of teaching as Inductive Thinking Model of teaching was found to improve the Achievement of IX class students in Science than Traditional Method of teaching (Hypothesis – H₀₁₃).

5. Concept Attainment Model, Inductive Thinking Model of teaching and Traditional Method of teaching has differential effects on Reasoning Ability of IX class students as a result of the treatment (Hypothesis – H₀₁₄).

These differential effects have been further studied for pair wise comparison.

6. Concept Attainment Model of teaching and Inductive Thinking Model of teaching did not differ in effectiveness in developing the Reasoning Ability of IX students and therefore are said to be equally effective in terms of the development of Reasoning Ability (Hypothesis – H₀₁₅).

7. Concept Attainment Model of teaching was found to improve the Reasoning Ability of IX class students than the Traditional Method of teaching. Thus, the Concept Attainment Model is superior to the Traditional Method of teaching in terms of developing Reasoning Ability (Hypothesis – H₀₁₆).

8. Inductive Thinking Model of teaching is superior to the Traditional Method of teaching as Inductive Thinking Model of teaching was found to improve the Reasoning Ability of IX class students than Traditional Method of teaching (Hypothesis – H₀₁₇).

9. Concept Attainment Model, Inductive Thinking Model of teaching and Traditional Method of teaching has differential effects on fostering Scientific Creativity among the students of IX class as a result of the treatment (Hypothesis – H₀₁₈).
These differential effects have been further studied for pairwise comparison.

10. Concept Attainment Model of teaching and Inductive Thinking Model of teaching did not differ in effectiveness in fostering Scientific Creativity among the students of IX class and therefore are said to be equally effective (Hypothesis – H019).

11. Concept Attainment Model of teaching was found to enhance the Scientific Creativity of IX class students than the Traditional Method of teaching. Thus, the Concept Attainment Model is effective than the Traditional Method of teaching in terms of enhancing Scientific Creativity (Hypothesis – H020).

12. Inductive Thinking Model of teaching is more effective than the Traditional Method of teaching as Inductive Thinking Model of teaching was found to promote the Scientific Creativity of IX class students than Traditional Method of teaching (Hypothesis – H021).

13. Concept Attainment Model, Inductive Thinking Model of teaching and Traditional Method of teaching has differential effects on development in Attitude of the students Towards Science as a result of the treatment (Hypothesis – H022).

These differential effects have been further studied for pairwise comparison.

14. Concept Attainment Model of teaching and Inductive Thinking Model of teaching did not differ in effectiveness in promoting the favourable Attitude of the students Towards Science and therefore are equally effective in developing the favourable Attitude of the students Towards Science (Hypothesis – H023).
15. Concept Attainment Model of teaching was found to promote a favourable Attitude of the students Towards Science of IX class students than the Traditional Method of teaching. Thus, the Concept Attainment Model is superior to the Traditional Method of teaching in terms of developing favourable Attitude Towards Science (Hypothesis – H₀₂₄).

16. Inductive Thinking Model of teaching is superior to the Traditional Method of teaching as Inductive Thinking Model of teaching was found to promote a favourable Attitude of the students Towards Science of IX class students than Traditional Method of teaching (Hypothesis – H₀₂₅).

It can be concluded that from the discussions (Chapter-V) and Conclusions drawn herein, the information processing models of teaching (Concept Attainment model and Inductive Thinking Model) studied by the researcher are more effective than the Traditional Method of teaching.

7.3 EDUCATIONAL IMPLICATIONS

In the present days with rapidly changing educational scenario, the role of teacher and teaching methods are changing fast where in he/she is enshrined with the responsibility of promoting effective learning and stimulating the students by adopting suitable strategies. Process skills are finding a conspicuous place in the system and so is development of 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 and touching all disciplines.

Thus in this technologically developing world, the present study has significant implications for all those who want to keep rapidity with this scientific rhythm having interest in research and innovations in the field of teaching science and do not lacks behind. The study can be said to have implications for 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. It will be desirable to present some such implications here:

1. Concept Attainment model and Inductive Thinking Model of teaching should be considered as an integral part of the methodology used for teaching concepts in science at highschool level as they have significant effect in bringing desirable development among students' Achievement in Science, Reasoning Ability, Scientific Creativity and Attitude Towards Science among the students. The finding that certain models are more suitable to particular subjects also supports this.

2. Faculties are already feeling the pressure to lectureless. Information Processing Model of teaching can be used to make learning environments more interactive, to integrate technology into the learning experience and to use collaborative learning strategies when appropriate.

3. The study has implication for education to suggest how these models of teaching (specially Information Processing Models of teaching) could be used to teach concepts effectively and tell which behavioural changes they should promote at the school level.

4. Today, science for all and scientific literacy are the matters of great concern for developing countries like India. These need systematic and extensive strategies for creating a sympathetic learning environment for teaching process in science. Interaction, reasoning and creativity aspects developed through science teaching become more important in such an environment. Thus the models of teaching, if used as teaching strategies can be effective mode as they are alternative to ‘Learning by Doing’ or even child centered approach. Learning science through them becomes an interested and lively activity.

5. The students taught through Concept Attainment Model and Inductive Thinking Model of teaching responds to more involvement and attend to participate actively in the classroom. The study has shown that the Concept Attainment Model and
Inductive Thinking Model of teaching have an increasing effect in the class room when used e.g. to select learning experiences, distinguish individual difference, develop desirable skills, bring about attitudinal changes in the students.

6. From the study it is clear that there is a need to create several sided models of teaching which are multidimensional and that help to isolate components of competency to be developed among students and even act upon them. The use of models built around a three phase concept designed to provide not only a broad academic competence and skills for teaching, but also the final polish of professionalism and teaching competence as well as an attempt to develop in the learner adequate scientific characteristics.

7. The Concept Attainment Model and Inductive Thinking Model of teaching referred to in the study have an important role in bringing about enhancement in teaching process; they could serve as instructional approaches to manage the classroom activities according to tendency of the learners in order to achieve a variety of educational objectives. Certain models are more appropriate to particular students needs.

8. The development of teaching models constitutes a unique combination of theory construction and empirical testing and incorporates a complex array of learning/instructional factors into a single working system.

9. Indigenous models are available for providing alternative instructional channels within existing classroom and school structure because various models of teaching are easily applicable to Indian classrooms, which are based on no other technology except technology of developing instructional materials.

10. Information-based teaching models are concentrate on helping students, learn to work with data through inductive reasoning and help them to visualize the problem, to break it down into discrete, manageable units.
11. Students Reasoning Ability and Creativity should be taken into account while making the choice of the strategy Concept Attainment Model and Inductive Thinking Model seems to be useful mainly for this purpose. The Concept Attainment Model has a high tolerance for ambiguity. This means that the students might seem to be following the wrong path, but eventually, they will come up with the expected answer.

12. Equality of teaching 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 by the use of models of teaching, specially the Concept Attainment Model and Inductive Thinking Model of teaching.

13. From the present study it is clear that teacher is an organizer and responsible for any change in the social system and learners respond differently to different or a variety of educational environments, contents remaining the same. Teachers at pre service stage as well as in-service stage 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 especially the information processing models of teaching like Concept Attainment Model and Inductive Thinking Model.

14. The findings of the study imply that it is highly desirable to teach science through Concept Attainment Model and Inductive Thinking Model while developing Reasoning Ability, Scientific Creativity and Attitude Towards Science. Such consideration can be equally vital for designing instructional materials, which is a major source of learning for students.

15. 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 pupil's characteristics and their needs.

### 7.4 SUGGESTIONS FOR FURTHER RESEARCH

In India, science education and models of teaching with development of mental processes, their integration in classrooms and in the process of teacher training have remained almost completely unexplored. Only negligible number of studies have been attempted in this direction, many linked questions and issues remains 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 future 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 generalizability 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 information processing models of teaching (bringing these models of teaching to classrooms) so that with certain modifications they can be effectively and frequently used.

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

4. There is a need of study for the use of models in our classrooms which will help to develop individuals that bear positive concepts about themselves, the environment and the subjects taught, in respect to their motives as learners and above all to
education as a profession. We as educators should therefore change our mode of instructional methods to imbibe the use of models, computerized or otherwise in order to maximize individual potentials and reduce the waste of human resources.

5. Study about the models of teaching used to scale, ranging from miniature, to full size and with the most recent approach through the use of the computer, exploring the special relationships of new constructions and of demonstrating the three dimensional qualities of objects for the advantage of students learning.

6. A factorial experiment should be conducted to study interactions of the orientation variables on the strategies of teaching involved in the study.

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

8. Efficacy of the models of teaching on individual learners as regards' their method of teaching to Individual Differences may also be tested.

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. Students' 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. Perceptual changes in students on being taught by the two strategies should be studied using semantic differential scale.

12. 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.
13. Information processing models of teaching specially Concept Attainment Model, Inductive Thinking Model and Inquiry Training Model can be tested and validated against variables of different domains on which the models have been found effective.

14. More instructional and nurturant effects of Concept Attainment Model, and Inductive Thinking Model should be studied for their wider applications in addition to the instructional effects.

15. Effectiveness of Concept Attainment Model, and Inductive Thinking Model needs to be checked on the variables at various levels of education including female and male learners, socio-economic conditions, nursery, primary, elementary, secondary or senior secondary etc.

16. Objectives of teaching science at elementary, secondary and senior secondary stage also need to be studied in relation to models of teaching (more specifically information processing models); their differential effectiveness for applicability also need to be studied.

17. The teacher behaviour under the three strategies of teaching studied here also needs to be analyzed on careful recording and subsequent transcripts on the lessons transacted using these three strategies.

18. Possibility of replacing the existing 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.