SUMMARY
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1. Introduction

The imperative character of education for individual growth and social development is now accepted by everyone. Education, in one sense or another, appears to be as old as the human race; through in course of time its meaning and objectives have inevitably undergone certain changes. The root meaning of education is given as bringing up, leading out or making manifest the inherent potentialities in a pupil.

To provide an all-round development we need to design a suitable instructional strategy, which helps our students grow emotionally, physically, socially and intellectually. There still exists a big gap between theoretical knowledge and actual teaching in the classroom or schools. Models of teaching as strategies need to be incorporated in our teaching.

1.1 Need and Significance of the study

From many years the lecture method was most widely used as instructional strategy in the classrooms. The disadvantages of traditional lecture method are that lecturing minimizes feedback from students, assumes an unrealistic level of students understanding and comprehension and often disengages students from the learning process by causing information to be quickly forgotten. Our traditional methods of teaching have failed to cope up increasing demand for education; while teachers and classrooms increase arithmetically, the demand for education increases geometrically. Hence, there is a need of new teaching methods. Models of teaching are a new and emergent method of instruction and teaching.
Hence in the present study two information-processing models of teaching viz. Concept Attainment Model and Inductive Thinking Model were selected because it would improve approaches to information processing in schools and drawn from the actual tasks developed in classroom situations.

1.2 Statement of the Problem

"EFFECTIVENESS OF CONCEPT ATTAINMENT MODEL AND INDUCTIVE THINKING MODEL OF TEACHING ON STUDENTS' ACHIEVEMENT IN SCIENCE, SCIENTIFIC CREATIVITY AND ATTITUDE TOWARDS SCIENCE."

1.3 Definition of the Terms used in the Study

Models of Teaching

"A model of teaching is plan or pattern that can be used to shape curriculums, to design instructional materials and to guide instruction in classroom and other setting" (Joyce, 1990).

Concept Attainment Model

Concept Attainment Model is designed to teach concepts and to help students to become more effective at learning concepts. It provides an efficient method for presenting organized information from a wide range of topics to students at every stage of development. The model provides a way of delivering and clarifying concepts and training students to become more effective at developing concepts.

Inductive Thinking Model

Inductive Thinking Model requires the students to predict consequences, explain unfamiliar data or hypothesize and then attempts to create inductive. This requires them to explain predictions, verify, or identify conditions that would verify them. Carefully squeezed content and suggested learning experiences form the basis of information to proceed inductively.
Traditional Method

The Traditional Method is the method adopted by a subject teacher under normal circumstances most of the time. Here pupil participation is limited. The lecture is the main feature of this method and the 'elicitation process' is involved with the use of the black-board.

Science

Science is a systematized body of knowledge. The knowledge may pertain to any subject or field of life. It is a storehouse of knowledge where an individual can rummage at will and slake his thirst for knowledge (Rai, 2002).

Achievement

“A test of educational achievement is one designed to measure knowledge, understanding, application and skills in a specified subject or a group of subjects”.

Reasoning Ability

Reasoning is a process of controlled thinking as association, which starts with some problem of interest to the reasoned and is directed towards its solution.

Scientific Creativity

Scientific Creativity may be considered as specific creativity expression, unique production or scientific process responsible for some creative contribution in the field of science, technology or otherwise. It deals with unusual or original excellence in the field of science or scientific productivity.

Attitude Towards Science

Attitude towards science indicates feeling of an individual or a group concerning science like faith in scientific method, opinion about scientific values of
science, interaction of science with individual and society, opinion held about science related social issues.

1.4 Objectives of the Study

Major objectives of the study are:

1. To study the effectiveness of teaching through Concept Attainment Model, Inductive Thinking Model and Traditional Method of teaching on improving Achievement in Science of IX class students.

2. To study the effectiveness of teaching through Concept Attainment Model, Inductive Thinking Model and Traditional Method of teaching on development of Reasoning Ability, Scientific Creativity and favourable Attitude of students Towards Science.

3. To study the relative effectiveness of teaching through Concept Attainment Model, Inductive Thinking Model and Traditional Method on improving Achievement in Science of IX class students.

4. To study the relative effectiveness of teaching through Concept Attainment Model, Inductive Thinking Model and Traditional Method of teaching on development of Reasoning Ability, Scientific Creativity and favourable Attitude of students Towards Science.

5. To compare the effectiveness of Concept Attainment Model and Inductive Thinking Model on Achievement in Science of IX class students, Reasoning Ability, Scientific Creativity, and Attitude Towards Science.

6. To compare the effectiveness of Concept Attainment Model and Traditional Method of teaching on Achievement in Science of IX class students, Reasoning Ability, Scientific Creativity, and Attitude Towards Science.
7. To compare the effectiveness of Inductive Thinking Model and Traditional Method of teaching on Achievement in Science of IX class students, Reasoning Ability, Scientific Creativity, and Attitude Towards Science.

1.5 Hypotheses

1. There is no significance difference between the mean score of IX class students in developing Reasoning Ability, Scientific Creativity and favourable Attitude Towards Science taught through Concept Attainment Model.

2. There is no significant difference between the mean score of IX class students in developing Reasoning Ability, Scientific Creativity and favourable Attitude of students Towards Science taught through Inductive Thinking Model of teaching.

3. There is no significant difference between the mean score of IX class students in developing Reasoning Ability, Scientific Creativity and favourable Attitude of students Towards Science taught through Traditional Method of teaching.

4. There is no significant difference between the mean score of achievement of IX class students in Science, Reasoning Ability, Scientific Creativity and Attitude Towards Science taught through Concept Attainment Model, Inductive Thinking Model, and Traditional Method of teaching.

5. There is no significant difference between the mean score of achievement of IX class students in Science, Reasoning Ability, Scientific Creativity and Attitude Towards Science taught through Concept Attainment Model and Inductive Thinking Model of teaching.

6. There is no significant difference between the mean score of achievement of IX class students in Science, Reasoning Ability, Scientific Creativity and Attitude Towards Science taught through Concept Attainment Model and Traditional Method of teaching.
7. There is no significant difference between the mean score of achievement of IX class students in Science, Reasoning Ability, Scientific Creativity and Attitude Towards Science taught through Inductive Thinking Model and Traditional Method of teaching.

1.6 Scope and Limitations of the Study

The limitations are some controls or restrictions present during course of research.

1. The study was considered for two models of teaching namely, Bruner’s Concept Attainment Model (1966), Hilda Taba’s Inductive Thinking Model (1967) and Traditional Method of teaching.

2. The selection of dependent variables is limited to reasoning ability, scientific creativity, students’ achievement in science and attitude towards science.

3. The study is limited only for IX class students of three marathi medium schools in Nagpur.

4. In concern itself with just a few topics of science course of class IX.

5. No deliberate attempt was made to match the groups on the basis of age, socioeconomic status, and other such intervening variables.

2. Models of Teaching

This chapter deals with the theory base of some of the relevant information processing models of teaching and other context.

3. Review of The Related Literature

Synoptic overviews of the research in the area of models of teaching indicate clearly that there were few research studies, which have been experienced into its depth. It is necessary to know the effectiveness of different models at various levels of teaching. In order to study the researches conducted in this field the total
work available from various sources i.e. books, journals, thesis etc. are divided into two main categories:

A) Studies involving a single model of teaching,

B) Studies involving two or more models of teaching

3.1 Studies involving a single Model of Teaching:


3.2 Studies involving a two or more Models of Teaching:


4. Design of The Study

Quasi experimental method was employed for the study with parallel group design.

4.1 Sample

A purposive sample was used for the study drawn from the population of IX class students chosen from three Marathi medium schools in Nagpur. The sample consisted of 377 students.

4.2 Variable Involved

Variables involved in the study are Achievement in Science, Reasoning Ability, Scientific Creativity and Attitude Towards Science.
4.3 Tools

As the objectives of the study to measures the subjects during pre-test and post-test on the criterion variables following tools were used for collecting date.

1. Researcher develops an achievement test, which based on selected topics of IX science.

2. Reasoning ability test (RAT) in Hindi by P. K. Bayati was used for the measurement of reasoning ability of the students.

3. Verbal Test of Scientific Creativity (VTSC) in Hindi by V. P. Sharma and J. P. Shukla was used for measuring scientific creativity of the students.

4. Science Attitude Scale (SAS) in Hindi by Avinash Grewal (1990) was used for measuring attitude of the students towards science.

4.4 Procedure of Data Collection

For the data collection, the experiment was conducted in a phased manner in the form of pre-test – treatment – post-test. Some topics of IX science were selected after careful analysis of the course contents recently prescribed by the State Board of Secondary and Higher Secondary Education. The experimental groups A and B were taught through Concept Attainment Model and Inductive Thinking Model respectively. The control group was taught through Traditional Method of Teaching. At the end of the experiment the achievement test, reasoning ability test, scientific test and science attitude scale was administered.

5. Analysis of the Data

The data was analyzed by using Mean, S.D., ‘t’ -test and ANOVA (Analysis of Variance).
6. **Interpretation of the Results and Discussion**

After analyzing the data in the preceding chapter, the results have been interpreted here with discussion. These findings are discussed here under the following heads:

a. Acquisition of objectives  
b. Improvement of IX class Students Achievement in Science  
c. Development of Reasoning Ability  
d. Development of Scientific Creativity  
e. Development of favorable Attitude Towards Science  

**Results and Discussions**

1. **There is no significance difference between the mean score of IX class students in developing Reasoning Ability, Scientific Creativity and favourable Attitude Towards Science taught through Concept Attainment Model.** This hypothesis was tested on the basis of t-test at 0.05 and 0.01 level of significance. Due to significant t-value, the hypothesis is rejected. It means that the group taught through Concept Attainment Model of teaching is effective in developing Reasoning Ability, Scientific Creativity and favourable Attitude Towards Science.

2. **There is no significant difference between the mean score of IX class students in developing Reasoning Ability, Scientific Creativity and favourable Attitude of students Towards Science taught through Inductive Thinking Model of teaching.** This hypothesis was tested on the basis of t-test at 0.05 and 0.01 level of significance. Due to significant t-value, the hypothesis is rejected. It means that the group taught through Inductive Thinking Model of teaching is effective in developing Reasoning Ability, Scientific Creativity and favourable Attitude Towards Science.

3. **There is no significant difference between the mean score of IX class students in developing Reasoning Ability, Scientific Creativity and favourable Attitude of**
students Towards Science taught through Traditional Method of teaching. This hypothesis was tested on the basis of t-test at 0.05 and 0.01 level of significance. Due to non-significant t-value the hypothesis is accepted. It means that the group taught through Traditional Method of teaching is not effective in developing Reasoning Ability, Scientific Creativity and favourable Attitude Towards Science.

4 There is no significant difference between the mean score of Achievement of IX class students in Science, Reasoning Ability, Scientific Creativity and Attitude Towards Science taught through Concept Attainment Model, Inductive Thinking Model, and Traditional Method of teaching. This hypothesis was tested on the basis of F-ratio through (ANOVA) one-way analysis of variance at 0.05 and 0.01 level of significance. Due to significant F-value the hypothesis is rejected. It means that the three groups taught through Concept Attainment Model, Inductive Thinking Model, and Traditional Method of teaching found to be differing in effectiveness on the concern variables.

5 There is no significant difference between the mean score of Achievement of IX class students in Science, Reasoning Ability, Scientific Creativity and Attitude Towards Science taught through Concept Attainment Model and Inductive Thinking Model of teaching. This hypothesis was tested on the basis of t-test at 0.05 and 0.01 level of significance. Due to non-significant t-value the hypothesis is accepted. It means that the group taught through Concept Attainment Model and Inductive Thinking Model of teaching are equally effective in terms of concern variables.

6 There is no significant difference between the mean score of Achievement of IX class students in Science, Reasoning Ability, Scientific Creativity and Attitude Towards Science taught through Concept Attainment Model and Traditional Method of teaching. This hypothesis was tested on the basis of t-test at 0.05 and 0.01 level of significance. Due to significant t-value the hypothesis is rejected. It means that the group taught through Concept Attainment Model and Traditional Method of teaching are not equally effective in terms of concern variables. It is
found that the Concept Attainment Model is more effective than the Traditional Method of teaching.

7 There is no significant difference between the mean score of Achievement of IX class students in Science, Reasoning Ability, Scientific Creativity and Attitude Towards Science taught through Inductive Thinking Model and Traditional Method of teaching. This hypothesis was tested on the basis of t-test at 0.05 and 0.01 level of significance. Due to significant t-value the hypothesis is rejected. It means that the group taught through Inductive Thinking Model and Traditional Method of teaching are not equally effective in terms of concern variables. It is found that the Inductive Thinking Model is more effective than the Traditional Method of teaching.


7. Conclusions, Educational Implications and Suggestions

7.1 Conclusions

1. Concept Attainment Model of teaching is effective in developing Reasoning Ability, Scientific Creativity and favourable Attitude Towards Science among the students of IX standard.

2. Inductive Thinking Model of teaching is effective in developing Reasoning Ability, Scientific Creativity and favourable Attitude Towards Science among the students of IX standard.

3. Traditional Method of teaching is not effective in developing Reasoning Ability, Scientific Creativity and favourable Attitude Towards Science among the students of IX standard.
4. The three groups taught through Concept Attainment Model, Inductive Thinking Model, and Traditional Method of teaching found to be differing in effectiveness on the Achievement of IX class students in Science, Reasoning Ability, Scientific Creativity and Attitude Towards Science.

5. Concept Attainment Model and Inductive Thinking Model of teaching are equally effective in terms of Achievement of IX class students in Science, Reasoning Ability, Scientific Creativity and Attitude Towards Science.

6. Concept Attainment Model and Traditional Method of teaching are not equally effective in terms of Achievement of IX class students in Science, Reasoning Ability, Scientific Creativity and Attitude Towards Science. It is found that the Concept Attainment Model is more effective than the Traditional Method of teaching.

7. Inductive Thinking Model and Traditional Method of teaching are not equally effective in terms of Achievement of IX class students in Science, Reasoning Ability, Scientific Creativity and Attitude Towards Science. It is found that the Inductive Thinking Model is more effective than the Traditional Method of teaching.

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

7.2 Educational Implications

The present study has significant educational implications in the field of education. Following implications have been made from the findings of the study.

1. 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.

2. 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.

3. 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.

4. Teacher education programmes in India should incorporated 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.

5. Concept Attainment Model and Inductive Thinking Model should be considered as an integral part of the methodology used for teaching concepts in science to IX class students.

7.3 Suggestions for Further Research

Based on the findings and the conclusions of the present study, some of the suggestions for future research in the area of models of teaching are identified as follows:

1. 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.

2. There is a need to synthesize 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.

3. 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.

4. 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.

5. Models of teaching also need to be studied as regard to different levels of organizational structure like nursery, primary, elementary, secondary, or senior secondary.