Effect of Concept Attainment Model of Instruction on Achievement in Mathematics of Under achiever and Over achiever Students of Secondary Schools

[SYNOPSIS]

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1. Introduction

In a society which is rapidly transforming itself into an industrial and technological society, knowledge is very much essential. Language, Social Science and Mathematics help man in communication, living life in the society, quantify ideas, etc. and above all to be precise in his day to day living. Mathematics correlates to all subjects. Mathematics is inevitable, learning mathematics involve thinking mathematical ideas. Hence in order to study and utilize Mathematics, efficiency in thinking is required. Thinking is the ability within individual; it is logical, structural and can be developed.

According to Perkins (1988) good thinking is not something that comes naturally; it requires developing tactics, strategies, techniques and methods. Thinking ability is developed only when the concepts about what is to be thought are clear. Moreover concepts and generalizations make up the content of mathematics. According to Biggs (1985) concepts are general mental notions of things or events arrived at by process of perceptual classification and discrimination used as basis for thought and expressed through symbolic language. Thus in order to make teaching create wonders it should thus stress on concepts and generalizations. Also usage of technology in teaching is must to enhance efficiency of teaching-learning process. Conceptual learning can be done in a better way by not only using appropriate technology but active participation of students is must.

Bruner (1993) says that the process of education should enable children to gather and process information that will become organized into stable mental structures to assist them in

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problem solving. The process of instruction should utilize appropriate technology for teaching of concepts.

Having experience of teaching at secondary school level for nearly five years the investigator decided that Concept Attainment Model of Instruction should be prepared in Mathematics and its effectiveness should be assessed among different type of achievers. It is quite obvious that all children in schools have individual differences. Hence it is very much essential that teaching technology meets the need of every child. Thus investigator prepared Concept Attainment Model of Instruction for teaching of unit ‘Sets’ in Mathematics and assessed its effectiveness among under achiever, normal achiever and over achiever students of secondary schools.

2. The Problem

The present research was entitled as;

**Effect of Concept Attainment Model of Instruction on Achievement in Mathematics of Under achiever and Over achiever students of Secondary Schools**

Firstly the unit 'Sets' of Std. 9 in subject Mathematics was chosen. The reason behind choosing this topic was very obvious, as we know that concepts of set theory are acting as a pillar of mathematics. For effective learning of higher mathematics concepts of set theory are very much essential. Moreover Set theory is the only topic having many new concepts together. On basis of the topic Concept Attainment Model was developed.

Investigator also decided to prepare a Standardized Achievement Test in Mathematics on the topic “Sets” for class IX. For this researcher prepared test as per the objectives and specifications. For standardizing it researcher followed several steps. The objective behind preparing a standardized test was to have unbiased true evaluation of students achievement after teaching them through Concept Attainment Model of Instruction. As the Standardized test construction part was finished researcher then worked for the implementation of the experiment.

The entire study was carried out in Mumbai. From the schools available, the students were tested on intelligence test. Their final exam scores in Mathematics were taken and these scores were converted to T-scores. These T-scores were considered as achievement scores and based on these two types of scores, regression equation were developed and over achiever, normal achiever and under achiever students were found. Then Concept Attainment
Model of Instruction was used to teach them and its effectiveness was assessed using standardized achievement test in mathematics. The effectiveness of Concept Attainment Model of Instruction was assessed on basis of significant difference in average educational achievement. Gender and Socio-economic status of pupils were also considered for the same.

3. **Objectives of the Study**

The objectives of the study were as follows;

1. To identify over achiever, normal achiever and under achiever students of secondary schools.
2. To study the effectiveness of Concept Attainment Model of Instruction on achievement in Mathematics of over achiever, normal achiever and under achiever students of secondary schools.
3. To study the effectiveness of Concept Attainment Model of Instruction on achievement in Mathematics among under achiever boys and girls.
4. To study the effectiveness of Concept Attainment Model of Instruction on achievement in Mathematics among normal achiever boys and girls.
5. To study the effectiveness of Concept Attainment Model of Instruction on achievement in Mathematics among over achiever boys and girls.
6. To study the effectiveness of Concept Attainment Model of Instruction on achievement in Mathematics of over achiever, normal achiever and under achiever students of secondary schools with reference to their gender.
7. To study the effectiveness of Concept Attainment Model of Instruction on achievement in Mathematics among under achiever students with different (high, medium, low) Socio-Economic status.
8. To study the effectiveness of Concept Attainment Model of Instruction on achievement in Mathematics among normal achiever students with different (high, medium, low) Socio-Economic status.
9. To study the effectiveness of Concept Attainment Model of Instruction on achievement in Mathematics among over achiever students with different (high, medium, low) Socio-Economic status.
10. To study the effectiveness of Concept Attainment Model of Instruction on achievement in Mathematics of over achiever, normal achiever and under achiever students of secondary schools with reference to their Socio-Economic status.
4. **Hypothesis of the Present Study**

   On the bases of objectives and measurement level of the data the investigator has farmed the null hypotheses.

   “There will be no significant difference among mean achievement scores of over achiever, normal achiever and under achiever students when they are taught using Concept Attainment Model of Instruction”

5. **Outline of the Study**

   The outline of the study is as follows:

   1. The unit 'Sets' of the subject Mathematics in grade IX was selected for the development of teaching model.
   2. Concept Attainment Model of Instruction was prepared after the content analysis of the selected unit.
   3. The model was tried out on small sample and the opinions of experts were taken on that instruction program and on the basis of suggestions the model was refined.
   4. The Construction and Standardization of Unit Achievement Test on ‘Sets’ was done.
   5. Test for measuring Intelligence and Socio-Economic status scale were administered upon the sample.
   6. The marks of previous year final examination in the subject Mathematics were taken and they were converted into t-scores and used as their scholastic achievement scores.
   7. Using regression equations for intelligence scores and achievement scores, students were identified as over achievers, normal achievers and under achievers.
   8. The implementation of the experiment was done on the students of I.E.S. high School and SVP high school. Standardized unit achievement test prepared by the researcher was used as post test and was conducted at the end of experiment.
   9. Using t-test, data analysis was done on the different groups for testing hypotheses pertaining to different objectives of the study.
   10. Conclusions were drawn from results of analysis and various implementations were made. Suggestions and recommendations for further researches were made.
6. **Area of Research**

From initialization of education till today many researches are done. On basis of them educational fields are decided.

Every research is attached to many field of research. The study was associated with (1) Mathematics Education and (2) Educational Technology.

7. **Type of Research**

The type of the research can be mainly classified in three ways (1) The research carried out can be Basic, Applied or Action Research based on its product, (2) The research can be Quantitative or Qualitative based on its implementation and (3) The methodology of the research such as; Survey, Descriptive or Experimental.

This study is an applied research because its results are applicable. The Concept Attainment Model of Instruction was developed during the study. This model is very much useful for teachers and students for making teaching and learning process easier.

In respect of data collection and analysis it was a quantitative research and research methodology point of view it was experimental research.

8. **Scope of the Study**

The scope of the study is applied to English medium secondary schools of Mumbai city. This was the universe of the study. Mumbai itself is divided into various areas, from those different areas, sample schools were selected for standardizing unit achievement test prepared by the researcher and two schools were selected for the experiment.

9. **Limitation of the Study**

The schools for the experiment were selected purposefully. The content and the standard were also selected objectively. These results may be applicable only to English medium secondary schools of Mumbai city.

10. **Research Method**

This was an experimental research. The design used was - Three groups only post test design.
11. **Universe**

The universe was the students, studying in the English Medium Schools at Secondary level following state board syllabus in Mumbai city during the academic year 2013-14.

12. **Sample**

For the experiment Indian Education Society (IES) High School and Sardar Vallabhbhai Patel High School (SVP) students were selected for the sample.

1. **Selection of class.** All the classes of ninth standard were selected.
2. **Group formation.** Students from all the classes formed experimental group as there was no control group.
3. **Implementation of Teaching Model.** All the classes were included in experimental group. This group was taught through Concept Attainment Model of Instruction.

There were 240 students from IES School and 238 students from SVP School. They were the sample for the present study.

13. **Variables of the Study**

The variables of the study were diagrammatically represented here;
14. **Preparation of Teaching Material**

The investigator developed lesson plans using Concept Attainment Model of Instruction. Following steps were followed for the same.

1. Planning of the Teaching Program
   a. Subject and Selection of Unit
   b. Content Analysis of the Unit
   c. Determining Teaching Aims
2. Construction of lesson plans based on Concept Attainment Model of Instruction.
3. Piloting for the opinion of experts, teachers and students
4. Final form of the Model of Teaching

15. **Tool**

The investigator prepared a (1) Standardized Unit Achievement Test, selected an (2) Intelligence Test by Ravens and (3) Socio-Economic Status Scale by Kuppuswamy. Thus three research tools were used by the researcher.

**Standardized Unit Achievement Test.** The standardized test for the testing achievement of students on the unit 'Sets' for the subject Mathematics in Std. IX was prepared by researcher. It was developed keeping in mind objectives, specifications and all methodology-steps according to ‘Test Construction and Standardization’ were followed in order to standardize the achievement test.

**Intelligence Test.** To find various achievement levels among learners researcher used Intelligent Test. According to the suitability of the research work and as per the necessity of the objectives of study researcher used Ravens Standard Progressive Matrices.

**Socio-Economic Status Scale.** In order to assess the Socio-economic Status of sample students the researcher used the adapted version of Socio-Economic Status Scale by Kuppuswamy.

16. **Method of Data Analysis**

The data were analyzed by following steps:

1. Intelligent quotient was obtained from the scores of pupils on intelligence test.
2. Achievement scores of final examination were obtained for the subject Mathematics, and they were converted to T-scores.
3. Using regression equation predicted achievement scores were found based on their scores of intelligence test.

4. Comparing predicted achievement scores and their achievement scores in final examination the sample were classified as under achiever, normal achiever and over achiever students.

5. According to the responses made by pupils on socio-economic status scale they were identified as pupils with high, medium and low socio-economic status.

6. All the students were taught using Concept Attainment Model of Instruction. Then they were tested on standardized unit achievement test. The marks of the students on the standardized unit achievement test were considered as achievement on post test.

7. Scores obtained in post-test by under achiever, normal achiever and over achiever students were compared using t-tests. The comparison was also obtained between the scores of boys and girls and in between the students belonging to high, middle and low socio-economic status.

Thus all the hypotheses were tested using SPSS software to check the effectiveness of Concept Attainment Model of Instruction on achievement in Mathematics of students with various achievement levels.

17. Results

The major findings of the present study were as follows:

- Effect of Concept Attainment Model of Instruction was significantly higher on the over, normal and under achiever students.
- Effect of Concept Attainment Model of Instruction was significantly higher on the over, normal and under achiever boys and girls.
- Concept Attainment Model of Instruction was effective in enhancing the academic achievement among over, normal and under achiever students with high, average and low socio-economic status.

18 Contribution of the Research

In the present research keeping in mind the objectives of study a Concept Attainment Model of Instruction was developed and to check its effectiveness in terms of achievement a standardized unit achievement test was developed by the researcher.
**Tool.** The researcher developed a Standardized Unit Achievement Test. This test measured the educational achievement of class IX students in Mathematics on the topic “Sets”.

**Program.** The Concept Attainment Model of Instruction was developed keeping in mind objectives and basic principles of teaching – learning process. Inductive - deductive approach was used and basic axioms of teaching like - Known to unknown, simple to complex etc. were used while developing this model that belongs to the family of Information Processing Models. This program is a combination of text and charts. Various characteristics of concepts, its examples and non-examples as well as essential and non-essential attributes are also mentioned. The lesson transcripts were prepared keeping in mind various objectives. All the concepts in the topic were analyzed and their relations were established. Taking in to account the procedure various phases were developed. Charts were prepared according to examples and non-examples and the presentation was made ready by keeping in mind various steps.

19. **Educational Implications**

Following are the educational implications of the experiment.

- Concept building is the heart of this program so children can learn easily and deeply through Concept Attainment Model.
- It inspires teachers to prepare such type of Model of Teaching.
- This Model package can satisfy basic necessities of slow learners as well as visual learners and for diagnostic and remedial teaching.