Developing a Teaching Package in General Science for Class X Using Inductive Thinking Model

MR. MAHESH PATEL
Assistant Teacher,
DNJ Adarsh High School & Shri O. M. Agrawal Higher Secondary School, Deesa
Gujarat (India)

Abstract:

The present study is experimental in nature. The objective of this study was to study the effect of Inductive Thinking Model of teaching on achievement in General Science at secondary stage. A sample of 40 students was selected at random. 20 students were selected randomly to form an experimental group. Another 20 students were selected randomly to form the control group for the study. The experimental group was given the Inductive thinking model of teaching and the control group was taught through the Conventional Method (Lecture Method) of teaching. The data was collected and analyzed with the help of suitable statistical techniques. Inductive thinking model was found to be effective in terms of achievement of students in General Science.

Keywords: *Achievement, Cognitive Structuring, Inductive thinking model, Conventional Method, Teaching General Science*

1. Introduction

In Indian school teaching is limited merely to lecture method and mostly teachers teach different types of contents i.e. facts, concept and generalization in the same way hence pupils experience a lot of difficulties in attaining concept. Hence students are compelled to rote learning which is ineffective and outdated in the present context. Need of the day is that student should understand the structure of the body of knowledge rather than memorize factual information. Therefore, it is the duty if the teacher to stress the structure of the field of study as structure leads to self learning. Education improvement through education technology is a demand of present education system. Education technology is a science for educational reform and boon for best teaching techniques (kumar, 1990 and Mukhopadhyay, 1991). Although some educational techniques were used in ancient times but they were not enough for present advance curricula.

The process of learning has been found to be intricately linked with that of thinking. The development of thinking skills should therefore, lead to an increase in the efficiency of learning. The thinking skills serve as necessary tools for learners to process the information, which could be in the form of discrete data or any kind of structured knowledge. We know that in the world around us we observe innumerable objects, people and events. It this large intake of information has to make any sense, and then it needs to be organized. Some pasterns have to be evolved in terms of generalizing inferences. The generalizations are formed by searching out underlying relationships among the seemingly discrete data or fragmentary pieces of information. The ability to analyses information and form concept is the fundamental thinking skill. In this study researcher developed a package on the concept of photosynthesis based on Inductive Thinking Model. The objectives of education have changed from time to time and so has our concept of teaching. What we teach and how we teach depends to a great extent on what we want to achieve. Teaching is both an art and a science. Able teachers always find ways and means to improve their teaching techniques. With the change in time, the teachers are asked to employ newer methods of teaching so that their students are able to cope with the demand of the times. The improvement of the teacher by employing newer methods of teaching and the latest

techniques of teaching is a need of the locus. The most recent concept of teaching is teaching the child how to learn, how to discover, how to think and how to inquire. Some sort of teaching has always been going on which might have been of any level. Improvements in the process of teaching have been made from time to time by the teachers. Some research workers, intellectuals, administrators etc. might have made special efforts to improve the teaching process. In fact, every good teacher in class-room always tries to prepare a model of teaching, then he or she wants to follow it for all times. He also goes on modifying it with the passage of time when he gains more and more experience of class-room teaching. A few models of teaching have been done searched out and are being propagated in different countries in order to derive maximum benefits. Thus models suggest something really very good for modifying the behavior of the learners. Teaching models are just instructional designs. They describe the process of specifying and producing particular environment situations which cause the student to interact in such a way that specific change occurs in his behavior. The teaching models are very useful for teachers for planning and organizing teaching activities. The teacher can make its use in planning curriculum, student teacher interaction and to develop specific teaching aids. Although, the process of teaching learning aims at transmission of knowledge, imparting skills, formulation of attitudes, values and behavior. However, teaching is a complex activity and which is a cluster of different roles and responsibilities. A teacher has to master multiple roles in order to become a role model for the students. Science today is becoming increasingly complex and abstract. It is therefore important that new methods and techniques of teaching must be introduced in order to make the teaching of science more effective and efficient. These are the days of knowledge explosion. Hence the learners must be prepared to process information suitably and meaningfully so that the information can be retained for a longer time and can be used in different situations of life.

In order to accomplish this objective, the root and fruit of knowledge, that is, the pupils must attain concept. The Inductive thinking model of Teaching was developed by Hilda Taba in 1956. The model emerged out of the study of thinking process in human beings. It is based on the assertion that a human being is endowed with the capacity to discriminate and to categorize things in groups. This model is used for teaching concepts to the students. It enables them to understand fully the similarities and relationship among various things of the environment. Inductive thinking model is built around the study of thinking conducted by Bruner. The Hilda Taba"s Inductive Thinking Model states that the role of teacher is to create situations in which students can learn on their own rather than to provide packaged information to students. It provides an efficient method for presenting organized information from a wide range of topics to students at every stage of development. Models of teaching as an area in research are emerging in a significant manner. Instructional effects and nurturing effects for each of the model of teaching have been hypothesized. On the basis of which research on Inductive Thinking Model is needed. So there is a great need for Indian researchers to monitor their research activities in context of new demands from teachers on one hand and research gaps in teachings and models of teaching on the other hand. Therefore, the investigator has selected this problem.

2. Objectives
1. To compare the mean pre-test scores of experimental and control groups.
2. To compare the mean post-test scores of experimental and control groups to see the effect of Inductive thinking model on achievement in General Science.
3. To compare the effectiveness of Inductive Thinking Model on Conventional Teaching Method.

3. Hypotheses
Ho_1 There will be no significant difference in the mean pre-test scores of experimental and control groups.

Ho_2 There will be no significant difference in the mean post -test scores of experimental and control groups.

Ho₃ There will be no significant difference in Achievement in general science taught using the Inductive Thinking Model and Conventional Teaching Method.

4. Method of the Study
Experimental research method was adopted in the present study.

5. Procedure of Sample Selection
For the present study, random sampling technique was adopted to select the sample. The universe from which the sample was selected was class X students of Shree Exotica School, Palanpur, District: Banaskantha, Gujarat. Initially a sample of 60 students was taken, but for statistical analysis and for discussion of results, it was reduced to 40. It was done with the help of K. G. Desai's Verbal –Non Verbal intelligence Test. Only these 40 students were selected for study, whose intelligence score lies between 20 and 45. Out of 40 students, 20 students were in experimental group and 20 students were in Control group.

6. Tools used in the study
The following tools were used in the research

1- Standardized tool – K.G. Desai's Verbal-Non verbal intelligence test.
2- Self made tools.
    i) Pretest questionnaire containing 20 questions on the topic "Balanced Diet".
    ii) Treatment schedule.
3- Post test questionnaire containing 20 questions.

7. Statistical Technique Applied
7.1 Descriptive Statistics
Descriptive Statistics such as Mean, S.D. were used to compare groups on pre-test scores and post-test scores. The technique of analysis of covariance (ANCOVA) was applied for analyzing the data.

7.2 Inferential Statistics
„t‟ test was applied to find out and to compare the results obtained through descriptive statistics.
Graphical Statistics
To have a pictorial view of scores of different variables, graphical statistics was used.

8. Results
8.1 Comparison between Mean Pre-Test Scores of Control and Experimental Groups
„t‟ value was computed to study the significant difference between mean p re-test scores of experimental and control groups. The results so obtained have been entered in Table 1.

Table 1 Showing't' value of mean pre-test scores of control and Experimental groups in general science

Group	N	Mean	S.D.	t-value	Remarks
Control	20	9.15	1.93	0.68	Insignificant At 0.01 level
Experimental	20	9.55	1.76		

Table 1 reveals that the mean pre-test scores of control and experimental groups are 9.15 and 9.55 respectively and their mean difference (D) is 0.68. The obtained „t‟-value (t=0.68) is insignificant at 0.01 level which shows that there exists no significant difference in the mean pre-test scores of experimental and control groups. Hence, the hypothesis, "There will be no significant difference in the mean p re-test scores of experimental and control group is accepted.

8.2 Comparison between Mean Post-Test Scores of Control and Experimental Groups

„t‟ value was computed to study the significant difference between mean post -test scores of experimental and control groups. The results so obtained have been entered in Table 2.

Table 2: Showing 'T' Value of Mean Post-Test Scores of Control and Experimental Groups in General Science

Groups	N	Mean	S.D.	t-value	Remarks
Control	20	9.40	1.88	12.41	Significant at 0.01 level
Experimental	20	16.85	1.95		

Table 2 reveals that the mean post-test scores of control and experimental groups are 9.40 and 16.85 respectively and their mean difference (D) is 7.45 which reveals that group taught with ITM has higher mean post -scores as compared to group taught with Conventional method. The obtained „t‟-value (t=12.41) is significant at 0.01 level which shows that there exists significant difference in the mean post-test scores of experimental and control groups. Hence, the hypothesis, "There will be no significant difference in the mean post-test scores of experimental and control group s" is rejected.

Table 3: Summary of Analysis of covariance of pre-test and Post-test scores of students in Experimental and Control groups

Source of Variation	df	SSx	SSy	MSx(vx)	MSy(Vy)
Among Means	1	1.23	250.0	1.23	250.0
Within Groups	38	56.75	589.1	1.49	15.50
Total	39	57.98	839.1		

Fx = 0.82 ,Fy = 16.13 From F table df = 1/38
F at 0.05 level = 4.08
F at 0.01 level =7.31

The F ratio for the 2 sets of scores were tested for significance .Since the table value of Fx for df 1/38 is 4.08 at 0.05 level, the obtained Fx is not significant. The Fy obtained (Fy = 16.13,p< 0.01) is significant at 0.01 level because the table value for Fy for df 1/38 is 7.31.The Analysis of variance of the Y Means indicates that there exists significant difference between ITM and Conventional Method of teaching.

Table 4: Summary of Analysis of Covariance for the Pre-test and Post-test scores of Students in the Experimental and Control groups

Source of variance	df	SSx	SSy	SSxy	Ssy.x	Msy.x (Vy.x)	Sdy.x
Among Means	1	1.23	250.0	17.50	193.48	193.48	
Within Groups	37	56.75	589.1	89.85	446.84	12.08	3.48
Total	38	57.98	839.1	107.35	640.32		

Fyx = 16.02 ,From table F df =1/37
F at 0.05 level = 4.12, F at 0.01 level = 7.42

Since the obtained F ratio 16.02 is greater than the table value 7.42, it is significant at 0.01 level (Fy.x = p< 0.01).This significant F ratio for the adjusted post-test scores shows that the two final Mean

scores of students in the Experimental group and that of the control group differ significantly after they have been adjusted for differences in the pre-test scores.

Table 5: Data for Adjusted Means for the Post-test scores of Students in the experimental and Control groups

Groups	N	Mx	My	My.x (adjusted)
Experimental	20	4.70	18.2	17.87
Control	20	4.35	13.2	13.43
General Means	40	4.53	15.65	

The Adjusted Means for post-test scores were tested for significance of df 1/37.The t value obtained was 4.05. The table value for significance for df 37 is 2.71at 0.01 level. So the obtained value is significant at 0.01 level($t = 4.05, p < 0.01$).

The significant t value shows that the two Means differ significantly. This means that the experimental group and Control group differ significantly in their Post-test Achievement.It indicates that Experimental group is superior to control group.So,it is concluded that the student taught using Inductive Thinking Model performed better than those taught using the Conventional Method of teaching.

9. Findings
The notable findings are given below:
1. There exists no difference in the mean pre-test scores of experimental and control groups. Reason for this difference may be that both the groups are equal in their intelligence.
2. There exists difference in the mean post -test scores of experimental and control groups. Reason for this difference in achievement may be that ITM (experimental group) was found to be superior in comparison to Conventional method (control group).
3. The Inductive Thinking Model is more effective than Conventional Teaching Method in teaching General science.

10. Conclusion
On the basis of the results drawn, the following conclusions have been drawn:
Inductive thinking model of teaching is superior and effective in terms of General Science concept understanding of students in comparison to Conventional Method. Inductive thinking model has significantly higher students liking in comparison to Conventional Method.

11. Educational Implications
As the present study review that Inductive thinking model was effective in terms of General Science concept understanding of students, hence ITM should be used by the school teacher in class-room teaching especially in teaching General Science concepts. In order to orient the interest of teachers towards the use of ITM in classroom teaching, workshops and seminars should be organized. Inductive thinking model plays a significant role in improving the achievement of students in the following way:
- ITM helps in strengthening the cognitive structure of the students.
- It can be used with all the categories of the student's viz. high, average and low intelligent students.
- It is beneficial for boys as well as girls.
- It provides deep understanding of the concept.
- It provides wide opportunities to students for acquiring concepts, interpreting the data and applying the principles in new and differential situations.
- In ITM, students get opportunity to think openly and freely.

- It can be used effectively to teach General Science.

References

1. Ahmad, M. (2008). Comprehensive dictionary of education. New Delhi: Atlantic publishers & distributors, Pvt. Ltd.
2. Ahmed, I., Gujjar, A. A., & Ali, A. (2011). A comparative study of effectiveness of Inductive thinking model and advance organiser model in teaching of English in teacher education course. Language in India, 11(3), 216-231.
3. Ahmed, I., Gujjar, A. A., Januja, S.A., & Bajwa, N. (2012). A comparative study of effectiveness of concept attainment model and traditional method in teaching of English in teacher education course. Language in India, 12(3), 216-227.
4. Anuradha (1998). Effectiveness of Concept Attainment Model in teaching certain grammatical concepts in English. Unpublished M.Ed. Dissertation, Amritsar: Guru Nanak Dev University.
5. Martindale, Emery Sherwood (1998). The effect of three Teaching Models on Undergraduate College students Achievement in Self Paced Lesson. Dissertation Abstract International Vol.59,Nov 7,jan 1999 page no 2460A