IJAER/June-July 2012/Volume-1/Issue-1 ISSN: 2278-9677
International Journal of Arts & Education Research

An Experimental study on Physics Teaching by Concept Attainment Model

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Abstract :
This study was an experimental work, which falls into the area of Educational Technology. It was an attempt to find whether the teaching of physics can be improved by the use of Concept Attainment Model. A comparison was drawn between Concept Attainment Model and Traditional Method for acquisition of physics concepts in class IX. The method used for the study was Non-equivalent pre- test post-test experimental design. The data collected were computed and analyzed using appropriate statistical techniques as t test and ANCOVA. It was found that use of Concept Attainment Model promotes various thinking strategies among students. Use of CAM facilitates the teacher - student and student – student interaction and thereby improves class – room interaction and group morale.

Introduction

Physics is a specific branch of science. It is study of nature and natural phenomenon. Physics is an accumulative and systematic learning of the natural phenomenon connected with matter and energy. Physics is a branch of knowledge related to matter and energy based upon continuous scientific observations leading to the formation of concepts, laws and theories which are subject to modification in the light of new evidences. Thus Physics starts with the study of basic properties of matter and radiation and it tries to explain different natural phenomenon in terms of those properties. Methods employed for science teaching are dull. They are just sort of chanting 'Om Jai Jagdish'. Both teachers and students worship the "goddess of examination". The testing abilities of the paper setters are low. These are the reasons that science teaching is not related to the environment at all. At present, at all levels traditional method of teaching i.e. Lecture method dominates the teaching Learning process. Lecture is more useful in communicating the information. If we observe

traditional class room teaching, we find that either the teacher is delivering information or one of the students is reading from the text book and other students are silently following him. In traditional method, students study in the classroom in a group. During the process of traditional method teachers are more active but students are passive listeners and not motivated to think independently.

Concept Attainment Model is an approach to teaching concept in which teacher provides examples and non-examples of the concept and student determined the concept from the examples quoted. In this study reception oriented strategy of CAM has been used to teach students in experimental group. The term Concept Attainment Model is historically linked with the work of Jerome S. Bruner and his associates. This Model is intended to teach specific concepts by comparing and contrasting examples that contain the concept with examples that do not contain the concept. It is built up from Bruner's work on the cognitive activity called categorizing. He is of the opinion that categorizing helps to reduce the complexity of environment and necessity for concept learning.Categorizing activity has two components: the act of concept formation and the act of concept attainment. Concept formation is the act by which new categories are formed while in Concept attainment, the concept is determined in advance, and the task is to determine the concept on the basis of exemplars and non-exemplars.

Objectives of Study

1 To compare the adjusted mean scores of concept of motion understanding of CAM Group and TM Group by taking pre concept of motion understanding and intelligence as covariates.

2. To compare the adjusted mean scores of concept of inertia understanding of CAM Group and TM Group by taking pre concept of inertia understanding and intelligence as covariates.
3. To compare the adjusted mean scores of concept of Acceleration understanding of CAM Group and TM Group by taking pre concept of Acceleration understanding and intelligence as covariates.
4. To compare the adjusted mean scores of concept of Force understanding of CAM Group and TM Group by taking pre concept of Force understanding and intelligence as covariates.
5. To compare the adjusted mean scores of concept of Gravitation understanding of CAM Group and TM Group by taking pre concept of Gravitation understanding and intelligence as covariates.

Hypothesis of Study

- There will be no significant difference in adjusted mean scores of physics concept understanding of concept attainment model group and traditional method group by considering pre physics concept understanding and intelligence as covariates.

Sample

- The study was conducted on IX class Students studying in English medium schools. The sample was comprised of 228 students.

Method and Procedure

The present study was experimental in nature. The design of the study was based on the lines of non-randomized control group pretest- post test design. The achievement test scores were subjected to‘t’ test. Since the groups were intact and

unequated, Analysis of Covariance (ANCOVA) was used for comparison of data. Achievement test in concerned physics conceptand Raven standard matrices were the tools used in this study.

Objective Wise Hypotheses Testing and Results

Objective 1

Summary of ANCOVA for Concept of Motion Understanding of CAM Group and TM Group By Taking Pre Concept of Motion Understanding and Intelligence as Covariates

SOURCE OF VARIANCE	SUM OF SQUARES	df	MEAN SQUARES	F- VALUE
Treatment	252.54	1	252.54	282.36**
Error	201.24	225	.894	
Total	478.51	227		

**significant at 0.01 level

It indicates that the adjusted mean scores of Concept of Motion Understanding of CAM and TM groups differ significantly when pre Concept of Motion Understanding and intelligence were considered as covariates. In the light of this the null hypothesis, namely, “There will be no significant difference in adjusted mean scores of Concept of Motion Understanding of CAM Group and TM Group by considering pre Concept of Motion Understanding and Intelligence as covariates”, is rejected.

Objective 2

Summary of ANCOVA for Concept of Inertia Understanding of CAM Group and TM Group By Taking Pre Concept of Inertia Understanding and Intelligence as Covariates

SOURCE OF VARIANCE	SUM OF SQUARES	df	MEAN SQUARES	F- VALUE
Treatment	235.36	1	235.36	320.98**
Error	164.97	225	.733	
Total	432.37	227		

**significant at 0.01 level

It indicates that the adjusted mean scores of concept of inertia understanding of CAM and TM groups differ significantly when pre concept of inertia understanding and intelligence were considered as covariates. In the light of this the null hypothesis, namely, "There will be no significant difference in adjusted mean scores of concept of inertia understanding of CAM Group and TM Group by considering pre concept of inertia understanding and intelligence as covariates", is rejected.

Objective 3

Summary of ANCOVA for Concept of Acceleration Understanding of CAM Group and TM Group By Taking Pre Concept of Acceleration Understanding and Intelligence as Covariates

SOURCE OF VARIANCE	SUM OF SQUARES	df	MEAN SQUARES	F- VALUE
Treatment	210.09	1	210.09	209.05**
Error	226.13	225	1.005	
Total	496.22	227		

**significant at 0.01 level

It indicates that the adjusted mean scores of Concept of Acceleration Understanding of CAM and TM groups differ significantly when pre Concept of Acceleration Understanding and intelligence were considered as covariates. In the light of this the null hypothesis, namely, "There will be no significant difference in adjusted mean scores of Concept of Acceleration Understanding of CAM Group and TM Group by considering pre Concept of Acceleration Understanding and Intelligence as covariates", is rejected.

Objective 4

Summary of ANCOVA for Concept of Force Understanding of CAM Group and TM Group By Taking Pre Concept of Force Understanding and Intelligence as Covariates

SOURCE OF VARIANCE	SUM OF SQUARES	df	MEAN SQUARES	F- VALUE
Treatment	294.28	1	294.28	398.95**
Error	165.97	225	.738	
Total	495.58	227		

**significant at 0.01 level

It indicates that the adjusted mean scores of Concept of Force Understanding of CAM and TM groups differ significantly when pre Concept of Force Understanding and intelligence were considered as covariates. In the light of this the null hypothesis, namely, "There will be no significant difference in adjusted mean scores of Concept of Force Understanding of CAM Group and TM Group by considering pre Concept of Force Understanding and Intelligence as covariates", is rejected.

Objective 5

Summary of ANCOVA for Concept of Gravitation Understanding of CAM Group and TM Group By Taking Pre Concept of Gravitation Understanding and Intelligence as Covariates

SOURCE OF VARIANCE	SUM OF SQUARES	df	MEAN SQUARES	F- VALUE
Treatment	300.07	1	300.07	378.57**
Error	178.34	225	.793	
Total	482.89	227		

**significant at 0.01 level

It indicates that the adjusted mean scores of Concept of Gravitation Understanding of CAM and TM groups differ significantly when pre Concept of Gravitation Understanding and intelligence were considered as covariates. In the light of this the null hypothesis, namely, "There will be no significant difference in adjusted mean scores of Concept of Gravitation Understanding of CAM Group and TM Group by considering pre Concept of Gravitation Understanding and Intelligence as covariates", is rejected.

Objective as a Whole

Summary of ANCOVA for physics concept understanding by considering pre physics concept understanding and intelligence as covariates

Source of variance	Sum of squares	df	Mean squares	F- value

Treatment	21539.43	1	21539.43	701.96**
Error	6904.07	225	30.69	
Total	35279.26	227		

**significant at 0.01 level

It indicates that the adjusted mean scores of CAM and TM groups (as a whole) differ significantly when pre physics concept understanding and intelligence were considered as covariates. In the light of this the null hypothesis that "There will be no significant difference in adjusted mean scores of physics concept understanding of CAM group and TM group (as a whole) by considering pre physics concept understanding and intelligence as covariates", is rejected. Further, the adjusted mean scores of physics concept understanding of CAM group was 85.61, which is significantly higher than that of TM group whose adjusted mean score of physics concept understanding was 65.58. It reflects that the treatment given to CAM group, in relation to CAM, was found to be significantly superior to TM of teaching, when both groups were matched with respect to pre physics concept understanding and intelligence as covariates. It may, therefore, we concluded that CAM was found to be superior to TM when pre physics concept understanding and intelligence as covariates.

Main Findings of the Study

On the basis of analysis of data finding of the study is :

- CAM was significantly superior in comparison to TM when pre-physics concept understanding and intelligence scores were taken as covariates.

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