

## **IMPACT OF COGNITIVE APPRENTICESHIP LEARNING PROGRAMME ON ACHIEVEMENT IN CHEMISTRY**

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### **Abstract**

The study was conducted to develop the Cognitive apprenticeship learning programme for teaching Chemistry, and experimenting it on the students studying in eighth standard and finding its impact **on achievement in Chemistry**. “pretest-post test parallel equivalent groups experimental design” was followed for this study. After comparing the pretest and post test scores of both the experimental and control groups and applying statistical techniques, it reflected that there exists significant difference between the two groups. The students learning through Cognitive apprenticeship learning programme prepared by researcher were found to be better in their achievement in Chemistry than the students learning through the traditional method of learning

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### **Keywords:**

First keyword;

Cognitive apprenticeship

Second keyword;

achievement in Chemistry

Third keyword;

Traditional method

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## **1. Introduction**

Science develops curiosity about the natural world around us. It helps in the development of the skills that can be applied to solve problems and make intelligent decisions in different contexts. It enables students to understand the concepts and acquire the knowledge. To achieve these goals we have to create interest in students in science learning. It is possible only when students participate in the process of teaching and learning. Constructivism is one approach that encourages student participation in the process. There are different instructional strategies of constructivism; one among them is cognitive apprenticeship.

Cognitive apprenticeship is one of the constructivist approaches that encourage students to observe the teacher performing the task and give them the opportunity to perform the same under the guidance of the teacher by getting coaching and scaffolding. Students articulate their understanding about the concept; they reflect and explore it outside the four walls of the classroom. But usually in traditional approach the teacher give a lecture on the topic in hand in his or her own convenient way and try to cover the syllabus prescribed. In traditional method students are given least opportunity to be the part of teaching learning process and no practical learning is encouraged, whereas in cognitive apprenticeship learning approach the students get an opportunity to have a complete experience of meaningful learning.

### **Objectives of the study**

1. To develop cognitive apprenticeship programme to teach Chemistry for VIII standard students.
2. To find out the impact of cognitive apprenticeship on achievement in physics of VIII std. students.

### **Hypotheses of the study**

1. There is no significant difference between the means of scores on pre-test of experimental group and control group in achievement in Chemistry.
2. There is no significant difference between the means of scores on post test in Chemistry of experimental group and controlled group.

3. There is no significant difference between the means of scores on pre-test and post test of experimental group in achievement of Chemistry.
4. There is no significant difference between the means of scores on pre-test and post test of control group in achievement of Chemistry.

## 2. Research Method

The researcher in the present study has employed the “pretest-post test parallel equivalent groups experimental design”. In this design pretest was administered before the application of the experimental (cognitive apprenticeship programme) and control (Traditional method) treatments and post test at the end of the treatment.

### Sample

In this study, the technique used for the selection of schools was random sampling technique. The groups were equated on the basis of previous year annual examination scores. The sample of the study consists of 50 students studying in VIII standard in two CBSE high schools at Davanagere district, Karnataka.

### Tools used

The following tools had been prepared for the following study:  
The investigator developed the cognitive apprenticeship programme with the six components that is modeling, coaching, scaffolding, articulation, reflection and exploration for the chapter

### **MATERIAL: METALS AND NON METALS** in Chemistry.

1. The investigator has prepared pre test and post test consisting of 30 multiple choice questions pertaining to the chapter **MATERIAL: METALS AND NON METALS** in Chemistry of VIII standard CBSE text book.
2. The investigator has prepared pre test and post test consisting of 30 multiple choice questions pertaining to the chapter **MATERIAL: METALS AND NON METALS** in Chemistry of VIII standard CBSE text book.

**Variables:**

*Independent variable:* cognitive apprenticeship programme and traditional learning method.

*Dependent variable:* Achievement in Chemistry.

**Delimitations of the study:** The delimitations of the study are as follows;

1. This study was delimited to CBSE secondary schools of Davanagere district.
2. It was delimited to VIII std students.
3. The academic achievement of the students in Chemistry only was included in the study.

**Data collection:**

During the experiment, two groups of 25 students each were selected. One group was considered as experimental group and the other group as control group. Cognitive apprenticeship programme prepared by the researcher on the chapter '**MATERIAL: METALS AND NON METALS**' was administered to the control group. The programme consists of eight sessions of 45 mins each. In each session a sub topic from the chapter was taught by applying the 6 components of cognitive apprenticeship approach i.e. modeling, coaching, scaffolding, articulation, reflection and exploration. The control group was taught using traditional method. There were 25 students in each group. The pre test scores on achievement in Physics of the two groups were used to equate the two groups. Soon after the treatment was over post test was administered to measure the achievement in Chemistry of the students. Post test scores were used to measure achievement of the students in Chemistry as a result of the treatment.

**3. Results and Analysis****Hypothesis 1**

There is no significant difference between the mean scores on pretest of experimental groups and control group on achievement in Chemistry.

't' test was applied to test the significance of difference between the means of achievement scores on pretest in Chemistry of experimental group and control group.

**Table 1: Means, SD, t value of pre test achievement scores in Chemistry of experimental group compared with that of control group.**

Groups	N	subject	Means of pre test scores	Standard deviation	't' value	'p' value	Level of significance at 0.05 level
Experimental group	25	Chemistry	12.04	3.12	0.177	0.86	Not significant
Control group	25	Chemistry	12.24	3.97			

Table 1 reveals that the 't' value is not significant at 0.05 level. The students of the experimental group do not differ significantly from the students of control group in the means of achievement scores in Chemistry at pre test level.

### Hypothesis 2

There is no significant difference between mean scores on post test in Chemistry of experimental group and controlled group.

't' test was applied to test the significance of difference between the means of achievement scores on post test of experimental group and control group.

**Table 2: Means, SD, t value of post test achievement scores in Chemistry of experimental group compared with that of control group.**

Groups	N	subject	Means of post test scores	Standard deviation	't' value	'p' value	Level of significance at 0.05 level
Experimental group	25	Chemistry	16.96	3.86	2.82	0.0069	significant
Control group	25	Chemistry	13.85	3.85			

Table 2 reveals that the 't' value is significant at 0.05 level. The students of the experimental group differ significantly from the students of control group in the means of achievement scores in **Chemistry** at post test level.

### Hypothesis 3

There is no significant difference between the mean scores on pretest and post test in **Chemistry** of experimental group. 't' test was applied to test the significance of difference between the means of scores on pre test and post test of experimental group.

**Table 3: Means, SD, 't' value of pre test and post test achievement scores in Chemistry of experimental group.**

Group	N	subject	Pretest		Post test		't' value	'p' value	Level of significance at 0.05 level
			Mean	SD	Mean	SD			
Experimental group	25	Chemistry	12.04	4.00	16.56	4.30	4.40	0.0002	significant

Table 3 reveals that the 't' value is significant at 0.05 level. Hence, it could be inferred that there is significant difference between the mean achievement scores on pre test and post test for the experimental group. The higher mean value in the post test shows that the students achievement in the post test was better than in the pretest. This furthers shows that the cognitive apprenticeship programme has helped students to score better in the post test.

### Hypothesis 4

There is no significant difference between the mean scores on pretest and post test in of control group. 't' test was applied to test the significance of difference between the means of achievement scores on pre test and post test in **Chemistry** of control group.

**Table 4: Means, SD, 't' value of pre test and post test achievement scores in Chemistry of control group.**

Group	N	Branch	Pretest		Post test		't' value	'p' value	Level of significance at 0.05 level
			Mean	SD	Mean	SD			
control group	25	Chemistry	12.24	3.97	13.88	3.85	1.71	0.1007	Not significant

Table 4 reveals that the 't' value is not significant at 0.05 level. Hence, it could be inferred that there is no significant difference between the mean achievement scores on pre test and post test for the control group.

**Findings:**

1. There is no significant difference between the mean scores on pretest of experimental groups and control group in achievement in Chemistry.
2. There is significant difference between the mean scores on post test in Chemistry of experimental group and control group.
3. There is significant difference between the means of achievement scores on pretest and post test in Chemistry of experimental group.
4. There is no significant difference between the mean scores on pretest and post test in Chemistry of control group.

**Conclusion**

Cognitive apprenticeship learning was one of the effective approaches to teach chemistry and improve student achievement in Chemistry. Cognitive apprenticeship learning approach encouraged student participation and allowed students to observe, to perform and to explore the knowledge under the guidance of teacher.

**References**

- [1]Ali Abdi “The effect of inquiry based learning method on students academic achievement in science course “Universal journal of education research 2(1):37-41, 2014 <http://www.hrpub.org>
- [2]Amith Goutam, A.K. Kulshrestha - “New paradigm in Education constructivist approach” Edutracks. Vol 10. No. 7, March 2011.
- [3]Anita Woolfolk – “Educational Psychology” published by Dorling Kindersley (India) Pvt. Ltd. Page No. 347 to 373.
- [4]Baskar. K., Shivakumar P.- “Constructivism – based science learning” – Edutracks – Vol. 11. No. 2 October 2011.
- [5]Deborah.O.Maxwell etal –“The effects of using inquiry based learning on science achievement for fifth grade students”. Asia pacific forum on science learning and teaching, Vol.16,Issue 1,Article 2,Jun 2015.
- [6]Weijin and Albert (2011) “The Effectiveness Of Cognitive Apprenticeship Learning (CAL) And Cognitive Tutor (CT) For Problem Solving Using Fundamental Programming Concepts”- <http://dl.acm.org/citation>