

The retention effect of computer assisted instruction (CAI) on student's achievement for teaching the chemistry topics of class VIII students

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Abstract- The aim of this research is to determine the retention effect of computer assisted instruction (CAI) on student's achievement for teaching the chemistry topics. The research included the structure of Atom, Air and carbon units of 8th grade chemistry lesson. In this research 80 students were structured as both control and experiment groups. Traditional instruction (TI) method is used for control group while traditional instruction with teacher supervised CAI method is used for experiment group. Chemistry subject test was applied as pre test and post test to both groups. To check the retention a delayed post test (Retention test) was administered 1 month after the post test. The results of students were analyzed using t-test statistic. The results shows that in the computer assisted instructions the students retained the concepts for a long period of time as compared to the traditional lecture method.

Index Terms- Computer assisted instruction, chemistry teaching, Retention

I. INTRODUCTION

Today, technology has changed the whole pattern of human life. The greatest contribution of cyber age technology is the development of computer and its use in teaching learning process. Instruction materials are among the assistant materials which teachers use them to make instruction more effective, lasting and enjoyable. Computers that are used as both a material and method and instructional materials are effective for making students concentrate on, understanding of, synthesizing and improving positive attitude towards the subject of the course an instructional material makes the topic clearer and more lasting by making the topics that are abstract for students more concrete (cepni et al., 2004; De mirel, 2004). Therefore, the usage of visual instructional materials is so much important in the instruction of abstract concepts as being included in chemistry lesson, understanding of the subject by students and improving positive attitude towards the course.

Nowadays, it is obvious that visual materials have been used in every field and technological devices, especially televisions and computers, have affected students. As a results of instructional materials that are supported by a variety of sound, image and animations are observed as more lasting enjoyable and effective ones. (De mirel, 2004). A host of research studies have been conducted to explore the effectiveness of computer assisted instruction in various fields of study and at different grade levels.

There are experimental evidences that only oral explanation method doesn't work well. If principles of how students learn are taken into account, richness of the visual content makes instruction more lasting and effective (mayer, 2003)

Computer assisted instruction

Is the process by which written and visual information is presented in a logical sequence to a learner through a computer. The student learn by reading the text material presented or by observing the graphic information displayed. Some of the programs provide audio-visual presentation with an option to the student to select audio presentation in addition to the visual media. Each segment of text is followed by questions, for student's response. Feedback on response is indicated immediately (Licatis & Atkinson, 1984; Wang & sleeman, 1993). CAI can be characterized as interactive and individualized learning as it usually involves a dialogue between one student and a computer programme and student can learn at his own pace and time frame (Curtis Howard,1990).

For these reasons, we have to develop chemistry lessons as the ones that are supported by visual and audio instructional material to draw student's attention and so provide lasting learning, reflect Chemistry nature and accelerate learning.

From these perspectives, the purpose of this search is to point out whether student's achievement will continue when a teacher studies structure of atom, air & carbon topics that are among chemistry topic of 8th grade science lesson controlled CAI.

II. STATEMENT OF THE PROBLEMS

In the resent study "The retention effect of Computer assisted instruction (CAI) on student's achievement for teaching the chemistry topics of class VIII students has been investigated.

Objectives of the study

The main objectives of the study was to- To explore the role of CAI in Maintaining the learning retention of the VIII class student.

Materials and method

In this research, a chemistry subject test of structure of atom, air and carbon topics was applied to 8th grade students as a pre-test ,a post test and a retention test after 1 months. This research is a quasi experimental and quantitative study of real

test model, of controlled pre test and post test model. In this research, there are two groups as experiment having the lessons with CAI and control group having the lessons with TI.

Population and Sample

For this study the population has been defined as all students studying in class VIII of schools, using NCERT books and affiliated to CBSE Board. Out of all schools, one school "Godwin public school" selected randomly for the sake of study. This school is in a process of taking up CAI (or) computer assisted instructions in a very big way. Each section having 40 students comprising of boys & girls having approximately same level of academic achievement were taken. To have a sample from the population, the mean & SD of the marks obtained in class VII were calculated for each section. Two sections were found approximately same mean & SD. There 2 selections were taken for this study. One section served as the control group, were imparted the science lesson in a traditional method & the other section which was the experimental group were imparted lesson through computer assisted instruction teaching programme. Hindi medium schools were not included in this study because the developed tools were in English language.

80 students were picked up from Godwin public school according to the following distribution.

Table - 1
Distribution of students from Godwin Public School

Sr.No.	Name of school	Section	No. of Students
1.	Godwin public school	Sec. – A (Control Group)	40
		Sec. – C (Experimental Group)	40
	Total		80

Random cluster sampling techniques has been used for this study.

Hypothesis

There is no significant difference in the Retention of the students taught chemistry through computer Assisted instruction and through traditional lecture method.

Variables involved

Present study entitled as "The retention effect of computer assisted instruction (CAI) on student's achievement for teaching the chemistry topics of class VIII students involves three variables out of which CAI is Independent variable & the dependent variables are the achievement & retention. The present study intends to investigate the effects of independent variable to the dependent variables. The fundamental aim is to find out the retention effect of computer assisted instruction (CAI) on student's achievement for teaching the chemistry topic. of class VIII students.

Computer Assisted instruction/CAI Package

In the present study the content was taught through two different methods. One was taught through the computer and the

other taught through traditional method commonly used in schools. To teach through computer we needed the content in a specially designed dice that is known as a CAI package. In this study the researcher herself developed a CAI package on chemistry subject (chapters – structure of Atom, Carbon & Air). The chapters were selected from their course book. After finalizing, the chapters were divided into sub topics. Detailed information related to each chapter and sub topics in gathered. from resource material available in the school library and an internet. The topic and subtopics were than arranged in a sequential pattern to give the clear understanding of the topics.

The Reliability & Validity of the test

A 30 question, chemistry subject test about structure of atom, carbon & air units with reliability of = .82 (coefficient of correlation obtained) was developed in order to measure achievement. In present research, the parallel from method was used to estimate the reliability of the chemistry achievement test.

The validity of a test depends upon the fidelity with which it measures what it purpose to measures. In the present research, "content validity" is employed in the selection of items of the test. The technique of face validity is for purpose of standardizing the tools was also employed.

This developed chemistry achievement test was applied as a pre-test, a post test and a retention test to both groups.

Data collection & Organization

For this study data was collected from 2 section of class VIII respectively chemistry achievement test was administered after the experiment. In this way scores were organized to deal it with appropriate statistical techniques.

Statistical Techniques

t-test was used to find the significance of difference between means of the 2 groups. (Experiment and control groups). For all statistical analysis 0.05 significance level was used.

III. RESULT AND DISCUSSIONS

Participants in this study consisted of 38 Male and 42 female students control group was composed of 18 male students and 22 female students whereas experimental group was composed of 20 male students and 20 female students.

Independent sample t-test results demonstrated that there is no statistically significant difference between experiment and control groups students pre-test results ($t=.454$; $p>0.05$). Mean and standard deviation scores of the groups and t-test results are given in Table 2 in details.

According to these results, it can be said that the knowledge levels of experiment and control group's students were at the same level at the beginning of the course.

According to post-test results that were gained after the application of the course, a statistically meaningful difference was found between experiment and control group's post test scores ($t=5.36$; $p<0.05$). As shown in Table 3 when we look at the group's mean scores in order to understand that whose side this difference is in favor of, post-test scores of experiment group students are determined as higher that post-test scores of control group students. That means, there is determined a significantly

meaningful deference for the achievement levels at the end of the course in favor of experiment group students.

Retention test was applied 1 month later than post-test application in order to see the retention effect of carried out education on experiment and control groups on student's achievement. As a result of retention test application, independent-samples t-test was used in order to see whether there was a statistically meaningful difference between both group's scores. Results were summarized in Table-4.

According to information given in Table-4 a statistically meaningful difference was found between the retention results of experiment and control groups ($t=5.91$; $p<0.05$). Both group's scores in order to understand that whose side this difference is in favor of, retention test scores of experiment group students are determined as higher than retention test scores of control group students. That means, retention level of the achievement test of the course for experiment group students is determined as higher than retention level of the achievement test of the course for control group students. This results shows that CAI not only provides better learning but also helps longer retention of gained properties.

Table 4 shows that experiment group's gain level is higher than control group's one. This situation is seen as continuing at retention test after 1 month.

If we look retention test into account, experiment group students have lost less knowledge than control group student have lost less knowledge than control group student according to post-test results. That means, CAI show retention effect. Although change is little for both groups, retention scores for CAI are closer than the ones of IT. It Results in that CAI is more effective in lasting achievement. There is a positive effect of educational technology on learning, without any doubt (Mihalca and Miclea, 2003)

IV. CONCLUSION

Results of this research determined that there is significantly meaningful difference between pre-test and post-test scores at chemistry Achievement test of both experiment and control groups. This shows that not only TI but also CAI are effective on student's achievement. A main effect of CAI on retention: participants learning with animated pictures remembered more elements than participants learning with static graphics. A positive effect of dynamic presentation appeared.

Another result of this research is that while there was not any significantly meaningful difference on both groups pre-test scores, there found a deference at post-test scores in favor of

experiment group. According to this result, CAI are effective than TI on students' achievement. If we compare the group's mean scores, the difference between gain levels increased almost nearly two times highly in favor of experiment group.

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Table- 2
Pre-test scores of Chemistry Achievement Test-

Groups	N	Mean	SD	T	P
Experiment	40	5.65	3.15	.454	0.08
Control	40	5.36	2.53		

Table- 3
Post-test scores of Chemistry Achievement test-

Groups	N	Mean	SD	T	df	P. Volume
Experiment	40	30	8	5.36	78	.000*
Control	40	22	5			

Table- 4
Retention score of Chemistry Achievement test-

Groups	N	Mean	SD	T	df	P. Volume
Experiment	40	25	7	5.91	78	.000*