Effect of computer aided learning (CAL) in promoting cognitive learning of sixth grade children of Government schools in Ludhiana district

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ABSTRACT : The thrust of the present study was to study the 'Effect of Computer aided learning in promoting cognitive learning of sixth grade children of government schools in Ludhiana district'. It used experimental research design to collect the data. The field experiment was conducted to assess the promotion of cognitive learning at first two taxonomic levels *i.e.* Knowledge and Comprehension (Bloom *et al.,* 1956) through the CAL package introduced under *Sarv Shikhya Abhiyan*. For this purpose randomized pre-test and post-test research design was used. Two matching groups of 25 students each studying in class 6th in the Government senior secondary schools of two adjoining villages in Ludhiana district were assigned treatment by random methods. The experimental group was taught through CAL and treated as intervention mode 1(IM_1), whereas control group was taught through traditional method and treated as intervention mode 2 (IM_2). The results revealed that IM_1 *i.e.* CAL was more effective as compared to IM_2 *i.e.* traditional teaching method. The gain in cognition scores was found to be significantly higher in case of IM_1 as compared to IM_2 in case of all seven lessons.

KEY WORDS : Computer aided learning, Cognitive learning, Traditional method

INTRODUCTION

In the field of education, computers are being used extensively both at administrative as well as teaching levels. The Information and Communication Technology (ICT) in Schools Scheme was launched by the Ministry of Human Resource Development, Government of India, in December, 2004 to provide opportunities to secondary stage students to mainly build their capacity on ICT skills and make them learn through computer aided learning process (Kushwaha, 2015). With the introduction of this scheme, schools in our country have taken large scale initiatives for making the use of computers all pervasive in teaching-learning activities.

Consequently, computers are not only being used as means of helping schools analyse data, but are

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becoming all pervasive tools for optimizing student learning and improving governance. Internet is also increasingly being used to gather and assimilate information for use in class assignments Computers are used in preparing and presenting instructional lessons (using LCD projector). So, basically computer aided learning is coming in vogue as a self-learning technique in almost all schools.

The advantages of CAL accrue in terms of flexibility, structured nature of contents, active participation on the part of the student, reporting system that provides the student with a clear picture of his/ her progress. Besides, it also offers a wide range of experiences that are otherwise not available to the students, It provides a lot of drilling which can prove useful for low aptitude students and enhances reasoning and decision- making abilities. Further, it also helps students learn inside as well as outside the classroom, provides individualized, continuous and authentic teaching activities, reduces learners' apathy and lack of involvement in the learning process. So, CAL supports the latest pedagogical theory which is learner-centered approach.

As learning involves change in three behavioural aspects *i.e.* cognitive, affective and psychomotor so, cognitive learning is an important dimension that needs focus in school education. Cognitive learning involves acquiring the knowledge and thinking skills for quick, effective learning. The skills that we acquire through cognitive learning include the ability to think abstractly, using logical reasoning, and making important decisions. Putting another way, cognitive learning is the process of learning the skills that help you in. *i.e.* critical thinking, logical reasoning and decision making abilities. Cognitive learning plays a massive role in determining your ability to learn new information and making progress in life so, teaching strategies must strive to improve cognitive abilities of school children.

 As CAL has been implemented recently in upper primary classes in 2004 of Punjab schools so, there is a noticeable lack of empirical data concerning its effectiveness in improving cognitive learning of children. Present study is therefore designed to explore the effectiveness of CAL program introduced in upper primary classes under *Sarv-Shiksha Abhiyan* to promote cognitive learning through designed learning material. Keeping in view the dearth of data on this relatively new phenomenon in school education in India, the present study has been focused on studying the effectiveness of computer aided learning *vis-à-vis* conventional method of teaching in promoting cognitive learning of 6th grade children of government schools of Ludhiana district.

METHODOLOGY

The CAL Package developed by Government of India for sixth grade students in the science subject under *Sarv Shiksha Abhiyan* to facilitate learning of students of government schools of India and to improve the quality of science education through animated multimedia based educational content was selected in the first instance for treatment.

The modes of intervention at the disposal of the investigator were computer aided learning and traditional teacher oriented approach of instruction. Two government schools located in rural areas (Villages) were selected purposively in Ludhiana district. *i.e. Threeke* where CAL had been implemented and *Jhande* village where it had not been implemented. A sample of 50 students studying in 6th class in government secondary schools of selected schools were the subjects. It was further divided into two groups of 25 students each *viz.,* experimental group and control group. Randomized pre-test, post-test design was used. Before conducting the experiment, the achievement test in science was administered to determine whether the two groups differed in their achievement or not. It was found that the achievement of the two groups matched before the introduction of treatment. The experimental group taught through CAL was treated as intervention mode 1 (IM_1), whereas, experimental group taught with the use of traditional method was treated as intervention mode 2 (IM_2).

There were fourteen lessons which comprised the science curriculum at this grade level. However, seven lessons were selected randomly *i.e.* our earth, Measurement, Nature of matter, classification of living organisms, structure and function of living organisms, Health and Hygiene and Natural resources for the purpose of interventional treatment. The framework of the study was to promote cognitive learning of sixth grade students through self- developed lesson. It was, therefore, necessary to ensure the inclusion of behavioural outcome at cognitive level of knowledge and comprehension. To ensure this aspect, the behavioural outcome at KC level as identified by Bloom *et al.* (1956) was included in each lesson. This battery of seven cognitive tests was given

to the judges for scrutiny of sentence construction and appropriateness for measuring cognitive learning. Only few minor corrections were suggested and incorporated as per feedback received.

Table A : The distribution of cognitive test items according to level of cognitive learning in each lesson in given below:			
Lesson wise	Level of cognitive learning/ number of test items		Total items
	Knowledge	Comprehension	
Lesson 1	2	2	4
Lesson 2	2	1	3
Lesson 3	3	2	5
Lesson 4	3	2	5
Lesson 5	1	1	2
Lesson 6	2	1	3
Lesson 7	2	1	3
Total	15	10	25

The data were collected by administering self-developed, knowledge test both before as well as after the treatment. The cognitive tests were evaluated according to the score cards prepared for each lesson. Since the study was experimental in nature, two sets of scores for each student were obtained. One set pertained to pre- test score and other set to post- test score. The obtained scores of students were used for analyzing the cognitive effect towards promotion of cognitive learning. The data were analyzed by using frequency, percentage, standard deviation paired t-test etc.

OBSERVATION AND ASSESSMENT

The results obtained from the present investigation are summarized below :

Pre, post and gain in cognition scores of learning :
Pre cognition scores :
The data presented in Table 1 shows lesson wise variability in pre- knowledge scores through both the intervention modes. In intervention mode 1 (IM_1), the score range was between 3.97 to 4.57 for lesson 2 and 3, respectively, whereas in intervention mode 2 (IM_2), the score range was between 3.71 to 4.23 *i.e.* lesson 1 and 4, respectively. The variation of mean knowledge scores was observed for all the lessons through both the modes. It can therefore be concluded that the pre-cognitive scores of the students differed from lesson to lesson through both the modes.

The differentiation was further analysed with 't' test and it was found that the 't' values for all lessons through both the modes were found non- significant. This implied that all the students were found to be homogenous in their pre- knowledge scores prior to treatment with respect to selected lessons in both the modes.

Pre-post test :
As evident in Table 2 the mean post test score for all the lessons in both the interventions modes was much higher than pre- test scores. This clearly showed that both intervention modes were sufficiently strong to promote knowledge of students in science subject. The difference of mean scores further tested with paired 't' test indicated that the 't' values were significant at 0.01 level of significance.

The findings suggest that gain in knowledge was significant through both the modes yet the gain through computer aided instruction (IM_1) was much more over traditional mode (IM_2). This may be due to multisensory nature of experience students get due to the use of multimedia in CAL package.

Table 1 : Intermode evaluation of lesson wise pre-cognitive scores of students						
Lesson	Intervention mode 1		Intervention mode 2			t-value
	Pre-cognitive stage		Pre-cognitive stage			
	Mean score	S.D.	Means score	S.D	Diff	
L_1	4.26	1.12	3.71	1.20	0.55	1.49
L_2	3.97	1.34	3.86	1.99	0.11	0.22
L_3	4.57	1.01	4.21	1.19	0.36	1.04
L_4	4.30	0.98	4.23	1.48	0.07	0.19
L_5	3.94	1.25	3.92	1.12	0.02	0.05
L_6	4.00	1.19	3.75	1.13	0.25	0.72
L_7	4.32	1.19	3.87	1.13	0.45	1.26

Note: I M $_1$ = Computer aided intervention mode 1
       I M $_2$ = Traditional intervention mode 2
       NS   = Non-Significant at p<0.01

Gain in cognition score :

The mean gain in knowledge scores presented in Table 3 shows the mean scores differed from lesson to lesson in both the intervention modes. The ranks assigned on the basis of mean score show different ranking pattern for all the lessons in the two modes. In (IM_1), the mean gain ranged between 10.20 for lesson 1 to 6.20 for lesson 2. In (IM_2), the mean gain score ranged between 7.81 for lesson 6 to 4.79 for lesson 1. The gain in knowledge in IM_1 was maximum for lesson 1 having obtained rank 1 and least *i.e.* 7 rank for lesson 2. In IM_2, the gain in knowledge score was maximum for lesson 6 and minimum for lesson 1 as is obvious through the rankings.

The pooled mean score of all the lessons of the 6th grade science subject between the two intervention modes showed significant difference in mean gain in knowledge score on the basis of mean scores. The first rank was obtained by IM_1 and second by IM_2. However, considering the mean gain of two modes of intervention both were found effective in promoting knowledge of 6th grade children in the science subject.

However, the gain was found to be significantly higher in computer aided intervention mode (IM_1) as compared to that in traditional intervention mode (IM_2) in all the lessons except 2 and 7. It may be concluded that IM_1 proved to be more effective as revealed by higher knowledge scores for all lessons as compared to IM_2. Due to higher knowledge gain in IM_1, it can be inferred that, computer aided learning needs to be promoted and blended with traditional classroom based learning for bringing about more effective cognitive behavioural changes among school children.

Table 2 : Intermode evaluation of lesson-wise post-cognitive scores of students

Lesson	Intervention mode 1			Paired t-value	Intervention mode 2			Paired t-value
	Cognition test	Mean	S.D.		Cognition test	Mean	S.D.	
L_1	Pre	4.26	1.12	20.65**	Pre	3.71	1.20	8.05**
	Post	14.65	2.73		Post	8.50	1.56	
L_2	Pre	3.97	1.34	11.11**	Pre	3.86	1.99	12.12**
	Post	10.17	2.60		Post	9.36	0.74	
L_3	Pre	4.57	1.01	28.78**	Pre	4.21	1.19	14.12**
	Post	12.70	1.24		Post	10.79	1.97	
L_4	Pre	4.30	0.98	18.06**	Pre	4.23	1.48	13.88**
	Post	13.36	2.60		Post	10.08	1.26	
L_5	Pre	3.94	1.25	22.67**	Pre	3.92	1.12	12.94**
	Post	12.68	2.03		Post	10.77	1.09	
L_6	Pre	4.00	1.19	35.83**	Pre	3.75	1.13	19.52**
	Post	13.97	1.20		Post	11.56	1.36	
L_7	Pre	1.32	1.19	20.27**	Pre	3.87	1.13	14.47**
	Post	11.61	1.90		Post	11.13	1.92	

Note: IM_1 = Computer aided intervention mode1
       IM_2 = Traditional intervention mode 2
       All values are significant at p<0.001

Table 3 : Lesson wise gain in cognitive score

Lesson	Intervention mode 1		Intervention mode 2		t-value
	Mean gain	Rank	Mean gain	Rank	
L_1	10.20	1	4.79	7	6.59**
L_2	6.20	7	5.50	6	0.80
L_3	8.13	5	6.58	4	2.97**
L_4	9.06	3	5.85	5	3.80**
L_5	8.74	4	6.85	3	2.68**
L_6	9.97	2	7.81	1	4.30**
L_7	7.29	6	7.26	2	0.05

$\Sigma \overline{X} = 59.78$ $\Sigma \overline{X} = 44.64$
Rank = 1   Rank = 2
** indicates significance of value at P <0.01

Conclusion :

It is concluded that computer aided learning among students has found to be effective as compared to traditional method as CAL taught students did better academically. However, it did not prove that advent of computer technology in schools has reduced teacher's labour as traditional teaching methods are still in vogue and found relevant and effective. The inference can therefore be drawn that teaching-learning process in schools should be transformed by making use of CAL/ multimedia to make lessons effective and attractive. Such scientifically prepared/ designed CAL packages can go a long way in enhancing thinking skills, strengthening, children's creativity and imagination and improving their academic achievement.

REFERENCES

Bloom, B.S., Engelhart, M.D., Furst, E.J., Hill, W.H. and Krathwohl, D.R. (1956). *Taxonomy of Educational Objectives, Handbook: The Cognitive Domain.* New York: David McKay Co Inc, New York, pp. 17-19.

■ **WEBLIOGRAPHY**

Kushwaha, U. (2015). Information and Communication Technology (ICT), Department of schools education and literacy. Retrived from:. *http://mhrd.gov.in/ict_overview*

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