Development and Effectiveness of Computer Based Learning Programme in Teaching Mathematics

ABSTARCT

In recent years the computer technology has established itself as an important feature of modern life. The computer will perform with remarkable speed, exactly the instructions given to it by a human user. Its role in education is that of a medium. Computer-based learning environments have been an important issue in mathematics education. Computer-based learning give more individualized and direct feedback, and correct misconceptions quickly. Computer-based learning is system which providing on-line direct interactive instruction, testing and prescription in learning process. Computer-based learning is a set of instructional programming. This instructional process to develop certain predecided skills for the students' competency in the subject content.

Keywords - *Computer-based learning (CBL), Mathematics, Learning, Teaching*

INTRODUCTION

Computers have become an important and versatile tool of instruction for teachers in the classroom. Instructor-centered teaching takes support from 'Visual aids', evolving until today, when we often see computers in the classroom. While good teachers teaching by traditionally method they use blackboard, models, pictures, slides, excursions, charts, drama and graphs as audiovisual aids to education, along with these the modern teacher makes use of technological devices like movies, radio, recording devices, computers and television. The computer communicates with student visually by displaying text, graphics or video images on a screen. The computer can be a partner for the learner. The computer interact with the learners what the rules are and what the learners has made and react in a manner which leads him not only to correct his mistake but also to understand the principles behind the correct solution. The good combination of tutorial, interactive and visual capabilities enables computers to have a good effect on students motivation.

Computer-based learning environments have been an important issue in mathematics education. Among the arguments advanced by the proponents of CBL is its ability to provide quantifiable and instantaneous feedback for its users. The term generally refers to a specific program which is designed to teach. There are many advantages, such as the ability to go at the student's own pace, individually, instead of having a classroom where some students are bored while others are bewildered. Students prepared with assignments, problems, exercises, reading materials by a computer for learning. The questions arise how does Computer Based Learning Programme help students in bringing conceptual clarity in topic? If it helps in bringing conceptual clarity then how does Gender and area of students affects their learning in maths through CBL Programme?

RATIONALE

Many studies have been conducted to find out the effectiveness of CAI in terms of achievement of the students in learning. Dittrich (1998) investigated the use of interdisciplinary Computer-based simulation compared to traditional method. Analysis of data revealed no statistical differences and negligible effect sizes in general orientation toward schooling, reading, math's, science and social studies for both gifted and non-gifted students. Burke (1999) and Soeder (2001) Study showed that not statistical differences between the CAI and traditional method. The students expressed more favorable attitudes then control class. Rivet (2001) Study support CAI can had a significant effect on the academic gains of students compared to traditional method. Rothman (2000) this study examine the impact of computer-based science instruction on content achievement, attitude about learning, critical inquiry skills and level of cognitive. In this study computer-based instruction in science

improved students' attitudes toward science learning. Demirici (2001) study supported the web-based physics program with traditional method have a significant effect on dispelling students' physics misconceptions. Hsu (2003) study showed that different modes of CAI programs produced significantly different effects on students' achievement in learning statistics. Expert system and drill-and-practice programs were the most effective modes and were followed by multimedia, tutorials and simulation. Computational statistical packages and web-based programs were the least effective modes. Knaack (2003) study indicates that all eighteen instruction design effective for learning. Students highly rated elements such as feedback, written help and audio guides because they perceived these elements to aid in their understanding and navigation of program. Low ability students perceived organization and tools in software to assist them more in their learning then high ability students.

THE PRESENT STUDY ENTITLES

Development and Effectiveness of Computer Based Learning Programme in Teaching Mathematics.

OBJECTIVES OF THE STUDY

1. To develop Computer Based Learning (CBL) Programme in Mathematics for standard IX students.
2. To Implement CBL Programme on Students study in Urban and Rural area schools in Navsari District.
3. To Study the effectiveness of the CBL Programme prepared on 'Solid Matter' unit in Math's subject for standard IX students.
4. To study the influence of teaching method, gender and their interaction between corrected means of the Students achievement scores of posttest by considering pretest scores as covariate.
5. To study the influence of area, gender and their interaction between corrected means
   of the Students achievement scores of posttest by considering pretest scores as covariate.

HYPOTHESES OF THE STUDY

1. There will be no significant difference between corrected means of the student achievement scores of control and experimental group by considering pretest scores as a covariate.
2. There will be no significant difference between corrected means of the student achievement scores of boys and girls group by considering pretest scores as a covariate.
3. There will be no significant influence of teaching method, gender and their interaction between corrected means of achievement scores of the students on posttest by considering pretest scores as covariate.
4. There will be no significant influence of area, gender and their interaction between corrected means of achievement scores of the students on posttest by considering pretest scores as covariate.

METHODOLOGY OF STUDY

For the present study one school from urban and one school from rural area was selected with incidental purposive sampling method. Multi-staged sampling technique was used by the researcher in this study. In each school the experimental and traditional both groups and each group consisted 20 boys and 20 girl's students. The total sample for the experiment consist 160 students. The true experimental design 'pretest-posttest control group' was employed. Students learn same content topic of 'Solid Matter'. Experiment time duration was 26 periods in both groups.

VARIABLES

The independent variable was teaching method. The dependent variable was achievement scores of the students on posttest. The covariate was scores of the students on pretest. The controlled variables were Gender, Subject matter, practice, Grade, time duration and School environment.

Tools for data collection

1. Computer based Learning Programme (CBL) which made after expert, teacher and student opinions. 2. Pretest and Posttest which was consists objective and short question. Both tests have 80 marks and 2 hours' Time duration.

DATA ANALYSIS AND INTERPRETATION

Data were analyzed through the statistical techniques such as ANCOVA.

Table 1: Signification between corrected mean of Control and Experimental group

Group	N	Mean of Posttest	Corrected mean of Posttest	Difference between correctedMean	Significant difference value	Signifi cation
Control	80	47.10	46.86	6.95	D0.01 = 1.90 D0.05 = 2.50	S**
Experimental	80	53.56	53.81			

**Significant at 0.01 level of significance

From table-1 it can be showed that the difference between adjusted mean 6.95 is significant and corrected mean of posttest for experimental group is higher then control group. Therefore null hypothesis 1 was rejected.

Table 2: Signification between corrected mean of Boys and Girls group

group	N	mean of Posttest	Corrected mean of Posttest	Difference between corrected Mean	Significant difference value	Significa tion
Boys	80	51.71	51.70	2.74	D0.01 = 1.90 D0.05 = 2.50	S**
Girls	80	48.95	48.96			

**Significant at 0.01 level of significance

From table-2 it can be showed that the difference between adjusted mean 2.74 is significant and corrected mean of posttest for boys group is higher then girls group. Therefore null hypothesis 2 was rejected.

Table 3: ANCOVA of scores on posttest for teaching method, Gender and its interaction

Source of Variation	degree of freedom (DF)	Sum of Squares (SS)	Mean Square (MS)	'F'	Signification of 'F'
Teaching Method between groups (A)	1	1853.02	1853.02	24.31	S**
Gender (B)	1	298.90	298.90	3.92	S*
Teaching Method x Gender (AxB)	1	230.43	230.43	3.02	N.S.
Within groups	155	11814.78	76.22		
Total	158	419569.00	-		

**Significant at 0.01 level of significance
*Significant at 0.05 level of significance

(A) Teaching Method

From table-3 it can be showed that the significant difference of teaching method between control group and experimental group. Therefore the null hypothesis 3 "There will be no significant influence of teaching method" was rejected. The detailed explanation of significance of teaching method is shown in hypothesis 1.

(B) Gender

Table-3 it can be also seen that the significant difference of Gender between boys and girls group. Therefore the null hypothesis 3 "There will be no significant influence of Gender" was rejected. The detailed explanation of significance of Gender is shown in hypothesis 2.
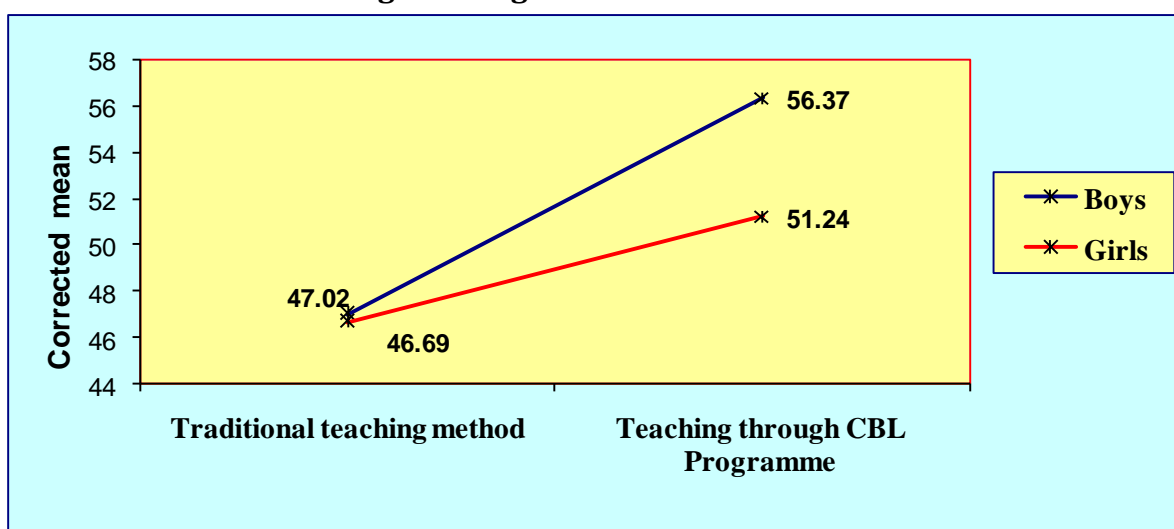
(A × B) Interaction

Table-3 it can be showed that the interaction of teaching method and Gender was not influence on posttest score after controlling the effect of pretest score on posttest score. Therefore the null hypothesis 3 "There will be no significant influence of interaction among teaching method and gender" was accepted. Significant influence of Gender" was rejected. The detailed explanation is shown in Graph-1 from table-4.

Table 4: corrected means of Interaction among Teaching method and Gender

Teaching method	Gender	N	mean of Posttest	corrected mean of Posttest
Traditional	Boys	40	47.28	47.02
	Girls	40	46.93	46.69
Computer Based Learning Programme	Boys	40	56.15	56.37
	Girls	40	50.98	51.24

Graph: 1 Interaction effect among teaching method and Gender basis on corrected means

Graph-1 from table-4 it can be showed that by considering pre test as co-variant there was no significant influence of interaction among teaching method and gender on achievement of posttest score of experimental group and control group.

**Table 5: ANCOVA of scores on posttest for area, Gender And its interaction**

Source of Variation	degree of freedom (DF)	Sum of Squares (SS)	Mean Square (MS)	'F'	Signification of 'F'
Area between groups (A)	1	661.74	661.74	8.03	S**
Gender (B)	1	303.78	303.78	3.69	N.S.
Area x Gender (AxB)	1	463.97	463.97	5.63	N.S.
Within groups	155	12775.41	82.42		
Total	158	419569.00	-		

**Significant at 0.01 level of significance

From Table-1 showed interaction of area and Gender was affected on posttest score after controlling the effect of pretest score on posttest score. Therefore hypothesis 4 is rejected.

Table 6: corrected means of Interaction of Area and Gender

Gender	Area	N	mean of Posttest	corrected mean of Posttest
Boys	Rural	40	47.93	47.96
	Urban	40	55.50	55.46
Girls	Rural	40	48.58	48.61
	Urban	40	49.33	49.30

Graph: 2 Interaction effect of Area and Gender basis on corrected means
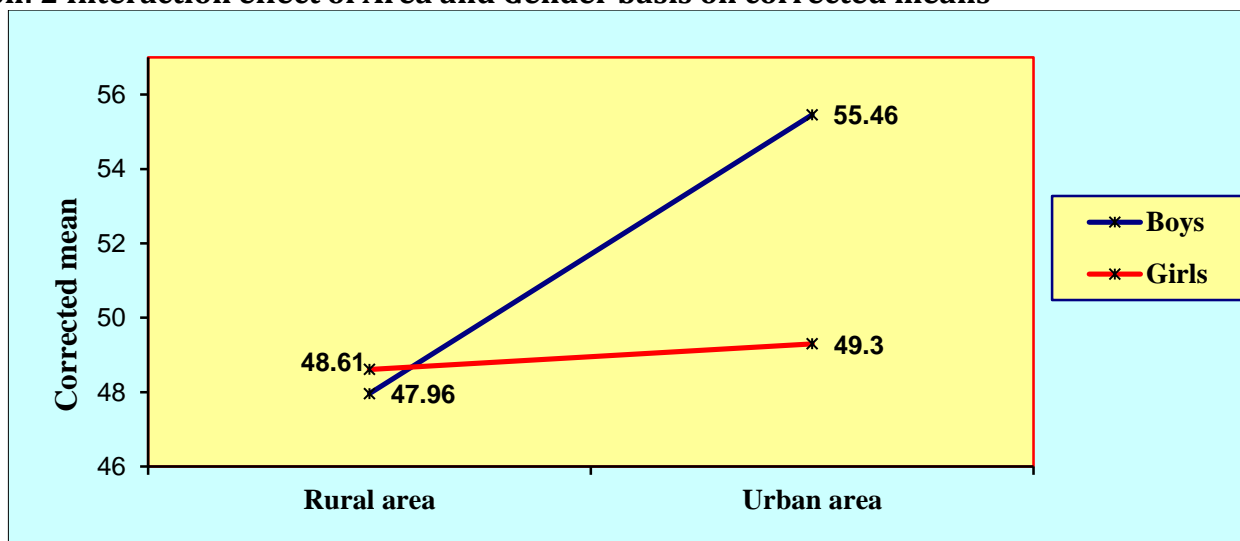
From table-6 and graph-2 showed Area and Gender Interaction was affected on adjusted mean achievement score of posttest.

FINDINGS

1. Math's teaching through CBL programme was more effective than traditional teaching method.
2. Math's teaching effect on Boys and Girls students was different. Boys students teach better than Girls students.

3. Effectiveness of teaching method on student's posttest achievement scores was same for both Gender.
4. Area effect on posttest achievement scores was different for both boys and Girls.

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