Development of Computer Assisted Instruction Programme and its Effectiveness to Teach Chemistry to XI Standard Students

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Abstract

The focus of the present study is to find out the effectiveness of CAI programme. Methodology of the study was experimental method, Pre-test Post-test equivalent group design and Purposive sampling method was used for this study. The CAI programme was designed in Java script, Flash, Java script animations, CorelDraw, Graphics, and in Web page. The null hypothesis of the research study is i.e. H0-1: There is no significant difference between mean score of students taught by conventional method and CAI method. The observations are i) there is a significant difference between mean scores of control group and experimental group taught by Conventional Method and CAI programme respectively are accepted. It means that calculated' value is 4.51 is found significant at 0.01 significance level.

1) The developed (CAI) Programme for Chemistry subject was found significantly superior to Conventional Method in terms of Academic Achievement.

Key Words: Computer Assisted Instruction, Effectiveness, Chemistry.

Introduction

Computers and Technology have contributed significantly in modernization of each and every aspect of human life even though; education sector is not excluded from it. So computer is the most advanced, and an endowed tool for education field. It plays vital role during the course of education. It enhances not only retention, learning rate, cognition, perception of the students; but also improve teaching rate of teachers. Computer Assisted Instruction provides learning experiences effectively, vivid, and efficient in nature, which leads to increase the perception level, and achievement level of the students gradually. Thus, the computer is the super machine; it brings teaching learning process in more realistic way.

In the general classroom, student come from different back ground of the society; which affects teaching learning process, but Computer classroom provides learning experience according to their need and pace. Hence, computer classroom environment become conducive, to more creative discipline. Thus, Computer Assisted Learning provides positive touch to real life; and brings equity & quality in education.

Another most important reason to prepare Computer Assisted Instruction programme for Chemistry subject is that, the most of the students plan their carrier in stream of Medical, Engineering, and Agricultural science, after XI, & XII science standard. In the fulfillment of students' goal, CAI plays the major role. In learning process of Chemistry student interacts with computer in variety of ways. The degree of computer awareness and creativeness and the rate of computer literacy increases. In this way, it enables to promote scientific temper and self esteem.

The researcher also experienced, that student tackle so many problem involving perception, retention, and cognition process in the learning of Chemistry subject. It was so because; the researcher had taught the same subject to XI, XII standard students from 2000 to 2003. During that tenure, the researcher comes to know there was an urgent need; for introducing some new teaching techniques; for the better understanding of Chemistry subject. Considering this, the researcher decided to emphasize the use of; Computer Assisted Instruction programme, the new trend developed in education.

Probing the problem of students, and studying the present situation of education in this Globalized world; the Researcher decided to investigate a research problem entitled, **Development of Computer Assisted Instruction Programme and its Effectiveness to Teach Chemistry to XI Standard Students.**

Rationale of Research Study

Ours is an age of Science and Information Technology. Without Science and Technology, no country can ever progress and prosper.

The progress of Science and Technology relies; on the standard of science education that is imparted in the country. Thus, it is essential for the country to inculcate Scientific and Technological education in students; they are the future citizens of the country. Therefore, it is necessary that each pillar of education should be, as strong as other. It can be done by using special strategies of instruction, such as Computer Assisted Instruction (CAI). Prof. C.V. Raman defines, unless the real importance of pure science and its fundamental influence in the advancement of all knowledge are realized and acted upon, India can not make headway in any direction and attain her place among the nation of the world. There is only one solution to India's economic problems that is science and more science and stills more science. (Mulani, B. G., & Savadatti, M. I. (Sept-Oct.2005). University News. 117-119)

21st century is a century of, Information and Technology. India's Ex-President Dr. A.P.J. Abdul Kalam, a recipient of the 'Bharat Ratna' award and an eminent Scientist, is a firm believer in the use of technology, as a tool for National development. He asserts, Technology is the key to development. (Reddy, G. S., (July 2002). Edutracks. (P. 6-10). It is his vision, to make India the 4th largest economy by the year 2020. He keenly depends on the teaching community; in order to lead the nation to materialize his dream. While, accepting this challenge we have to build a new knowledgeable generation, and this is possible only through the Education system.

CAI is used to improve the teaching and learning process. The advantage of CAI is that, it provides immediate feedback and remedies the mistakes. The student is able to locate their mistakes immediately and learn from their mistakes, learn with his own pace, & time. The course material is so designed that, the students learning process is continuous and sequential.

Chemistry is one of the most, important subjects next to mathematics, which has a wide scope and area of job application. The future of the most students is being shaped at Jr. College level and they may choose Medical or Engineering side as their carrier. Keeping this view in mind, the researcher has decided to do research on Computer Assisted Instruction (CAI) in Chemistry.

From the above facts, the importance of CAI in today's educational scenario is quite clear. In this, context researcher has decided to find out the contribution of CAI in teaching - learning process.

Statement of Problem

Development of Computer Assisted Instruction Programme and its Effectiveness to Teach Chemistry to XI Standard Students.

Operational Definition of terms

i) Development CAI programmme

A software package based on principles of Computer Assisted Instruction is prepared with the help of CorelDraw, Macromedia flash animations, Graphics, Java script, Adobe Photoshop, so the Computer provides information & learning material during the learning process.

ii) Effectiveness

A Significant difference between mean score of students taught by CAI and Conventional Method.

iii) Conventional Method

A teacher oriented teaching method, which is regularly used in a general classroom situation.

iv) Chemistry

A content based knowledge of Chemistry subject, which is newly designed for the study of XI science Std. that is accepted and prescribed by Maharashtra state H.S.C. Board.

Objectives

i) To develop CAI programme for the selected units of Chemistry.

ii) To find out the effectiveness of CAI programme, over the conventional method   of teaching Chemistry to XI standard students.

Research Hypothesis

There is a significant difference between mean scores of control group and experimental group taught by Conventional Method and CAI programme respectively.

Null Hypothesis

H0-1 There is no significant difference between mean scores of Control group & experimental group taught by Conventional Method and CAI programme respectively.

Assumptions of the study

i) XI science students have a basic knowledge of the Computer operating system.

ii) If CAI programme is used, students can learn at their own pace and time.

Scope, Limitation, Delimitation

a) Scope

✧ A CAI programme is applicable to Jr. College Chemistry subject teachers and lecturers.

✧ It is applicable to English and semi English medium.
✧ It is applicable to science Jr. College XI std. students**.**

b) Limitations
✧ The aspects like electricity, computer hanging, software running, and other technical problems regarding computer are beyond the control of the researcher.
✧ The aspects like motivation, interest, and attention of the students are beyond the control of the researcher.

c) Delimitations
The researcher was aware about the versatile applicability of the computer so the study was delimitated to:
✧ A Chemistry Text Book prescribed by Maharashtra state H.S.C. Board for XI std.
✧ Science Jr. colleges.
✧ XI science standard students 240.
✧ Chemistry subjects four chapters (Alkanes, Alkenes, Alkynes, and Aromatic Compounds.)
✧ This research study conducted only for developed CAI programme.
✧ This research study is applicable for the academic year 2008-09.

Research design

Pre-test Post-test Equivalent Group Design

$$R \quad O_1 \quad X \quad O_2 \qquad O_1 \, O_3 = \text{Pre-test}$$
$$R \quad O_3 \quad X \quad O_4 \qquad O_2 \, O_4 = \text{Post-test.} \qquad (10^{th} \text{ eds. Best \& Khan page, 181})$$

This research design requires at least two groups i. e. one control group and one experimental group. Both groups were assigned by random assignment and administered pre-test. Control group receives conventional treatment where as experimental group receives Computer Assisted Instruction (CAI) treatment. At the end of the treatment both groups were post-tested and post-test scores compared to determine the effectiveness of treatment.

Variables of Present Research Study

i) Independent Variable: The main motive of the present research study was to find out the effectiveness of Computer Assisted Instruction (CAI) programme.   Therefore, the Independent Variable in the present study was Computer Assisted Instruction (CAI) programme, which was developed by the researcher.

ii) Dependent Variable: In the present research study, the dependent variable was the scores obtained by the student in their achievement test and was measured by post-test.

Control of Extraneous Variables of Present Research Study

In the present study researcher had tried to control and minimize the impact of the following extraneous variable.

i) Age: All the students studying in the XI science standard had completed 15+ to 16 + years of the age.

ii) Two Equated Groups: From selected sample the experimental group and control group from four science Jr. Colleges were equated on the basis of scores obtained in the pre-test.

iii) Chemistry Achievement Test (CAT): Chemistry content-based achievement test was used for pre-test as well as post-test.

iv) Test Administrator: To control the variable both test pre-test and post-test were administered by the researcher.

v) Jr. College Environment: The Experimental group and corresponding control groups were from the same Jr. College so the environment of the four Jr. Science Colleges was same.

vi) Computer Laboratory Environment: To control this variable one computer was provided separately for each student, and same technical facilities were provided.

viii) Time: To control this variable equal time was provided to the every control group and experimental group.

Population of the Research Study

TABLE: 1
Population of the Research Study.

Sr. No.	Total Sci. Jr. Colleges	Total Div.	Total Students
1	189*	792	33,213

*source Manual of Zilha Parishad Pune.

Statistical data obtained from Zilha Parishad Pune, for the period 2005 – 2006. The total numbers of Science Jr. Colleges in Pune District were approximately 189; those were attached to senior colleges and Secondary schools. These 11th std Science colleges' cover 792 divisions with a total strength of 33,213 students of all divisions.

Sampling Method of the Present Research Study

Sampling method of present research study is Purposive-sampling method, which comes under the Non-probability sampling method.

The reason for selecting these colleges was that the corresponding Junior colleges allowed researcher, to conduct his research study in a specified period and time, and made available all the technical facilities. Among these four Jr. Colleges, the researcher had selected 240 students for the research study. In subsequent College, each group of 30 students' acts as a control group and 30 students acts as an experimental group.

Tools and Techniques of Data Collection

a) Data Collection

i) Chemistry Achievement Test (CAT) i.e. Pre-Test and Post-Test

The test was prepared by the researcher with the help of subject teacher, experts in education field, and was termed as Chemistry Achievement Test (CAT) i.e. Pre - test & Post – test. Pre - test & Post – test was administered after pilot study. Pre- test was administered before implementing the CAI programme, in order

to find out their previous knowledge about the subject. The post- test was administered after implementing the CAI programme in order to find out the effectiveness of CAI. The pre-test and post-test separately prepared for each chapter. After implementing the CAI programme for first chapter, the post-test administered on the next day.

b) Statistical Tools

i) Mean: Mean was used to calculate critical ratio

ii) Standard Deviation (S.D): Standard deviation was used to calculate critical ratio of collected data.

iii) t – test: t- test was used to evaluate the significant difference between two mean scores of the students.

c) Technical Tools

i) Computer Assisted Instruction (CAI) Programme

The researcher prepared a story board, which is bifurcated into teaching component and Computer component (Software component), and developed the CAI programme. The programme was aimed specifically for students to learn Chemistry subject with the help of this technical tool. The CAI programme was designed in Java script, Flash, Java script animations, CorelDraw, Graphics, and in Web page.

Programme Implementation

After the administration of pre-test to both groups, the following teaching methods were used;

1. Conventional Teaching Method for Control group.
2. Computer Assisted Instruction Teaching Method for Experimental group was implemented.

After orienting the student about CAI programme, the CAI treatment was executed for the Experimental group. The selected sample, from concern school had permitted to conduct the research based all activities in the provided tenure by them. This helps to complete the research activities i.e. administration of pre-test, post-test, students reaction scale, orientation lecture, implementation of CAI programme within sixteen days in total 10 hr. and 50 minutes. The researcher executed this treatment without disturbing the time schedule of Science Jr. Colleges.

Testing of the objectives – testing of the Hypothesis

Objective: 1) To find out the, effectiveness of CAI programme, over the conventional method of teaching Chemistry to XI standard students.

H0-1 There is no significant difference between mean scores of Control group & experimental group taught by Conventional Method and CAI programme respectively.

TABLE: 2

Comparison of Mean score, S. D., t value of Control and Exp. Group

Group	Mean		S. D		df	't' obs.	't' Cal.	Decision of Null Hypothesis
	Pre-test	Post-test	Pre-test	Post-test				
Control	25.62	28.40	0.71	1.46	119	2.62	4.51*	**Rejected**
Exp.	26.20	44.99	1.14	1.68				

* Not significant at 0.01 significance level

Observation and Interpretation

❖ Table: 2 shows the mean of marks obtained by, XI students of control group; as well as experimental group. This table also shows standard deviation, calculated 't' value at 0.01 significance level.
❖ The calculated 't' value is 4.51 exceeds than observed 't' table value at both 0.01 significance level respectively.
❖ Hence it is considered to be remarkable and significant resulting in the rejection of null hypothesis H0-1: and accepting the research hypothesis.

Major findings of the study
1) The CAI programme was designed in Java script, Flash, Java script animations, CorelDraw, Graphics, and in Web page. [Details are provided in Preparation of CAI programme]
2) The developed (CAI) Programme for Chemistry subject was found significantly superior to Conventional Method in terms of Academic Achievement. [Refer Table: 2]

Discussions
The results of following research study support to the present research study.
1) Kadhiravan, S. (1999). Effectiveness of Computer Assisted Instruction in Relation to Students Use of Self-regulated Learning Strategies.
2) Singh, R.D. (1992). Effectiveness of teaching mathematics through Computer-assisted instruction and conventional method of instruction on cognitive and non-cognitive variables

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