EFFECTS OF COMPUTER ASSISTED INSTRUCTION (CAI) ON THE ACADEMIC ACHIEVEMENT IN MATHEMATICS AMONG THE STUDENTS OF ELEVENTH STANDARD SCHOOL STUDENTS IN DHARMAPURI DISTRICT

Dr. P. Purushothaman
Dr. M. Senthilkumaran

Abstract

In this Paper, we will discuss about my research result about an investigation on Effects of computer assisted instruction (CAI) on the academic achievement in mathematics among the students of eleventh standard school students in Dharmapuri district. The present research was experimental in nature. Two equal groups only post-test design' was selected for implementation of the experiment was adopted the sample consists of 42 students (24 Boys and 18 Girls) of those sections were taking for the sample studying Govt Higher secondary School, Matlampatti in Dharmapuri district. The researcher carried out the study to measure the independent variable after the treatment phase a post-test was constructed by the researcher. The research was designed on 'Two equal groups only post-test design'. In which the method of instruction was the independent variable. And the students' academic achievement was dependent variable. The group receiving instructions through CAI Package was treated as experimental group and the group receiving no treatment was considered as control group. The following objectives have been set in the present study. To develop a computer assisted instruction programme for instruction in Functions and Graphs. To check the effectiveness of computer assisted instruction programme with compared to traditional teaching method. Major findings The effectiveness of Computer in teaching Functions and Graphs, the CAI Package was developed to teach Functions and Graphs in mathematics to the students of Class XI was studied. It shows some positive gains in various achievement tests as well as increased student confidence and satisfaction in mathematical learning in Dharmapuri district.

INTRODUCTION

Nowadays, providing instruction via computer-mediated communication (CMC) has seen tremendous growth throughout the world. With this increase in asynchronous instruction have come questions concerning the role of the instructor as it determines the quality and impact of learning and of what optimal faculty development might consist. Computer-assisted teaching and assessment has become a regular feature across many areas of the curriculum in higher education courses around the world in recent years. This development has resulted in the "digital divide" between disabled students and their nondisabled peers regarding their participation in computer-assisted courses. The students who study mathematical analysis are dissatisfied with the way they are taught. They have to face certain inherent

problems and drawbacks of the tools, techniques and system as well. These things have forced teachers and educationists to think seriously and devise ways to tackle them. As a consequence, various developments in educational technology and psychology have proven of much help to learners and teachers. They can avail different aids and methods of teaching. In the traditional method, each student is taught at the same pace. This type of classroom environment is not of much help to the students with heterogeneous educational achievements. According to the modern educationists, if a kind of self learning material is produced and provided to each student keeping in mind his strength and weakness, he can proceed at his own pace and revise the given topic whenever he wishes. The self-learning material, with whole unit divided into small units with an ample illustrations and self checking facility, can be effective in classroom teaching. To examine the effectiveness of computer in teaching Functions and Graphs, the researcher had prepared a computer assisted instruction package for teaching of Functions and Graphs section of the mathematical analysis, to assess its effectiveness.

SIGNIFICANCE OF THE STUDY

Information and communication technology has already entered in the Indian schools scenario. Most of the urban schools have their own computer labs or at least good number of PCs. Nowadays the classroom no longer remained limited within the four walls but has extended its horizon to each and every corner of the World and made the teaching – learning processes more meaningful. In rural areas also the Government is trying to provide computers in the schools.

Some special software programmes for teaching in schools are already available in the market, but they alone cannot satisfy the various needs of the real classroom of every school. Most of the available educational software that is available in the international market does not fit in the cultural context of India. Thus, software that particularly satisfies local school needs is the demand of the time. Therefore, there is urgency for the development of tailor made software for this purpose. The present CAI Package is an attempt towards that direction.

In the present study, the researcher tried to employ the Information and Communication technology in the field of teaching the essential part of the mathematics, i.e., Functions is a part of the mathematical analysis section in the given context. The inbuilt nature of the growing children is that they simply adore colors and motions. The CAI Package for teaching functions developed by the researcher has all those features. Any teaching device with these features naturally attracts them, tickling their curiosity and draws their attention. Thus, readiness to learn is thereby effectively induced. As this Package is prepared in a CD ROM, the programme may be displayed off and on line and as and when required. At any point, one may stop, go back and go forward according to the

demands of the classroom situation. While teaching Functions, this CAI Package may be used for any stage of teaching, i.e., for introduction, presentation, drilling, evaluation, assignment or revision. The CAI Package is useful for teaching "types of functions" a part of the mathematical analysis section of the subject Mathematics at Higher Secondary level of any school affiliated to any educational board throughout the country.

NEED FOR THE STUDY

- In traditional education, subjects were taught according to logical method of presentation and little attention was paid on the eagerness and interests of the students to learn.
- In general the understanding of the things of the world is based on the sensory experience and physical objects were the products of our sensory perception.
- The teacher must determine which method of presentation is to be preferred by students of a particular standard.
- The teacher should be a aware of the effectiveness of different types of instructional media and techniques in the field of education.
- The perspective morality served up to students within the frame works of these disciplines began to give way to more emphasis on contents that were more purely historic or geographic in nature.

REVIEW OF RELATED LITERATURE

Barnett, L. (2021), The Effect of Computer Assisted Instruction on the reading skills of emergent readers.

Objectives: To examine the effect of Computer Assisted Instruction (CAI) in the reading skill of emergent readers in Kindergarten classes at select Reading First schools in the School District of Palm Beach Country, Florida. (ii) To analyzed teacher attitude towards the computer affected student reading achievement.

Method: The measure used to compare treatment and non treatment schools were the Dynamic Indicators of Basic Literacy Skills (DIBELS), which tested letter naming ability, initial sound identification, phoneme segmentation ability and nonsense word decoding. The Word Recognition and Reading Running Record assessments form the School District of Palm Beach Country Reading and Writing Assessment System Grades K-1 protocol booklet tested identification of 25 sight words and ability to read continuous text.

Findings: Students using Destination Reading (Riverdeep, 2001) did not benefit significantly from the use of the program compared to nonuser. The CAI group scored significantly lower on the initial sound fluency measure. Factorial ANOVA were used to compare DIBELS scores for effectiveness of the treatment, pre and post test comparisons and interaction of treatment with test scores for the CAI compared with the nonuser group. The distributions were used to analyze data from the Reading Running Record and Word Recognition assessments. There

were no significant differences between the CAI and comparison schools on these two measures. Teacher attitude toward computer did not affect students‟ acquisitions of reading skills, as survey responses were in the positive range for all participants. Deck, Alan. 1.5 STATEMENT OF THE PROBLEM In the present study, the researcher tried to employ computer based instruction in the field of teaching the essential part of functions and graphs. Teaching – learning material in the form of CAI in Power Point Presentation of MS Office 2007 was developed keeping in view the use of multimedia facilities. The researcher selected groups from Standard XI in government higher secondary school, Matlampatti. (1) Experimental group (CAI Package Group), (2) Control group (Traditional classroom teaching group). By employing "two equal groups, only post-test design" the effectiveness of the CAI package was tested. Statistical analysis on collected data was done using„t‟ test. 1.6 TITLE OF THE STUDY The title of the present research:

"Effects of Computer Assisted Instruction (CAI) on the Academic Achievement in Mathematics among the Students of Eleventh Standard School Students in Dharmapuri District"

OBJECTIVES OF THE STUDY

The present study was carried out with the following objectives:

- To develop a computer assisted instruction programme for instruction in Functions and Graphs.
- To check the effectiveness of computer assisted instruction programme with compared to traditional teaching method.
- To know the reactions in form of opinion of the students regarding learning through computer assisted instruction programme.

HYPOTHESES OF THE STUDY

- H01 There is no significant difference between the mean scores of experimental and control group in the pre-test.
- H02 There is no significant difference between the pre-test and post-test gain scores of experimental group.
- H03 There is no significant difference between the mean scores of the pre-test and post-test of the control group.
- H04 There is no significant difference between the mean scores of the Student‟s receiving instructions through Computer Assisted Instruction (CAI) Package and the students receiving instructions through Traditional (normal classroom) teaching on the post-test.

POPULATION OF THE STUDY

Students of higher secondary level (Standard XI) of Co-Educational government higher secondary school, Matlampatti are the population of the present study. 1.10 SAMPLE OF THE

STUDY As the present study being experimental in nature some requirements were to be met such as (1) forming of groups, (2) rearrangement of time table and (3) computer facilities. So the school, Govt Higher secondary School, Matlampatti was selected. Students of Standard XI were randomly selected. Total 42 students (24 Boys and 18 Girls) of those sections were taking for the sample study.

RESEARCH DESIGN

The present research was experimental in nature. 'Two equal groups only post-test design' was selected for implementation of the experiment. The layout of the design is as under:

Table -1 Research Design

Group	Pre-test	Treatment	Treatment Post-test
Experimental (E)	Traditional	CAI	TE
Control (C)	Traditional	Traditional	TC

The achievement test was constructed by the researcher. The collection of the data was done by administering the post-test (T2) on both the groups on the same day and at the same time.

DEVELOPMENT OF COMPUTER ASSISTED INSTRUCTION PACKAGE

Computer Assisted Instructional Package was developed to teach functions and graphs, utilizing MS PowerPoint Presentation Application tool. Detailed description regarding the development of the package is as under.

TOOLS FOR THE STUDY

Construction of Post-test: To measure the independent variable after the treatment phase a post-test was constructed by the researcher. One of the objectives of the study was to study the reactions of the students towards CAI Package. The description of the measurement tools is given below.

DEVELOPMENT OF THE ACHIVEMENT TEST

The achievement of the students in the area of experimentation was measured by conducting an achievement test. The test was a written test and was constructed on the basis of the objectives framed for teaching of functions as per the blue print.

Type and number of Questions: The test included objective type of questions. The test duration was 30 minutes. The number of questions is 20 and the marks are 20.

IMPLEMENTATION OF THE EXPERIMENT

For testing the effectiveness of CAI Package, the present study was conducted. The research was designed on 'Two equal groups only post-test design'. In which the method of instruction was the independent variable. And the students' academic achievement was dependent variable. The group receiving instructions through CAI Package was treated as experimental group

and the group receiving no treatment was considered as control group.

VALIDITY OF THE EXPERIMENT

To make a significant contribution to the development of knowledge, an experiment must be valid. Campbell and Stanely (1966) described two types of experimental validity i.e. internal validity and external validity. In the present study factors pertaining to internal validity and external validity were seriously observed.

PROCEDURE OF DATA COLLECTION

After the treatment phase of experiment stage the collection of the data was done by administering the post-test (T2) on both the groups. For that the achievement test was prepared by the researcher. The scoring of answer sheets is done. Then the feedback of the students about receiving instruction through CAI Package is collected.

NATURE OF THE COLLECTED DATA AND TECHNIQUES OF ANALYSIS

One of the various stages of research process is analysis of collected data. It requires in depth knowledge and computational skills related to statistics to perform analytical procedure on the part of the researcher. The stage of data analysis is highly difficult one, but now computer software"s are available to serve the purpose. Microsoft"s Excel and SPSS for windows are the best statistical software"s available for qualitative data analysis of this nature.

MAJOR FINDINGS OF THE STUDY

The following were the findings of the present study.

- The effectiveness of Computer in teaching Functions and Graphs, the CAI Package was developed to teach Functions and Graphs in mathematics to the students of Class XI was studied.
- CAI proved effective in terms of the students" higher academic achievement in the experimental group when compared to the conventional group.
- The students responded positively towards learning through CAI Package. They wished to learn other subjects through this method.
- They experienced it more convenient, easy to understand and more interesting. It helps to grasp the content easily for a long period of time.
- According to the opinion of the student, CAI increases concentration, and its leads to self learning.
- It is a fact that a perfect teacher cannot be replaced by any technology so far as teaching of any subjects is concerned. Mostly in the shortage of good teachers and as reinforcement, the CAI Programme can fulfill the need of the students.

PRODUCT OF THE RESEARCH

The product of the research is the CAI Package and a teacher made achievement test on Functions and Graphs. The CAI Package is developed by using the

platform of MS Office PowerPoint Presentation application tool. The CAI acquires some unique characteristics.

- It clearly mentions instructional objectives.
- It helps to recall the pre knowledge as well as tests the existing knowledge.
- The content is logically divided into parts and is presented in small steps with ample illustrations which follow the basic laws of learning.
- Inductive-deductive method is used effectively.
- The verbal content is supported by non-verbal content.
- Designing and color scheme is pleasing.
- Achievement Test questionnaire was prepared with immense care to test the students knowledge and skill.

OBSERVATIONS

- CAI Package attracts them naturally and arouses their curiosity & draws their attention. Thus, readiness to learn is induced.
- It has brought in a lot of variety and novelty in the teaching and the learning process.
- It provides a vast exposure to the students and they can learn on their own.
- Graphics help the students to understand the content of the unit easily.
- Students were of the opinion that the method and the style can be fruitful if it is available for all the topics of their syllabus and they can score better in their examinations.
- Students" experience of learning through CAI is enjoyable, meaningful and personally satisfying.

EDUCATIONAL IMPLICATIONS

On the basis of the findings of the present study, following educational implications are mentioned.

- CAI Package can be helpful to create positive teaching-learning situation in classroom as it provides visual experiences which bring novelty to the subject. So it can be more useful and effective for the learners.
- CAI Package helps each student to proceed with his own speed & capacity of grasping power. It is also helpful to increase their concentration & interest towards learning process.
- It also provides opportunity to the students for an active participation.
- Principals and school management should utilize such programmes in their school and also inspire the teachers to develop and to use such CAI Packages.
- Such Programmes or Packages can be introduced in teachers' training programmes to develop teachers' efficiency. The achievement of the students will naturally be positively effective through skillful teachers.

RECOMMENDATIONS OF THE STUDY

After this study, recommendations for further research are cited as below:

- The effectiveness of CAI Package can be compared to other methods like self learning or graded learning.
- Similar research can be conducted on the other parts of the subject Mathematics such as arithmetic, algebra, coordinate geometry etc.
- Some complex units of mathematics could be taken for the development of CAI Package to check their efficacy for the distant learning or reinforcement learning processes.
- The effectiveness of CAI Package can be compared to group learning and to an individual learning.
- A similar study can be made for teaching units of other subjects also.
- With the use of Computer Assisted Instruction Programmes, diagnostic and remedial work can also be carried out in the field of education.

CONCLUSION

The findings of this paper indicate that CAI can be an effective method. It shows some positive gains in various achievement tests as well as increased student confidence and satisfaction in mathematical learning in Dharmapuri district. In addition, CAI provides alternative learning resources that can better address diversity in skill levels, and learning styles among this population. The findings will be helpful for the teachers and curriculum developers in identifying the problem of the student in learning mathematics and make favorable changes in the curriculum and make the teaching and learning process in a more enjoyable way.

REFERENCES

1. Alhassan Dokochi Safo., Ifeoma Ezenwa & Danteni Ibrahim Wushishi (2013)“Effects of Computer Assisted Instructional Package on Junior Secondary School Students Achivement and Retention In Geometry in Minna Niger State, Nigeria”. International Journal of Humanities and Social Science.
2. Ajelabi, A. (1998). “The relative effectiveness of computer assisted and text- assisted programme instruction on students learning outcomes in social studies”. PhD thesis of the University of Ibadan, Ibadan, Nigeria.
3. Burns, K., & Polman, J. (2006).The impact of ubiquitous computing in the Internet age: How middle school teachers integrated wireless laptops in the initial stages of implementation. Journal of Technology and Teacher Education.
4. Best, J.W. (1986).Research in Education (11thed.). New Delhi: Prentice Hall of India Pvt. Ltd.
5. Bombay. Cekbas Y., Yakar H., Yildirim B. & Savran A. (2003). “Effect on Students of Computer Assisted Instruction”. The Turkish Online Journal of Educational Technology (TOJET). 2 (4) Article 11.

6. Campbell, D. T., & Stanley, J. C. (1963). "Experimental and quasi-experimental designs for research on teaching" . In N. L. Gage (Ed.),Handbook of research on teaching (pp. 171–246).Chicago: Rand McNally College Publishing.
7. Christopher H. Tienken James & A. Maher "The Influence of Computer-Assisted Instruction on Eighth Grade Mathematics Achievement" role online research in middile level education.
8. Crow, Crow (1961).Educational Psychology, New York: American Book Company. Cohen, L., Lawrence Manion and Keith Morrison. "Research Methods in Education" Sixth edition
9. Dangar, B.G. (2003)."Development and Effectiveness of Computer Aided Instruction (CAI) Programme for teaching subject English at Primary Level", Saurashtra University.
10. Dhevakrishna. R., Devi. S & Chinnaiyan.K(2012),"Effectiveness of computer assisted instructions in teaching of mathematics at secondary level". International Journal of Advancements in Research & Technology, ISSN 2278-7763.
11. Emin Aydın(2005)., "The use of computers in mathematics education: a paradigm shift from "computer assisted instruction" towards "student programming". The Turkish Online Journal of Educational Technology.
12. Edgell, Larry J (1998). "Computer Assisted Instruction versus Classroom Instruction, Master's Thesis, Salem Teikyo University.
13. Good, C.V. (1981).Dictionary of Education. New York: McGraw Hill Book Company, Inc. Garrett, Henry. E. (2005). "Statistics in Psychology and Education". Twelfth Indian Reprint, Paragon International Publishers, New Delhi.
14. Hirani, T.R. (2003). "Development and Effectiveness of Computer Aided Instruction (CAI) Programme in teaching subject Science of Secondary School Level", Saurashtra University, Gujarat.
15. Kothari, C.R. (1997). Research Methodology; Methods & Techniques (14thed.) New Delhi.
16. Kariya, L.H. (2001). Effectiveness of Computer Aided Learning as a self learning techniques, Saurashtra University.
17. Kumar, K.L. (1996). Educational Technology. New Delhi : New Age International publishers.
18. Mukhopadhyay, M., Khanna K. & Parhar M. (eds.) (1989). Educational Technology:Year Book 1988. New Delhi: All India Association for Educational Technology.
19. Pramilaramani, Harsha Patadia (2012). Computer Assisted Instruction in Teaching of Mathematics Stetter, M.E., & hughes, M.T. (2011). "Computer assisted instruction to promote comprehension in students with learning disabilities", international journal of special education.

20. Tayyabakausar, Bushra Naoreenchoudhry & Aijaz Ahmed gujjar "A comparative study to evaluate the effectiveness of computer assisted instruction (cai) versus class room lecture (crl) for computer science at ics level" The Turkish Online Journal of Educational Technology.
21. Tienken, C. H., & Wilson, M. (2007). "The impact of computer-assisted instruction on seventh-grade students" mathematics achievement. Planning and Changing, 181–190.
22. Traynor, P. (2003). "The effects of computer-assisted instruction on different learners". Journal of Instructional Psychology, 137–151.
23. Yusuf, Afolabi (2010)."Effects of computer assisted instruction (CAI) on secondary school students' performance in biology". The Turkish Online Journal of Educational Technology.

INTERNET SOURCES

1. http://www.researchgate.net/
2. http://www.academia.edu/
3. www.eric.com
4. www.wikipedia.com
5. www.apa.org
6. http://www.journalijar.com

Dr. P. Purushothaman
Assistant Professor in Mathematics Education
Varruvan Vadivelen College of Education, Dharmapuri,
Tamil Nadu, India

Dr. M. Senthilkumaran
Assistant Professor, Department of Educational Technology
Tamil Nadu Teachers Education University, Chennai, Tamil Nadu, India