

Investigating the Impact of Programmed and Computer - Assisted Instruction on Science Education

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Abstract: *This study investigates the effectiveness of programmed instruction and computer - assisted instruction in teaching science to eighth - grade students. The research employs an experimental method, with two groups of students exposed to the two different teaching methods. The results indicate a significant difference in student's achievement in science, with computer - assisted instruction proving more effective. The study concludes with implications for both teachers and students.*

Keywords: Computer Assistance, Science Education, teaching

1. Introduction

India is a developing country. India is trying to cope with other nations of the world in every field of development. For the all round development of any country science education is most important, so their quality of education depends on the quality of instructions in the classroom.

According to UNESCO Information Technology is that which is related to "Scientific, technological and engineering disciplines and the management techniques used in information handling, and processing their application. It also includes computers and their introduction with men and machines and their association with social, economical and cultural matters". In the last 20 years there have been observed remarkable innovations in the delivery of education. The technologies available today and those about to emerge have the potential to transform the nature of education and the role of learners and teachers in the learning process. Technology has empowered the values, attitudes and conventions, trying to modify, change alter or replace those, which are traditional and old.

2. Significance of the study

In the age of techno - scientific revolution, quantity of knowledge is rapidly expanding. There is a need of innovation in our traditional system of instruction to meet the challenges of present day society.

Students need unique experiences in the presentation when teacher uses several resources in classroom. Understanding of facts, concepts and principles become effective when they are taught by innovative tools like overhead projector, computer and LCD etc. In a subject like science, visual experiences are more effective than verbal experiences. Traditional teaching in classrooms using chalkboard can be supplemented with the lessons prepared with the help of computers and good programmed learning teachers all over the world have always been looking for effective teaching aids. To realize the vast potential of computers, as a tool for education, effort is required in the direction of thinking of how to use the computer as a teaching aid and consequently

develop appropriate software for the subject matter. The linear programming and CAI are the most important strategy for behavioral change points of view are used for solving the problems of education.

The individual difference is the major problem of education. The learner doesn't get an opportunity to proceed according to his own abilities and rate of learning. There is no provision for diagnosing the weakness and difficulties which may be organized to remove learner's difficulties. Teaching strategies, textbooks, teaching aids don't provide any opportunity to student. Keeping in view usefulness of programmed learning and CAI as an instructional mode and the increasing necessity for such material in school subject, the investigator developed linear programmed material and CAI on Water Pollution in science for 8th grade students, to check his responses immediately so that he could know how successfully he is learning. In classroom teaching, the teachers tries to pace with the average students of the class. These problems of teaching learning can be effectively solved by the use of instructional material.

Objectives of the study:

The present study was conducted to attain the following objectives.

- 1) To develop programmed instructional material for eighth class students on the topic 'water pollution'.
- 2) To develop instructional material for eighth class students on the topic 'water pollution' through Computer Assisted Instruction (CAI).
- 3) To develop criterion reference test in science (water pollution) to measure the achievement of students for pre - test and post - test scores.
- 4) To study the effectiveness of teaching science through programmed instructional material.
- 5) To study the effectiveness of teaching science through Computer Assisted Instruction (CAI).
- 6) To compare the effectiveness of teaching science through programmed instructional material and Computer Assisted Instruction (CAI).

Hypothesis of the study:

There is no significant difference in student's achievements in science while teaching through Computer Assisted Instruction and Programmed Instruction.

3. Methodology

In order to achieve objectives of the present study the experimental method was adopted. The methodological details like sample, tools and statistical techniques are given below:

Research Design

The investigators adopted two groups randomized pre - test and post - test design for the purpose of investigation.

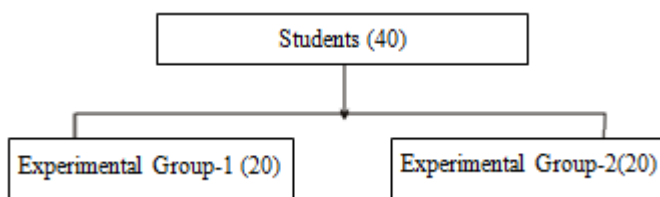
Experimental Group 1: The students of the experimental group - 1 were taught through the programmed learning presentation and they were exposed to certain special experiences.

Experimental Group 2: The students of the experimental group - 2 were taught through the Computer Assisted Instructions and they were exposed to certain special experiences.

Randomly Assigned	Pre - Test Independent Variable	Post Test
Experimental Group 1	T ₁ EProgrammed learning Method	T ₂ E
Experimental Group 2	T ₃ EComputer assisted instructions	T ₄ E

Sampling

For conducting the present study, simple random sampling method was used, Forty students (twenty for experiential group - 1 and twenty for experiential group - 2) studying in the Class eighth from D. A. V. Inter College, Bijnor were selected randomly.



The following tools were used in the present investigation.

(a) Instructional Tools

- Computer based teaching package for Computer Assisted Instruction (CAI) (developed and standardized by the investigators).
- Programmed learning instructional package for Programmed instruction (developed and standardized by the investigators).

(b) Measuring Tools

- Previous class report card of eighth class students to know their achievement.
- Criterion reference pre - test (developed and standardized by the investigators).

- Criterion reference post - test (developed and standardized by the investigators).

Statistical Techniques Used

The data were mainly analyzed in terms of mean and standard deviation. The 't' test was used to find out the significant differences. To find the level of significances; the calculated t - values were compared with the table values.

4. Analysis, Interpretation and Discussion of Results

The data were analyzed and interpreted separately for each of the item and objectives. Interpretation has done carefully, logically and critically examining the result obtained after analysis considering the limitation of the sample chosen, the tools selected and used in the study.

Table 1

Difference between Means of Pre - test and Post- test Scores of Experimental Group - 1 on Achievement in Science

Group - 1	N	Mean	't'	df	Level of significance
Pre - test	20	15.7	1.31	19	Not significant
Post - test	20	18			

Where, N= Number of Students, M= Mean, df=Degree of Freedom

It is observed from table No.1 that the mean of experimental group - 1 regarding achievement in science on the basis of their pre - test and post - test scores are 15.7 and 18 respectively. The 't' ratio comes out to be 1.31 which is not significant at.05 level of significance. This shows that there is no significant difference between the means of Pre - test and Post - test scores of the experimental group no.1 towards the effectiveness of teaching science through programmed learning material.

Table 2

Difference between Means of Pre - test and Post - test Scores of Experimental Group - 2 on Achievement in Science

Group - 2	N	Mean	't'	df	Level of significance
Pre - test	20	11.25	5.37	19	Significant at.01 level
Post - test	20	21.80			

Where, N= Number of Students, M= Mean, df=Degree of Freedom

Table no.2 reveals that the mean of experimental group - 2 regarding achievement in science on the basis of their pre - test and post - test scores are 11.25 and 21.8 respectively. The 't' value is found to be 5.37 which is significant at.01 level of significance. This shows that there is a significant difference between the mean of the pre - test and post - test scores. As the mean score 21.80 of post - test scores is higher than the mean scores of 11.25 of the pre - test scores, it is concluded that teaching science through CAI has a positive effect in promoting achievement in science.

5. Findings of the Study

The results of the study indicate that there exists significant difference in students' achievement in science through programmed learning material and computer assisted Instruction. The research has proved that teaching science through computer assisted instruction helps the students more to learn individually and according to their pace.

Educational Implications

The most outstanding characteristics of any research is that it must contribute something new to the development of area concerned, so the Investigation has to find out the educational implications for both the teachers and the students.

Implications for teachers

Teachers must try to use computer as a communication tool and not just a machine because it helps the teacher in many areas like evaluation of student's performances, classification of children according to their abilities, preparation of time - table and schedules, providing immediate feedback to students for better interaction and motivation etc. Computer also helps the teachers to deliver instructions and fulfill needs of the students more efficiently. By using technology related to teaching aids in the class room teachers feel more satisfied because they are able to teach better and also they are free to work on the software and they collect a lot of information.

Implications for students

Teaching through computers attracts the attention of students, create interest among them and motivate them to learn. Combination of graphics, animations and text facilitates learning. Technology aided learning enhance the imaginative and thinking power of students. It also helps students to visualize the concepts, make concepts more clearly and thus improves learning. This is also useful for correspondence and private students who don't have direct contact with teachers. It is also helpful for students because it helps all types of students to learn according to their own pace.

6. Conclusion

The study concludes that computer - assisted instruction significantly improves students achievement in science compared to programmed instruction. This finding has important implications for science education, suggesting that integrating technology into teaching can enhance learning outcomes. Further research is needed to explore how these instructional methods can be optimized for different learning contexts and subjects.

References

- [1] Aggarwal, J. C. (1995). Essentials of Educational Technology: Teaching learning and innovations in evaluation. New Delhi: Vikas Publishing house.
- [2] Aggarwal, Y. P. (1995). Comparative study of conceptual understanding by programmed learning and

- CAI. Sixth survey of Educational Research. New Delhi: NCERT.
- [3] Atkinson, R. C. (2000). Computer Assisted Instruction: A book of reading. New Delhi: Sterling Publishers Pvt. Ltd.
- [4] Balasubramaniam, N. (2002). Relative effectiveness of computer assisted instruction in biology learning. Indian educational review, New Delhi: NCERT.
- [5] Gibson, S. (2002). Incorporating computer based learning into pre - service education courses. Contemporary Issues in Technology and Teacher Education (online serial), 2 (1), pp.95 - 116.
- [6] Kumar, R. K. and Ambedkar, V. (2005). A study of effectiveness of computer assisted English language learning. Anweshka Indian Journal of Teacher Education, NCTE, 2 (2), pp.68 - 77.
- [7] Panda, S. K. (2009) Integration of ICT for Professional Development of Elementary Teachers - A case Study. Experiments in Education, Vol XXXVII (4), pp79 - 83.