

**ADVANCED TECHNOLOGY FOR FUTURE OF TEACHING AND LEARNING IN
MATHEMATICS EDUCATION****Subhash G. Pawar, Ph.D.***Department of Mathematics K.T.H.M. College, Nashik (Maharashtra)***Abstract**

The advance technology can be applied in teaching and learning processes, by teacher in mathematics education is important role for development of society. Mathematics software helps person to develop his logical abilities, skill of formulating, thinking and problems solving from interdisciplinary fields. Use of mathematical software in teaching programme is more beneficial for promoting mathematical thinking among the students.

Keywords: Advance technology, mathematical software, teaching and learning.



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Introduction

Mathematics is a very important subject for human society. It is the subject which has its own culture. Mathematics helps person to develop his logical abilities and so it plays an important role for development of civilization. In this technological era the thinking of teacher is changing from 'Dispenser of knowledge' that of an 'information manager'. Internet has become keyword of this information technology age. In every where human being is using computer with internet to get good results in a short time period. It has become responsibility of teachers that he or she tries to update knowledge about computer and use it in his or her classroom teaching. Now today use of internet, mathematical software and other technology in the field of education has become the necessity for learners. It will be beneficial to both teachers and students to use mathematical software as teaching assistant in the field of education. Under this technology approach students will become more productive, creative and self reliant. This provided the theoretical support for teaching programme using with mathematical software. This research study taken by researcher is to investigate the impact of mathematical software on second year mathematics students.

The advance technology can be applied in teaching and learning processes, by teacher in education is important role for development of society. Now a day's teachers need to be equipped not only with expert in their subject and effective teaching methodology, but with capacity to assist students to fulfil their demands of the emerging knowledge-based human being. Therefore teachers require to familiarity and update with recent technology, communication technology and various software and need to have ability to use such new technology for improvement of quality of teaching method. By use of new technology, teacher can perform his task on students in effectively and efficient manner. Recent technology helps the teacher to find and develop the new methods, strategies, innovative

practices and new systems to achieve educational objectives to its high level in effectively and efficient manner. Recent technology enables to make sensible and systematic use of LCD projector, model, software etc. for the teacher. It helps the teacher for the development of students through various angle viz. cognitive, affective and logical thinking abilities.

Mathematical Software / Model

Mathematical software / model is the expressions involving relationship either equations or inequalities representing variables and parameters that define a particular phenomenon. Mathematical software / models are built by using symbols and numbers that can be transfer into functions, formulae, inequalities and equations. They also can be used to build much more complex model like linear programming model. First mathematical software was developed in 20th century by Ada Lovelace Alan Turing in 1935 (computable number with an application) for the decision problem. Maximum mathematical models were developed in the subject of Operation research.

Mathematical software / model develop the skills among the students such as:

- (vi) Skill of formulating, thinking and problems solving from interdisciplinary fields.
- (vii) Interest in subject knowledge and application to other subject.
- (viii) Knowledge of and practices with computation.
- (ix) Application of mathematical and logical thinking.
- (x) Communication skills, spoken and written.
- (xi) Change the rapid interaction between students and teacher.
- (xii) It encourages spending extra period on their learning processes.

Aim of the Study

Aim of the study is to Implement of mathematical software in teaching of mathematics and verify the efficacy of mathematical software. Researcher prepared two topics from Linear algebra, but he focused on students of S. Y. B. Sc. mathematics class from Savitribai Phule Pune University. Readymade mathematical software *fx-CG20* is use for teaching programme because this software is user friendly.

Mathematical Software *fx-CG20*

Basic calculations on *fx-CG20* are performed viz. addition, subtraction, multiplication, division of numbers, logarithmic function calculations, and exponential functions calculations. Also perform trigonometric, inverse trigonometric, hyperbolic, inverse hyperbolic calculations and Probability distribution, random number generation in accordance to various distributions using this software. Also this software helpful to obtain numeric calculations viz. rounds off, GCD, LCM, mod (remainder when n divides by m) and Permutation and combination. Furthermore perform coordinate conversion, sexagesimal operations (conversion of decimal value to sexagesimal value) and logical operators (AND, OR, NOT, XOR) on *fx-CG20* software. Addition of matrices, multiplication, scalar multiplication, determinant, transposition, inversion and square of matrix are perform using *fx-CG20* software. Also calculate solution of system of linear equations up to six unknowns and root of higher order equation 2nd to 6th degree using this software. This *fx-CG20* software is very useful to mathematics teachers and students because on this software some of the applications of mathematical software viz. MATLAB, Octave, Freemath and Scilab are available.

Research Method

According to Best J. W. classified the research methods into three types, i) historical ii) survey iii) experimental. As per aim of the study, the experimental methodology is useful for conducting the research work. The experimental research is based upon John Stuart Mill's single variable principle.

“Two situations are equal in every respect and if one element is added / removed to one group but not the other group, any difference that develops is the effect of the added/removed element”.

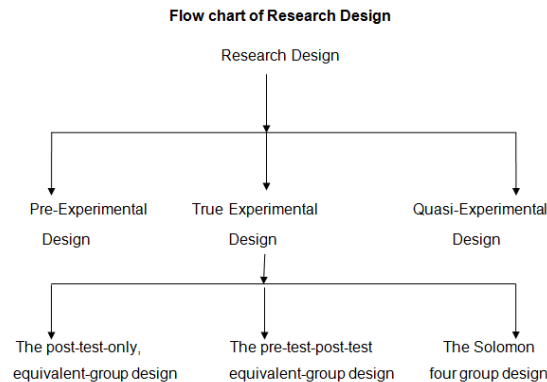
Research Design

Experimental design is an algorithm of the procedure that helps the investigator for testing population mean in research study for reaching valid conclusion about comparison. The experimental design classified in to three categories.

- 1) Pre-experimental design.
- 2) True experimental design.
- 3) Quasi-experimental design.

From the above categories, true experimental design is proposed for the present research work, because it is the powerful design. In true experiment design the equivalence of the control and experimental groups are selected by random assignment of subjects to control and experimental treatments. Again true experimental design classified in to three categories as follows.

- 1) The post-test-only, equivalent-group design.
- 2) The pre-test-post-test equivalent-groups design.
- 3) The Solomon four-group design.



As per aim of the present research study, the post-test-only equivalent-groups design from True experimental design is useful for testing the population mean. This design is one of the simplest and powerful experimental designs. Researcher has selected 20 students out of the 147 students by diagnostic test for the experiment from K.T.H.M College, Nashik. These 20 students are equally divided in to control and experimental groups. These equal group made by making equal pair from score in the diagnostic test. From these two groups one group was selected randomly as experimental group and other as control group. Tools used by researcher to collect the data are i) Mathematical software *fx-CG20* ii) Teaching programme developed by the researcher iv) Teacher made achievement test and statistical tools are mean, variance, S.D. and C. V.

Procedure of study

There are two groups under the study. One is experimental group which taught by using mathematical software and other is the control group which taught by traditional method. Both groups are treated in the usual manner. During the implementation of teaching programme using mathematical software researcher recorded some observations at the time of the experiment. After completion of teaching programme the achievement test in mathematics was administered to both groups under the experiment at the same time.

For the study researcher prepared two topics, system of linear equations and linear independence. During the study, researcher made following observations.

1. Mathematical software *fx-CG20* is easy to understand.
2. The students in experimental group, show interest in each topic.
3. Most of the students are able to think and derive conclusion.
4. Creative and cooperative atmosphere is found while the teaching programmes duration.

Data Analysis

Title: Summary of the mean score of the Experimental group and Control group

	Experimental group	Control group
	X₁	X₂
Size(n)	10	10
$\sum X$	340	270
\bar{X}	34	27
$\sum(X - \bar{X})^2$	17.58	58.5
S.D. (σ)	1.32	2.42
C.V.	3.88	8.96

Table No. 1

For Coefficient of Variation (C. V.), we have

$$\begin{aligned}
 \text{C. V. of Experimental group} &= \frac{S.D. \times 100}{\text{Mean}} \\
 &= \frac{1.32 \times 100}{34} \\
 &= 3.88
 \end{aligned}$$

$$\begin{aligned}
 \text{C. V. of Control group} &= \frac{S.D. \times 100}{\text{Mean}} \\
 &= \frac{2.42 \times 100}{27} \\
 &= 8.96
 \end{aligned}$$

Conclusion:

Hear mean score of experimental group is greater than mean score of control group in achievement test and coefficient of variation of experimental group is less than the coefficient of variation of control group. Hence, use of mathematical software in teaching programme is more beneficial for promoting mathematical thinking among the learners. Also, observe that mathematical software have greater potential to advance a conceptual change in students and change their misconceptions to correct conceptions. Researcher conclude that teaching mathematics by using mathematical software more powerful than the traditional teaching because it increase the level of understanding of students, induce proper and clear concepts up to significant level.

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