

HOW HAS COMPUTER CHANGED TEACHING AND LEARNING OF MATHEMATICS**Manjit Singh, Yadavindra College of Engineering, Talwandi Sabo****manjitcsir@gmail.com****ABSTRACT**

The 21st century also called world of computer literacy includes not only the traditional concept of literacy, but it also encompass the ability to incorporate new technologies into teaching and learning of Mathematics. The paper focus on studying effects of use of computer in teaching and learning of Mathematics among students and teachers. Total 150 questionnaires were administered among students teachers and collected and their perception about teaching and learning of mathematics was tested after use of technology in classroom. The technology usage by students teachers in mathematics teaching and learning suggests that understanding concepts in mathematics is important and ability solve mathematical problems increases with practice. It has been observed that in chalk and talk method of teaching lot of precious time is wasted which might otherwise could have been use for better conceptual clarity in Mathematics learning.

Keywords: Anxiety, Attitude and Perception**INTRODUCTION**

Any Mathematical problem basically can solved in four steps: 1. Define the problem, 2. Develop a plan, 3. Implement the plan 4. Evaluate the results. These four steps demand the ability to develop a deep understanding of the problem and to devise a plan to solve it. Teachers of mathematics should encourage its students to develop new techniques or methods to solve given problem and to value its importance. However, in most of schools teachers generally stress on cramming the steps of mathematical approach of problem solving not on how to develop correct mathematical approach to solve certain problem this is possibly due to the fact that teacher are themselves unaware of problem solving techniques but it not only their fault it always the burden of huge syllabus and short schedule of semester.

How Computer can help in Learning the Problem in better way

In mathematics class technology can be used in three different way 1. using technology to analyze data, 2. using technology to simulate mathematical model, 3. using technology to integrate mathematics with a context. It is matter of great research that whether technological tools have any effect on learning and teaching of mathematics. In recent researches it has been shown that with the introduction of technology, it is possible to de-emphasize on algebraic calculations and more time can be spent on the development of mathematical concepts. It is of no doubt that Technology saves time and gives students more time to explore mathematical concepts at a depth that has not been possible without the use of computer. Introduction of computers leads to fundamental changes in mathematics instruction. For example, its

very easy to run complex mathematical model with using computer and different results can easily be obtained by simple parametric variation in the model. Further, in teaching of calculus the results can easily be projected on screen with greater understanding of differentiation and integration ,for example derivative of function can be shown as tangent to curve at point at which derivative is being calculated similarly in process of finding volume of some solid or volume of common space between two or more solids common volume can shown in three dimension using projector which was earlier very difficult to draw on two dimensional board . It has been observed that weaker students learn in better way with help of technology that means learning of mathematics is not only for bright students. That might be due to the fact that weaker students are weak in geometrical projection of the mathematical problem but they start learning in better way when problem is projected on big screen. Although lot has been written about the benefits of technology in teaching and learning of mathematics but little has been investigated whether the use of technology could actually change students' perceptions of problem solving . We are investigating statistically to know whether the use of technology can change teacher and students perceptions of problem solving. However, we are aware that students were not much familiar with use of computer before this instatistical investigation.

Attitude and Anxiety Toward use of Technology

Attitudes is an individuals' overall affective reaction to using a system. Several studies reveals that individual attitude towards technology have a strong effect on use intention . Attitudes of University academic staff toward technology use within the institution are important and often overlooked component of successful curriculum integration of technology. Much of the research done on technology integration assumes that once appropriate technological tools are in place in the classroom, lecturers, and students will overwhelmingly support the change toward a technologically based curriculum. The success of any initiatives to implement technology in an educational program depends strongly upon the support and attitudes of lecturers involved. It has been suggested that if lecturers believed or perceived proposed computer programs as fulfilling neither their own or their students' needs, they are not likely to attempt to introduce technology into their teaching and learning. Among the factors that affect the successful use of computers in the classroom are lecturers' attitudes towards computers . Attitude, in turn, constitutes various dimensions. Some examples of these are perceived usefulness, computer confidence , training , gender , knowledge about computers , anxiety, confidence, and liking.

Anxiety toward computer use can be understood as uneasiness of the mind caused by the apprehension of things going wrong when using computers. While using computer the new users are prone irritation and frustration because user have to not only with correct use of software but at the same time be faced with technical computer problems. Computer anxiety is more prevalent among aged teachers who hadn't used computer before

but when they start using computer the anxiety toward computer use starts fading away. Researchers (Loyd and Gressard, 1984; Howard & Smith, 1986; Glass and Knight, 1988; Necessary and Parish, 1996), support the theory of increasing computer experience will decrease computer anxiety. Parish and Necessary found that college students with little or no computer experience have more anxiety than those students that have experience. The results of their study revealed that "increased levels of computer experience and balance of weekly computer usage were both related with reduced levels of computer related anxiety". Glass and Knight (1988) determined those computer anxious students will become less anxious after an initial trauma period. By working through these fearful or frustrating stage students will gain experience, thus reduce anxiety. It is reasonable to assume that by increasing computer usage thereby experience, one would naturally reduce anxiety.

Statistical Survey

We are interested in studying sample of 150 student and teachers who are attending one month short term Computer Oriented Mathematics course at Punjabi University, Patiala. These students teachers are not very much familiar with use of computer in process of teaching and learning of Mathematics. We are interested in studying the change in behavior of these students and teachers after use of Computer in Mathematics teaching and learning. These student teachers are from different basic mathematics qualification, gender and teaching experience. Most of the participants in this are female with different qualification in mathematics and their age is ranging between 18 to 30. Most of sample was of Sikh community and rest consist of Hindus. More than sixty percent of sample consist of participants with very good background in mathematics and rest were average in mathematics.

Sampling

After use of computer in teaching and learning of mathematics we are interested Statistical Testing of two hypothesis

1. Concept clarity in Teaching and Learning of mathematics is necessary.
2. Mathematical ability can only be increases with practice.
3. Technology Usage can enhance Attitude.
4. Anxiety toward use of technology decreases with use of technology.

Table 1 There is a significant increase in the mean (mean = 3.43) after undergoing the course and it is statistically significant. This shows that the teachers believe and agree that it is important to understand the concepts in mathematics rather than just following steps and being satisfied with getting the right answers.

Table 1: T-test for pre and post answer scores					
	N	Mean	dfe	t	Sig
INITIAL Getting Answers	150	3.13	145	-5.797	0
FINAL Getting Answers	150	3.43	145	-5.797	0

When effort is concerned, the study revealed that the teachers believe and strongly agree that effort can increase mathematical ability. This is indicated by the increase in the mean of the effort scores (mean = 3.68) after the course and this was found to be statistically significant (see Table 2)

Table 2: T-test for pre and post effort scores					
	N	Mean	dfe	t	Sig
INITIAL Effort	150	3.49	149	-3.257	0.03
FINAL Effort	150	3.68	149	-3.257	0.03

However, scores for attitude towards word problems in mathematics indicates a positive score that was not statistically significant (mean = 2.66). This suggests that the student teachers are uncertain about the importance of word problems in mathematics because their belief was not altered after attending the course. See Table 3.

Table 3: T-test for pre and post attitude scores					
	N	Mean	dfe	t	Sig
INITIAL word problem	146	2.64	143	-0.557	0.5
FINAL word problem	146	2.66	143	-0.557	0.5

On the other hand, the anxiety scores actually went up (mean = 3.15) after the course. Although, this was not statistically significant, it is something anticipated because this was a new experience for the student teachers in using ICT in teaching of mathematics

	N	Mean	dfe	t	Sig
INITIAL anxiety	136	2.96	135	-1.7	0.2
FINAL anxiety	136	3.15	135	-1.7	0.2

CONCLUSIONS

This was a novice attempt to encourage future teachers of mathematics to integrate ICT in the teaching and learning mathematics. The findings reveal that the student teachers' perception about problem solving in mathematics actually changed with the use of ICT. Although they were quite apprehensive at first but they enjoyed the course and most importantly, they experienced a new perspective on mathematical problem solving. The role of ICT is seen as supporting and enhancing the ability of the student teachers to solve mathematics problems. Most importantly, it changed the way the teachers see the problems and devise ways of teaching mathematical problem solving using technology in order to offer new and powerful learning environment for our future generations.

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