

Role of ICT in Teaching to Reduce Learned Helplessness in Mathematics

Manju Gera¹, Sanju Verma²

^{1,2}USOL, Department of Education, Punjab University Chandigarh, India

Abstract: *Mathematics is the core subject in the field of science and engineering. At the school level this subject should be taught in depth. But research shows that in adolescents the learned helplessness in mathematics is much more than other subjects. The information and communication technology (ICT) trends can be used to enhance the learning of mathematics among students. Teachers should integrate ICT technology in their teaching. These days students usually know little bit more than teachers about the technology. For the positive results first of all teachers have to take step to learn the technology and then use this resource of technology to make students learn the mathematics.*

Keywords: Information and communication, mathematics, school, learned helplessness, attitude.

1. Importance of Mathematics

These days students desire for a promising career and for that they have to stay on particular track. To be successful in life they have to be expert in the skills in mathematics, science and technology. Mathematics mastermind can teach different ways of thinking that are used in simple life and to work also. [3]. There is some truth for the importance of maths.

- Students who are taking algebra and geometry go on to college at much higher rates than those who do not (83% vs. 36%).
- Most four-year colleges require three to four years each of high school math and science for admission.
- Almost of all new jobs require math skills beyond the high school level.
- Entry-level mechanical engineers must use advanced mathematics formulas to wire a car's electrical circuits.
- In civic life strong math skills are needed for understanding graphs, charts, and opinion polls in a newspaper, for calculating house and car payments, and for choosing a long-distance telephone service. [3]

Mathematical literacy is essential for every child's future.

- A solid mathematics education is essential for an informed public, our national security, a strong economy, and national well-being. [3]
- All students can be successful in mathematics and should receive a high-quality mathematics education, regardless of gender, ethnicity, or race.
- Teachers should encourage and inspire every student to continue the study of mathematics. [3]
- Developing mathematical proficiency requires a balance and connection between conceptual understanding and procedural and computational proficiency.
- Problem solving and using mathematics to understand our world are integral parts of all mathematics learning.
- Teachers must have a solid knowledge of both mathematics content and teaching methodologies, as well as enjoy and value mathematics.

- Effective programs of teacher preparation and professional development help teachers understand the mathematics they teach, how their students learn that mathematics, and how to help each student learn. [3]
- Improving mathematics education for all students requires a commitment from a variety of stakeholders, including teachers, mathematics teacher-leaders, school and district administrators, institutions of higher learning, mathematicians, professional organizations, families, politicians, business and community leaders, and students. [3]

2. Learned Helplessness in Math

Learned helplessness is a general assumption that one is lacking the ability to attain the tasks and has compact control on environment. G. K. Probst [1] referred the failure of learning math is due to math anxiety. It is the state of being edgy, doubtful while attending a mathematics class. He showed that why earlier methods were unsuccessful in teaching mathematics. One of the reasons was earlier teaching methodology. An approach was proposed that addresses the six areas which were multiplication tables, prerequisite skills, vocabulary skills, accuracy, practice time and study system.

S. Yates [7] studied that usually mathematics teachers face students with infirmity in learning and disposed learning mathematics. He used student behavior scale to measure student infirmity in learning. The study commenced with approximate sample of 300 students in grades 3 to 7 in two schools in Australia. The characteristics of scale were reaction to failure, motivation, persistence and effort. One year of survey showed that students when given encouragement then they performed better than earlier.

H. Yaran et al. [10] investigated the differences in three characteristics based on gender and school location. These characteristics are attitudes, anxiety and mathematical achievement. The research was carried out on 188 students. The results showed that there were significant differences in attitude and in mathematics score obtained. The research

studied the students in rural as well as urban areas. The rural area students had got higher attitude scores and low mathematical achievements in comparison to urban schools. The results depend upon various factors like parental factor, educational opportunities. Students in urban areas are more aware of education patterns and get private lessons easily while in rural areas these opportunities are not available.

3. Role of ICT in Education

3.1 Barriers to ICT integration with Education and Solutions

There are so many perceived barriers in adding the ICT technology with the classroom lessons. One of them is ICT infrastructure and the technical support after establishment of ICT infrastructure.

S. Tapan [2] conducted two experiments at University Teacher Education Institute. Dynamic geometry was used to measure the impact of ICT in education. First of all in the dynamic geometry the interrelation of mathematical knowledge with the knowledge on the use of unit was analyzed. It was analyzed that informative knowledge was crucial for teachers to construct educative situations even they had knowledge at different levels.

C. C. Keong et al. [4] concluded a survey to investigate use of ICT and the barriers of integrating ICT into the teaching of mathematics. Responses of total 111 persons were analyzed using SPSS statistical package. The questionnaire was divided into seven areas. The result showed that computer literacy among teachers is high. Forty percent used presentation tools and approximate 50 percent used courseware in classroom. Approximate eight percent used graphical visual tools. Total 42 percent faculty received ICT training and 71 percent had found training useful. One of the major barriers faced by teacher in integrating ICT was the lack of time in the school schedule for projecting involving ICT. Also there are not sufficient teacher training opportunities for ICT projects. The proposed solution was to develop a mathematical portal for teaching mathematics. This portal would contain resources and a lesson planner so that teacher can be relieved from routine tasks. Result showed that 72 % teachers were very much satisfied and 27% viewed it as useful as well as helpful.

R. Hudson et al. [8] used mixed model approach in his study to use ICT to improve mathematics education. He developed a questionnaire having three sections. Section 1 includes the questions regarding the professional development for using technology in math. It contains eight questions. Section 2 includes the student belief and conception in math teaching and learning using technology. It contains two questions along with sixteen beliefs about the mathematics. Section 3 includes 3 questions regarding the use of technology and instructional practices. He used a model which examines the relationships between uses of technology by teachers and different variables like beliefs, barriers, professional development needs- choices and computer use.

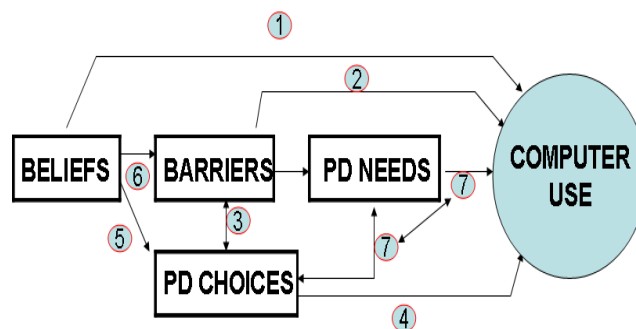


Figure 1: Model for examining relationships

The analysis of study includes four sections. The resultant of study was the final model which predicts the computer use.

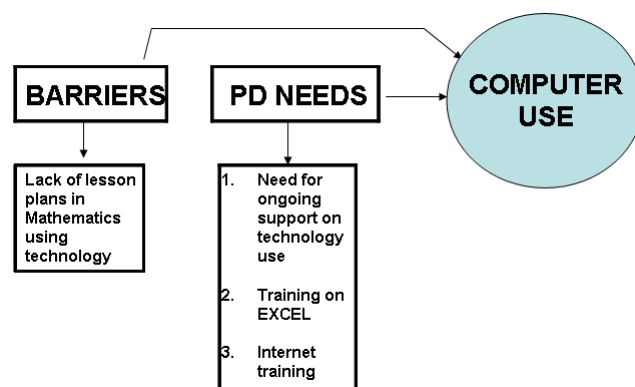


Figure 2: Final Model predicting computer use

The result obtained from this study on teachers showed that compute policies and professional development programs which integrate ICT in math were not effective. It could not make teachers to adopt ICT in classroom. He recommended that more structured approach should be there to align teachers to their needs and beliefs.

D. D. Agyei et al. [9] studied in Ghana that key factor in failure of ICT education is both the administration support and ICT infrastructure availability. There are also other problems which are lack of experience in integrating ICT with classroom lessons and teachers don't have sufficient time to create lessons with ICT methodology.

He also studied the different teaching strategies like the chalk and talk method, use of handouts, assignments, use of ICT and use of demonstrations. The result showed that use of ICT in teaching strategy is least used in mathematics classroom. His study also revealed that maximum teachers don't use even any single application in classroom. It was the result of two key problems. One was that older staff don't have technology skills and other is that curriculum was designed in a way that you have to use chalk and talk approach. He stated that teachers wanted to re-design the course and instructive content knowledge and more hands on activities should be there. Teachers stressed on lectures on professional developments so that they could handle their computer by themselves. For that there should be technical courses for the teachers before starting the session.

Research also disclosed that maximum time training programs were not timely either they were held in between

the session or after the session. Also fresher teachers were given preference in comparison to older ones.

3.2 Implications of the study and suggestions

The study has many significant implications for each of students, faculty and parents. To remove the obstructive attitude towards the math, education planners, teachers, students, parent should work together. To build constructive attitude and to increase interest in mathematics, students should work on fundamental concepts and stick to the basics. They should not try to memorize the things. They should devote time to solve the unsolved problems. They have to solve different kinds of problems on the same topic. Teachers should pay more attention to weak students and should try to light the candle of learning mathematics in students. They can devote more time to students with making group of students. Some students are good in algebra but not in geometry so groups of same topic should be clubbed together. Even students can help each others. Parents should also do homework on their students. From the childhood stage they should learn the basics of math like they should be able to do calculation of basic numerical activities in daily life. Even the school administration should not try to just making profit from their students. They should provide ICT technology to each student so that community can rise and world will become free from learning barriers.

In conclusion, the education is not discrete in nature but it is a continuous process like a chain. Each and every part of this has different characteristics. For proper results, each part should be taken care seriously and sincerely and only then task can be properly completed.

4. Future Scope

This study presents the relation between learned helplessness in mathematics of students and improvement in learning of students by using ICT methodology. Educationists can improve the study by introducing new means so that mathematics will become fun for the students.

References

- [1] G. K. Probst, "Overcoming or preventing math anxiety that causes learned helplessness in mathematics," *The Learning Center Newsletter*, pp. 237-241, 2002.
- [2] S. Tapan, "Integration of ICT in the teaching of mathematics in situations for treatment of difficulties in proving," *CERM3*, 2003.
- [3] A. Mirra, "A family's guide: fostering your child's success in school mathematics," *NCTM*, pp. 1-33, 2005.
- [4] C.C. Keong, H. Sharaf and D. Jacob, "A study on the use of ICT in mathematics teaching," *Malaysian Online Journal of Instructional Technology*, 2 (3), pp. 43-51, 2005.
- [5] Q. Li, "Student and Teacher Views about Technology: A Tale of Two Cities?," *Journal of Research on Technology in Education*, vol. 39(4), pp. 337- 398, 2007.

- [6] T. Lyons, "The professional development, resource and support needs of rural and urban ICT teachers," *Australian Educational Computing*, vol. 22, Number 2, pp. 22-31, 2007.
- [7] S. Yates, "Teacher Identification of Student Learned Helplessness in Mathematics," *Mathematics Education Research Journal*, Vol. 21, No. 3, pp. 86-106, 2009.
- [8] R. Hudson and A. Porter, "ICT use to improve mathematics learning in secondary schools," In D. Gronn & G. Romeo (Eds.), *ACEC*, 2010.
- [9] D. Agyei and J. Voogt, "ICT use in the teaching of mathematics: Implications for professional development of pre-service teachers in Ghana," *Education and Information Technologies*, 16(4), pp. 423-439, 2011.
- [10] H. Yaratana and L. Kasapoğlu, "Eighth grade students' attitude, anxiety, and achievement pertaining to mathematics lessons," *Social and Behavioral Sciences*, 46, pp. 162-171, 2012.

Author Profile

Manju Gera is an assistant professor at University School of Open Learning, Department of Education, Panjab University Chandigarh in India. She has more than 15 years of experience in various areas of education. Her major area of interest is mentally retarded children and problems faced by them. During her tenure she has guided more than ten Ph.D. scholars whose research area is related to the psychological disorder of adolescents.

Sanju Verma is a research scholar in department of Education, Panjab University Chandigarh. She received the M.Ed. degree from the Panjab University Chandigarh in 2009. During 2010-2013 she had worked as an assistant professor at Smt. Jawala Devi College of Education, Fatehgarh Sahib. At present she is doing research for educationally deficient children.