Use of ICT in Teaching Mathematics at the Secondary Level

Javiad Ahmad Khan*

Abstract

In present times, technology has cast its control in almost every field. If we talk about the educational field, here is also a very important role of technology as such we can say that nowadays education is almost impossible without the latest technology. Keepinginviewalltheaboveimportancewehaveconductedafieldsurveytoknow to how many schools are using technology during the teaching process and how many schools have proper facilities to provide teaching integrated with technology, especially mathematics subject. This study will talk about Information and Communication Technology (ICT). This study is based on secondary schools in which we tried to find out how many schools use ICT in teaching mathematics at the secondary level. The data was collected by observation and questionnaire methods. The study is based on secondary schools of Kashmir division, district Budgam. The researcher has selected 22 secondary schools by simple random sampling method. In these schools, there were 49 mathematics teachers. The data was collected from these schools and these mathematics teachers. Findings indicate that only27%secondaryschoolsindistrict Budgam have ICT facilities properly. It was also found that 61% of mathematics teachers are aware of ICT. Also, the important finding was that no one of the mathematics teachers was using ICT for teaching mathematics subjects in secondary schools.

Introduction

Without education, things can be imagined. But in present times we see that most of the students of school age are not interested in education, especially In mathematics subject. The reasons are many but one and perhaps the most influential reason is that the teaching methods are not up-to-date. In almost every school our teachers are using traditional methods to teach students. But the need of the hour is different. We must use different technologies to teach students especially when we are talking about mathematics subjects we cannot compromise the future of students. We must use information and communication technology (ICT) to teach students every subject especially mathematics subject is incomplete nowadays without the integration of ICT. Mathematics education research tells us that success in mathematics requires more than lessons. McLeod stated in his research in 1988 that students can fully absorb mathematical concepts only if they can change their attitude towards learning mathematics. He also said that the more students are taught through ICT the more their understanding increases and the longer it imprints on their minds (McLeod, 1988). This research has also shown that computer-based education brings conceptual change in

* Research Scholar, Department of Education

students' understanding of scientific concepts. The government of India has laid stress from time to time on using ICT in the teaching process, especially for mathematics subjects. If we mention some, it was RAMSA in 2009 and RUSA in 2013. In both of these schemes, there was high importance given to the use of ICT in the teaching process.

Rashtriya Madhyamik Shiksha Abhiyan (RAMSA), a program focused on secondary education, focused on ICT-aided education. Under the National Reporting of Open Education Resource (NROER) programme, CIET has carried out a study on teachers in a changing era. Efforts have been made to make them aware of the use of ICT and at the same time to make them experts so that they can participate in the preparation of OER (rmsaindia.gov.in).

The National Council of Teachers of Mathematics (NCTM), the world's largest association of mathematics teachers, has identified technology as one of the six principles for mathematics in schools. It said that technology is very important in learning and teaching mathematics. It enhances the learning ability of the students (NCTM, 2000, P.11).

In the National Policy on Education (NPE, 1986), although computer education in schools has not been given clear importance, the provision of computers in schools has been indicated. The policy states that computers are a part of education, especially in vocational education. The 1992 Plan of Action (POA) also gave clear instructions that computers should be used in mathematics classes. To increase computer literacy on a large scale, it should be taught in schools for a specified period.

In 1998, the Government of India set up a National Task Force on Information Action Plan and Software to increase computer literacy on a large scale. It was called the ICT Action Plan. This computer literacy and ICT proved to be an important step in the development of ICT skills. Various projects were made under this. The ICT Action Plan (1998) recommended computer education in schools on a large scale to promote computer literacy in schools. Under this plan, the Computer Literacy & Studies in School (CLASS) program was run which was created in the year 2000. Some of the main objectives of this program were:

- Providing computer education in 10,000 schools.
- Providing computers to 1000 schools.
- To introduce computer-based education in standard school

The National Council of Teacher Education (NCTE) also recommended including ICT in the education system. As a result, educational technology is taught as a compulsory or optional subject in B.Ed. colleges of many universities today.

Jean Piaget's (1973) statement that "every normal child has within him the ability to learn mathematics" has placed a great responsibility on mathematics education providers to be unselfish and impartial when teaching students, in this current age of science and technology, conventional methods of teaching cannot create interest in students and their mental, psychological and emotional needs cannot be met. Therefore, it has become necessary to change the teaching and learning methods and the inclusion of new technology in the teaching system is indispensable.

In mathematics teaching, the use of ICT instils a spirit of collaboration among students and helps them gain knowledge together and build self-confidence by building relationships with each other. With the help of ICT, positive motivation is created in the students. It also has the advantage that students develop the ability to focus on their lesson and understand it better. Because of this ICT, their precious time is saved a lot which they otherwise have to waste in solving difficult questions.

Research by Chien, Wu and Hsu (2014) has shown that students in school have high expectations for ICT integration in the classroom as the new generation is born and grown with technologies and could be defined as a digital–native phenomenon. The younger the students, the higher their expectations are on ICT integration in the classroom. ICT integration aims to improve and increase the quality, accessibility and cost-efficiency of the delivery of instruction to students, it also refers to the benefits of networking the learning communities to face the challenges of current globalization (Albirini, 2006, p.6). There is a positive relationship between students' Learning and the use of ICT (Harrison et al., 2002)

Because students are familiar with Technology and will earn better within the technology-based environment, the issue of ICT integration in schools, specifically in the classroom is vital. This is because, the use of technology in education contributes a lot to the pedagogical aspects in which the application of ICT will lead to effective learning with the help and support from ICT elements and components (Jamieson-Procter et al., 2013)

ICT is the combination of information processing and delivery technology. Generally, Information and Communication Technology (ICT) is also synonymous with Information Technology (IT). But ICT is a combination of many technologies including

telephone, computer, various software, audio-visual tools, internet etc. In ICT (Information and communication technology), three words are seen: Information, Communication and technology. A brief explanation of these words is as follows:

Information

Information is data or facts that become information with the addition of acquisition. In other words, information is the acquisition of facts or acquisition of data.

Communication

The word "communication" is derived from the Latin word "communis" which means transmission. This means that conveying messages and information from one place to another through verbal, visual, symbolic, written etc., is called communication.

Technology

The word Technology is derived from the Greek word Technologia. Technology itself is a combination of two words "Technique" and "Logia".Technique means skill, art or craft and Logia means study. That is, technology means the study of a skill, art, or craft.

In this way, by combining these three words, It can be said that getting the information correctly by asking someone, or from books, magazines, pictures, photography, watching a movie, listening to the radio, from the internet, etc., and organizing this information in the right way by using some tools or technology is called Information and Communication Technology (ICT).

In ICT there are various devices such as computers, smart boards, Internet, Notebook, Digital cameras, CDs, printers, scanners, projectors, Wi-Fi, and different applications for mathematics etc. But in this study, we have taken some limited tools for observation and these are computers, the Internet, projectors, Wi-Fi connections, smart boards and different applications for mathematics subjects.

Objectives of the study

The given study was conducted to achieve the following objectives:

1) To study the availability of ICT in schools at the secondary level.
2) To study the awareness of mathematics teachers about ICT.
3) To identify the ICT applications used by mathematics teachers in the teaching process at the secondary level.

Research Design

In this study, survey methodology was used to collect data. There searcher has used observation and questionnaire methods to collect data from secondary schools and mathematics teachers teaching there. The researcher developed the questionnaire and finalised it before being distributed to the targeted group of respondents.

Population and Sampling

In the present study, the researcher has selected secondary schools and mathematics teachers of these secondary schools of Budgam district as the population. The researcher has selected mathematics teachers of secondary schools of one educational zone i.e. Soibugh zone among the different educational zones of Budgam district of Kashmir division who are teaching mathematics to ninth and tenth-grade students. First of all, one zone was selected from the total 13 educational zones of Budgam district which has been done by simple random sampling method. Which has come to the educational zone Soibugh.The number of secondary schools and their mathematics teachers in this educational zone is given in Table 1 and this is the researcher's sample:

Table1:No.Of Mathematics Teachers In 22 Secondary Schools O f Zone Soibugh District Budgam (Teaching 9th and 10th Class Students).

No. Of Secondary Schools In Educational Zone Soibugh.	22
No. Of Mathematics Teachers.	49

Source: Internet and personal survey

Analysis and Interpretation of Data

In this research, the researcher has tried to achieve three objectives. Objectives1:- To study the availability of ICT in schools at the secondary level. The analysis of data collected for this objective is given in Table 2.

Table 2: List of schools having the following ICT facilities.

S/No.	ICT facility	No. of schools having these tools	No. of schools not having these tools
1.	Smart Boards	0.0	22
2.	Projectors	2.0	20
3.	Wi-Fi connections	6.0	16
4.	Computers	6.0	16

Source: Questionnaire and observation

From the above table, it is clear that only 27% of secondary schools in district Budgam have the availability of ICT facilities. Here it is worth to mention that none of these schools are having smart boards.

Objective2:-To study the awareness of mathematics teachers about ICT.

The analysis and result of data collected for this objective is given in the table3.

Table3: List of mathematics applications and number of mathematics teachers having knowledge of these applications.

S/No.	Mathematics Applications	No. Of teachers having knowledge of These apps.	No. Of teachers not having knowledge of These apps.
1.	Word Processing Packages.	30	19
2.	Graphic Calculators.	30	19
3.	Simulation Program.	28	21
4.	Databases Application.	29	20
5.	Portable Application.	28	21
6.	Spread Sheet.	30	19
7.	Drill/ Practice Tutorial.	27	22
8.	Graphic Application.	28	21
9.	Flash Presentation.	30	19

Source: Questionnaire

Form the above table it is clear that 39 mathematics teachers out of 49 are aware about different applications used in teaching mathematics subject. But there are 19 teachers also who do not have knowledge about applications that can be used in teaching mathematics. That means 61%ofmathematicsteachersareawareand have knowledge of different applications that can be used in teaching mathematics subject.

Objective 3:- To identify the ICT applications used by mathematics teachers in teaching process at secondary level.

The analysis and result of data collected for this objective:

After collecting data for this objective we found that none of the mathematics teachers were using ICT in teaching mathematics in this educational zone (Soibugh). So there were also no applications used by them.

Findings of the study

The findings from the present study are explained as under:

- In district Budgam educational zone Soibugh there are 27% secondary schools in which the ICT facility is available to some extent but not as much as should be.
- There are 61% of mathematics teachers in these schools who are aware and have knowledge about ICT.
- In the selected educational zone there were none of the mathematics teachers who are using ICT in teaching mathematics subjects to the students of class 9^{th} and 10^{th} standard.

Conclusions

The present age is the age of technology. Every country is on the path of this development and technology. India is a developing country but educationally it is a backward country. The development and survival of every country and nation depends on its education system and science and technology. Therefore, it is very important to make education of global standard nowadays. Therefore, there is a need to re-evaluate the educational system and educational process and align the educational process with modern technology. Research has shown that the availability of new technology i.e. ICT in schools is negligible. And besides, even where this facility is available to some extent, teachers do not use it in the classroom. Educationists and even the government are emphasizing that education should be imparted to students with the help of technology as much as possible so that they can forget the traditional methods and get new-age education and high-quality education. Therefore, it should be emphasized that education should be taught with the help of ICT in schools so that students can understand well and their inclination towards learning will increase.

Suggestions for further research

1. The current study consists of the education zone Soibugh of Budgam district. Further study can also be done from other education zones of Budgam district.
2. The present study has been conducted on secondary schools of district Budgam zone Soibugh, further studies can be conducted on colleges and other institutions.
3. The present study is only on mathematics teachers, further study can be done on teachers of other subjects also.
4. This study did not make any comparison between the availability of ICT between public and private schools, further study could do this comparison.
5. In the present study researcher has not studied the problems or barriers to using

ICT in teaching mathematics subjects, further research can be done to find such problems.

Educational Implications

To make the education process better new teaching aids can be used and are being used in the field of education. These teaching aids also include ICT. It is obvious that if ICT is used in teaching, the teaching will be effective because the more senses the students are included in the teaching, the more effective and stable the teaching will be.

Despite the importance of new technology, not all schools in India today have access to computers, internet, etc. The researcher visited 22 schools to collect data for his research paper but not all of them had access to computers, internet etc. Some computers were in schools but lying idle. In some schools, computers were kept only to enhance the glamour of the principal's office.

This research provided an opportunity to know the school conditions where there is nothing in the name of ICT and other technologies and thus in today's modern age without computers, the internet etc., we cannot imagine educational development. Therefore, this research will help our educational policymakers, educators, administrators and the government to facilitate the provision of ICT facilities in schools and to develop mechanisms to ensure its use.

The government and administration should make at least basic ICT facilities available for teaching in each school so that teaching is effective and stable and ensure the appointment of trained teachers in each school. In addition, all teachers should be given basic ICT training so that they can use ICT in their classrooms. Teachers should encourage and ensure the use of ICT as much as possible.

References

1. Albirini, A. (2006). Teachers' attitudes toward information and communication technologies: The case of Syrian EFL teachers.*Computers&Education*,47(4), 373-398
2. Brave, Dr Minalshi and Vasant. (2012). Role of Technology in Teaching-Learning Mathematics
3. Chien, S.P., Wu, H.K., & Hsu, Y.S. (2014) An investigation of teachers' beliefs and their use of technology-based assessments. *Computers in Human Behavior*, 31, 198-210.
4. Cox, M.J.,&Marshall, G.(2007).EffectsofICT: Do we know what we should

know?

a. *EducationandInformationtechnologies*,12(2),59-70.

5. Fariza K., NurAfiqaZakaria. (2016). The benefits and constraints of the use of information and communication technology (ICT) in teaching mathematics.
6. Ghavifekr, S., AbdRazak, A.Z., Ghani, M.F.A., Ran, N.Y., Meixi, Y. &Tengyue, Z. (2014) ICT Integration In
7. Education: Incorporation for Teaching & Learning Improvement. *Malaysian Online Journal of Educational Technology (MOJET)*,2 (2), 24-46.
8. Harrison, C., et al. ImpaCT2: *the impact of Information and communication technologies on Pupil learning and attainment*, Becta, Coventry, 2002.
9. Jamieson-Proctor,R.,Albion,P.,Finger,G.,Cavanagh,R.,Fitzgerald,R.,Bond,T.,&Grimbeek, P. (2013). Development of the TTF TPACK Survey Instrument *Australian Educational Computing*, 27(3),26-35
10. KevinC.,A.,BabatundeBayodde.(2017).ICTinteachingmathematics:Nigerian

a. Teachers'perspective;EnuguStateUniversityofscienceandtechnology.

11. Marigia R., Dance Savikove and Jasmine Kochoska (2027) ICT– The educational programs in teaching mathematics
12. McLeod, D. B. (1988) Affective issues in mathematical problem solving: Some theoretical considerations. *Journal for research in mathematics education,* 19, 134–141
13. "Principles and Standards for School Mathematics" National Council of Teachers

a. Of Mathematics,2000

14. Shafeeq. N.Y. and Imran, M. "Teacher's attitude towards the use of Information and Computer Technology (ICT)In Classroom Teaching."*The International*

a. *Journal of Social Sciences and Humanities Invention, vol*. 3, no. 6, pp. 2323- 2329