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PERSPECTIVES

PEDAGOGY OF SCIENCE

Research Project

A STUDY OF EFFECTIVE IMPLEMENTATION

OF TALP TRAINING IN THE FACILITATION OF

SCIENCE IN SELECTED TALP SCHOOLS OF

SHIMOGA

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CHAPTER : 1

Introduction

Education in elementary and high schools must include education in the field of information and communications technology (ICT), to enable children and young people to systematically understand the basics of this technology, to build the foundations for its productive use in everyday life and learning and to open the way for competitiveness in the labour market. In addition, the creation of a more thorough general education characterized by greater autonomy of students is necessary along with facilitation of the development of analysis and critical cognition skills. These measures should enable young people to learn independently in the broader idea of lifelong learning, and thus easier adapt to changes of jobs, which will be more frequent in the future.

Young, highly educated people should be trained for effective and creative use of ICT in their profession. At the same time, they should also develop understanding of the basics of this technology for an easier use of various tools of the modern era that will be developed during their working lives. In addition, the number of highly educated people specialized in ICT should be increased significantly. It is essential to achieve internal changes at the level of the teaching practice and organization of educational work so that teaching and learning in the school and university context can experience a real change.

It is widely accepted that digital technology popularly known as Information and Communication technology (ICT) have the potential to strengthen & reform school education aiming to support the creation of an ecosystem of ICT integration. ICT should aim to support the achievement of educational aims of educational policy. The thrust of these policies has been to support constructivist classroom pedagogies, make learning connected to local contexts and responsive to learner needs make the school culture democratic and participatory, support decentralised school system administration by

strengthening school autonomy, teacher agency and connecting the school to the local community going beyond a narrow focus on learning outcomes.

Information Communication Technologies are the power that has changed many aspects of the lives. The impact of the ICT on each sector of the life across the past two-three decades has been enormous. The way these fields act today is different as compare to their pasts. Across the past twenty years the use of ICT has basically changed all forms of endeavour within business, governance and off-course education! ICT has begun to have a presence but unfortunately we are lacking to achieve desired impact. The education is a socially oriented activity. It plays vital role in building the society. The quality education traditionally is associated with strong teachers having high degrees. Using ICTs in education it moved to more student – centered learning. As world is moving rapidly towards digital information, the role of ICTs in education becoming more and more important and this importance will continue to grow and develop in 21st century.

ICT POLICY FRAMEWORK & DELIVERY MECHANISM IN KARNATAKA

The various policies & plans adopted by the State of Karnataka to bring in an ICT based educational change in the state.

IT policy

Karnataka State Education Act 1983 (amended in 1998) does not mention the use of ICTs for primary & secondary education, neither has the state of Karnataka released any policy for ICTs and primary & secondary education specifically. However, the state announced its IT policy in the year 1997 known as "Mahiti Sindhu, The Millenium Information Technology policy of Karnataka". In the area of education, the policy plans

to take ICT to all the schools and to set up training centres in schools. These centres were to be supported by the private sector to impart teacher training, computer education as well as to foster general education with the help of ICT tools. The policy further stipulated that private companies running such centres can employ them for commercial use before and after school hours.

Thus computer based education was introduced in Karnataka, starting with 1000 government secondary schools under the Mahiti Sindhu Project in the year 2000 by the Government of Karnataka. The project was exclusively funded by the State and later on various other central and state-funded schemes for ICT in education was introduced in a number of government schools and private grant-in-aid schools.

Teacher training programs in Karnataka

As a part of implementing ICT in schools, the State Government of Karnataka has taken up computer training of teachers in a big way. Besides computer literacy, the teachers are trained in using the internet to enhance their teaching capabilities and skills. The summer vacations are used for computer traning of teacher. Apart form agencies (NIIT, Aptech, Educaomp, ECIL, Everon) who were involved with the teacher training projects in implementing ICT in schools, Intel, Microsoft, World links and the American Indian Foundation are also associated with teacher training programs in Karnataka.

Intel

Intel has a worldwide non-profit initiative called " Innovation in Education" and have tied up with the Education department in Karnataka to impart training for teachers to innovatively use computer technology to enhance student learning. Under Mahiti

Sindhu program, Intel has trained and created a resource pool of teachers and 1500 Master trainers.

Microsoft

It has tied up with the Education Department with an objective to

- Accelerate IT literacy among government school teachers and students
- Promote ICT integration in schools

Progress of Microsoft :

- 1864 master trainers trained
- 16799 teachers trained by master trainers
- 32 teacher educators trained as master trainers
- 256 teacher educators trained by master trainers

Mahiti Sindhu Project

The State of Karnataka has gained worldwide reputation for being in the race of Information Technology. The policy of the Government is to give Computer education and computer aided education free of cost under "Mahiti SIndhu" to VIII, IX and X standard students in 1000 government schools in the state.

One secondary school was selected from each hobli also Morarji Desai residential schools were also selected for computer education under this program. The entire cost of " Mahiti Sindhu" project amounting to nearly 210 crore is to be spent during the project period of 5 years from 2001-2006. This project was fully financed by the government of Karnataka. The entire cost of extended " Mahiti Sindhu" project total cost was Rs. 5141 lakhs for 3 years project period.

Objectives of Mahithi Sindhu project

The ambitious project aims at giving free computer education and computer based education to the students of Government schools who come from rural and economically weaker sections of the society thereby enhancing the quality of education being given to them. The objectives are as follows :

- To enable the students to gain computer education and t understand its applications

- To enhance the learning levels of the students in curricular subjects through computer aided education using multimedia software CDs

- To introduce students to the world of opportunities, computers have to offer

- To enable the students to understand the basics of computer programming

- To introduce students to the communication media of e-mail and the internet

- To train rural youth in the use of computers outside school hours

- To provide opportunities to the entire community to use computers

The Mahithi Sindhu project closed in the year 2006. The government has decided to extend the same project for further 3 years from 2007-08 and identified KEONICS company a government undertaking as the implementing agency.

Special features of Mahithi Sindhu project

In addition to computer education students learn mathematics, Science, Social Science and English subjects through CD ROMs

Students are given hands on experience in e-mail and internet facilities

Students have the option of learning through ether English or Kannada medium

Four periods are set apart a week for computer & computer added education

Teachers of these selected schools and neighboring schools are also trained in the project period

STF (Subject Teacher Forums)

Rashtriya Madhyamika Shiksha Abhiyaan (RMSA) Karnataka , Department of State Educational Research and Training (DSERT), Karnataka, worked to create Teachers communities of Learning thorough the STF, Karnataka in Mathematics , Science & Social Sciences across 34 districts of Karnataka. The program was based on the extensive and intensive use of public digital resources to build and support teachers' network as well as to create a resource rich learning environment for these subjects. IT for change, an NGO is working as the resource institution for this program in partnership with RMSA & DSERT.

The Information & Communication Technology (ICT) in schools have been subsumed in the RMSA. Now ICT in schools is a component of RMSA. ICT in schools was launched in December 2004 and revised in 2010 to provide opportunities to secondary stage students to mainly build their capacity on ICT skills and make them learn through computer aided leaning process.

EDUSAT : Satellite Project in Karnataka

EDUSAT is dedicated educational satellite, launched by the Government of India in 2004 to serve the educational sectors offering an interactive satellite based distance education system for the country. In Karnataka, it was proposed to utilize the technology to improve the quality of education at elementary and secondary schools. In the first phase, all the primary schools of Chamarajanagar district were covered. Later on

in the same year, it was expanded to Gulbarga district. With both districts combined 1770 schools have been covered through EDUSAT.

At present, EDUSAT is also available in 427 schools in Bengaluru rural and 406 schools in Ramanagara district. From an archieve of 450 programs on science and mathematics, two selected episodes of half an hour duration each are telecasted everyday under the EDUSAT program. The UPLINK facility was established in DSERT, Bengaluru and the DOWNLINK facilities at all the primary schools with facilities such as ROTs and television sets to receive video lessons through EDUSAT and with solar power facility to combat frequent power problem. SSA supports the project partnership with ISRO (Indian Space Research Organisation).

National Policy on Education (NPE)-1992

NPE-1992 tells that training must be given to teachers regarding ICT because of the features like exposure to computers and training to be part of professional education and employing educational technology to spread information and train and re-train teachers.

National Policy on ICT in School Education -2009

National Policy on ICT in School Education   gives the following recommendations to the use of ICT in school. They are

- ICT literacy and competence enhancement
- ICT enabled teaching-learning process
- Capacity building of teachers
- ICT infrastructure in schools
- ICT for open and distance learning

State Policies

Two State policies being released between 2000 and 2005 which had allowed for the release of policies addressing ICTs and primary and secondary education and therefore there are some positive developments.

Information Technology Act

The Information Technology Act-2000 emphasized technical higher education, which would help students gain employment in the IT industry and the Science and technology Policy 2001 called for the teaching of science at school and college levels. However none of these policies specifically mentioned the use of ICTs for primary and secondary education.

Information Technology Policy -2005

It recognized the strategic importance of ICTs as key components of socio-economic development, governance and enhanced service delivery. Additionally the policy also called for the improvement and spread of education to achieve 10% computer literacy in the state in ten years and 30% in 20 years and for the state to mae use of private networks, cable TV , wireless networks and internet to link all schools, colleges, universities, engineering colleges and research organizations.

ICT plan in School Education

The Government has introduced various initiatives to facilitate the greater adoption and diffusion of ICT to improve capacities in different fields. They include

- Enhancement of education and training program
- Provision of an environment conducive to the development of ICT

- Provision of incentives for computerization

ICT in Secondary Education

Teacher should play a key role as facilitator in the learning process. ICT is a mode to mobilize teacher's creativeness. E-communities become quick and popular ways to discuss staff perfection and teacher training.

The main role of ICTs is to act as a catalyst for the learner's interest to get acquainted with the unknown. ICT is a bridge between existential and intellectual aspirations. (Vladimir, Kinelev, Piet Kommers and Boris Kotsik-2004). ICTs are no longer the instructional format for reconciling prerequisite learning steps. Now they offer an exploratory space where the learner is in charge o his own education. Teacher here is just a facilitator who stimulates the learner to take risk, understand by analogy, reflect and offer consolation.

Technology Assisted Learning Program (TALP)

The state Government launched many projects like Mahiti Sindhu ICT Phase I, Phase II, Phase III, etc. In collaboration with the outsource, to enable the outgoing secondary school students with special priority to rural school to participate in the field of information technology but they did not fulfill the objective of the program. Therefore the government launched a new program TALP IT@school based on Kerala state model where it is implemented effectively since 15 years. TALP is one of the biggest projects to digitalise almost all the schools in five years.

Objectives of TALP

- Quality education
- Usage of computers

- E-literacy

Features of the project

- Training to the teachers who in turn develop learning materials for the students

- Open source is adopted

- Integration of ICT is preferred using of educational tools and open sources

Aspects covered under TALP

- Lab setup and OS installation

- Internet and Browser

- Data, Text and media handling

- Assistive technology

The tools, content and the software adopted in this project are open software and open sources. Ubuntu free software is the base of TALP project and public educational tools like Libre office writer, drawing tools to create mathematical figures and figures relate to science and writing formulas, LIBRE CALC for handling data, LIBRE IMPRESS to create presentations, Open Shot Audacity to modify the videos and to create digital stories and exploring resources form creative commons, Flicker, Wikipedia and to integrate ICT independently with confidence.

The training is given to the subject and language teachers and headmasters. Earlier it was given in face to face mode for ten days then the training was given using the online course for teachers from ICT curriculum website. The unit cost of the training is Rs. 400. The government schools are brought under TALP by providing computer labs, computers, laptops and LCD projectors.

Partnership with Khan Academy

The Government of Karnataka has redesigned ICT program in school education and is implementing TALP from 2016-17 with an objective to complement normal classroom teaching with ICT enabled teaching and learning in all subjects and to ensure digital literacy for all secondary school students for enhancing learning achievement. TALP is an integration of EDUSAT, Tele-education and ICT-3. The department has mapped available digital resources in Mathematics and Science to the state curriculum under various programs like KOER (Karnataka Open Educational Resources). EDUSAT, Radio Tele-education, Agastya Foundation's Science experiments, etc. The TALP schools are provided with the e-content pre-loaded in laptops . The state government has partnership with Khan academy in making e-contents like videos, exercises, articles and teaching tools.

RESEARCH QUESTION

A study of effective implementation of TALP training in the facilitation of science in selected TALP schools of Shimoga

PURPOSE OF THE STUDY

The State and the Central government are supporting the education department specially teachers to strengthen academically in order to bring quality in education. Computer literacy is the need of the day. Researchers have suggested that IT plays three crucial roles in fostering learning. It acts as a driver to promote learning, projecting learners into a global knowledge society that requires a high level of IT proficiency for success in everyday pursuits. It acts as a bridge to high academic achievement and to more engaged, relevant, meaningful and personalized learning all of which can lead to

higher academic achievement. IT acts as a platform for informed decision-making and provides a platform for the use of meaningful data to shape learning opportunities. (Gibson 2002, Gulbahar,2007 and Nance,2003). Hence it is very important from secondary school teachers' point of view to have the computer skills so that they can use it effectively in their teaching-learning process in inculcating the computer knowledge and skills. So in the present study an attempt was made to know the effective implementation of TALP training in the facilitation of Science in secondary schools. This study is being undertaken to find out how effectively the dream project in the field of Education in Karnataka ie., it@schools is having its influence in the teaching-learning process in secondary schools through TALP (Technology Assisted Learning Program) . An effort is done to know the change in the attitude of science teachers and students towards the understanding of the concepts. It is also tried to know if there are any hurdles for the implementation of technology assisted learning in schools.

OBJECTIVES OF THE STUDY

1. To study the integration of ICT in education system

2. Role of ICT in the professional development of teachers in building professional learning community

3. Best utilization of the ICT infrastructure of the school for teaching-learning process

4. To study the role of teachers to motivate students in the understanding of concepts through the mediation of ICT

5. To effectively use ICT tools, software applications and digital resources

6. To integrate ICT into teaching-learning and its evaluation

7. To acquire ,organize and create their own digital resources

8. To compare the knowledge about computers before and after the TALP training

9. To know the ability in using computer technology in various aspects like online ticket booking, online money transaction, etc.,

10. To know about the knowledge hunting through various websites

11. To know about the areas where the TALP knowledge is being used

12. To familiarize with the students' opinion regarding science teacher's utilization of TALP training knowledge

13. To study students' point of view regarding learning through computer

14. To study headmaster's opinion regarding TALP trained science teacher's utilization of technology in office and classroom.

15. To know about the hurdles faced by the teachers/school in the implementation of technology in teaching-learning process

CHAPTER : 2

REVIEW OF RELATED LITERATURE

1. **The studies conducted in various countries like Pakistan, Croatia, India, etc., regarding the implementation of ICT in schools reveal the following aspects** :

   - The usage of ICT in Pakistan has increased many fold in the last 10 years and the latest educational policy also stressed on using ICT in school. It highlights the differences amongst teachers and students about the technology to be adopted in class room. (Students and teachers perceptions of ICT use in classroom: Pakistan classroom)

   - The guidance of students and teachers to ICT and improvement of connections of fundamental, applied and developmental studies as long-term support of the development strategy, should be increased in higher education. (High school students' and teachers' computer training: Awareness, participation and motives. Dept. of Pedagogy, University of Zadar, Croatia)

2. **Role and significance of ICT in India the field of teaching –learning :**

   - ICT has become an integral part of nearly all sectors and segments especially linked to the education landscape. Be it teaching, learning an assessment, ICT is crafting the role of future education in India, writes Rashi Aditi Ghosh of Elets News Network (ENN).

   - ICT has changed the education scenario in the last few decades by emerging as one of the most efficient tools used in the learning process both by tutors and learners. It has proved to be the boon to both the teachers and the learners. Vaibhav Kapoor Principal, Ajanta Public School (Gurugram).

3. **ICT overpowering traditional methods**

- Students in today's classrooms are encouraged to participate actively in the learning process and become active producers of ideas and thoughts. " The students are equipped with the correct knowledge, skill and attitude to take full advantage of all the new opportunities that will be available for them in future" according to Dr. Bharti Sami Vidyashram International School (Jodhpur).

4. **Effectiveness of ICT implementation :**

- it@school project is successfully educating Kerala with ICT. Set up in 2000 for empowering the state schools and the project has achieved in implementing ICT in over 8000 schools in the state.

- Schools with sufficient ICT resources achieved better results than those that are not well equipped. There is significant improvement on learners performances. Finally teachers become more convinced that educational achievements of pupils are due to good ICT use. Therefore ICT can improve teaching by enhancing an already practiced knowledge and introducing new ways of teaching and learning. (ICT implementation for education and learning, IOSR Journal of Research and Method in Education, Soni Srivastava, Associate Professor, University of Allahabad)

5. **Meral Hakverdi (2012) :** The purpose of this study was to examine exemplary science teachers' level of computer use, their knowledge/skills in using specific computer applications for science instruction, their use of computer related applications/tools during their instruction. The sample of this study includes middle and high school science teachers who received the Presidential Award for Excellence in Science teaching

award. Analysis of the survey responses indicated that exemplary science teachers have a variety of knowledge/skills in using computer related applications/tools. The most commonly used computer applications/tools are information retrieval via the internet, presentation tools, online communication data collection.

CHAPTER : 3

RESEARCH METHODOLOGY

Type of Research : Qualitative Research

Variables of the study

Following variables are considered for the present study

Type of schools: Selected TALP schools of Shimoga District

Teacher subject background :

Science teachers : It refers to the teachers teaching science for 8th ,9th and 10th standard students.

Sampling

The study cannot be undertaken without the selection of the sample. The study of entire target population is practically not possible. Cost, time and other factors come the way of studying of the target population. Sampling makes the research feasible within the available resources. The study includes a sample of nearly Science teachers of 35 TALP schools of Shimoga district. 5 TALP schools were selected from each taluk of Shimoga district by Random Selection Method.

Research tool

Questionnaires were selected as a major tool for the study.

Three types of questionnaires were opted for the study. They are

1. Teacher's questionnaire

2. Questionnaire for Headmaster/Headmistress

3. Questionnaire for students

1. **Teacher's questionnaire** :

It had two parts namely personal information and Academic information. It aimed at collecting teacher's knowledge of computers prior and after the TALP training, their usage of technology in various fields like online transaction, communication, shopping. Implementation of knowledge of TALP training in teaching process and its utilization for school work and for the personality development of the teacher.

2. **Questionnaire for Headmaster/Headmistress**

This questionnaire is to draw the Headmaster's opinion regarding the science teacher's involvement in the class teaching, assistance in office work with respect to technology and also to know the attitude of the teacher and the effect on the students after adopting the ides/knowledge of TALP training in the classroom.

3. **Questionnaire for students**

Through this questionnaire, an effort is being done to know the attitude of students towards the involvement of technology in the facilitation of science.

Procedure for Data collection

The sample schools were selected by random selection method. 3 questionnaires were prepared and the selected schools were visited by the researcher and data was collected from the science teachers, students and the head of the institution.
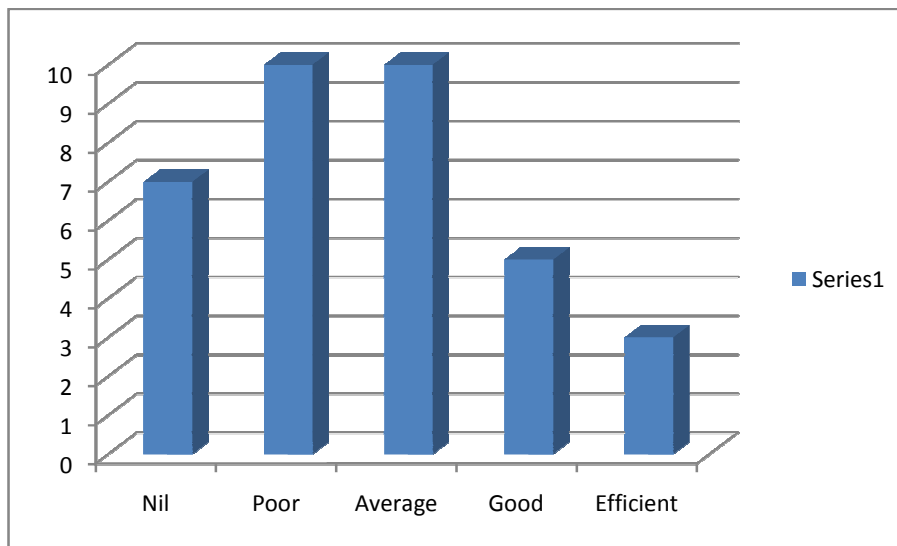
CHAPTER : 4

RESULTS AND DISCUSSION

1. **Teacher's knowledge about computers before TALP training**

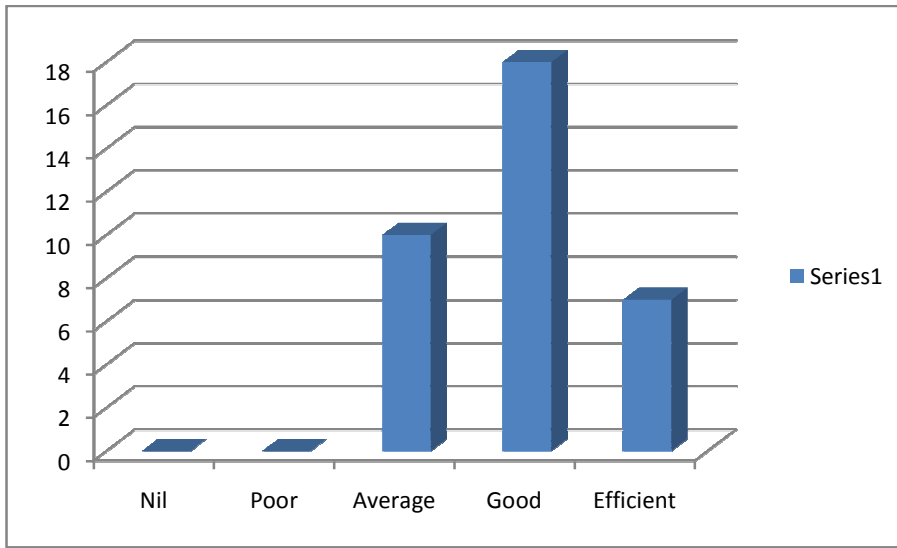| Nil	Poor	Average	Good	Efficient
7	10	10	5	3

Table : 1

It shows that out of 35 teachers, 8 teachers unaware of the knowledge about computers whereas 11 teachers with Poor, 10 average, 5 Good and 1 efficient . Though some of the teachers were with many years of teaching experience, they lack the knowledge about ICT.

2. **Teacher's knowledge about computers after TALP training**

Nil	Poor	Average	Good	Efficient
0	0	10	18	7

Table : 2

After a period of 10 days of TALP training, those teachers with nil and poor in computer knowledge got confidence in the usage of technology and hence there was increase in the number of average, good and efficient levels.

3. **Utilisation of online resources in day to day life**
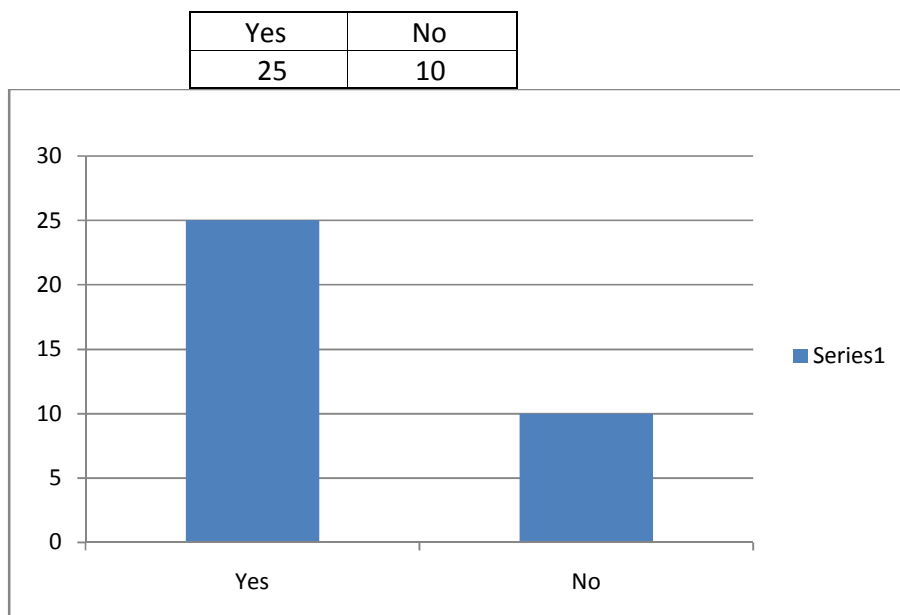
Yes	No
23	12
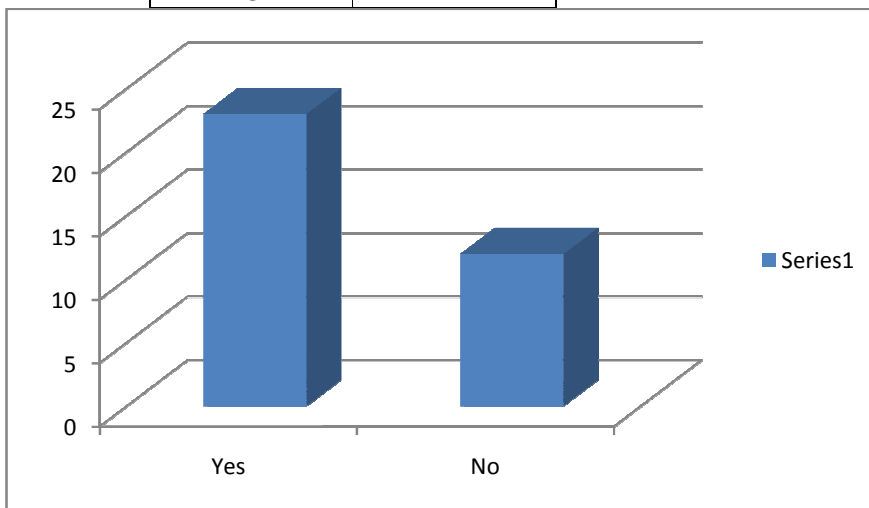
Table : 3 : Who can book online tickets

Table : 4 : Can perform online money transaction

Yes	No
25	10

4. Websites frequently visited by the teachers

Google	Mindmap	Quora.com	Youtube	KSEEB	Edheads	Brainpop
Khan academy	Wikipedia	Phetsimulations	Earth.org	Swayam prabha	CBSE	E-books
E-shiksha	curiosity	NCERT	DSERT	Inyatrust	Biologyarizona.edu	Science maste.com
KROER	H5Pmoodle	Sciencekids	Byjus	schooleducation	Vedantu	Kazam
NROER	Indiclass	e patshala	Edx.org	Photomath	Hhmi biointeractive	Teachers try science

By the above data, it could be concluded that the teachers were influenced by the TALP training and they showed interest in gathering knowledge from various resources like educational websites, the knowledge thus gathered was shared with the staff and the students which influenced various factors like interest in learning, browsing, knowledge hunting process.

5. Developing educational resources

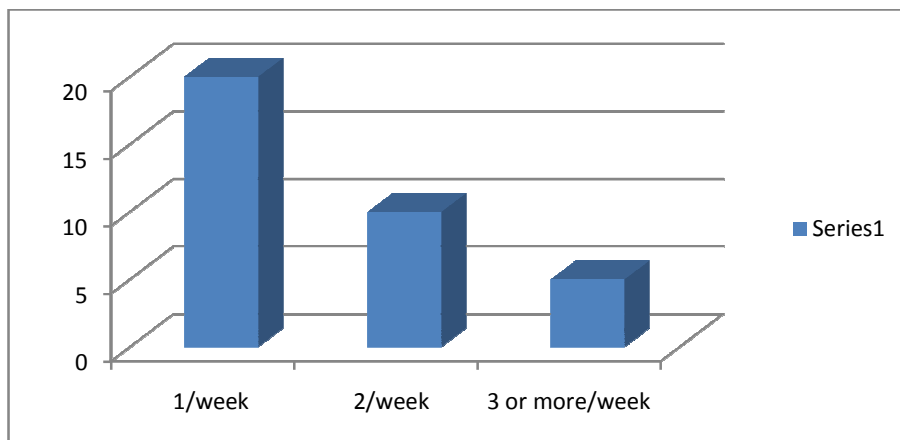| Yes	No
29	6

Table 5 :
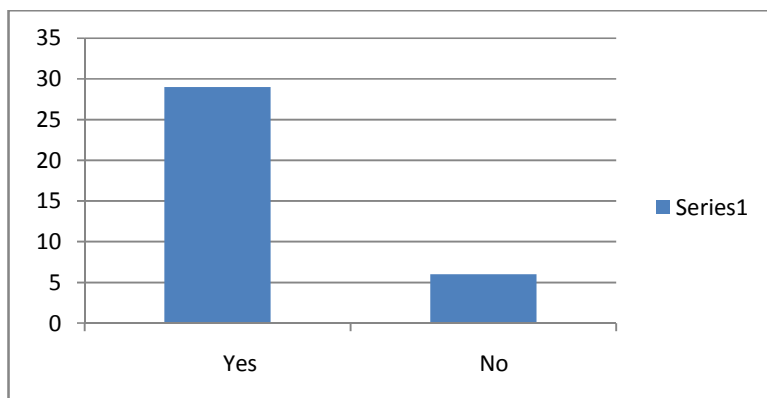
With the effect of TALP training, the teachers started developing various educational resources like PPTs, videos, animations, e-content, etc., to facilitate science effectively in the classroom. The students enjoy learning through these new resources.

6. Number of AVE classes engaged in week

1/week	2/week	3 or more/week
20	10	5

Table 6 :

The classroom environment has changed from routine black board-chalk to display on projectors with provision for audio, video, pictures, orientation towards activities. The science teachers started adopting technology for their teaching process which resulted in increased interest among the students giving concept clarity. Among 35 teachers, 20 teachers make provision for atleast 1 class using AVE in a week , 10 teachers twice a week and about 5 teachers take 3 or more AVE classes per week.

7. **Difficulties faced in conducing AVE classes**

Yes	No
25	10

Table 7:
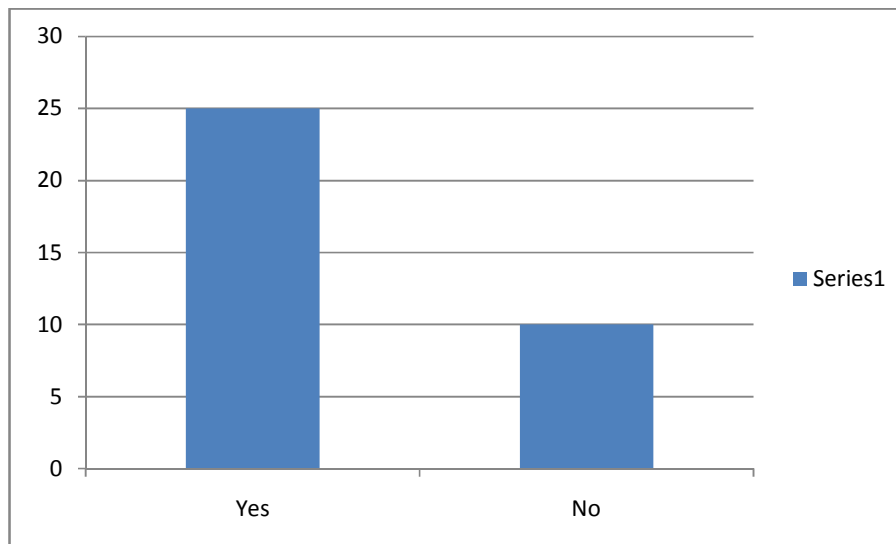
- Lack of time
- Erratic supply of power
- Non-functional UPS
- No internet facility
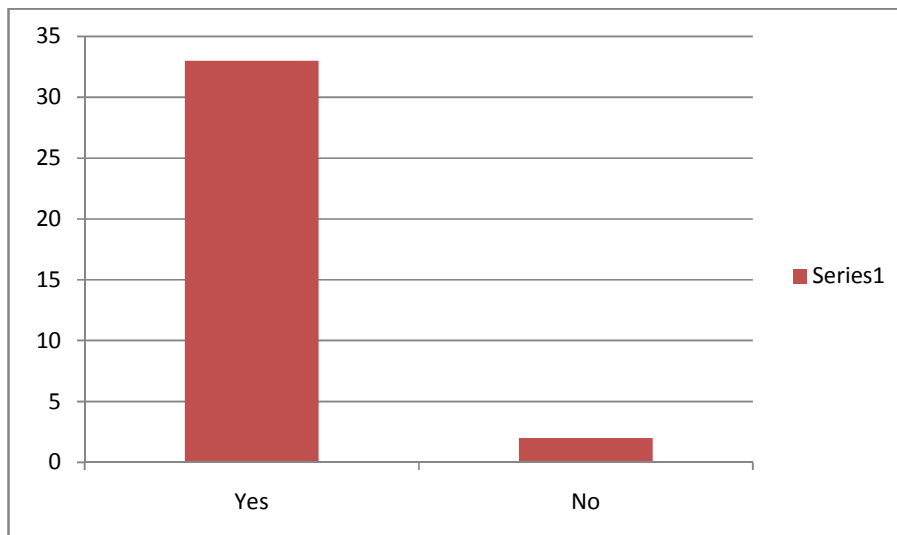
8. Typing Question paper

Yes	No
28	7

Table 8 :
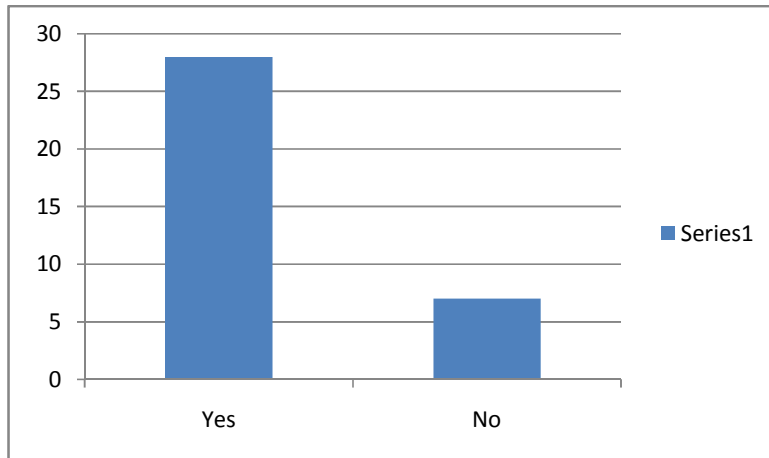
9. Is there any change among students in understanding the subject by using the technology ?

Yes	No
33	2

Table 9 :

10. Do you(Science teacher) need further training for improvement ?

Yes	No
32	3

Table 10 :
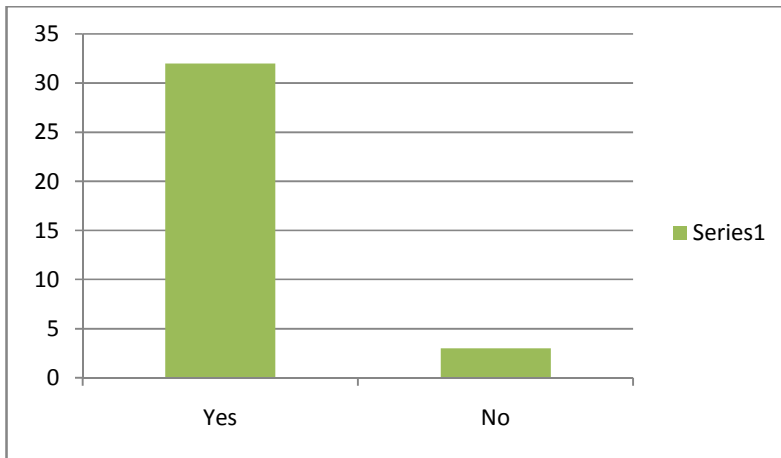
11. Do you encourage other teachers to use technology in teaching?
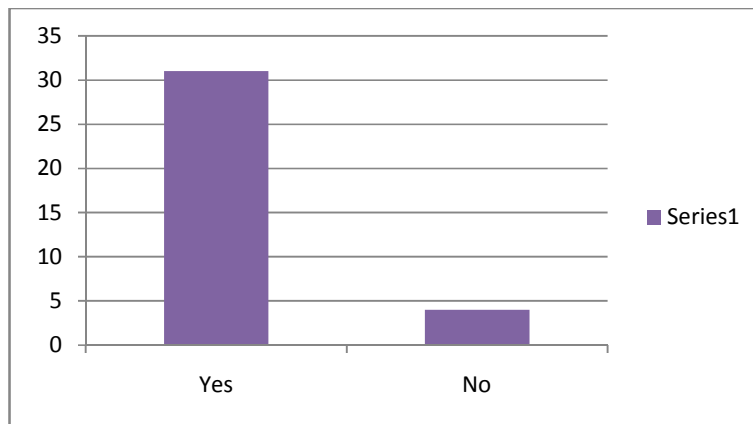
Yes	No
35	0

Table 11 :
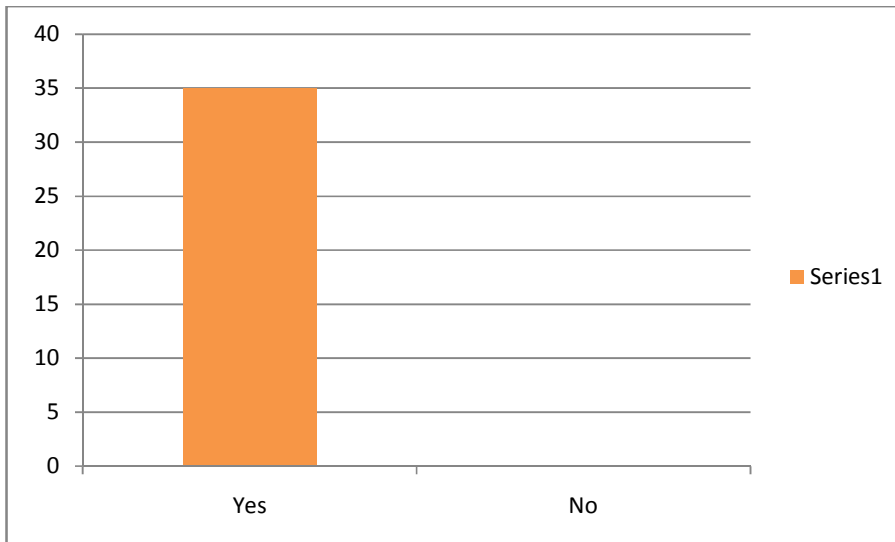
12. Opinion regarding TALP training

- Good idea to adopt technology in classroom teaching

- Lack of basic needs like power supply, internet facility, scarcity of time, etc., are curbing the progress of the theme

- Helpful in preparing Teaching-learning materials

- Helpful in knowledge empowerment

13. Is the science teacher show educational video/pictures through computer/laptop/projector ?
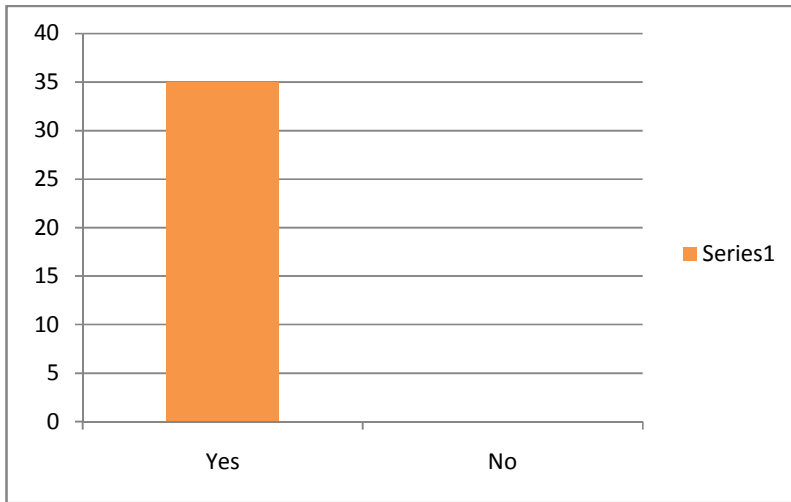
Yes	No
31	4

Table 12 :

14. Is it interesting for the students to attend SMART class ?

Yes	No
35	0

Table 13 :

15. Is it easy to understand the subject if taught through technology ?

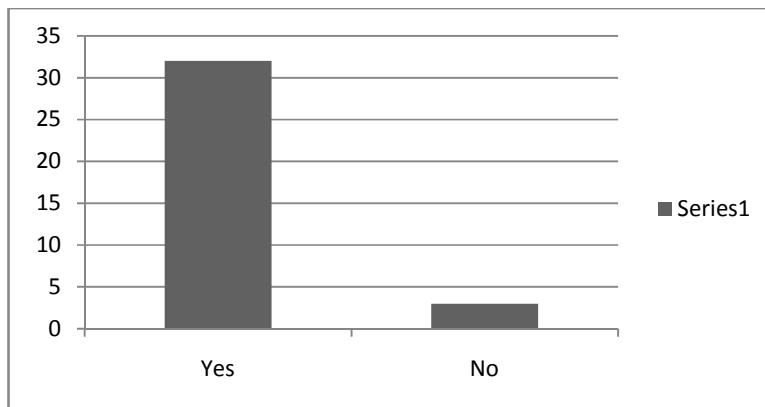| Yes	No
26	9

Table 14 :
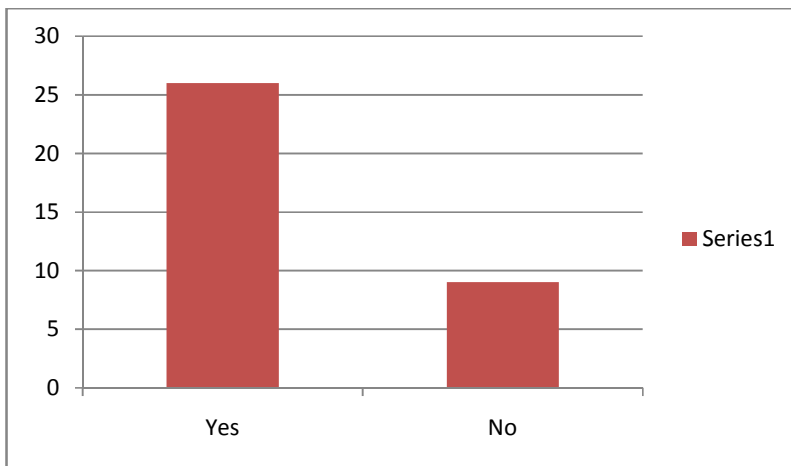
- Easy to learn through AV media

- Develops interest in learning

- Classes will be more attractive

- Easy to understand the concepts

- Lively classroom environment

- Helpful in remembering the concepts

16. **Do the students want other teachers to engage classes by the assistance of technology ?**

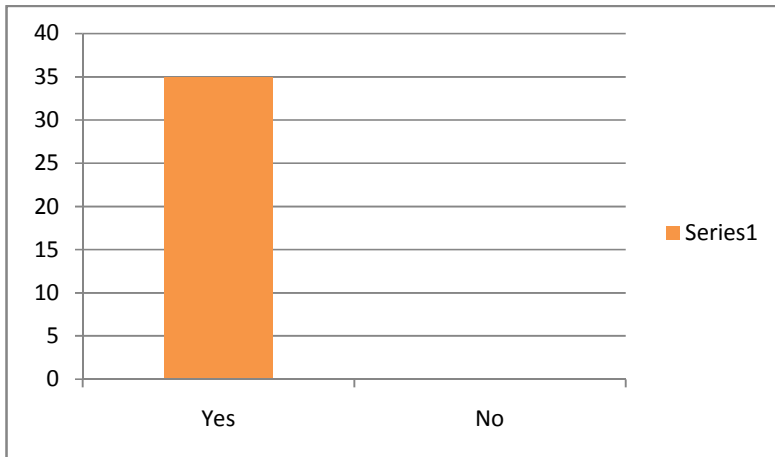| Yes	No
32	3

Table 15 :

17. **Opinion of students regarding learning through computer/technology assistance.**

- More time allocation should be made for technology based classes

- Promotes easy learning

- Ease in understanding the concepts

- Promotes computer literacy

18. **Do the students want to learn computers?**

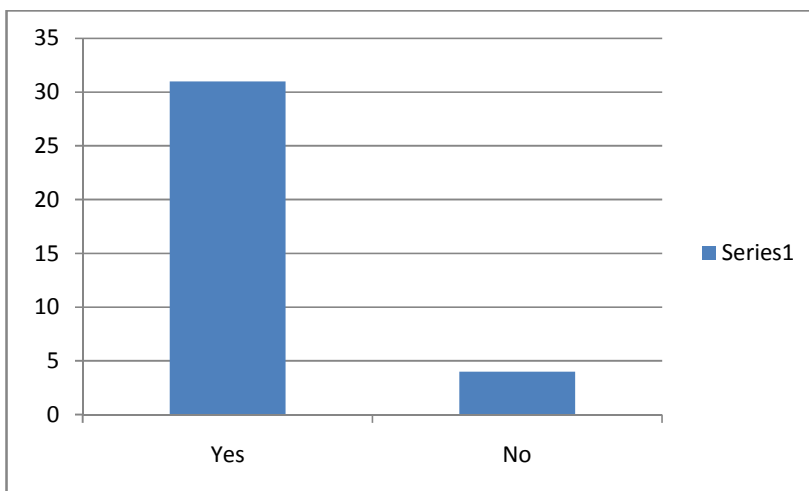| Yes	No
35	0

Table 16 :

The students are influenced by the change adopted by their science teacher in the facilitation process. They show interest in learning computers and to enter the world of knowledge through technology assisted resources.

19. Is it easy to understand the subject if taught through technology assistance ?
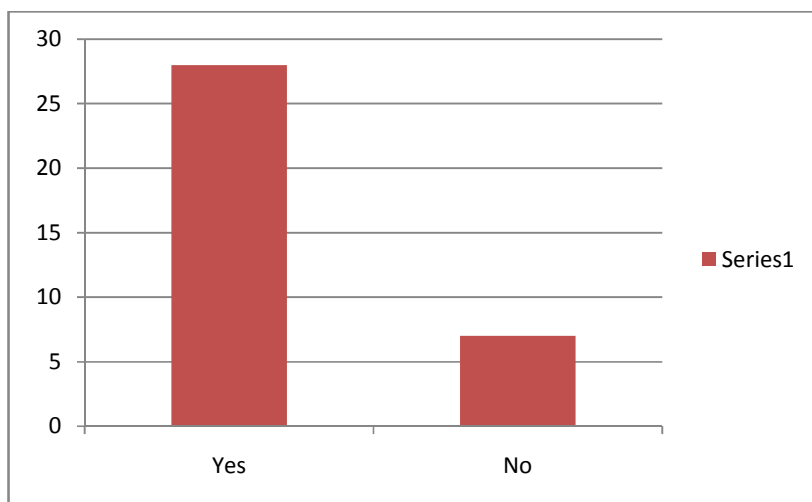
Yes	No
31	4

Table 17 :

20. Do the headmaster/headmistress find any change in the teaching attitude of Science teacher after getting the TALP training ?

Yes	No
28	7

Table 18 :

- Best use of available resources to make the concept clear

- The teachers are visiting science related websites and share the knowledge with the students

- More focus towards SMART class

- Motivation to other teachers in the use of technology

- Improved student-teacher interaction

- Encouragement to technology based teaching

- Increased the confidence level of teachers in the subject matter

21. Any technical assistance obtained by the TALP trained teacher in office work.

Yes	No
30	5

Table 19 :
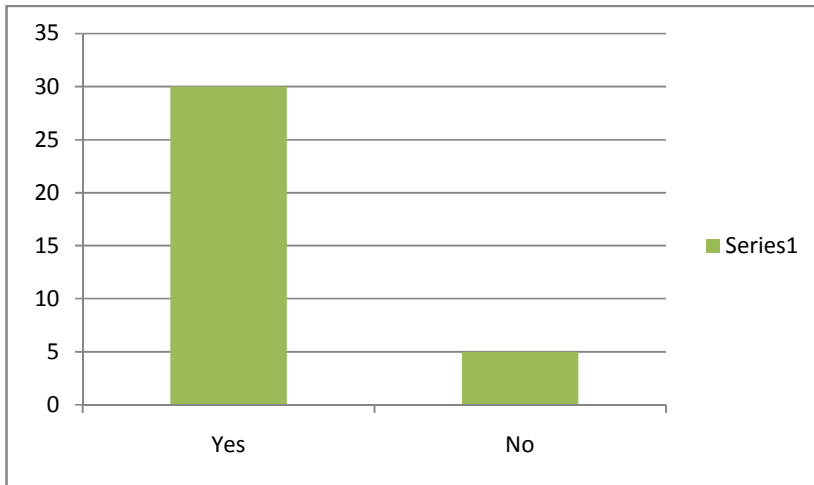
- Online feeding of various data

- Management of HRMS work of the school

- Online entry of SATS information, scholarship etc.,

- Marks entry

22. Does the teacher need further training ?
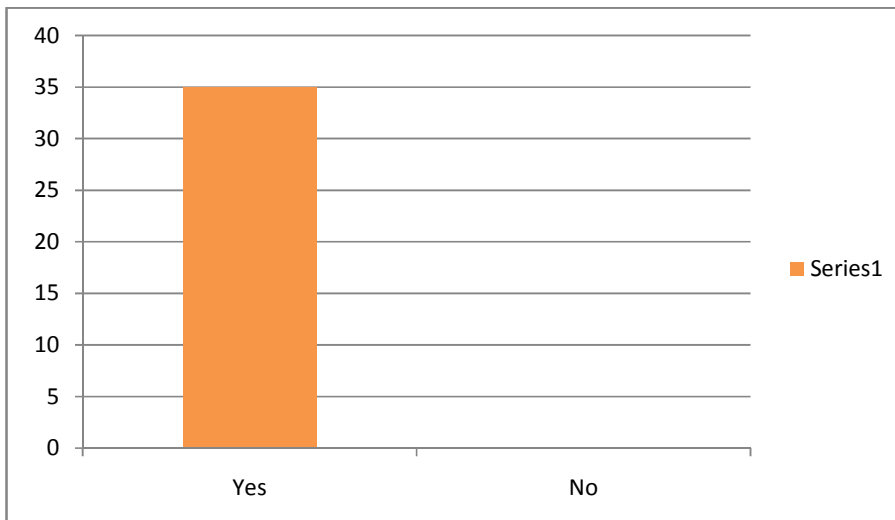
Yes	No
35	0

Table 20 :

23. Mention the changes noticed among the students in understanding the subject in the class.

- The students seem to be interested with the ongoing concept of using new technology in teaching-learning program

- More interested in learning

- Eagerly wait for SMART classes

- Clarity of concepts

- Increased learning capacity

- Good understanding of the subject

- Majority of the students enjoy learning through the technology assistance whereas very few find difficulty to cope up with it.

- Enjoy learning

- Interested in handling computers, browsing information and sharing the same with the teachers and friends.

CHAPTER : 5

CONCLUSION AND RECOMMENDATIONS

The role of ICTs in the education is recurring and unavoidable. Rapid changes in the technologies are indicating that the role of ICT in future will grow tremendously in the education. By observing current activities and practices in the education, we can say the development of ICTs within education has strongly affected on What is learned? How it is learned? When & where learning takes place ? and Who is learning and who is teaching?. Brown (2001) states that computer is an interactive audio and visual technology in which it could enhance the teaching and learning process to be fun, interactive co-operative as well as effective in imparting linguistic values. The teachers could use ICT to help them in teaching the lesson. The success of the training depends on the effective implementation at the working place. The following conclusion could be drawn out of the findings of the study

1. There is considerable increase in the teachers' knowledge about computers after obtaining the TALP training

2. More orientation towards the utilization of online services like ticket booking, money transaction, etc has saved the time and also exposure to the wide world of knowledge

3. The browsing activity of various science related websites by the TALP trained teachers shows their interest in gathering knowledge from various sources and its dissemination to the students and to other teachers and the society.

4. The trained teachers have developed various e-contents, e-resources, educational videos, PPTs , etc., which are helpful in making the teaching-learning process an attractive one. They also share it with the subject teacher groups so that majority are benefited in the educational society.

5. TALP training has its influence in the classroom in the presentation process which has promoted the concept clarity among the students.

6. Though TALP is an innovative program to make the teachers and the students computer literate, its implementation in schools is not an easy task. The teachers have to face many problems in implementing the technology. The State government is taking various steps to strengthen the computer labs by developing the infrastructure, providing required computers, projectors, laptops, internet facility, etc.,

7. Through TALP training the teachers are enriched in typing and browsing ability of the teachers. Hence, it has reduced their dependence on outsources for question paper typing, printing, etc.,

8. Out of 35 schools under study, nearly 33 school students showed change in their understanding of the subject by the implementation of TALP in the teaching process.

9. Influenced by bye TALP training and its implications in personal and professional life, the teachers need to upgrade their knowledge in technology field.

10. By the study it has been observed that TALP training has created technology oriented environment in schools and the teachers and the students are moving towards innovative ideas in teaching-learning field

11. The students have opined that nearly 31 teachers are using technology successfully in the classroom

12. SMART class has increased the curiosity level of the students. The usage of technology in science class has motivated other teachers to make their teaching process a SMART one.

13. Influenced by the technology orientation in the class, the students would like to become computer literate.

14. Only few teachers finding it difficult to incorporate the technology in their teaching process.

15. Few schools suffer from the lack of continuous power supply, UPS problem, no internet facility, lack of interest, non availability of computers, projectors, their maintenance, etc.,

RECOMMENDATIONS

1. Availability should be made for basic facilities like continuous power supply, provision of UPS, internet facility, availability of computers, projectors for the implementation in the TALP schools

2. Provision for atleast 2 classes a week /class should be made in the timetable

3. Every TALP trained teacher should be insisted to inculcate technology in the facilitation process.

4. Sharing of innovative practices of TALP trained teachers should be made to encourage the teaching community regarding the usage of technology in the facilitation process

CHAPTER : 6

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CHAPTER - 7

APPENDIX : 1

TOOLS OF RESEARCH

Teachers' questionnaire

Personal information

1. Name :

2. School name and address

3. Teaching subject :

4. Teaching experience :

5. Qualification :

6. Your knowledge about computer before TALP training : Please mark **(√)** to relevant box

Nil	Poor	Average	Good	Efficient

7. Your knowledge about computer after TALP training :

Nil	Poor	Average	Good	Efficient

8. Do you book online tickets ?   **(Yes / No)**

9. Will you do online money transaction ?   **(Yes / No)**

10. Do you shop online ?   **(Yes / No)**

11. Do you visit regularly to educational websites ? If yes, name them.

       1.   2.   3.   4.

12. Will you communicate through online, email, video call, whatsapp, facebook , etc.,

13. Any other usage of computer for personal development .

Academic information

1. Does your school have smart class ?

2. Name the educational websites that you visit often.

    a.   b.   c.   d.

3. Mention the educational mobile applications that you use regularly.

    a.   b.   c.   d.

4. Will you develop educational resources like ppt, videos, etc, for teaching purpose on your own or with the help of others.   **Yes / No**

5. How many AVE classes you tube in a week per class ?

6. Do you face any difficulty in conducting AVE classes ?

    a.

    b.

7. Can you type your question paper ?   **Yes / No**

8. Is it easy for you to teach science using technology ?   **Yes / No**

9. Is there any change among students in understanding the subject by using technology ?   **Yes / No**

10. Do you had further training for improvement ?   **Yes / No**

11. Can you encourage other teachers to use technology while teaching ?

12. Any other opinions :

Questionnaire for Headmaster/Headmistress

1. Will the science teacher take classes using technology ?

    Yes / No

2. How many technology assisted classes he/she engage in a week?

    No.:

3. Do you find any change in the attitude of science teacher after getting TALP training .

    Yes / No

4. If yes, please specify the change.

5. Do you get any technical support/assistance from the science teacher in office work?

    Yes / No

6. If yes, please specify the nature of support obtained.

7. Does the teacher require further training for improvement ?

    Yes / No

8. Do you see any change among the students in understanding the subject/curiosity in the class. Please specify.

9. Is there any hurdle for the usage of technology tools in teaching process ? If yes, please specify.

10. Has the teacher produced any e-resource/ e-content regarding their subject (science) ?

11. Have you noticed any educational app being used by the science teacher in the teaching process ? If yes, name them.

Questionnaire for students

1. Do your science teacher show any educational videos/pictures through computer/ laptop/projector ?

2. Is it interesting for you to attend in smart class/ class in computer lab ?

3. Is it easy for you to understand the subject if taught through technology ? If yes, please specify.

4. How many classes your science teacher engages with the aid of technology in a week ?

5. Do you feel any change in the classes by the use of computer technology ?

6. Do you want other teachers to take such technology assisted classes ?

7. Any other opinions regarding learning through computers.

8. Do you want to learn computers ?

9. Is it easy for you to understand the subject if taught through technology?

10. Do you feel boring by the usage of technology in the teaching sessions.

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