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## ICT in Science Teaching: Knowledge, Uses and Attitude of Science Teachers

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### Abstract

*The aim of science education is to enable the learners to know the facts and principles of science and its applications, consistent with the stage of cognitive development. In order to make the science lesson interesting and understandable it is necessary that the science teaching and learning should have a relationship with maximum organs of perceptions. Various scheme and project have been undertaken by the India Government to enhance the scope of use of ICT in education. Various ICT training program have also been organized for the teachers many a times. In case of Chhattisgarh state teachers training program for the use of ICT has been conducted in 2014 in the form of ICT@ SCHOOL PROJECT conducted by NIIT. Researcher conducted this study to find out the knowledge of ICT of science teachers, use of ICT and attitude towards use of ICT of the science teachers of Government schools of Chhattisgarh state. Study was delimited in the Bilaspur district of Chhattisgarh. In the present study, the researcher took the 60(sixty) secondary science teachers (physics, chemistry and biology) who took part in the teachers training 2014 in ICT@School project as sample from the 20(twenty) Government school of Bilaspur district. Descriptive survey method was used. Researcher found that though all 60 teachers were trained in ICT @ school project conducted in 2014 and more than 40% of the teachers had sufficient knowledge of computer, but still in case of use of ICT in science teaching, result was unsatisfactory. But, majority of the science teachers were showing positive attitude towards use of ICT in science teaching. It was also found that though the science teachers had high positive attitude towards use of ICT and maximum teachers had knowledge of ICT but still they did not use ICT in regular basis. Researcher concluded after the study that though positive attitude have been formed in the mind of science teachers but some other factors are hindering the use of ICT. The higher administrator of the school education should concentrate on this and short*

*out the problem so that the effective and regular use of ICT in science teaching can be possible.*

**Key Words:** ICT, Science Teaching, Attitude

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### **Introduction:**

The field of education is very vast and includes all those activities and experiences which prepare the individual to engage him in activities of his own good and good of the society of which he is an integral part. 'In modern times the chief aim of education is to enable a citizen to develop a scientific attitude, to think objectively and rationally, and base his conclusions on tested data' (Mishra, 2013). 'With the development of such scientific attitude an individual is able to have the understanding and intellectual integrity to shift truth from falsehood, facts from propaganda and to reject the dangerous appeal of fanaticism and prejudice' (NCF, 2005). It conveys the requirements of science education. NCF 2005 has pointed out that 'the aim of science education is to enable the learners to know the facts and principles of science and its applications, consistent with the stage of cognitive development'. ICT enables the learners to acquire various skills, helps to understand the methods and process that lead to generation and validation of scientific knowledge. It helps to acquire the required theoretical knowledge and practical technological skill to enter into the world of work'. In order to make the science lesson interesting and understandable it is necessary that the science teaching and learning should have a relationship with maximum organs of perceptions. Although the teacher is himself an audio-visual aid because he makes the lesson easy and tries to explain it properly, still he is not complete in himself. The theoretical, oral and uninteresting topics can be made more natural, entertaining and useful with the use of Information and communication technology in different forms. Technology provides an array of powerful tools that may help in transforming the present isolated, teacher centered and text book bound classroom into reach, student focused interactive knowledge environment. ICT can provide a greater capacity for project based learning dealing with topic relevant to pupil's

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interest (Milster, Jackson and Songer 2000). Betts (2003) has pointed out that ICT allows science teachers to engage and motivate pupils to greater degree. Chandrakar and Biswal (2011) founds that training of teachers helps the learner to use computers for learning and enhance logical skills. There is no doubt that ICT plays an important role for effective science teaching-learning.

Recognizing the critical role of Information and Communication Technology (ICT) in achieving the country's developmental and educational objectives, the National IT Task Force in 1998 recommended the introduction of ICT infrastructure in schools and that one to three percent of the budget be spent on providing computers in secondary and senior secondary schools over the subsequent five years (NCERT, 2014). Based on this recommendation, in 2004, the government of India launched its flagship ICT scheme for schools, the 'ICT@Schools', to promote ICT literacy and ICT-enabled learning in government and government-aided secondary and senior secondary schools. Government of Chhattisgarh implemented its ICT@school project under the Rastriya Madhyamik Shiksha Abhiyan. In the first phase government started the programme 653 schools and in phase two it was launched in 593 schools. In total the ICT@school project was launched in 1246 schools (Source: MHRD, Dept. of School Education & Literacy). The main focus of the programme was to develop ICT awareness and skills among the students along with learning of subject content with the help of multimedia software. The development of knowledge and skills of students, it is highly essential that the teachers need to have knowledge of ICT and positive attitude towards ICT so that they can use it in their day-to-day transaction of curriculum. Therefore, it is necessary to conduct a research to know the knowledge of ICT, attitude towards and use of ICT by science teachers.

### **Objectives**

1. To study the knowledge of ICT of science teachers.
2. To study the status of use of ICT in science teaching.
3. To study the attitude of science teachers towards use of ICT.
4. To study the relation between-
  - knowledge and use of ICT,
  - knowledge and attitude towards ICT, and
  - use and attitude towards ICT

### **Delimitation of the study:**

Study was delimited to the Blaspur district of Chhattisgarh state and secondary science teachers of the Government school only where ICT @ SCHOOL project is run by NIIT.

### **Methodology:**

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In the present study descriptive survey method was used.

### Population

The population of the present study comprised of all the secondary science teachers of the Government schools of Chhattisgarh in which ICT @ SCHOOL project is run by NIIT.

### Sample:

In the present study Bilaspur district was selected purposively looking into the feasibility aspect of the study. Out of seven blocks four blocks were selected randomly and from these four blocks 20 schools were selected through simple random technique. Out of 20 schools, three science teachers from each school were selected which consist the sample of present study. These teachers had received training in 2014 under ICT@ School project.

### Tools:

For the present study three self made rating scale ( 5 point Likert type) was used to collect the data related to knowledge of science teachers about ICT, use of ICT and attitude of science teachers towards ICT. Knowledge of ICT Rating Scale contained 10 closed ended questions based on knowledge of ICT; ICT Use Rating Scale contained 10 closed ended questions based on use of ICT in science teaching and Attitude Rating Scale for use of ICT in science teaching contained 20 statements.

### Procedure of Data Analysis:

Mean knowledge score, mean score of use of ICT in science teaching and mean score of attitude of science teachers towards use of ICT were calculated. Different ranges of knowledge, use and attitude also were classified. To find out the relationship between knowledge and use of ICT, knowledge and attitude towards ICT, use and attitude towards ICT Pearson product moment correlation was used. The total scores obtained by the teachers related to knowledge, use and attitude about ICT have been divided into five class interval.

### Analysis of Data Related to Knowledge of ICT of Science Teacher.

The analysis and interpretation of data of the study is presented below.

**Table 1**

#### Mean Knowledge Score of ICT and its Distribution

Class interval	Range of Knowledge	Frequency (f)	Respondents (%)	Mean Knowledge Score of ICT
0-7	Very low knowledge	10	17	20.98
8-15	Low knowledge	12	20	
16-23	Average knowledge	14	23	
24-31	High knowledge	12	20	
32-40	Very high knowledge	12	20	

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From the table 1, it is clear that the mean knowledge score of the science teachers of ICT is 20.98 which lie in the average knowledge range. It is also found that 17% of the total teachers have very low knowledge about ICT; 20% of the teachers have low knowledge of ICT and 23% have average knowledge. In case of high knowledge, 20% of teachers have high knowledge and another 20% of teachers have very high knowledge of ICT. It shows that 40% teachers have above high knowledge and 23% teachers have average knowledge range of ICT. It can be said that majority of the science teachers of government schools under the ICT @ school project conducted by NIIT do not have sufficient knowledge of ICT.

**Table 2**

### Mean Score of Use of ICT and its Distribution

Class interval	Class	Frequency (f)	Respondents (%)	Mean Score of Use of ICT
0-7	Very rare use	14	23.33 %	13.88
8-15	Rare use	26	43.33%	
16-23	Average use	12	20%	
24-31	Frequent use	8	13.33%	
32-40	Very frequent use	0	0%	

Table 2 shows that the average score of use of ICT science teachers is 13.88 which lies in the range of 'very rare use'. The above table clearly shows that 23.33% teachers use ICT very rarely; 43.33% uses rarely; 20% use in an average way and 13.33% uses ICT frequently where as not a single teacher use ICT frequently. It is worth to mention that all the 60 science teachers were trained under ICT @ school project in 2014 and more than 40% teachers have above high knowledge about ICT but their use of ICT in teaching is very disappointing. It reflects that though the Science teachers have undergone ICT training programme and have knowledge of ICT but they do not use it in their teaching learning process.

**Table 3**

### Mean Attitude Score Science Teachers towards ICT and its Distribution

Class interval	Class	Frequency (f)	Percentage of respondents	Mean score of Attitude towards ICT
20-35	High negative attitude	0	0%	75.8
36-51	Negative attitude	0	0%	
52-67	Neutral attitude	4	6.66%	
68-83	Positive attitude	49	81.66%	
84-100	High positive attitude	7	11.66%	

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Table 3 shows that the mean attitude score of science teachers towards ICT is 75.8 which lies in the range of 'positive attitude'. From the above table it is clear that 93.32% science teachers have above positive attitude towards use of ICT in teaching learning process. It indicates that the science teachers have firm belief or attitude in the use of ICT. But, if we compare the data of table 2 and 3 a different picture emerges i.e. attitude of teacher towards use of ICT is very high but the use of ICT is less.

**Table 4**

### Relation between Knowledge of ICT and Use of ICT

Knowledge of ICT	N=60	Coefficient of correlation=0.544
Use of ICT	N=60	

From the above table it is clear that the coefficient of correlation between knowledge of ICT and use of ICT is 0.544 which is significant in 0.01 level. It shows that there exists a positive correlation between knowledge of ICT of science teachers and use of ICT by science teachers. It indicates that teachers having more knowledge of ICT should use more ICT in the science teaching. But the mean knowledge score of ICT of science teacher is 20.98 where as the mean score of use of ICT is 13.88.

**Table 5**

### Relation between Knowledge of ICT and Attitude towards ICT

Knowledge of ICT	N=60	Coefficient of correlation=0.67
Attitude towards ICT	N=60	

Table 5 shows that there is a high positive correlation between the knowledge of ICT and attitude towards ICT of science teachers. The obtained coefficient of correlation is 0.67 which is significant in 0.01 level. So, it can be concluded that knowledge and attitude has a positive correlation.

**Table 6**

### Relation between Attitude towards ICT and Use of ICT

Attitude towards ICT	N=60	Coefficient of correlation 0.453
Use of ICT	N=60	

Table 6 shows that the there is position coefficient of correlation between attitude of science teachers towards ICT and use of ICT. The obtained coefficient of correlation is 0.453 which is significant in 0.01 level. Hence, it can be said that attitude is positively correlated with use.

But the data of table 2 and table 3 shows that even if the science teachers have high positive attitude, the use of ICT in science teaching is less.

### Findings

The findings of the study are mentioned below.

1. It was found that the average knowledge score of the science teachers about ICT is 20.98 which lie in the average range. 20% of teachers have high knowledge and another 20% of teachers have very high knowledge of ICT. Maximum teachers were in average knowledge range.
2. The average score of use of ICT in science teaching is 13.88 which lie in the range of 'very rare use'. 43.33% of the teachers use ICT rarely. Only 13.33% of the science teachers used ICT frequently in science teaching. No any teacher used ICT very frequently in regular basis. Though all 60 teachers were trained in ICT @ school project conducted in 2014 and more than 40% of the teachers had sufficient knowledge of computer, but still in case of use of ICT in science teaching, result is unsatisfactory.
3. It was found that the science teachers have very positive attitude towards use of ICT in science teaching. The mean attitude score of ICT of science teachers is 75.8 and 93.32% of teachers have above positive attitude toward us of ICT in science teaching.
4. It was found from the data that though the science teachers have undergone through ICT training and high positive attitude but their use of ICT in science teaching is very disappointing. It indicates that they do believe on usefulness of ICT but it doesn't reflect in action.
5. It was found from the analysis of data that there exist positive correlation between the coefficient of correlation between knowledge and use of ICT, knowledge and attitude towards ICT, and use and attitude towards ICT.

### Conclusion:

The scenario of teaching and learning in the 21st century is completely different from earlier time. The technology has changed the role of teachers as well as students. ICT offers great potentials and advantages in enhancing students learning and achievement. It is also established fact that learning through ICT is more effective as they provide opportunities for using multiple technologies there by providing visualization aids to understand difficult concepts. In case of science education ICT allows science teachers to engage and motivate pupils to greater degree (Betts, 2003). India Government also has realized the importance of ICT in education. Chhattisgarh state Government also arranged a teacher training programme

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in 2014 as ICT @ SCHOOL project conducted by NIIT. Researcher conducted the present research to study the knowledge of the science teachers about ICT, the status of use of ICT in science teaching and attitude of science teachers towards use of ICT. It has been found that the science teachers have average knowledge about ICT. Though most of them know the operation of computer and use of internet but in case of operation of L.C.D projector and M.S Excel they are not so comfortable. It was found that science teachers rarely use ICT in the science teaching learning. Bajpai (2011) found the same kind of result in the Government school of Chhattisgarh. Also the findings of Chandrakar & Yadav (2012) found the same result in case of teacher educators. Very few teachers use ICT on a regular basis for transacting science curriculum. Though all the teachers are trained in 2014 under the scheme ICT @ school project and have positive attitude towards the use of ICT in teaching, still in case of use of ICT in science teaching, result is very unsatisfactory. Therefore, it could be concluded that in spite of having knowledge, attitude and facilities of ICT in the schools, the students are not benefitting from it. The higher administrator of the school education should ensure that the teachers must use ICT on a regular basis so that students get benefit out of it and the purpose for which the programme has been implemented may be fulfilled.

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