

The Impact of Information and Communication Technology (ICT) on Achievement of Students in Chemistry at Secondary Level of CBSE and UP Board in India

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Abstract: *To adjust oneself in modern scientific world, and to understand an environment in which industrial technology and science play an ever more important role, man needs a solid grounding in science. The initial scientific knowledge he has given in the course of regular schooling is no longer enough. From the point of view both of knowledge and of methods, the education must continue throughout his working life. Education is a lifelong process. The growing need for scientific knowledge and training, due to the evaluation of the modern world and the rapid spread of education, has been analysed and is now widely recognized. In face of that need, it would seem logical to give emphasis on the most modern educational technologies, and in particular, to make a wide spread mass use of television techniques, internet, multimedia etc. This study investigated the impact of information and communication technology (ICT) on Achievement of Students in Chemistry at Secondary Level. For the purpose, a list of secondary school of CBSE and U.P. Board are prepared and four institutions were selected with the help of lottery method. The selected samples of four schools were randomly divided into two groups Experimental groups and Controlled groups. The required data was collected at two stages as pre-test and post test scores from the achievement test in chemistry. Data was analysed quantitatively employing statistical techniques of mean, S.D. and t-test.*

Keywords: Information and communication technology, students' achievement, chemistry at secondary level, country specific development.

1. Introduction

Ever since ancient times people have devised various techniques for communicating their thoughts, needs and desires to others. In early civilized times, people tend to congratulate in geographically localized cluster in which communication were adequately achieved through speech and written messages. As civilization spread over larger geographical areas, a variety of long distance communication methods were tried such as smoke signals, carrier pigeons etc. one of the earliest known optical links, was the use of fire signal by Greeks in the eight century B.C. for sending alarms, calls for help, or announcement of certain events. However, because of environmental and technology limitation, it generally turned out to be faster and more efficient to send letter messages by courier over the road network. The discovery of telegraph by Samuel, F.B. Morse 1938 ushers in a new development in communication that is, the era of electrical telegraphy system were first encoded into strings of binary symbols and were then manually transmitted and received. The development and implementation of communication systems employing electric signals became increasingly sophisticated leading in turn to the birth of telephone, radar and microwave links. Today, these communication systems have become an integral part of everyday life with circuits spanning the entire world carrying voice, text, pictures and many other types of information. As recent advances integrated circuits to technology have allowed computers to become recognized, less expensive and widely available, which make people to be more interested in connecting them to internet. Internet is a computer system that allows millions of computer users around the world to exchange information with the use of the

internet, which made communication easier and faster, many bodies have spring up to assist the use of this technology such as management information services (MIS), Information technology (IT) and many others.

Information technology (IT) is concerned with the use of technology in large organizations. In particular, IT deals with the use of electronic computers and computer software to convert, store, protect process, transmit and retrieved information. For that reason, computer professionals are often called IT specialists or Business process consultants and the division of a company or university that deals with software technology is often called the IT department. In United Kingdom education system, information technology was formally integrated into the school curriculum when the natural curriculum was devised. It was quickly realized that the work covered was useful in all subjects. With the arrival of the internet and the broad band connections to all schools, the application of IT knowledge, skills and understanding in all subjects became a reality. This change in emphasis has resulted in a change of name from information technology to information and communication technology (ICT). Information and communication technology in education can be understood as the application of digital equipment to all aspects of teaching and learning. It is present in almost all schools in advance countries and is of growing influence. The National Grid for learning, UK government initiatives indicated that teachers must move swiftly to more internets and web based work in schools. According to Benton (1983), the whole world is experiencing the advancement of science and technology. Each nation is either a powerful producer of technology or a consumer of other nation's technology efforts.

In fact technology has made the whole world a global village and ICT breakthrough has made a new landmark in globalizing education. The use of ICT is fast gaining prominence and becoming one of the most important elements defining the basic competencies of the students.

According to World Bank, ICT consists of the hardware, software, networks, and media for the collection, storage, processing, transmission and presentation of information; The use of ICT falls into four (4) major categories: constructing knowledge and problem solving (through the internet-mail, CD-ROMs, databases, videoconferencing); using process skills; aiding explanation of concepts; and communicating ideas {power point, desktop publishing} (WCEA,2002).

The use ICT in teaching is a relevant and functional way of providing education to learners that will assist in imbibing in them the required capacity for the world of work. It fundamentally changes the way we live, learn and work. Technology has entered the classroom in a big way to become part of the teaching and learning process.

2. Need and Significance of the Study

The problem of low academic achievement among the students has been plaguing our educational system completely right from the primary classes to university level. This problem is responsible for the tremendous wastage of human potential and facilities for education apart from the financial wastage, which a developing country like ours can ill afford. The present study helps us to provide the effective media to present the content matter among the large number of students in a classroom. This study investigated the extent of the impact of ICT on teaching and learning of chemistry and to find out whether students taught chemistry with the use of ICT materials such as computer system, internet facilities, projector, video player etc performed better than those taught with textbook only.

3. Objective of the Study

The main objectives of the present investigation were;

- To study the difference between experimental group taught through ICT and controlled group taught through traditional method.
- To study the difference between experimental groups I (U.P. Board) taught through ICT and controlled group I (U.P. Board) taught through traditional method. 3-To study the difference between experimental groups II (CBSE) taught through ICT and controlled group II (CBSE) taught through traditional method.

4. Research Hypothesis

H1-There is a difference between experimental group taught through ICT and controlled group taught through traditional method.

H2-There is a difference between experimental group I (U.P Board) taught through ICT and controlled group I (U.P. Board) taught through traditional method.

H3- There is a difference between experimental group II (CBSE) taught through ICT and controlled group II (CBSE) taught through traditional method.

RESEARCH DESIGN:

For the purpose of the present study, the pretest post test equivalent group design suggested by Best (1983) was adopted with certain modification

Population

The population of the present study are the 9th class science students studied during the session 2011-2012 in different secondary school of C.B.S.E and U.P. Board of Gorakhpur region of Eastern UP having ICT facilities.

Sampling

For the purpose, a list of secondary school of CBSE and U.P. Board having ICT facilities was prepared & four institutions were selected with the help of Lottery Method. The selected samples of 4 schools were randomly divided into groups. (i) Experimental groups (ii) Controlled groups 140 and 80 students were selected from CBSE and UP board respectively, having same Entering behaviour, Intelligence and Socio-Economic status. The selected students divided into two group's namely experimental group and controlled group.

Tools of Research

For the purpose of the present study following tools were prepared

- 1-Lesson plan of the selected topic based on traditional method of teaching
- 2- Lesson plan of the selected topic taught through ICT by investigator.
- 3- Achievement test in (Chemistry) for the selected topic taught by the investigator.
- 4- Intelligence Test
- 5- Socio-Economic status scale.

Data Collection

The required data was collected at two stages as pre-test and post test scores from the achievement test in chemistry.

Analysis and Interpretation of Data

Quantitative techniques were used for analysing the collected data. For the objectives data was analysed quantitatively employing statistical techniques of mean, S.D. and t-test.

SECTION--I

H1- There is a difference between experimental groups taught through ICT and controlled group taught through traditional method.

Table 1

S. No.	Groups	N	Mean	S.D.	't' _r value
1.	Experimental	110	16.32	3.59	3.45
2.	Controlled	110	14.18	5.28	

Table 2

Level of Significance	Obtained 't' value	Table value with df= 223	Result
0.05	3.45	1.96	Significant
0.01	3.45	2.59	Significant

The obtained t_1 value shows that null hypothesis is rejected at both level of significance and therefore Hypothesis -1 is accepted. It shows that there is a difference between experimental groups taught through ICT and controlled group taught through traditional method.

SECTION--II

H2- There is a difference between experimental group I (U.P .Board) taught through ICT and controlled group I (U.P. Board) taught through traditional method.

Table 3

S. No.	Groups	N	Mean	S.D.	' t_2 ' Value
1.	Experimental (U.P .Board)	40	14.80	3.46	3.21
2.	Controlled (U.P. Board)	40	12.20	3.52	

Table 4

Level of Significance	Obtained 't' value	Table value With df = 73	Result
0.05	3.21	1.99	Significant
0.01	3.21	2.64	Significant

The obtained t_2 value shows that null hypothesis is rejected at both level of significance and therefore Hypothesis -2 is accepted. It shows that there is a difference between experimental group I (U.P .Board) taught through ICT and controlled group I (U.P. Board) taught through traditional method

SECTION--III

H3- There is a difference between experimental group II (CBSE) taught through ICT and controlled group II (CBSE) taught through traditional method.

Table 5

S. No.	Groups	N	Mean	S.D.	' t_3 ' Value
1.	Experimental (C.B.S.E. Board)	70	17.18	3.42	2.52
2.	Controlled (C.B.S.E. Board)	70	15.17	5.72	

Table 6

Level of Significance	Obtained 't' value	Table value with df = 138	Result
0.05	2.52	1.98	Significant
0.01	2.52	2.61	Insignificant

The obtained t_3 value shows that null hypothesis is rejected at 0.05 level of significance and accepted at 0.01 level of significance. Therefore Hypothesis-3 is accepted at 0.05 level. It shows there is a difference between experimental group II (CBSE) taught through ICT and controlled group II (CBSE) taught through traditional method.

5. Discussion of the Result

SECTION-1

There is a significance difference between experimental groups taught through ICT programmes and controlled group taught through traditional teaching approach.

Table-1 shows that the mean value of achievement score of experimental groups taught through ICT ($M_1=16.32$) is

higher than the mean value of achievement score of controlled group ($M_2=14.18$) taught through traditional method. The S.D. of experimental group was 3.59 and controlled group was 5.28. The calculated 't' value was 3.454 and table value at $df = 223$ is 1.96 at 0.05 and 2.59 at 0.01 level of significance. This clearly shows that the obtained 't' value is more than the table value at both the level of significance.

The experimental group got higher achievement score on Chemistry achievement test than the controlled group. The reason was very clear that experimental group were more exposed to such technological programmes in and outside the school. On the contrary, the controlled group students had limited resources in and outside the school campus..

SECTION-2

There is a significant difference between experimental group I (U.P. Board) taught through ICT programme and controlled group I (U.P. Board) taught through traditional method.

Table 3 shows that the mean value of achievement score of experimental group I (U.P .Board) taught through ICT ($M_1=14.80$) is higher than the mean value of achievement score of controlled group I (U.P. Board) ($M_2=12.20$) taught through traditional method. The S.D. of experimental group was 3.46 and controlled group was 3.52. The calculated 't' value was 3.21 and table value at $df = 73$ is 1.99 at 0.05 and 2.64 at 0.01 level of significance. This clearly shows that the obtained 't' value is more than the table value at both the level of significance.

SECTION-3

There is a significant difference between experimental group II (CBSE Board) taught through ICT programme and controlled group II (CBSE Board) taught through traditional method.

Table-5 shows that the mean value of achievement score of experimental group II (CBSE) Board taught through ICT ($M_1=17.18$) is higher than the mean value of achievement score of controlled group II (CBSE Board) ($M_2=15.17$) taught through traditional method. The S.D. of experimental group was 3.42 and controlled group was 5.72. The calculated 't' value was 2.52 and table value at $df = 138$ is 1.98 at 0.05 and 2.61 at 0.01 level of significance. This clearly shows that the obtained 't' value is more than the table value at 0.05 level of significance and less than the table value at 0.01 level of significance.

It indicates that the school chosen from CBSE had the similarity in organizational climate of the classroom and the socio- economic structure of the children. Even if the group II was not taught through ICT programmes it had the previous experience of such programme and had learnt through mass media formally and non-formally. Thus, it nullified the craze and effect of ICT in the classroom.

6. Major Findings of Study

(1) The ICT programme is more effective than the traditional teaching approach in term of the achievement scores of the students. Scientific discoveries of technological advancement have the patterns of life of all human being. Education is also

forced to make a note of technology for improving the quality of a pace of activity as well as productivity in teaching learning process.

(2) ICT is supposed to be the most powerful medium of mass communication, which has revolutionized the teaching learning process in many ways. ICT programmes designed specifically for classroom teaching were used in the study to create an interest on the ground, which cannot normally be dealt with success in the classroom teaching by a teacher.

(3) As we all known the well-said proverb “Seeing is believing and a picture is worth a thousand words” The ICT provides the three-dimensional pictures of the content to motivate the students and to satisfy the queries and curiosity about various scientific concepts.

7. Implication of the Study

In the present scenario, it has been realized by the educationist the importance of ICT in school to develop more interest and up to data knowledge of the content. However, the teacher cannot be neglected. It assists the teachers to provide more authentic and comprehensive knowledge of contact among students mainly in those areas, which cannot be easily described in words. The ICT provides the three dimensional picture of the content which help in motivating the students and developing interest among them.

It also helps to satisfy the queries and curiosity about various scientific concepts that a teacher is generally fail to do in the classroom teaching.

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