

Effectiveness Of Information And Communication Technology (Ict) In Teaching Of General Science Subject At Elementary Level

Dr. Fareena Nazim¹, Dr. Quratul Ain², Umair Mehmood³, Muhammad Akhtar⁴, Ghulam Farooq⁵

¹Assistant Professor, Department of Education, Alhamd Islamic University Islamabad
(fareenanazim.fn@gmail.com)

²Assistant Professor, Head of Department, Department of Education, Alhamd Islamic University Islamabad
(quratul.ain@aiu.edu.pk)

³PhD Scholar, Department of Education, Alhamd Islamic University Islamabad (umairabid2016@gmail.com)

⁴PhD Scholar, Department of Education, Alhamd Islamic University Islamabad (chakhtarssc@gmail.com)

⁵PhD Scholar, Department of Education, Alhamd Islamic University Islamabad (ghulamfarooq13@yahoo.com)

ABSTRACT

The purpose of this study was to determine the effectiveness of Information and Communication Technology (ICT) compared to the traditional method of teaching in the subject of general science at elementary level in Rawalpindi. It was an experimental study of 04 weeks duration, and “post-test equivalent group design” was used for the statistical analysis of the research at 0.05 levels of significance. To conduct the research, the population considered was all male and female students studying general science subject at elementary level from four hundred and thirty five public and private schools. A sample of sixty students, having equal number of students studying general science in class VIII, was selected from sample school. Students were divided into two equal groups, i.e. experimental group and control group. Both the groups were equated on the basis of their scores by pair random sampling from the previous examination of class VII in the subject of general science. Every group contained thirty students. The students of the experimental group were exposed to the teaching through ICT, whereas the students of control groups were taught through traditional method of teaching in the subject of general science. The effectiveness of ICT in general science at elementary level against traditional method of teaching was measured through two objectives: i)-To determine the effectiveness of Information and Communication Technology (ICT) in the academic achievement of the students at elementary level. ii)-To find out the effect of ICT in the academic achievement of low and high achievers.

For statistical analysis, means, t-test and Analysis of Variance (ANOVA) were applied. While compiling the results of students on post-test for individual schools/sectors, implementation of ICT was found effective as compared to traditional method of teaching for female students and for average ability students in general science at elementary level. For slow learners it was found effective for the students as a whole and for the students of public sector school. For the high ability students, ICT as a teaching strategy was least effective against traditional method of teaching in overall and in individual cases as well. On the basis of the findings of this study, various recommendations were made: (i) ICT might be introduced as a separate discipline in the curriculum of Pakistan from the primary level. (ii) For students to become more familiar with the use of ICT, the libraries in the educational institutions might be converted to on-line libraries. (iii) Pre- service, in- service and refresher courses for teacher may be enriched with ICT training. To educate students in the field of technology, the vital role of teachers might become more effective by

giving them in-service and before-service training for using technology.

Keywords: Correlation, ICT learning, academic achievement of students.

1. INTRODUCTION

The use information and communication technology in education is growing admittance to information, educational products and overall perspectives, which are coming to form a globalized information network. Entrance to these technologies is a requirement for contribution in a global information society. So for the obvious reasons students/individuals and institutions that are competent to access and joined in these global networks are at an advantage (Pandeys, 2001).

ICTs can improve the retentive memory of student, teacher can easily explain the more complex instructions through ICTs and make cooperative classes to make the lesson pleasurable (Singh, 2005). Computers and networks, hardware and software, cell phones, televisions, radios, audiovisual systems and satellite systems, as well as various services and applications associated with them, such as videoconferencing and distance learning, are part of ICT (Tariq, 2016).

2. HYPOTHESIS

- I. There is no significance difference between the mean scores of academic achievements of students of experimental and control groups on post test.
- II. There is no significance difference between the mean scores of low achievers of experimental and control groups on post test.
- III. There is no significance difference between the mean scores of high achievers of experimental and control groups on post test.

3. REVIEW OF LITERATURE

3.1 INFORMATION

COMMUNICATION TECHNOLOGY (ICT)

In the new digital age, Information Technology (IT), or Information Communication Technology (ICT) is the major factor in shaping the new society. ICT tools have changed the ways of peoples communicate resulting in significant transformations in industry, agriculture, medicine, business, engineering, and other fields.

The new technologies challenge the conventional concept of teaching, learning methods, and materials and it reconfigures how teachers and learners access knowledge. To meet this challenge schools must embrace ICT tools for teaching and learning to move towards transforming the traditional model of teaching (Sawyer et al. 1997)

To enhance the use of computers in schools and to achieve the required educational goals, computers can be installed in individual classrooms, in central computer labs, libraries, and teachers planning rooms, depending on the requirements and resources available in the schools (Pandey, 2001).

3.2 STUDENT'S LEARNING AND TECHNOLOGY

In this new era, educational institutions have changed their strategies due to the infusion of new technologies in the teaching and learning process. With the use of ICT students will become more active, independent and more responsible as they plan their own learning path. Students will collaborate more often with each other. ICT applications will be more users oriented. Learning will be flexible in terms of time and location. The learning process may become one of active knowledge construction rather than passive acquisition, more strongly social than individual in nature, and less focused

on specific content and contexts, as these are prone to change with time.

For extended the learning of students, ICT is known as a teaching tool in the school curriculum. Since pupils become confident and skillful in extending their learning by the use of ICT. However, further opportunities to add value and extend teaching and learning process may be made possible by existing and emerging ICT teaching tools. The use of interactive whiteboards, video projection units, microscopes connected to computers, prepared spreadsheets to capture and model data, CD-ROMs, presentations with video and carefully selected resources from the Internet all provide examples of how ICT can be embedded into teaching (Mishra, 2005).

Tahir (2005) studied the use of computers for mathematical and computer learning, He concluded the effect was equal or more effective than traditional teaching. Few teachers considered the computers as necessary for encouraging indulgent in professional learning. Tahir hypothesized that the more will be the usage of technology, the better will be the mathematical skill among students.

Hinkley (2001) admitted that the use of information technology has become compulsory for students learning. We must adopt modern education and use computers, projectors, and tabs. Students have to provide guidance in daily affairs through the internet and cell phones.

Anderson (2005) reported that communications technology will change the learning habit of students in the institution and the potential for communication technology is to change students and help them effectively. So, it is essential to introduce communication technology tools that are effective in promoting elementary education.

Shaikh (2009), found that Students was improved in results by using computer technology in general science at the elementary level. Providing technology in distance learning

processes has better educational results. It can be concluded from his study that new technology improves learning and teaching techniques among teachers.

Emeka et al. (2011) admitted that the use of ICT enhances the academic performance of high school students. ICTs are powerful educational media for improving student learning skills. His study found that there is a correlation between the use of ICT and the academic achievement of high school students and shows a significant positive relationship between various variables. A positive relationship indicates that with the increased use of ICT, grades of students will also increase. Studies suggest that teachers should continue to use ICT teaching materials during teaching to increase efficiency and attract students' attention. Using ICT helps to make learning more interesting and leads to better learning outcomes.

Liwanag (2015), found that teacher's use of ICTs in teaching is seen as an important predictor of student performance and there is an important relationship between the use of ICT in the classroom and student academic performance. The grades of computer science students are from 88.18% to 87.80% and most of them receive very satisfactory results.

4. METHODOLOGY

Method and procedure to achieve the objectives of the study were as follows:

The population considered was all male and female students studying general science subject at elementary level from four hundred and thirty five public and private schools. A sample of sixty students, studying general science in class VIII, was selected from sample school. Students of sample school were divided into two equal groups, i.e. experimental group and control group. Both the groups were equated on the basis of their scores by pair random sampling from the previous examination of class VII in the subject of general science. Every group contained thirty students. The students of the experimental group

were exposed to the teaching through ICT, whereas the students of control groups were taught through traditional method of teaching in the subject of general science.

In order to measure academic achievements of the sample students in the science subject a teacher made post-test was administered immediately after completing the experiment/teaching to both the groups, and data

collected was the scores of students achieved in the post- test.

5. RESULTS AND DISCUSSION

SPSS version 23 was used for the analysis of data. After the collection of data, the lists of the scores were prepared for each group separately to compute the means, standard deviations, “t” test and difference of means.

Table 1: Significant difference between the means scores of students of experimental and control groups on previous examination.

Group	N	Df	Mean	SD	SED	t-value
Experimental	30	29	25	6.85	0.97	1.03 NS
Control	30	29	24	6.77		

NS = Not Significant

Table value at 0.05 = 2.02

$t_{cal} 1.03 < t_{tab} 2.02 \rightarrow$ Not Significant \rightarrow Equal groups

Table 1 shows that the calculated value of t (1.03) is less than the table (2.02) value at 0.05 levels. Hence, there was no significant difference between the mean scores of experimental and

control groups on previous achievements test. Therefore, both the groups were statistically equal on the variable of previous examination in general science.

Table 2 Significant difference between the means scores of students of experimental and control groups on post-test.

Group	N	Df	Mean	SD	SED	t-Value
Experimental	30	29	19	2.32	1.76	2.27*
Control	30	29	13	05.85		

* Significant

Table value at 0.05 = 2.02

$t_{cal} 2.27 > t_{tab} 2.02 \rightarrow$ Not Significant \rightarrow Ho1 \rightarrow Rejected

Table 2 shows that the calculated value of t (2.27) is greater than the table value of t (2.02) at 0.05 levels. Hence, null hypothesis (Ho1) is rejected and concluded that students of experimental group scored better than the

students of control group in the academic achievements in the post-test in general science at elementary level. This shows the effectiveness of ICT as a teaching strategy in contrast to the traditional method of teaching in science subject

at elementary level. This supports the findings of Johri (1998) that the students of experimental group under ICT treatment scored significantly

higher than the students of control group who are taught through traditional method of teaching.

Table 3 Comparison of means scores of low achievers of experimental and control groups on post-test.

Group	N	Df	Mean	SD	SED	t-Value
Experimental	1	1	19.6	0.83	3.70	2.37 NS
Control	1	1	12.6	4.84		

NS = Not Significant Table value at 0.05 = 4.3

$t_{cal} 2.37 < t_{tab} 4.3 \rightarrow$ Not Significant $\rightarrow H_02 \rightarrow$ Accepted

Table 3 illustrates that the calculated value of t (2.37) is lesser than the table value (4.3) at 0.05 levels. Thus, null hypothesis (H_02) is accepted and concluded that there is no significant difference between the mean scores of low achievers of experimental and control groups on

post-test in science as compared to traditional method of teaching at elementary level. This is supported by the findings of Rose & Rackow (1995) that low achievers in academics scored low when taught through ICT.

Table 4 Comparison of means scores of high achievers of experimental and control groups on post-test.

Group	N	Df	Mean	SD	SED	t-value
Experimental	1	1	28	0.6	1.16	1.28 NS
Control	1	1	26	1.75		

NS = Not Significant Table value at 0.05 = 4.3

$t_{cal} 1.28 < t_{tab} 4.3 \rightarrow$ Not Significant $\rightarrow H_03 \rightarrow$ Accepted

Table 4 shows that the calculated value of t (1.28) is lesser than the table value (4.3) at 0.05 levels. Hence null hypothesis (H_03) is accepted and concluded that implementation of ICT is not effective for high achievers in the academic achievements in science as compared to traditional method of teaching at elementary level. This is not supported by the findings of

Gertfield (1995) that high achievers benefit from the use of technology.

DISCUSSION

The results obtained from the statistical analysis of the four tables to achieve the objectives of this study.

- i. The calculated value of 't' was found significant that revealed the overall academic

achievements of students of experimental group were better than those of control group. Hence proving the effectiveness of information and communication technology in the academic achievements of students in the subject of science at elementary level.

- ii. To assess the academic achievements of low ability students with the use of technology and to achieve objectives number three, From table 4.3 the calculated value of 't' of low achievers of the total sample schools was not found significant, hence showing ineffectiveness of ICT for low ability students in academic achievements.
- iii. To achieve the objective number four for the high achievers, Table 4.4 illustrated the non-significant results of high achievers as a whole. That showed ineffectiveness of ICT as a teaching strategy for high ability students.

5. FINDINGS AND CONCLUSIONS

Following were the findings of the study.

- i. Table 1 show that the calculated value of t (1.03) is less than the table (2.02) value at 0.05 levels. Hence, there was no significant difference between the mean scores of experimental and control groups on previous achievements test. Therefore, both the groups were statistically equal on the variable of previous examination in general science.
- ii. Table 2 shows that the calculated value of t (2.27) is greater than the table value of t (2.02) at 0.05 levels. Hence, null hypothesis (Ho1) is rejected and concluded that students of experimental group scored better than the students of control group in the academic achievements in the post-test in general science at elementary level. This shows the effectiveness of ICT as a teaching strategy in contrast to the traditional method of teaching in science subject at elementary level. This supports the findings of Johri (1998) that the students of experimental group under ICT treatment scored significantly higher than the

students of control group who are taught through traditional method of teaching.

- iii. Table 3 illustrates that the calculated value of t (2.37) is lesser than the table value (4.3) at 0.05 levels. Thus, null hypothesis (Ho2) is accepted and concluded that there is no significant difference between the mean scores of low achievers of experimental and control groups on post-test in science as compared to traditional method of teaching at elementary level. This is supported by the findings of Rose & Rackow (1995) that low achievers in academics scored low when taught through ICT.
- iv. Table 5 shows that the calculated value of t (1.28) is lesser than the table value (4.3) at 0.05 levels. Hence null hypothesis (Ho3) is accepted and concluded that implementation of ICT is not effective for high achievers in the academic achievements in science as compared to traditional method of teaching at elementary level. This is not supported by the findings of Gertfield (1995) that high achievers benefit from the use of technology.

CONCLUSIONS

Conclusions were drawn on the basis of findings.

- i. Information and communication technology (ICT) was effective in overall perspective of students in academic achievement in general science at elementary level. Students had shown good results in the use of technology in the teaching-learning process in general science subject.
- ii. From the findings of the study, it was concluded that students showed better responses towards the use of technology. This was the positive indication for the successful implementation of technology in general science at elementary level against traditional method of teaching in Pakistan.
- iii. For slow learners, ICT was found least effective. This might be due to lack of

- technological knowledge given by their teachers, or due to non-availability of computers at home, or due to lack of practice at school level.
- iv. ICT was least effective for high achievers in general science in contrast to traditional method of teaching in general science at elementary level. This might be due to over confidence of high ability students in general science or due to habit of rote learning in traditional method of teaching due to which high ability students did not get benefit from the use of technology.
 - v. It was found that ICT was least effective for students in the academic achievement in general science at elementary level. This might be due to the non-availability of the technological facilities at school or at home or due to lack of knowledge/interest in using the technology.
 - vi. It was also concluded that ICT was effective for low ability student to some extent in the academic achievement in general science at elementary level. This might be due to the special attention given to them by their teachers or parents, and their own interest towards the learning of technology in general science.

RECOMMENDATIONS

The following were recommendations on the basis of findings and conclusions.

- i. It is recommended that Information and communication technology (ICT) might be introduced as a separate discipline in the curricula of Pakistan from primary level.
- ii. Refresher courses may be conducted for teachers to develop motivation for use of ICT tools. Therefore, to make the use of ICT effective in the teaching-learning process the vital role of teachers in this process may be enhanced by giving them

in-service and before-service training for the use of technology.

- iii. Use of ICTs tools in others subjects for improvement of student's abilities may be arranged in public and private sector.

References

1. Mishra, RC (2005). Teaching of Information. APH Publishing Corporation, New Delhi. P. 66- 298.
2. Pandey V.C (2001). Digital Technologies and Teaching Strategies. Isha Books Publisher, Delhi.P. 94-168.
3. Singh, Y.K & Richika N (2005). Teaching of Computer Science APH Publishing Corporation, New Delhi. P. 140-142. Software & Information Industry Association Software implementation checklist for educators. Washington, DC: SIIA. Retrieved Mar 9, 2009, from <http://www.siiia.net/html>.
4. Tahir, (2005). A Comparative Study of the Effect of use of Information and Communication Technology in Varied Teaching Approaches on Achievement and Retention of Students of Mathematics. Unpublished Thesis for Ph.D. Gomal University, DI Khan, Pakistan.
5. Becker, H., & Hativa, N. (1994). History, Theory, and Research Concerning Integrated Learning Systems. International Journal of Educational Research, 21(1), 5-12. Associates (Ed.), The modern American college. San Francisco: Jossey-Bass.
6. Becker, H., & Lovitts B. (2000). A Project-Based Assessment of Judging the Effects of Technology use in Comparison Group Studies. Unpublished manuscript, University of California at Irvine.
7. Bennett, J (2003). Teaching and Learning Science. Published by

- Continuum, London – New York. P. 123-130.
8. Berk Halpern. D & Lamay (2000). Gender Difference and Mental Abilities Retrieved Jan, 2009, From www.google.com/genderdifferencesinmentalabilities.
 9. Berk, 2002, Willingham & Cole, (1997). Scholastic Assessment Tests (SATs). Retrieved Jan, 2009, From www.google.com/genderdifferencesinmentalabilities.
 10. Berk, Eisenberg & Fabes, (1998). Gender Role Identity. Retrieved Feb, 2009, From en.Wikipedia.org/wiki/Gender-Role.
 11. Brown, (2002). Growing Up Digital: How the Web Changes Work, Education, and the Ways People Learn. United States Distance Learning Association. California at Berkeley,