Impact of Information and Communication Technology (ICT) on Academic Achievement of Senior Secondary School Students in Mathematics

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Abstract

The present paper is an attempt to study the impact of ICT on academic achievement of senior secondary school students in mathematics. Eighty senior secondary students of 11th grade were selected through purposive sampling technique from an Inter College, Rudian, Badaun district, Uttar Pradesh. Pre-treatment achievement marks were considered to form equated two groups and were randomly labeled as experimental and control group. Results reveal that 1) ICT has significant and positive impact on academic achievement of senior secondary school students in mathematics as comparison to conventional method of teaching mathematics; 2) ICT has significant and positive impact on academic achievement of senior secondary school boys and girls in mathematics as comparison to conventional method of teaching mathematics. Teaching of mathematics with the integration of ICT was found more effective when compared with teaching of mathematics through general method. It is recommended that ICT integration should be there in mathematics teaching in senior secondary schools for the enhancement of students’ achievement in mathematics.

Keywords: ICT, Students' Mathematical Achievement and Senior Secondary School Students

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Introduction

Achievement

Achievement is the performance in a test shown by the students with respect to school subjects. Achievement reflects the students’ ability that how well he/she has grasped the required knowledge. Effective instructional method plays a vital role in achievement.

Information and communications technology (ICT)

A varied set of technological resources and tools used to create, communicate, broadcast, manage and store information is known as ICT. Computers, internet, broadcasting technologies (radio and television) and telephony are included in the varied set of technologies.

It includes different communication device like software, satellite systems, media and social media, online and offline devices like video-conferencing and computers. In modern times, It is used in all fields like ICT in the education, marketing, defense, politics, daily work, medical, libraries etc.

Ebenezer (2004) advocated that teaching in any field should be supplemented with computer assisted instruction. The results of various research studies showed that instruction through computer assisted instruction is more effective than traditional way of instructions. For the effectiveness of the instructions in different activities like teaching, drill, practice, simulation etc. computers are very helpful. But computer should be used for instructions in classrooms and laboratory work only as an assistant in teaching not as a substitute for teacher or other activities.

Kiboss et al (2006) conducted a research to study the effectiveness of computer based instruction simulation on students’ understanding, perception and achievement in biology. Results revealed that there is improvement in learning, understanding, perception and achievement of students in biology class after teaching the topics of biology with computer based instruction simulation. It is also concluded that those topics of biology or science subject which are supposed to be very difficult to teach, understand and learn through regular methods of teaching are easily and effectively taught with the integration of computer based instruction simulation in teaching. Therefore, investigator stressed on the integration of computer assisted instructions into the existing school curriculum.
Yung & Hsin (2009) examined student achievement of educational objectives by providing verbal and visual prompts through computer–generated instructions. The outcome of the research showed that performance of students who received visual prompts through animated pedagogy or videos, is better than those students who received texts and verbal prompts only.

Dalacosta et al (2009) explored the effectiveness of animated cartoons in supporting teaching and learning science at elementary level. Computers were used to design a cartoon-style multimedia application and appropriate programs were used for preparing animated cartoons from by the investigator. A sample of 179 pupils (age group 10-11 years) from various elementary schools of Athens and Greece was selected for the study. The research concludes that knowledge and understanding among elementary students, for those specific science concepts which are considered to be difficult to comprehend and generally cause misconceptions in the mind of young students, increases significantly with the use of animated cartoons in teaching of elementary science.

Safdar et al. (2011) conducted a research in Pakistan to compare the effectiveness of traditional and new method (teaching by using ICT) of teaching secondary school mathematics. An experimental method was used by the investigator. In order to conduct the experiment, investigator used post-test equivalent group design. A total of one hundred and twenty students (60 students each from Public and Private sectors) were selected. Two groups (i.e. experimental and control) were formed in the schools selected for study, which includes thirty students each. Marks of mathematics obtained by students in final exam of class VIII were consider for equating the groups by pair random sampling. Traditional method of teaching mathematics was used to teach control group of students whereas mathematics was taught to experimental group students with the help of ICT. Topics of mathematics (namely sets, algebraic expressions and logarithm) taught to both the groups are same and selected from the syllabus of Intermediate and Secondary Education for class IX prescribed by Federal Board. Findings of the study reveal that students taught through ICT in the both the schools i.e. private and public showed enhanced academic performance in mathematics than conventional method. So, academic performance of students in mathematics enhances with the use of ICT, and, therefore, instructions with the assistance of ICT in class makes teaching learning process more effective.

Hussain et al. (2017) conducted a research to study role of ICT on students’ retention and achievement in chemistry. A sample of fifty 9th grade students was randomly selected from College Latamber Karak and Kohsar Public School. Experimental design used is Pre and Post test equivalent groups design. In order to make, both the groups equivalent, Pre-test scores of students were used. It is concluded from the results of the study that students’ retention and achievement in chemistry affected positively with ICT; and teaching chemistry with the integration of ICT is more valuable, compelling and effective when compared with teaching of chemistry with regular means.

Statement of the Problem
Impact of ICT on Academic Achievement of Senior Secondary School Students in Mathematics

Objective
1. To investigate the impact of ICT on academic achievement senior secondary students in mathematics.

Hypotheses
1. There exists significant positive impact of ICT on academic achievement of senior secondary school students in mathematics as comparison to conventional method.
2. There exists significant positive impact of ICT on academic achievement of senior secondary school boys in mathematics as comparison to conventional method.
3. There exists significant positive impact of ICT on academic achievement of senior secondary school girls in mathematics as comparison to conventional method.

Sample
A sample of 80 senior secondary school students comprised of 40 boys and 40 girls was drawn from 11th grade of an Inter College, Rudian, Badaun district, Uttar Pradesh.

Tools
1. Instructional tool compact disc by S. Chand & Company for 11th grade students.
2. Self prepared Achievement test in Mathematics for 11th grade students.

Design
The present research is an experimental research in nature. The sampling method used to select the sample was purposive. Eighty senior secondary school students of 11th class were selected as sample from an Inter College, Rudian, Badaun district, Uttar Pradesh. Pre-treatment achievement scores were considered in forming two equated groups and were randomly labeled as experimental and control group. Experimental group exposed with the use of ICT daily while teaching mathematics to a maximum of ten days and conventional method of teaching was used for...
teaching mathematics to control group for the same period. The allocation of the students of the sample to various groups is shown in the table 1 below:

**Table 1 – Distribution of Sample**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Group</th>
<th>Boys</th>
<th>Girls</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Control</td>
<td>20</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>2.</td>
<td>Experimental</td>
<td>20</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>40</td>
<td>40</td>
<td>80</td>
</tr>
</tbody>
</table>

**Delimitations**

1) 80 students of 11th grade of an Inter College, Rudian, Badaun district, Uttar Pradesh.
2) Mathematics subject of 11th grade only.

**Statistical Techniques**

The hypotheses of the study have been examined by using t’-test.

**Results and Discussion**

Analysis of data, result and interpretation of findings has been done according to the objective and hypotheses of the study.

**Result Pertaining to Impact of ICT on Academic Achievement of Senior Secondary School Students in Mathematics**

The objective was to explore the impact of ICT on academic achievement of senior secondary school students in mathematics. After administrating the self prepared achievement test in mathematics for 11th grade students; mean, standard deviation, standard error of difference and z’-value were computed. The table 2 shows the mean, SD and z’-ratio of control and experimental group.

**Table 2: Mean, Standard Deviation and t’-ratios of Control and Experimental Groups**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>SED</th>
<th>t’-ratio</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Control Group</td>
<td>40</td>
<td>28.10</td>
<td>5.42</td>
<td>1.21</td>
<td>3.89</td>
<td>Significant at 0.01</td>
</tr>
<tr>
<td></td>
<td>Experimental</td>
<td>40</td>
<td>28.80</td>
<td>5.39</td>
<td>1.73</td>
<td>2.77</td>
<td>Significant at 0.01</td>
</tr>
<tr>
<td>2</td>
<td>Control Group Boys</td>
<td>20</td>
<td>28.30</td>
<td>5.50</td>
<td>1.73</td>
<td>2.77</td>
<td>Significant at 0.01</td>
</tr>
<tr>
<td></td>
<td>Experimental Group Boys</td>
<td>20</td>
<td>27.90</td>
<td>2.60</td>
<td>1.73</td>
<td>2.60</td>
<td>Significant at 0.05</td>
</tr>
</tbody>
</table>

Table 2 shows the mean scores, standard deviation (SD), standard error of difference (SED) and t’-value of academic achievement in mathematics among senior secondary school students.

The table 2 reveals that the mean scores of experimental and control group students in academic achievement in mathematics are 32.80 and 28.10 respectively. It may be concluded that the experimental group students’ academic achievement in mathematics is better as compared to control group students. The value of standard deviation in case of experimental group students is 5.39 and in case of control group students it is 5.42. The t’-value of experimental and control group students in terms of academic achievement in mathematics comes out to be 3.89 which is significant at (0.01) level of confidence. It shows that control group and experimental group students differ significantly from each other in their academic success in mathematics.

Therefore, the stated hypothesis that there exists significant positive impact of ICT on academic achievement of senior secondary school students in mathematics as compared to conventional method is rejected at (0.01) level of confidence.

The table 2 reveals that the mean scores of boys of experimental and control group in academic achievement in mathematics are 33.10 and 28.30 respectively, which means that boys of experimental group performs better in mathematics as compared to boys of control group. The value of standard deviation in case of boys belongs to experimental group is 5.19 and in case of boys belongs to control group it is 5.50. The t’-value for control group and experimental group boys in terms of academic achievement in mathematics comes out to be 2.77.
which is significant at (0.01) level of confidence. So, boys belong to control and experimental group differ significantly from each other with respect to their academic success in mathematics.

Therefore, the stated hypothesis that there exists significant positive impact of ICT on academic achievement of senior secondary school boys in mathematics as compared to conventional method is rejected at (0.01) level of confidence.

The table 2 reveals that the average marks of girls belongs to experimental and control group in academic achievement in mathematics are 32.50 and 27.90 respectively. It conveys that the girls of experimental group perform better in mathematics as compared to control group girls. The value of standard deviation in case of girls belongs to experimental group is 5.44 and in case of girls belongs to control group it is 2.60. The t’-value for control group and experimental group girls in terms of academic achievement in mathematics comes out to be 2.60 which is significant at (0.05) level of confidence. It means girls belong to control and experimental group differ significantly from each other with respect to their academic success in mathematics.

Therefore, the stated hypothesis that there exists significant positive impact of ICT on academic achievement of senior secondary school girls in mathematics as compared to conventional method is rejected at (0.05) level of confidence.

Major Findings
1. Academic achievement of senior secondary school students in mathematics is significantly and positively influenced with the use of ICT in mathematics teaching as comparison to traditional method.
2. Academic achievement of senior secondary school boys and girls in mathematics is significantly and positively influenced with the use of ICT in mathematics teaching as comparison to traditional method.

Conclusions
Information and communication technology establish as more worthwhile and effective technique when compared with conventional method of teaching mathematics. Therefore, investigator suggested that ICT should be used for increasing success rate of senior secondary school students in mathematics as well as in making learning of mathematic more interesting and dynamic.

Educational implications of the Findings
Investigator concluded from this study that for better achievement in mathematics, mathematics teachers should effectively use ICT in instructional process for the enhancement of achievement in mathematics of all type of students.

Suggestions for further Research
The further studies can be conducted on schools affiliated to C.B.S.E and I.C.S.E., students of other classes, other subjects like Science, English etc.

References