THE IMPACT OF INFORMATION AND COMMUNICATION TECHNOLOGY ON TEACHING OF SCIENCE IN BACHELOR OF EDUCATION PROGRAMME

SUMMARY

Submitted to the
JIWAJI UNIVERSITY, GWALIOR (M.P.)
For the award of the Degree of
DOCTOR OF PHILOSOPHY
IN
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(2017)

SUPERVISOR :
Dr. RAMA TYAGI
Principal
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RESEARCHER :
MRS. MAYURI CHAUDHARY

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SUMMARY

The given research was based on Pupil Teacher’s of Science Stream of various B.Ed Colleges of Gwalior. The main aim of the research was to identify and analyse the teaching competency of pupil teacher’s after and before training them through computer efficacy.

ICT has a very important role in today’s education scenario as it make student confident, make them withstand in global learning platform and enhances the teaching methodology.

Information and Communications technologies are a diverse set of technological tools and resources used to communicate, and to create, disseminate, store and manage information (Blurton, 1999). ICT includes the use of computer technology, including hardware, peripheral devices, media, delivery systems and software. This term is used in the ISTE NETS standards and is used by UNESCO in reference to the integration of technology into teaching (UNESCO, 2002).

The need of Research-

ICT is potentially a powerful tool for extending educational opportunities and can provide remote learning resources. ICT encourage students to take responsibility for their own learning and offers problem centered and inquiry based learning which provides easy access and information based resources.

ICT has a great potential to contribute positively towards knowledge dissemination, effective learning & development of more efficient education services.
Today’s teachers must be prepared to provide technology supported learning opportunities to their students because this is the need of knowledge based economy today. They must be prepared to use technology & should know how technology can support student learning; therefore it must be made integral to every teacher’s professional repertoire.

It has been seen that there is enormous growth in usage of ICT based learning technique in school, college & universities. B. Ed. faculties instruct pre-service teachers how to teach based on their own experiences within the classroom & often model effective pedagogy.

Success of ICT-based education depends upon the teacher's ability to keep pace with the developments since teachers are responsible for quality control, improvement of learning and the aggregate effectiveness of the learning process. The main role of teachers will not be to transmit information and culture, but rather to act as experts and leaders to motivate learning. This study will be focused on ICT usage & its impact on science teaching in pre service teachers.

Teachers also enhance their quality by use technology in teaching. Particularly Mathematics and Science teachers need to know exactly how ICT is used as a teaching and learning tool, for their own purposes and to help students to use them. This research will be based on integration of ICT as a tool in the classroom particularly in science teaching with the overall aim of increasing the effectiveness of teaching and improving students’ learning.
Need for integrating ICT in teaching learning process

- To use ICT as a tool for designing new learning environments for their own subject-specific purposes to help their future students to use ICT.

- To provide the student-teacher with the knowledge, skills and attitudes to better use technology in their research, communication, problem solving, and continuing professional development.

- To critically apply the pedagogical principles of ICT integration in science education.

- To develop and facilitate ICT-based learning activities in the context of teaching Science.

- To analyse and evaluate appropriate content and context for the use of ICT in Science teaching.

- To use appropriate and varied communication and multimedia tools (emails, websites etc) in teaching and learning Science.

- To use ICT efficiently in research, problem solving and project-based learning in science.

- To integrate ICT appropriately into science curriculum activities that will foster students ownership of their ICT-rich learning environment.
ICT and Education

OBJECTIVES OF THE STUDY:

1. To study the difference in Teaching Competency in ICT Trained and untrained student teachers.
2. To implement an ICT package for Teaching of Science in B. Ed Students.
To study the effectiveness of ICT and Conventional Methods in relation to Teaching Competency.

To compare the difference between ICT and Conventional Method of Teaching in Student Teachers Intelligence.

To Study the effect of ICT on Teaching Skills of prospective Teacher in teaching of science.

To study the effect of Conventional method on teaching ability of prospective teachers in teaching of science.

To study the interaction between the conventional and ICT based method of teaching.

To study the interaction of Teaching of Science and other subjects.

To study the impact of ICT in Teaching by Male students.

To study the impact of ICT in Teaching by Female students.

To study the impact of ICT on Socio Economic status of Pupil Teacher.

HYPOTHESIS:

Following hypothesis were formulated in the study:

1. There is no significant difference in Teaching Competency of Pupil Teacher by ICT method of Teaching

2. There is no significant difference in Teaching Competency of Pupil Teacher by Conventional method of Teaching

3. There is no significant difference between teaching through ICT and Conventional method of Teaching

4. There is no significant difference in intelligence of Pupil Teacher taught by ICT method of Teaching.

5. There is no significant difference in intelligence of Pupil Teacher taught by Conventional method of Teaching.
6. There is no significant difference between male and female pupil teachers taught by ICT Method.
7. There is no significant difference between male and female pupil teachers taught by Conventional Method.
8. There is no significant difference between Socio Economic Status of Pupil Teacher taught by Conventional Method
9. There is no significant difference between Socio Economic Status of Pupil Teacher taught by ICT Method
10. There is no significant difference between Experienced and Non Experienced Pupil Teacher in ICT based teaching
11. There is no significant difference between Experienced and Non Experienced Pupil Teacher in Conventional based teaching
12. There is no significant difference between Graduate and Post Graduate Pupil Teacher in ICT based Teaching
13. There is no significant difference between Graduate and Post Graduate Pupil Teacher in ICT based Teaching

**Research Method**

The purpose of the present study is to look into the effect of ICT in Teaching of Science on teaching competency of prospective teachers. For this purpose experimental method of research was used to conduct the present study which is explained as under. In order to achieve this objective, it was required to select a representative sample of prospective teachers and the necessary tools for collecting the data.

According to Hillway (1964, p.138) ‘to describe in detail the specific method being used, incidentally, constitutes a very good way of determining whether the method chosen has been worked out properly and is likely to prove effective. If the scholar cannot describe his method, the chances are that it is too vague and general to yield him satisfactory results’.
Broudy (1963) stated that “Method refers to the formal structure of the sequence of acts commonly denoted by instruction. The term method covers both strategy and tactics of teaching and involves the choice of what is to be taught and the order in which it is to be taught.

George J. Mouly has classified research methods into three basic types: survey, historical and experimental methods.

Methods to conduct a research study differ in their nature and intent. Choice of the methods of research is determined by the nature of the problem. The present study is an attempt to study the impact of ICT on the pupil teacher’ teaching competency. It is obvious that the effect of ICT cannot be studied through survey or historical method. It needs an experimental setting. Keeping this in mind, the investigator used pre-test, post-test experimental method to conduct this study.

The study was conducted through experimental method of research. An experiment is the process in which the experimenter manipulates one variable to study the effect of the manipulation on another variable. The experimental method tests the hypothesis concerning cause and effect relationship. The method requires sample for conduct of study with certain research tools for conduct of the study.

In the present study, pupil teacher of the Experimental group were taught using a power point programme saved to CD-ROM/ pen drive. The power point presentation included animated pictures, video clips. While pupil teachers of the Control Group were taught using a chalkboard, textbooks, models and charts. Experimental classes housed a ceiling-mounted LCD projector that was connected to a computer and classroom projector projected onto a interactive whiteboard. The presentation expanded each lesson by providing extra examples. In the present study, pre-test post-test control group quasi
experimental, design was employed with a purposive sample in the form of intact sections of pupil teachers.

The study included a control group (100 pupil teacher) and an experimental group (100 pupil teacher). The experimental group was taught through ICT used teaching and the control group through conventional method.

The intact sections were equated on intelligence and socio-economic status.

A figurative representation of the design is given in Table 3.1.

**Table 3.1 Design of the Study**

<table>
<thead>
<tr>
<th>Groups</th>
<th>Pre-Test</th>
<th>Independent variable</th>
<th>Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>A1</td>
<td>Traditional teaching</td>
<td>A1</td>
</tr>
<tr>
<td>Experimental</td>
<td>A2</td>
<td>ICT Based teaching</td>
<td>A2</td>
</tr>
</tbody>
</table>

The study involved three operational stages as identification stage, treatment stage and post-testing stage. The first stage involved pre-testing of all the pupil teacher of both groups on intelligence, socio-economic status, and General Teaching Competency Scale and confidence level in Science Lesson Plans. The second stage involved the experimental treatment, which consisted of eleven Teaching plan of science subject taught through ICT based teaching and in Control Group through conventional teaching. The third stage dealt with post testing of the control and experimental group using the GTCS test. A schematic view of the phases of experiment is presented in Table3.2.2
Table 3.2 Phases of the study

<table>
<thead>
<tr>
<th>Stage</th>
<th>Control Group</th>
<th>Experimental Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>II. Treatment</td>
<td>Teaching science through conventional method</td>
<td>Teaching science through ICT used method</td>
</tr>
<tr>
<td>III. Post-testing</td>
<td>1. Measurement of general teaching competency scale of pupil teacher</td>
<td>1. Measurement of general teaching competency scale of pupil teacher</td>
</tr>
</tbody>
</table>

Variables under Study

In an experimental research, the relationship between two types of variables, namely independent and dependent variables are studied. Independent variables are the causes, while dependent ones are effects. Another category of variables, which is equally important, is of the intervening variables. The three kinds of variables, identified for the study are:
- Independent Variables

These variables are manipulated in order to see their effect on the learning outcome of pupil teacher. In this study ‘Treatments’ acted as an independent variable. The treatments involved the two approaches of teaching viz., ICT-used teaching and conventional teaching. The experimental group was taught through ICT-used teaching and the control group was taught through the conventional teaching. Thus, ICT-used teaching and conventional teachings were the two independent variables for the study.

- Dependent Variables

Teaching Ability of Pupil Teacher and Teaching Competency were taken as dependent variables, which were measured twice during the course of the study. First, before beginning the experimental treatment i.e. at the pre-test stage and then after completing the experimental treatment i.e. at the post-test stage.

- Intervening Variables

There are certain variables known as intervening variables which have their effect on the learning outcomes, and influence both independent and dependent variables. Intervening variables such as nature of college, science subject, intelligence of pupils, socio-economic status of pupils, previous knowledge of pupils etc. were successfully controlled experimentally.

- Control Employed

It is necessary to control all those variables that may significantly affect the dependent variables. Hence, such intervening variables were controlled by employing suitable controls.
### Control Employed to Variables

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Dependent Variables</th>
<th>Control Variables</th>
<th>Control Employed</th>
</tr>
</thead>
</table>
| 1. Method of Teaching  | 2. Teaching Competency | 1. Nature of college  
2. Teacher Education  
3. Subject Science  
4. Duration of treatment  
5. Pupil Teacher socio-economic status  
6. Pupil teachers intelligence | 1. Administrative 5-6 colleges of both the groups  
2. Administrative (Only B.Ed 3rd sem. Student chosen as sample and taught)  
3. Both the groups were taught by the same teacher (investigator hereby)  
4. Administrative (Same topics lesson plan taught in both groups)  
5. Belonged to the same milieu  
6. Belonged to the same milieu. |
RESEARCH TOOLS

For collecting new unknown data required for any research problem, one may use various devices. For each and every type of research we need certain tools together facts or to explore new fields, which act to as means are called research tools. Different tools are suitable for collecting various finds of information for various purposes. The selection of suitable tools is of vital importance for successful research. The success of any research Endeavour is largely dependent upon the tools which are used for the data collection. The following tools were selected and used by the investigator in the study.

In this study following tools were used by the investigator.

• Test of General Intelligence of Dr. K.S. Misra and Dr. S.K.Pal

• General Teaching Competence Scale (GTCS) of Dr. B.K.Passi and Dr. Mrs. Lalita (1977)

• Test of Socio Economic Status Scale of Upadhyay & Saxena

• Power Point Presentation and slides on Science Teaching Plan were prepared by the investigator to be used on projector for this purpose

Population

The population of the study is prospective teachers studying in education colleges situated in 51 districts in State of Madhya Pradesh. Further the focus of the study was on prospective teachers studying in B.Ed. out of 51 districts one district namely Gwalior was selected on random basis.
Sampling makes it possible to draw valid generalisation by studying a relatively small proportion of the population selected for observation and analysis. In the present investigation, Gwalior district of Madhya Pradesh was the field of study. The sample of the study comprised 200 pupil teacher each studying in B Ed Colleges of Gwalior. One section of 100 pupil teacher formed the control group and the other section formed the experimental group,

**TABLE 3.4 SAMPLE OF STUDY**

<table>
<thead>
<tr>
<th>S. NO.</th>
<th>Groups</th>
<th>Total No. of Pupil teacher</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Control Group</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>Experimental Group</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>200</strong></td>
</tr>
</tbody>
</table>

Sampling is the essential feature in any research endeavours. Since it is not possible to cover the whole population in experimental studies, the researcher is to resort to sampling.

The sampling done was purposive sampling as only pupil teacher of science stream was required for research. The sampling was done only from those B.Ed. Colleges who were having more number of science pupil teachers. As per the availability of science pupil teacher the following colleges were selected. Jain College, K.S. College, Preston, BBM, National, Texas, Madhav, RNS, Mahatma Gandhi, ITM, IITE, Aryans, Jai Shree Shyam, Sanskar, Shivnath, Subhash Chand Bose, Sun Institute & Vidyavati College.
No doubt, the sample is small for the result of the study to be generalized, an experimental study is normally more suitable on a small sample, as is evident from earlier investigations conducted through experimental design, which used small samples only.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Sex</th>
<th>Qualification</th>
<th>Teaching Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Graduate</td>
</tr>
<tr>
<td>Number of pupil teacher</td>
<td>46</td>
<td>54</td>
<td>66</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

The Control Group (A1) based on conventional teaching methodology comprises of 100 pupil teacher of different B Ed Colleges of Gwalior which has been further divided on the basis of sex (Male-46, Female-54), Qualification (Graduate-66, Post Graduate-34) and Teaching Experience (Experienced-43, Un-experienced- 57)

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Sex</th>
<th>Qualification</th>
<th>Teaching Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Graduate</td>
</tr>
<tr>
<td>Number of pupil teacher</td>
<td>35</td>
<td>65</td>
<td>68</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>
The Experimental Group (A2) based on ICT teaching methodology comprises of 100 pupil teacher of different B Ed Colleges of Gwalior which has been further divided on the basis of sex (Male-35, Female-65), Qualification (Graduate-68, Post Graduate-32) and Teaching Experience (Experienced-42, Un-experienced-58)

PROCEDURE FOLLOWED

Procedure of the experiment comprised of two main stages, that is, selection of the sample and conducting the experiment.

**Basis of Selection of Sample:** As it is experimental study therefore few colleges were randomly selected to achieve the sample size of 200 pupil teachers which further segregated into two groups: control and experimental. The experimental group comprising of 100 pupil teacher was trained by inculcating ICT in teaching methodology on various topics of science teaching. In both the groups teaching learning process were evaluated by means General Teaching Competency Scale at Pre and Post Stage of the Sample.

**Stage 1: Selection of the sample**

The sample of the study comprised of 200 pupil teacher of B Ed 3rd sem (100 as control group and 100 as experimental group) studying in different education college affiliated to Jiwaji University of Gwalior.

**Selection of Experimental Group:**

For the experimental group, a total of 100 Pupil Teachers studying in B Ed Colleges having science subject was chosen.
**Selection of Control Group:**

The control group consisted of 100 Pupil Teachers studying in B Ed Colleges having teaching of science subject. The group was exposed to conventional method of instruction. No novel treatment was given to the control group of pupil teacher.

**Stage 2: Conducting the experiment**

The experiment was conducted in three phases:

**Phase I: Administration of the Pre-test**

Before the start of the experiment, the purposive sampling was done as study is to be carried only on B Ed pupil teacher having Science subject were selected and rapport was established with them. They were oriented about the tests to be used.

Three pre-tests i.e., S.E.S., Intelligence, GTCS Test were administered to the pupil teacher of two groups by the researcher herself. Cooperation of the teacher educator was sought for administering the tests properly. The instructions pertaining to the tests were explained verbally in clear terms to the pupil teacher before administering the test.

The administration of the tests was carried out as per norms and instructions contained in respective test manuals.

After this, the pupil teacher of both the groups were provided orientation and instructions about the treatment to be allotted to them to get over the anxiety and curiosity of the pupil teacher. The pupil teacher of the experimental group were given a trial of their respective materials, which helped them in getting over the curiosity and anxiety around via the electronic system being applied in the classroom setting. The pupil teacher of the control group were also made familiar about the objectives, etc, of the tests to elicit their cooperation in the conduct of the study.
Phase II: Conducting the Instructional programme

The second phase of the experiment was addressed to the real execution of the experiment. In this phase, the experimental group pupil teacher were taught by ICT-used teaching and the control group pupil teacher were taught by conventional method of teaching. The instructional treatment was given about 30 days to the experimental group, where as the control group was taught by the conventional method. Same content was taught to both the groups.

Phase III: Administration of Post-test

Immediately after the instructional treatment was over, the researcher tested the competency of pupil teacher of experimental group and control group on the dependent variables (Teaching Competency and Confidence level).

Date Schedule of the Instructional Phase for both the groups:

Table 3.7 Date Schedule of the Instructional Phase for both the groups

<table>
<thead>
<tr>
<th>S.NO.</th>
<th>Name of Lesson Plan</th>
<th>Date Schedule of the Instructional Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nutrition</td>
<td>10-04-2017</td>
</tr>
<tr>
<td>2</td>
<td>Coal</td>
<td>11-04-2017</td>
</tr>
<tr>
<td>3</td>
<td>Cell</td>
<td>12-04-2017</td>
</tr>
<tr>
<td>4</td>
<td>Tissue</td>
<td>12-04-2017</td>
</tr>
<tr>
<td>5</td>
<td>Natural Resources</td>
<td>13-04-2017</td>
</tr>
<tr>
<td>6</td>
<td>Matter: Nature and Behavior</td>
<td>13-04-2017</td>
</tr>
<tr>
<td>7</td>
<td>Diversity in living organisms</td>
<td>14-04-2017</td>
</tr>
<tr>
<td>8</td>
<td>Our Environment</td>
<td>14-04-2017</td>
</tr>
<tr>
<td>9</td>
<td>Synthetic Fiber and Plastics</td>
<td>15-04-2017</td>
</tr>
<tr>
<td>10</td>
<td>Crop Production &amp; Management</td>
<td>17-04-2017</td>
</tr>
<tr>
<td>11</td>
<td>Control and Co-ordination</td>
<td>17-04-2017</td>
</tr>
</tbody>
</table>
FORMATION OF FACTORIAL DESIGN

The major objective of the study will be to explore relationship of ICT and conventional method. In order to study the effect of ICT varies the teaching ability of prospective teachers in comparison with conventional method special in context of Teaching of Science Subject Treatment will be considered as factor A. It included two groups of prospective teachers one experimental and one control group.

A1 – Controlled Group A1 Teaching of Science through conventional method

A2 – Experimental Group A2 Teaching of Science through ICT

TESTINGOF HYPOTHESIS

On the basis of result of the study, as reported in preceding section, testing of hypotheses was made as report under:

1. There is no significant difference in Teaching Competency of Pupil Teacher by ICT method of Teaching.
“There is no significant difference in teaching Competency of Pupil Teacher by ICT method of Teaching”. Hypothesis is rejected as the Teaching Competency at 0.05 level of significance is significant in ICT Based Teaching Method.

2. There is no significant difference in Teaching Competency of Pupil Teacher by Conventional method of Teaching

“There is no significant difference in teaching Competency of Pupil Teacher by conventional method of Teaching”. Hypothesis is accepted as the Teaching Competency at 0.05 level of significance is not significant in Conventional Method of Teaching.

3. There is no significant difference between teaching through ICT and Conventional method of Teaching

“There is no significant difference between teaching through ICT and Conventional method of Teaching” Hypothesis is accepted as the Teaching Competency at 0.05 level of significance is not significant of both the group Conventional Method of Teaching (Control Group) and ICT based Teaching (Experimental Group).

4. There is no significant difference in intelligence of Pupil Teacher taught by ICT method of Teaching.

“There is no significant difference in intelligence of Pupil Teacher taught by ICT method of Teaching.” Hypothesis is accepted as the Intelligence Score at 0.05 level of significance is not significant in ICT Method of Teaching.

5. There is no significant difference in intelligence of Pupil Teacher taught by Conventional method of Teaching.
“There is no significant difference in intelligence of Pupil Teacher taught by Conventional method of Teaching.” Hypothesis is accepted as the Intelligence at 0.05 level of significance is not significant in Conventional Method of Teaching.

6. There is no significant difference between male and female pupil teachers taught by ICT Method.

“There is no significant difference between male and female pupil teachers taught by ICT Method.” Hypothesis is accepted as the Teaching Competency at 0.05 level of significance of male and female pupil teachers is not significant in ICT Method of Teaching.

7. There is no significant difference between male and female pupil teachers taught by Conventional Method.

“There is no significant difference between male and female pupil teachers taught by Conventional Method.” Hypothesis is accepted as the Teaching Competency at 0.05 level of significance of male and female pupil teachers is not significant in Conventional Method of Teaching.

8. There is no significant difference between Socio Economic Status of Pupil Teacher taught by Conventional Method

“There is no significant difference between Socio Economic Status of Pupil Teacher taught by Conventional Method.” Hypothesis is rejected as the Socio Economic Status Score at 0.05 level of significance is significant in Conventional Method of Teaching.

9. There is no significant difference between Socio Economic Status of Pupil Teacher taught by ICT Method
“There is no significant difference between Socio Economic Status of Pupil Teacher taught by ICT Method.” Hypothesis is rejected as the Socio Economic Status Score at 0.05 level of significance is significant in ICT Method of Teaching.

10. There is no significant difference between Experienced and Non Experienced Pupil Teacher in ICT based teaching

“There is no significant difference between Experienced and Non Experienced Pupil Teacher in ICT based teaching.” Hypothesis is accepted as the Teaching Competency of Experienced and Un-Experienced pupil teacher at 0.05 level of significance is not significant in ICT Based Method of Teaching.

11. There is no significant difference between Experienced and Non Experienced Pupil Teacher in Conventional based teaching

“There is no significant difference between Experienced and Non Experienced Pupil Teacher in Conventional based teaching.” Hypothesis is rejected as the Teaching Competency of Experienced and Un-Experienced pupil teacher at 0.05 level of significance is significant in Conventional Method of Teaching.

12. There is no significant difference between Graduate and Post Graduate Pupil Teacher in Conventional Method of Teaching.

“There is no significant difference between Graduate and Post Graduate Pupil Teacher in Conventional Method of Teaching.” Hypothesis is accepted as the Teaching Competency of Graduate and Post Graduate pupil teachers at 0.05 level of significance is not significant in Conventional Method of Teaching.

13. There is no significant difference between Graduate and Post Graduate Pupil Teacher in ICT based Teaching
“There is no significant difference between Graduate and Post Graduate Pupil Teacher in ICT based Teaching.” Hypothesis is accepted as the Teaching Competency of Graduate and Post Graduate pupil teacher at 0.05 level of significance is not significant in ICT Based Method of Teaching.

DELIMITATIONS:-

1. The experiment will be restricted 200 pupil teacher only.
2. The sample will be taken from B.Ed. students only.
3. The students will be belonging to Gwalior region only.
4. The ICT presentations will be developed of science subject only.
5. The ICT package will be develop only in English.
6. Although there are various teaching approaches out the present study will be confirmed to ICT only.
7. The effectiveness of ICT will be studied in the subject of Science only.

SUGGESTION FOR FURTHER RESEARCH

- The study could be replicated to explore how ICT affects the student teacher of various abilities on cognitive, emotional and motivational dimensions.

- There is need to compare ICT-used teaching method with other methods of instructions at different grade levels.

- The study could be replicated on a large sample for validation and for a longer duration to examine the effects on non-cognitive variable like social skills or some personality variables which take more time to bring about a change.
• There is need to study the integrated effect of ICT-used method with other institutional treatments.

• Research is needed to study the effect of ICT on special groups of children such as gifted. The learning disabled and other mildly handicapped student teacher.

• Power point programme can be developed for other classes and research may be conducted to study the impact of power point programme on student teacher’s learning in various subjects/levels, i.e.; for subjects other than Science and for various levels as well, as also to determine the extent to which it could be used within the exciting conditions and parameters in schools and other educational institutions.

• The study was confined to Gwalior Region only so for further study comparative analysis of urban and rural regions can be studied.

• The duration of exposure to ICT Based learning can be increased to see more stable results.