CHAPTER VI
DISCUSSION OF RESULTS,
CONCLUSIONS AND
RECOMMENDATIONS
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CHAPTER VI
DISCUSSION OF RESULTS, CONCLUSIONS AND RECOMMENDATIONS

6.1 INTRODUCTION:
The main purpose of the present study was to develop multimedia instructional system on the elective "Computer Education" for B.Ed. pupil-teachers and to see its effectiveness on the performance of the pupil-teachers. Multimedia technique was used to develop the instructional system; the system was tested experimentally and stored on CD-ROM. The different issues pertaining to the system approach, procedure and design of the study and analysis and interpretation of data have been discussed in the earlier chapters. It is, therefore, high time to discuss the results, draw conclusions and make suggestions based on the analysis of the data collected. This is done in the following paragraphs.

6.2 THE OBJECTIVES AND THE HYPOTHESES OF THE STUDY:
The objectives behind the present study are enumerated briefly as
1. to analyze the conventional approach of teaching Computer Education.
2. to plan multimedia instructional system for Computer Education.
3. to design and construct multimedia instructional system for Computer Education.
4. to test the effectiveness of constructed multimedia instructional system.
5. to compare the effectiveness of constructed multimedia instructional system with the conventional system of instruction.
6. to validate multimedia instructional system in terms of their effectiveness over conventional system of instruction.
7. to equip the pupil teachers and teacher-educators with reliable system to overcome the difficulties in instructing theory course of Computer Education.

Based on the objectives, researcher put forth following research hypotheses

R.H.1: The present setting of teaching the elective Computer Education in B.Ed. Colleges is not satisfactory for better learning of the pupil-teachers.

R.H.2: An instructional system for Computer Education through multimedia technology can be planned, designed and constructed.

R.H.3: A) The male pupil-teachers and female pupil teachers perform differently on achievement in their groups irrespective of the system used in instructing them.

B) The male pupil-teachers perform differently on achievement irrespective of the system used in instructing them.

C) The female pupil teachers perform differently on achievement irrespective of the system used in instructing them.


R.H.5: (A) The male pupil-teachers and female pupil teachers perform differently in retention of achievement in their groups irrespective of the system used in instructing them.

B) The male pupil-teachers perform differently in retention of achievement irrespective of the system used in instructing them.

C) The female pupil teachers perform differently in retention of achievement irrespective of the system used in instructing them.

The research hypotheses R.H.3 to R.H.6 were further stated below in null form for the sake of experiment and for testing purpose.

Ho.1: There is no significant difference between the performance of the pupil-teachers from control and experimental group in pre test.

Ho.2: There is no significant difference between the performance of the pupil-teachers from control and experimental group in posttest.

Ho.3: There is no significant difference between the performance of the pupil-teachers from control group in pre over post testing.

Ho.4: There is no significant difference between the performance of the pupil-teachers from experimental group in pre over post testing.

Ho.5: There is no significant difference between the gains in achievement in terms of scores in pre over posttest of the pupil-teachers from control and experimental group.

Ho.6: There is no significant difference between the performance of the pupil-teachers from control and experimental group in retention test.

The researcher collected the data through experimentation by using reliable and valid tools, analyzed and interpreted the data to achieve objectives and also test the hypotheses.
6.3 DISCUSSION OF RESULTS AND CONCLUSIONS:

For the first objective of the study and the research hypotheses RH.1 and RH.2, the researcher collected the data using questionnaire and unstructured interviews of teacher educators.

RH.1:
The present setting of teaching of Computer Education in B.Ed. Colleges is unsatisfactory for better learning of the pupil-teachers.

RH.2:
an instructional system for Computer Education through multimedia technology can be planned, designed and constructed.

From table IV.1 to IV.7 following are some of the conclusions obtained through careful analysis and interpretation of questionnaire and interviews.

❖ Most of the respondents are from science faculty (25) and all the 48 respondents are postgraduates in education.(From Table IV.1)

❖ Most of the respondents (33) have not completed courses related Computer Education. Only fifteen respondents completed courses related Computer Education such as MS.CIT, DIT, Computer Literacy Programme (One Day). (From Table IV.2)

❖ Thirty one percent of the respondents have a teaching experience below ten years; sixty nine percent of the respondents have teaching experience more than ten years. (From Table IV.3)

❖ Most of the respondents have teaching experience of teaching elective Computer Education below ten years (77%) and only eleven respondents have teaching experience more than ten years. (From Table IV.4)
❖ The main difficulties faced by the teacher educators are lack of audio-visual aids and if available they are not in good condition. (From Table IV.5)

❖ The main difficulty faced by the teacher-educator that there is no well-equipped Computer lab having audio, visual and audio-visual aids. (From Table IV.6)

❖ The respondents suggested the importance of audio, visual and audio-visual aids and also the use of multimedia technology in teaching of Computer Education.

❖ They suggested that the charts, pictures, printed materials, video cassettes of demonstration lessons, use of computer and also use of multimedia technology can be produced for understanding of Computer Education course.

❖ They also suggested animated pictures, use of hardware's, Video clips, Background sounds, etc. for teaching different units of an elective subject Computer Education.

❖ Most of the respondents are not using different teaching aids in their Computer Education teaching regularly.

The results about the present setting of teaching Computer Education course forced to draw following conclusions.

Conclusion 1:
The research hypothesis no. 1 is accepted. The present setting of teaching of Computer Education in B.Ed. Colleges is unsatisfactory for better learning of the pupil-teachers.

Objective No.1 regarding analysis conventional approach of teaching Computer Education is analyzed.

Conclusion 2:
The research hypothesis no.2 is accepted. An instructional system for Computer Education instruction through multimedia technology can be planned, designed and constructed.
The researcher planned, designed and constructed Multimedia Instructional System for an elective subject Computer Education and hence the objectives No. 2 and 3 are achieved.

The researcher collected the information through Conventional Instructional System and Multimedia Instructional System to test the research hypotheses (R.H.3 to R.H.6) and the null hypotheses Ho.1 to Ho.6.

The null hypotheses were subdivided which are discussed before in the Chapter V. viz. Analysis and Interpretation of Data Obtained in Beta Testing.

The "t" and "F" matrix obtained in analysis and interpretation of data from Pre, Post and Retention tests are given in the next tables.
Table VI.1: 't' MATRIX OF SIGNIFICANCE OF DIFFERENCE OF VARIOUS GROUPS IN PRE, POST AND RETENTION TEST

<table>
<thead>
<tr>
<th></th>
<th>Pre test Control Group</th>
<th>Posttest Control Group</th>
<th>Gain Control Group</th>
<th>Retention test Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M1 F1 T1</td>
<td>M1 F1 T1</td>
<td>M1 F1 T1</td>
<td>M1 F1 T1</td>
</tr>
<tr>
<td>Pre test</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental Group</td>
<td>M2 0.186 (18)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>F2 - 0.184 (10)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>T2 - 0.238 (30)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Posttest</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental Group</td>
<td>M2 4.484* (38)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>F2 - 3.3845* (22)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>T2 - 5.806* (62)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gain</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental Group</td>
<td>M2 4.088* (18)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>F2 - 4.052* (10)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>T2 - 5.460* (30)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retention test</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental Group</td>
<td>M2 5.507* (38)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>F2 - 4.499* (22)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>T2 - 7.187* (62)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Indicates significant at 0.01 and 0.05 levels, The numbers in the bracket indicates df.
Table VI.2: 'F' MATRIX OF SIGNIFICANCE OF DIFFERENCE OF VARIOUS GROUPS IN PRE, POST AND RETENTION TEST

<table>
<thead>
<tr>
<th></th>
<th>Pre test</th>
<th>Posttest</th>
<th>Gain</th>
<th>Retention test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control Group</td>
<td>Control Group</td>
<td>Control Group</td>
<td>Control Group</td>
</tr>
<tr>
<td></td>
<td>M1</td>
<td>F1</td>
<td>T1</td>
<td>M1</td>
</tr>
<tr>
<td>Pre test</td>
<td>M2</td>
<td>0.034*</td>
<td>(9-9)</td>
<td>19.945*</td>
</tr>
<tr>
<td>Experimental</td>
<td>F2</td>
<td>0.020*</td>
<td>(5-5)</td>
<td>12.829*</td>
</tr>
<tr>
<td>Group</td>
<td>T2</td>
<td>0.056*</td>
<td>(15-15)</td>
<td>33.745*</td>
</tr>
<tr>
<td>Posttest</td>
<td>M2</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Experimental</td>
<td>F2</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Group</td>
<td>T2</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Gain</td>
<td>M2</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Experimental</td>
<td>F2</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Group</td>
<td>T2</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

The numbers in the bracket indicates df.
The 't' matrix presented in table VI.1 shows the inter group differences on the variable of performances in the pre test, post test and retention test. The male, female and total pupil teachers from control group did not reveal any differences with the male female and total pupil teachers from experimental group in pretest. The male, female and total pupil teachers from experimental group showed significant differences with the male, female and total pupil teachers from control group in posttest, gain and retention test.

The 'F' matrix presented in table VI.2 shows the inter group differences on the variable of performances in the pre test, post test and retention test. The male, female and total pupil teachers from control group did not reveal any differences with the male female and total pupil teachers from experimental group in pretest. The male, female and total pupil teachers from experimental group showed significant differences with the male, female and total pupil teachers from control group in posttest, gain and retention test.

The details of results obtained through experimentation are discussed in the following paragraphs.

- Male and female pupil-teachers from any group do not differ in their performance in the pretest. (Table V.3). The differences between the means of the female pupil-teachers (Table V.4), male pupil-teachers (Table V.5), total pupil-teachers (Table V.6), from control and experimental group were non-significant. Both the respective groups were equivalent in their achievements w.r.t. means in pretest.

- Male and female pupil-teachers from any group do not differ in their variability about the performance in the pretest. (Table V.7). The differences between the S.D.s of the female pupil-teachers (Table V.8), male pupil-teachers (Table V.9), total pupil-teachers (Table V.10), from control and experimental group were non-significant. Both the respective groups were equivalent in their achievements w.r.t. S.D.s in pretest.

- The data obtained in pretesting confirmed the equivalency of the control and experimental groups before going to a further treatment.

From the above results the null hypothesis Ho.1 is accepted.
Conclusion 3:

There is no significant difference between the performance of the pupil-teachers from control and experimental group in pretest.

- The analysis and interpretation of the data obtained in posttesting indicate that the male and female pupil-teachers from control group are equally good in the performance in the posttest (Table V.13).
- The male and female pupil-teachers from experimental group are also equally good in the performance in posttest (Table V.13). There is no significant difference between the achievement of the male and female pupil-teachers from any group considered as isolate groups.
- When the mean performance in posttest of the female pupil-teachers from control group was compared with the female pupil-teachers from experimental group the female pupil-teachers from experimental group significantly achieved more. (Table V.14). It is true with the male pupil-teachers from the experimental group than in control group. (Table V.15). When the mean performance in posttest of the total 32 pupil-teachers from control group was compared with the performance of the total 32 pupil-teachers from experimental group the experimental group significantly achieved more. (Table V.16).
- The differences between the S.D.s were found to be significant w.r.t. male and female pupil-teachers and also significant w.r.t. total pupil teachers which means that the treatments affected the performance in terms of S.D.s (Table V.17 to V.20).
- From the above results, the null hypothesis Ho.2 is rejected which means that the Developed Multimedia Instructional System helped the male, female and all 32 pupil-teachers in performing better than the pupil-teachers from control group.

Conclusion 4:

There is significant difference between the performance of the pupil-teachers from control and experimental group in posttest.
Developed Multimedia Instructional System helped the male, female and all 32 pupil-teachers in performing better than the male, female and all 32 pupil-teachers from the control group.

In order to understand ‘How much they achieved?’ the data was further analyzed and compared the differences between their performances on pre over posttest in their respective groups. The results are as follows:

- From the Tables V.22 to V.24 and V.28 to V.30, the analysis and interpretation of the data obtained in pre over posttesting for the control group indicate that when then performance in pre and posttest of the female pupil-teachers from control group was compared, the female pupil-teachers significantly achieved more in posttest. Same is true with the male pupil-teachers form control group. When the performance in pre and posttest of the total 32 pupil-teachers from control group was compared, the 32 pupil-teachers from control group significantly achieved more in posttest.

- So the null hypothesis Ho.3 is rejected which indicates that the Conventional Instructional System helped the female pupil-teachers, male pupil-teachers and all 32 pupil-teachers from control group in performing better in pre over posttest. The difference between the S.D.s were found to be significant for female, male and total pupil-teachers which means that the treatments affected the performances in terms of S.D.s for female, male and total pupil-teachers. Same is true in terms of mean differences for female, male and total pupil-teachers.

**Conclusion 5:**

There is significant difference between the performances of the pupil-teachers from control group in pre over posttesting. Conventional Instructional System helped the male, female and all 32 pupil-teachers from control group in performing better in pre over posttest.
From the Tables V.25 to V.27 and V.31 to V.33, the analysis and interpretation of the data obtained in pre over posttesting for the experimental group indicate that when then performance in pre and posttest of the female pupil-teachers from experimental group was compared, the female pupil-teachers significantly achieved more in posttest. Same is true with the male pupil-teachers form experimental group. When the performance in pre and posttest of the total 32 pupil-teachers from experimental group was compared, the 32 pupil-teachers from experimental group significantly achieved more in posttest.

So the null hypothesis Ho.4 is rejected which indicates that the Developed Multimedia Instructional System helped the female pupil-teachers, male pupil-teachers and all 32 pupil-teachers from experimental group in performing better in pre over posttest. The differences between the mean differences were found to be significant for female, male and total pupil-teachers which means that the treatments affected in terms of mean differences. Same is true in terms of S.D.s.

Conclusion 6:

There is significant difference between the performances of the pupil-teachers from experimental group in pre over posttesting. Developed Multimedia Instructional System helped the female pupil-teachers, male pupil-teachers and all 32 pupil-teachers from experimental group in performing better in pre over posttest.

The analysis and interpretation of the data obtained about gains in scores indicate that the female pupil-teachers and male pupil-teachers form control group are equally good in the performance in their groups. (Table V.40), the female pupil-teachers and male pupil-teachers from experimental group are also equally good in the performance (Table V.40). There is no significant difference between
the achievement of the female pupil-teachers and male pupil-teachers from any group.

- When the performance of the female pupil-teachers from control group was compared with the female pupil-teachers from experimental group, the female pupil-teachers from experimental group significantly achieved more (Table V.41). The same is true with male pupil-teachers from the experimental group than in control group (Table V.42).

- When the performance of the total 32 pupil-teachers from control group was compared with the performance of the total 32 pupil-teachers from experimental group, the experimental group significantly achieved more (Table V.43).

- Hence the null hypothesis Ho.5 is rejected which indicates that the Developed Multimedia Instructional System helped the female pupil-teachers, male pupil-teachers and all 32 pupil-teachers in performing and gaining better than female pupil-teachers, male pupil-teachers and all 32 pupil-teachers from the control group. The differences between the S.D.s. were found to be significant which means that the treatments affected the performances terms of S.D.s.

Conclusion 7:

There is significant difference between the gains in achievement in terms of scores in pre over posttest of the pupil-teachers from control and experimental group.

Developed Multimedia Instructional System helped the female pupil-teachers, male pupil-teachers and all 32 pupil-teachers from experimental group in performing and gaining better than the female pupil-teachers, male pupil-teachers and all 32 pupil-teachers from control group.

- The analysis and interpretation of the data obtained in retention indicate that the female pupil-teachers and male pupil-teachers from control group are equally good in the performance, the female pupil-
teachers and male pupil-teachers from experimental group are also equally good in the performance in retention test (Table V.46). There is no significant difference between the achievement of the female pupil-teachers and male pupil-teachers from any group.

- When the performance of the female pupil-teachers from control group was compared with the female pupil-teachers from experimental group, the female pupil-teachers from experimental group significantly achieved more (Table V.48). The same is true with male pupil-teachers from the experimental group than in control group (Table V.49).

- When the performance of the total 32 pupil-teachers from control group was compared with the performance of the total 32 pupil-teachers from experimental group, the experimental group significantly achieved more (Table V.50).

- Hence the null hypothesis Ho.6 is rejected. It indicates that the Developed Multimedia Instructional System helped the female pupil-teachers, male pupil-teachers and all 32 pupil-teachers in performing and retaining better than pupil-teachers from control group. The differences between the S.D.s were found to be significant which means that the treatments affected the performances in terms of mean scores and also in terms of S.D.s.

**Conclusion 8:**

There is significant difference between the performance of the pupil-teachers from control and experimental group in retention test. Developed Multimedia Instructional System helped the female pupil-teachers, male pupil-teachers and all 32 pupil-teachers from experimental group in performing and retaining better than the pupil-teachers from control group.

The objectives No.4, 5 and 6 has been also achieved while testing the hypotheses. The effectiveness of constructed Multimedia
Instructional System has been tested, compared with Conventional Instructional System and validated accordingly.

To achieve objective No.7 researcher developed Multimedia Instructional System on an elective subject Computer Education for B.Ed. pupil teachers. It was stored on CD-ROM. Also researcher tested its effectiveness through experimentation in the research. Hence the objective No.7 has been also achieved.

6.4 SOME RECOMMENDATIONS:

From the responses of the respondents and the experience in this study, following are some recommendations:

1) The teacher-educator should have complete understanding of the subject Computer Education. Without proper understanding of the subject one cannot explain multimedia technology approach.

2) The Computer Education paper should be revised accordingly.

3) The teacher-educators and the pupil-teachers should develop multimedia instructional materials helpful in teaching of Computer Education.

4) It is suggested that self-learning material be developed on the lines as discussed in this study.

5) The Colleges of Education should rethink over the method they are teaching and following in their Computer Education course. One has to develop steps and correlate the same with day-to-day lecture planning.

6) Multimedia Instructional System is the necessities of the Colleges of Education. A joint effort in this direction will be highly appreciated.

7) The preparation of multimedia instructional system should be part and parcel of Computer Education course.
6.5 SUGGESTIONS FOR FURTHER RESEARCH:

While conducting the present research work, the researcher came across some problems that he feels needed further elaborate exploration through research. These problems are not directly related to the problem under investigation, and hence the researcher has not explored them any further. However, for the benefit of the researchers in this field as well as for the better understanding of the present research, the researcher has enumerated them here below.

1) Multimedia Instructional System can be developed for all papers for B.Ed. course.
2) The developed multimedia instructional system may be implemented in maximum colleges of education on a large scale and the validity of the system can be tested.
3) The studies related to B.P.Ed. courses can be conducted by using multimedia technology.
4) A research can be conducted in Web-based strategies for professional courses in rural, regional and remote areas.
5) Multimedia Instruction System can be developed in Mathematics and Science Education for secondary Schools.
6) A research can be developed Computer-based Technologies for all subjects in rural Schools.
7) The researcher feels that such type of research can be conducted regards effect of IT in teaching learning process.
8) A research study can be conducted in Online Teaching in Distance Education System.
9) The researcher used limited number of facilities in multimedia technology like Linear Multimedia System; he feels that Interactive Multimedia System can be used for better learning.
CHAPTER VII
SUMMARY