CHAPTER VII
SUMMARY

7.1 BACKGROUND OF THE STUDY
7.2 STATEMENT OF THE PROBLEM
7.3 OBJECTIVES OF THE STUDY
7.4 HYPOTHESIS OF THE STUDY
7.5 DELIMITATIONS OF THE STUDY
7.6 DEVELOPMENT AND RESEARCH PROCEDURE
   A) RESEARCH PROCEDURE (in brief)
   B) EXPERIMENTAL DESIGN
   C) SAMPLING DESIGN OF THE STUDY
   D) VARIABLES IN THE EXPERIMENT
   E) CONTROL OF THE EXPERIMENT
   F) TOOLS AND TECHNIQUES
   G) ANALYSIS AND INTERPRETATION OF DATA
7.7 CONCLUSIONS
7.8 SIGNIFICANCE OF THE STUDY
7.9 SUGGESTIONS FOR FURTHER RESEARCH
7.10 SCHEME OF CHAPTERIZATION
7.1 BACKGROUND OF THE STUDY:

Teacher education is an area, which is deliberately proposed for teacher training. The teacher training institutes are established in our country to educate teachers. Different universities developed different course for training of the teachers, B. Ed. course is one of them, which is for pre-service teacher education. It includes theoretical part and practicum part. B. Ed. Part I is a theory part and B. Ed. Part II is a practicum part. There are six theory courses (papers) in revised B.Ed. syllabus of Shivaji University, Kolhapur out of which Paper IV section II is of electives in which Computer Education is one of the elective.

The objectives of teaching Computer Education are as follows.
To enable the pupil-teacher to:

1. become aware of developments in computer and role of computers in Information Technology.
2. use computer hardware and software to produce educational documents.
3. use computers in the educational process.
4. use Internet for self-learning.
5. evaluate ready-made software for school subject.
6. evaluate the use of computers in Education.

It is our common observation that the theory course is taught by lectures. The teacher educators rarely use other methods of instruction. Instructional materials are also used rarely in teaching learning of the theory courses. Which results in memorization for examination purpose and it is also observed that the pupil teachers forget the pedagogy and rarely apply it in their day-to-day in-service career.

Computer Education is a latest and important subject that the teachers should know. The policy of state Government of Maharashtra regarding IT is so much advanced than other state and hence IT has been introduced in
secondary schools from std. V. The government wishes to start computer awareness programmes from std. I and it will soon introduced. Advances in Computer & communication technology affected all aspects of our lives – and teacher education is of no exception. Both private and public sectors in international economies are undertaking huge efforts to build revolution in educational environment. The instructional strategies are tremendously changed because of the revolution. Now the educationists and the teachers recognized the importance of instructional media in both formal as well as informal education. The media helps in increasing the interact of students in their learning. Most of open universities are now using media to interact their remote students in their courses. To increase the interest of students and teachers also, new instructional media can help.

We are living in 'Information Age'. We are bombarded by information-related technology for effective change. Integrated and quality education with good communication strategies is a need of the day for effective changes in the students.

Communication is an interactive process. Computer-based multimedia technology is a tool for communicators of all trades and an effective catalyst for change. Multimedia technology is a tool – not an end in itself, applications of multimedia technology are practically limitless and people from a wide variety of fields are encouraged to learn how to plan and develop multimedia applications in their fields of interest.

Multimedia Instruction System is new technique that can be used at B.Ed theory instruction. Development of Multimedia Instruction System has provided new opportunities for delivering instruction innovative ways. MIS is self-instruction strategies. The use of Multimedia Technology can make learning more interesting and enriching.

Multimedia technology is widely used in advertisement and the results are amazing. The researcher is a teacher educator working in the field of teacher education since last 9 years. He is teaching "Computer Education" since last 7 years. He was using lecture method for theoretical units and completes the course of an elective Computer Education. He felt unsatisfied of
his strategy of instruction and hence the researcher decided to undergo a research on use of multimedia technology to instruct Computer Education itself for the pupil-teachers. He felt that the multimedia instructional system on Computer Education can be developed and store on CD-ROM, which will help the pupil-teachers to learn at their own pace. The system can be self-learning interactive process having self-formative and summative evaluation scheme. The system can be time saving and more effective in comparison with the traditional.

7.2 STATEMENT OF THE PROBLEM:

The statement of the problem for research on hand was, therefore, stated in the following words.

"Development of Multimedia Instructional System on Computer Education for B.Ed. Pupil Teachers"

7.2.1 DEFINITIONS OF THE TERMS:

The operational definitions of the terms used in the statement of the problem were defined for the sake of clarity and also for delimiting the scope of study as follows:

1) Development: The term development includes planning, designing, constructing and the testing of an instructional system.

2) Multimedia Instructional System: This term includes three sub terms viz. System, Instruction and Multimedia

   System: A system is self-regulating self-learning set of ideas, principles, methods or procedure.

   Instruction: The term instruction is limited to teaching learning and guiding the students in their development of concepts in computer education.

   Multimedia: So far this research is concerned the term is limited to the integration of multiple media – such as visual imagery, text,
video, sound and animation – which together can multiply the impact of message.

**Multimedia Instructional System:** So far this research is concerned the term multimedia instructional system is an instructional system developed through multimedia technology.

3) **Computer Education:** The term Computer Education is a vast term. Here Computer Education means the introductory information of computer hardware & software, operating systems, MS-office and use of computers in Education with preliminary information of Information Technology. The term Computer Education is limited to the contents covered in the course of an elective in B.Ed syllabus revised in June 2001 by Shivaji University Kolhapur.

7.3 OBJECTIVES OF THE STUDY:

The study was undertaken with the following objectives.

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 theory course of Computer Education instruction.
7.4 HYPOTHESES OF THE STUDY:

Following were the research hypotheses of the study.

R.H.1: The present setting of teaching of Computer Education in B.Ed. Colleges is unsatisfactory 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.4: The conventional instructional system and the developed multimedia instructional system for Computer Education differ in their effectiveness on the performance in achievement of the total pupil - teachers.

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 performs differently in retention of achievement irrespective of the system used in instructing them.

R.H.6: The conventional instructional system and the developed instructional system for Computer Education differ in their effectiveness on the performance in the retention of achievement of the total pupil-teachers.
The research hypotheses R.H.3 to R.H.6 were stated below into null form for sake of experiment and for testing purpose.

Ho.1: There is no significant difference between the performance of the pupil-teachers from control and exp. group in pretest.
Ho.2: There is no significant difference between the performance of the pupil-teachers from control and exp. group in posttest.
Ho.3: There is no significant difference between the performance of the pupil-teachers from control group in pre over posttesting.
Ho.4: There is no significant difference between the performance of the pupil-teachers from exp. group in pre over posttesting.
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 exp. group.
Ho.6: There is no significant difference between the performance of the pupil-teachers from control and exp. group in retention test.

7.5 DELIMITATIONS OF THE STUDY:

1) This study was limited to an elective from B.Ed. syllabus “Computer Education” only.

2) This study covered all units from “Computer Education” course in B.Ed. revised syllabus of Shivaji University, Kolhapur from June 2001.
   Unit I: An Introduction to Computers
   Unit II: Computer Hardware Functions & Applications
   Unit III: Computer Software
   Unit IV: Application Software For Education
   Unit V: Use of Computers & Multimedia in Education

3) The development of multimedia instructional system was restricted to marathi medium.

4) The experiment was restricted only to the pupil teachers admitted in College of Education, Barshi affiliated to Shivaji University, Kolhapur.
5) The development of a system included designing, developing and evaluating stages. The evaluating stage includes large-scale try-out of the system, but the study was confined to experimental try-out in one college of education. The results of the evaluation of developed system were limited to this institute only.

7.6 DEVELOPMENT AND RESEARCH PROCEDURE:

The research procedure of the study was explained briefly in the following paragraphs. The details were elaborated in the chapter IV: Development of Multimedia Instructional System & Research Procedure.

A) RESEARCH PROCEDURE

The researcher used following procedure to develop multimedia instructional system.

1. The researcher analyzed the traditional approach of teaching Computer Education used by teacher-educators. He collected the data by administering questionnaire to 48 teacher-educators in various Colleges of Education affiliated to Shivaji University, Kolhapur. Unstructured interviews of all teacher-educators and some experts (10) are conducted to obtain further related data.

This helped the researcher to understand the present position of teaching Computer Education and helped in designing an instructional system.

The outcome of this step was a rough sketch of the instructional system.

2. The researcher planned, designed and constructed an instructional system for Computer Education. In this step goal, objectives and content of the system are defined. The application scripts are developed and are translated into outline and outlines into logic flow charts. Audio and video files production scripts and schedule are decided. Program storyboards for each screen are developed.

The outcome of this step was a complete design script of the proposed system.
3. After the planning of the multimedia application researcher constructed multimedia instructional system for Computer Education. In this production step researcher prepared Text block, 2-D & 3-D Graphics, Computer animation, audio & video files. Authoring software Macromedia Director 7 was selected accordingly and a first working model of the proposed multimedia instructional system was developed. The system was then stored on CD-ROM. The internal evaluations of a multimedia application have done within the multimedia development team. Alpha testing of the system had done on selected group of teacher-educators (Experts) to receive feedback and recommendations about the system.

4. After an internal evaluation and Alpha testing at every stage, the Prototype of the proposed system has been made ready for its testing.

5. The testing of the Prototype was an experiment called as Focus group testing or small-scale try-out. It was two group pretest – posttest experimental design. The sample was composed of forty (40) pupil-teacher having Computer Education as an elective. The control group was of 12 male pupil-teachers and 8 female pupil-teachers from Azad College of Education, Satara. The experimental group of 12 male pupil-teachers and 8 female pupil-teachers from College of Education, Barshi. A pretest is administered before the implementation of the prototype and the same test was used as posttest after the implementation of the prototype. The data is analyzed and interpreted to collect the information about the effectiveness of prototype.

6. Researcher revised and reshuffled the instructional system after a small-scale try-out.

7. Copies of revised system stored in CD-ROM are made available to a group of pupil-teachers from College of Education, Barshi called Beta testing group.

8. Beta testing of the system was also an experiment. The Solomon Four-Group Experimental Design is used. The sample was composed of sixty four (64) pupil-teacher having Computer Education as an elective. The control
group was of 20 male pupil-teachers and 12 female pupil-teachers from D.P.B. Dayanand College of Education, Solapur. The experimental group of 20 male pupil-teachers and 12 female pupil-teachers from College of Education, Barshi. The group is evaluated by administering pre and post achievement tests.

9. The experiment was conducted within seven months, the procedure of which is explained in detail in chapter IV: Development of Multimedia Instructional System and Research Procedure.

B. EXPERIMENTAL DESIGN

The researcher used the Pretest-Posttest Equivalent - Groups design in small-scale try-out sample (TOS). The design is explained below:

\[
R_1 \rightarrow O_1 \rightarrow X \rightarrow O_2 \\
R_2 \rightarrow O_3 \rightarrow C \rightarrow O_4
\]

Where \( O_1, O_3 \) = pretest, \( X \) = Treatment (Multimedia Instructional System), \( C \) = Conventional Instructional System, \( O_2, O_4 \) = posttest.

A pretest was administered before the implementation of the prototype and the same test was used as posttest after the implementation of the prototype. The data on pre-over posttest was analyzed and interpreted to collect the information about the effectiveness of the prototype.

The Solomon Four-Group Experimental Design: The design be as follows:

\[
R \rightarrow O_1 \rightarrow X \rightarrow O_2 \\
R \rightarrow O_3 \rightarrow C \rightarrow O_4 \\
R \rightarrow X \rightarrow O_5 \\
R \rightarrow C \rightarrow O_6
\]

In this design:

1. Pupil-teachers from the College were randomly assigned to four groups. There were approximately 16 pupil-teachers in each group.
2. Two groups were received the experimental treatment (X), which was implementation of the systems.

3. One experimental group was received a pretest (O₁).

4. Two groups (control) were not received treatment (C).

5. One control group was received a pretest (O₃).

6. All four groups were received posttests (O₂ O₄ O₅ O₆).

   Analysis of variance was used to compare four posttest scores, analysis of variance to compare gains in O₂ and O₄.

C. SAMPLING DESIGN OF THE STUDY

   The researcher was used following samples in his study.

   • All teacher-educators teaching Computer Education in Colleges of Education affiliated to Shivaji University, Kolhapur are asked to respond the questionnaire.

   • Some of the teacher-educators (10) are selected for unstructured interviews. The sample is randomized sample and it is obtained through hat sampling method.

   • Sample of teacher-educators used in Alpha testing are those teacher-educators who were interviewed.

   • Sample of pupil-teacher to be used in focus group testing is of 40 pupil-teachers. Out of which 20 pupil teachers from Azad College of Education, Satara and 20 pupil teachers from College of Education, Barshi which is randomly selected from the pupil-teachers, opted the course by using a table of random numbers.

   • A sample of pupil teachers used in Beta testing is of 64 pupil teachers offering Computer Education as an elective. Out of which 32 pupil teachers from D.P.B. Dayanand College of Education, Solapur and 32 pupil teachers from College of Education, Barshi which is randomly selected from the pupil-teachers, opted the course by using a table of random numbers.
D. VARIABLES IN THE EXPERIMENT:
The dependent and independent variables in the study were located and listed. They were

Dependent Variables:
The dependent variables were achievement of the pupil-teachers in terms of scores, ability of learning, behavioral changes of the pupil-teaches. These dependent variables were combined into one that was; scores achieved in the pre over posttest pupil teachers.

Independent Variables:
Sex, socio-economic status, intelligence and ability of the pupil-teachers, college atmosphere, facilities of instruction, equipments used in instruction, instructional materials, time and period of exposure to a particular condition, reward and punishment during instruction, evaluation procedure, were the independent variables.

Though there were so many independent variables, the researcher had decided to consider only two independent variables in his experiment viz. sex and system of instruction. The effects of remaining independent variables on dependent variables were controlled.

E. CONTROL OF THE EXPERIMENT:
Randomization technique was used in controlling the extraneous variables. Two groups of the pupil-teachers selected from grantable Colleges of Education affiliated to Shivaji University, Kolhapur which helped the researcher in controlling socio-economic status, age, classroom situation, intelligence, reward and punishment effects, abilities of learning.

It was decided to complete both the units in same month helped in controlling time of instruction variable.

The equivalency of the two groups was checked by statistical measures.

F. TOOLS AND TECHNIQUES
The researcher used the following tools and techniques in data collection for the present study:
1) **A Questionnaire**: Questionnaire was constructed and used in analyzing the present system of Computer Education instruction.

2) **Interview Schedule**: An interview schedule for teacher-educators and experts was constructed which cover all questions related to the present and future system that is to be developed.

3) **Internal Evaluation Form**: Internal evaluation form was developed and used in internal evaluation of the system.

4) **A Program Evaluation Form**: A program evaluation form was developed and used in Alpha testing, focus group testing and Beta testing.

5) **Achievement Tests [Pre and Post] for pupil-teachers**: Achievement tests on Computer Education are constructed and administered on sample under study.

6) **Retention Tests**: The retention test on Computer Education is constructed and administered on sample under study. It was parallel forms of achievement test.

Reliability and validity of the tools are established.

**G: ANALYSIS AND INTERPRETATION OF DATA**

The data was analyzed with the help of statistical and non-statistical measures. The techniques of t test, Analysis of Variance and Covariance were used to test the hypotheses.

**7.7 CONCLUSIONS:**

**Conclusion 1:**

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

**Conclusion 2:**

The research hypothesis no.2 was accepted. An instructional system for Computer Education Instruction through multimedia technology can be planned, designed and constructed.
Conclusion 3:
The null hypothesis Ho.1 was accepted. There is no significant difference between the performance of the pupil-teachers form control and experimental group in pretest.

Conclusion 4:
The null hypothesis Ho.2 was rejected. 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 from expt.group in performing better than the male, female and all 32 pupil-teachers from the control group.

Conclusion 5:
The null hypothesis Ho.3 was rejected. 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.

Conclusion 6:
The null hypothesis Ho.4 was rejected. 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.

Conclusion 7:
The null hypothesis Ho.5 was rejected. 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.

Conclusion 8:
The null hypothesis Ho.6 was rejected. There is significant difference between the performance of the pupil-teachers from control and experimental group in retention test.

7.8 SIGNIFICANCE OF THE STUDY:
The significance of the present study was as follows:

- As far as the knowledge of researcher is concerned, no study of such kind has been done earlier.
- The study will deeper the understanding of the Computer Education course to be taught in B. Ed. colleges.
- The developed instructional system will help the teacher, educators and the pupil-teachers in teaching and learning of Computer Education. They will not depend only on textbook. The study will enable the pupil teachers to understand the nature and purpose of Computer Education develop communication skills and enable to use modern information technology for school purposes.
- The deficiency of unavailability of multimedia CD-ROM on Computer Education will be removed the some extent.
- It is observed that the multimedia instructional system is more significant than traditional teaching learning approach. This multimedia instructional system will help in revising the Computer Education course.
- The system will be helpful for the distance learning mode and in-service training.
- The present study is different one. So it will add to present stock of knowledge.
7.9 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 were 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.
7.10 SCHEME OF CHAPTERIZATION:

CHAPTER I: INTRODUCTION

The chapter included background of the research, statement of the problem, objectives of the study, hypotheses of the study, methodology and significance of the study, scope and limitations.

CHAPTER II: REVIEW OF THE RELATED LITERATURE AND STUDIES

The chapter was devoted to the theoretical aspects of Computer Education and review of related studies.

CHAPTER III: SYSTEMS APPROACH TO MULTIMEDIA INSTRUCTION

The chapter included theoretical background of a system approach and meaning of multimedia instructional system with its developing procedure.

CHAPTER IV: DEVELOPMENT OF MULTIMEDIA INSTRUCTIONAL SYSTEM AND RESEARCH PROCEDURE.

In this chapter researcher explained the procedure used in the development of a multimedia instructional system analysis and interpretation of the small scale try-out data, improvements in the prototype, experimentation procedure in full scale try-out, variables in the experiment, control of experiment, research and null hypotheses of the study, experimental design, sampling design and description of the tools used in the study.

CHAPTER V: ANALYSIS AND INTERPRETATION OF DATA OBTAINED IN BETA TESTING

The data obtained through experimentation was analyzed and interpreted accordingly. The analysis and interpretation of the data in the form of table's graphs and figures and statistical measures was given in this chapter.
CHAPTER VI: DISCUSSION OF RESULTS, CONCLUSIONS AND RECOMMENDATIONS

In this chapter researcher discussed the result of the experiment and the conclusions based thereupon. The chapter also included recommendations based on conclusion and topics for further research.

CHAPTER VII: SUMMARY

The chapter included the summary of the study.