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CHAPTER II
REVIEW OF THE RELATED LITERATURE AND STUDIES

2.1 INTRODUCTION:
As the statement of the problem suggests, the present study was concerned with the development of a multimedia instructional system on Computer Education, the researcher had decided to review the theoretical aspect of computer education, information technology and multimedia along with the review of related studies for better understanding of his research work on hand. The chapter includes theoretical aspect of computer education and information technology, multimedia instruction and the review of related studies in India and abroad.

2.2 THEORETICAL ASPECTS OF COMPUTER EDUCATION, INFORMATION TECHNOLOGY, MULTIMEDIA AND SYSTEMS APPROACH:

The computer are now become a pervasive part of workplace, the classroom and the home. The rapid development in information technology and easy access to information through Internet is now undeniable fact of contemporary life. The new and emerging technology challenged the traditional process of teaching and learning, and the way education is managed.

2.3 COMPUTER EDUCATION:

We are living in the computer age and gradually computer has become such a dive necessity of life that it is difficult to imagine life without it. Computer is affecting every sphere of our life – be it government, business, education, legal practice, entertainment, defense or home – computer has become an indispensable and multipurpose tool.

Computer education is a vast term, used in different disciplines, has different scope and limitations. Here the word 'Computer Education' is limited to introductory information and uses of computers in education. The computer education course for B.Ed. pupil teachers includes following units.
UNIT I: AN INTRODUCTION TO COMPUTERS
a) Concept of Computer System and its characteristics and capabilities.
b) History of computer Development and special features of generations of computers.
c) Classification of computers based on size, purpose and data processing.
e) Concept of Information Technology and the role of computers in Information Technology.

UNIT II: COMPUTER HARDWARE FUNCTIONS AND APPLICATIONS (Input, Process And Output Devices)
a) Input Devices:- i) terminals and dedicated data entry systems, ii) direct data entry devices, iii) voice input devices and iv) pointing devices.
c) Central Processing Unit: i) Control Unit ii) Arithmetic /Logic Unit iii) Memory Unit

UNIT III: COMPUTER SOFTWARE
a) Computer Software and its types.
b) Types of Operating Systems.
c) MS-DOS-Commands and working with Dos.
d) Compilers, Interpreter and Translators in Brief.
e) Programming Languages-Syntax, Semantics and Concept of Higher Level Languages: BASIC, FORTRAN, PASCAL, COBAL, LISP, C and LOGO (IN brief)

UNIT IV: APPLICATION SOFTWARE FOR EDUCATION
a) Features of Microsoft Windows-95/98/2000(or whichever is available)
b) Features of M.S.Office 97(Whichever version of M.S.Office is available)
c) Ready made Package for teaching school subject.
UNIT V: USE OF COMPUTERS AND MULTIMEDIA IN EDUCATION

a) Use of Computers and Multimedia in teaching-learning process
b) Use of computers in office management
c) Use of computers for examination.
d) Internet – Genesis, software and hardware requirement for Internet, surfing, educational websites, uses of Internet.
e) Effects of use of computers in education – on students, teachers and process of education.

Unit 1 consists of five sub units these units are related to the characteristics, capabilities, development, classification, block diagram of computer and Information Technology.

Unit 2 covers the areas such as input devices, storage devices, central processing unit and output devices. In this unit all subunits are related to basic concepts only.

Unit 3 regarded to types of software, operating system, MS – DOS commands and programming languages. This helps the B.Ed. pupil teachers to develop the knowledge about the various operating system and languages.

Unit 4 explains the various uses of Microsoft Windows, M.S.Office and ready-made package for teaching school subjects.

Unit 5 is totally based on the application of computer in various fields such as multimedia in teaching-learning process, computers in office management, computers for examination and educational websites and their use in the field of education.

2.4 INFORMATION TECHNOLOGY:

The computer age now gradually transferring into the age of information. When data is processed through the computer, it is usually called as information, which is used in decision-making.

"It is considered to be synonymous with knowledge or intelligence ". Layman " When data is processed through the computer, it is usually called information ".

" Information is data which is used in decision making ".


This definition makes us to realise that information is never only for sake of information. A message or data is furnished or received by us can be turned as an information only when it can be utilized for arriving at some conclusion or decision. Hence the ability of decision-making is quite linked and dependent upon the quality of information received and utilized by use for this purpose.

*a) The criteria of information are:*
- It should be accurately transmitted and received.
- It should be understood in the way it is meant for.
- It should help the recipient in decision making and affecting his behaviour.
- Information collected and stored should be as accurate and reliable as possible.
- The sources of information must be readily available to the users.

**2.4.1. MEANING AND GROWTH OF INFORMATION TECHNOLOGY:**

Now, we define the term Information Technology as under.

"Information Technology is that type of technology which helps in the collection, storage, processing, retrieval, use and transmission of information as accurately and effectively as possible for the purpose of enriching the knowledge and developing decision making as well as problem solving ability of the user".¹

"Information Technology means the collection, storage, processing, dissemination and use of information. It is not confined to hardware and software, but acknowledges the importance of man and the goals he sets for this technology, the values employed in making these choices, the assessment criteria used to decide whether he is controlling the technology and is being enriched by it".¹

"The scientific, technological and engineering disciplines and the management techniques used in information handling and processing; their

applications; computers and their interaction with men and machines; and associated social, economic and cultural matters”.

“Information Technology is defined as microelectronics plus telecommunications plus computing equals to Information Technology”

b) Growth of Information Technology:

The advanced technological development, facilitating the task of recording, storage of information and retrieval of Information may be outlined as below:

❖ The photography invented in 1835 by a Frenchman L.G.M. Daguerre and an Englishman W.H.F. Talbot.
❖ Photostat in 1900, by Professor Abbe Rene Graffin of France.
❖ Xerography The process was invented by the American printer Chester F. Carlson in 1937 and was first developed commercially in 1950.
❖ Micrography invented in 1940 by an Englishman J. B. Dancer and Frenchman Rene Dagran.
❖ Laser technology used for printing and memory device in 1960 by Theodore Mainman of U.S.A.
❖ Magnetic video camera, videodisc and computers developed in 20th century.

Besides this, the advancement in the field of telecommunication technology has contributed a lot in the evolution of Information Technology. The landmarks in such development can be cited as below.

❖ Telegraph invented by S.F.B. Morse of U.S.A. in 1895.
❖ Telephone invented by Alexander Graham Bell of Scotland in 1876.
❖ Radio invented by G. Marconi of Italy in 1895.
❖ Television invented by J.L. Baird of Scotland in 1925.
❖ The American inventor Herbert Eugene Ives in New York first demonstrated a two-way video telephone in 1930.

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❖ Development of communication satellites in 1957. Launched by U.S.S.R. and cable and facsimile transmission (Fax) technology in the 20th century.
❖ In 1969 the first global telephone relay network was completed with a series of satellites in stationary orbits 35,880 km (22,300 mi) above the Earth.
❖ In 1969 the ARPA (Advanced Research Project Agency) created ARPANET to help the researchers communicate with each other.
❖ In 1986 the NSF (National Science Foundation) created NSFNET, a network with five supercomputers to help establish effective communication among the universities.
❖ To provide services to Internet users, and in an attempt to standardize the working on the Internet, NSF created an organization called InterNIC in 1993. InterNIC is a collaborative project between AT&T and Network Solution.

Internet was originally meant for research purposes, it has now changed significantly and is used mainly for commercial purposes.

2.4.2 OBJECTIVES OF INFORMATION TECHNOLOGY:

The Objectives of Information Technology, can be listed as below:

➢ To build a system of information for scientific collection, storage and dissemination of information to the users.
➢ To help the users in proper understanding and interpretation of the information in its true and original form.
➢ To help the users properly in the task of information processing manually or with the help of computers.
➢ To help the users or learners to make use of the information in an effective way for bringing desirable changes in their behaviour and developing their decision making and problem solving abilities.

2.4.3 VARIOUS MEDIA OF INFORMATION TECHNOLOGY:

Information Technology may make use of a variety of media for furnishing its services to the learners in the process of teaching learning. In brief, these means and media can be named and outlined as under:
♦ Printed media in the form of textbooks, resource books, journals, news items and other literature available in the school and public libraries.

♦ The verbal information and ideas exchanged with the peers, teachers, parents and other members of the society.

♦ Various types of audio-visual teaching aids and equipment like graphical aids (pictures, charts, maps etc.), radio, television, audio and video recording devices, films, movies etc.

♦ Programmed learning material, teaching machines and computers.

♦ The places of gathering first hand information like museum, factories, agricultural fields, rivers, mountains, historical buildings and geographical locations.

♦ Access to the information network, local area network (LAN), wide area network (WAN), Metropolitan area network (MAN), and World Wide Web (WWW), computers data base, E-mail, Internet, and Multimedia software like CD-ROM

2.5 MULTIMEDIA:

a) Meaning:

The teaching leaning is a crucial aspect of the educational phenomenon. All modern audio-visual aids help to promote the teaching learning activities. The development of computer technology and Information technology play an important role in today's teaching learning process.

The term Multimedia is made of two words multi and media. Multi means many and media means the way by which we communicate.

Now we define the term multimedia as follows:

“The technologies of using text and words, diagrams, graphics, a sound and video image collectively to show every thing more effectively is called as multimedia.”

“Elements of text, graphics, animation, video, and sound combined for presentation to consumer are called multimedia.”

The word multimedia refers to the integration of multiple media—such as visual imagery, text, video, sound, and animation—which together can multiply the impact of your message.\textsuperscript{5}

The multimedia is that it denotes the combination of several media to transport the information in several forms from one point of another. Hence multimedia can be visualized as a fusion of different modes of media.

Multimedia system may be grouped into two categories

1. **Linear Multimedia**
2. **Interactive Multimedia**

1. **Linear Multimedia:** In this type sequence of sound, video, and images without any control over the presentations' content, this is called linear multimedia or sometimes-passive multimedia system. This type of multimedia is also called as passive multimedia. Videotape or a TV documentary may be cited as example for this type of a system.

2. **Interactive Multimedia:** In the contrast of linear, if the programme lets the user control the sequence by selecting different options, it is called Interactive Multimedia or non-linear multimedia. In other words, interactive multimedia system achieve a higher level of information transfer because they provide customization that allows end users to receive data, information or knowledge and to actively participate in the process. Digital libraries, digital newsrooms, electronic games, video mails are the examples of this type.

**b) Components:**

The main components of multimedia are the text, graphics, sound, and animation. Text is an integral part of any multimedia production and used to add emphasis to presentation. Graphics can be in the form illustration, charts, maps, pictures, images, etc. Graphics aids better understanding and makes presentation lively. Sound is in the form of voice, music or special effects.


Animation can be used to explain complex subjects that are yet to become reality.

c) Multimedia Building Blocks

Following are the multimedia building blocks.

1) Graphics
2) Text
3) Video
4) Sound
5) Animation

1) GRAPHICS:

A graphic is a multimedia application can be more appealing and meaningful than a thousand text characters. People often learn and retain more information from pictures than from other forms of information. This is a function of their learning style. Learning styles are the various methods individuals have for perceiving and processing information while reacting to their environment. The integration of graphics into a multimedia application could include the following elements.

a) Backgrounds
b) Photos
c) Three-dimensional pictures
d) Charts (graphs)
e) Flowcharts
f) Organizational charts
g) Drawings (line art)
h) Clip art
i) Buttons (icons)

2) TEXT:

Text is one of the most widely used multimedia building blocks. The intensity of text usage depends greatly on the purpose of the program. You can use and display text in different forms for different purposes. These are some possible uses.

a) Titles
b) Buttons
c) Bullets
d) Paragraphs
e) Scrolling text

The research and selection of text are the responsibilities of the content specialist. The paragraphs of text bullets are depend in coordination with the Text Editor. Text is related to the other multimedia building blocks. For example, when planning to place text over a background, you must consider for color, font size and the contrast against the background. If the characters are not legible against the background, you may have to place the text over a text box with a solid or translucent color.

3) VIDEO:

To integrate video into an interactive multimedia application, you can employ a number of different technologies, including the following.

a) Digitized video.
b) A video window displaying the output of a laser disc or video tape player.
c) A video window displaying a live TV signal or a broadcast signal using PC-TV.

The following factors should be considered when planning the application:

a) Goals of the application.
b) Availability of video footage.
c) Length of video to be displayed.
d) Video digitizing computer capabilities and configuration.
e) Video window size.
f) Hardware configuration of the playback equipment.
g) Available video projection equipment.
h) Budget.

The video could be stored on a laser disc and displayed in a video window, or it could be displayed through a video monitor next to the computer. Long videos can also be stored in a digitized compressed format on a large hard drive. It is the proposed application only short videos (30 sec to a few
minutes), an on-screen digitized video format is recommended. The playback equipment configuration for digitized video requires at least 8M of memory and a processing speed of at least 33 Mhz. The size of the video screen needed will depend on the quality of the digitized video when captured and on the hardware configuration of the playback equipment. A good rule of thumb is to use a ¼ screen-size video format for maximum performance and image quality.

4) SOUND:

All the information need not be text or visual. Sound (music, narration and sound special effects) can enhance the application significantly.

Sound should be considered while planning the application. Some forms of sounds that can be used are:

a) Special sound effects.

b) Narration.

c) Audio tracks from analog or digital sources.

d) Background music or musical performances.

e) Background or ambient sounds.

One can associate special sound effects, such as alert sounds (beeps, door slams, explosions and so on) with buttons. The sound indicates to the user that the button has been activated and an action is expected. In another instance, animated text rapidly entering the screen can be preceded by the sound of a Jet or a “Whoosh” sound. The integration of alert sounds and special effects provides an additional dimension. The use, number and length of recordings will vary with the purpose of the application.

Audio tracks from CDs can be played back from a multimedia application. In this case, plan to develop and use a script in the authoring application to play a specific track or segment of an audio CD. In such cases, a script in the authoring application and in some applications such as Macromedia Director X object must be in place in the application directory or folder. An object is a set of programming instructions that are developed as a resource to allow additional functionality to a multimedia application.
5) ANIMATION:
Animation is the appearance of an image changing over time. The most common types of animation in Macromedia Director involve moving a sprite on the Stage (tweening animation) and using a series of cast members in the same sprite (frame-by-frame animation).

One can animate text, graphics, sounds, movies, charts, and other objects on slides so that researcher can focus on important points, control the flow of information, and add interest to your presentation. One can set up the way researcher wants text or an object to appear on the slide. One can change the order and timing of your animations, and can set them to occur automatically without having to click the mouse.

- **Tweening** is a traditional animation term that describes the process in which a lead animation draws the animation frames where major changes take place, called keyframes. Assistants draw the frames in between. Tweening in Director lets you define properties for a sprite in frames called keyframes, and Director changes the properties in the frames in between. Tweening is very efficient for adding animation to movies for websites, since no additional data needs to download when a single cast member changes.

Frame-by-frame animation involves manually creating every frame in an animation, whether that involves switching cast members for a sprite or manually changing settings for sprites on the stage.

2.6 MULTIMEDIA APPLICATION AREAS:
Multimedia is being used in the supervision of highly automated industrial plants, power stations, manufacturing units etc by way of integrating on-line electronic documentation facility with the process control system and other video controlled operations.
Multimedia finds application in various fields as:

Entertainment

Video conferencing

Scientific visualization

Publishing

Broadcasting

Advertising

Marketing

World wide web

**fig 2.1: MULTIMEDIA APPLICATION AREAS**

### 2.7 SYSTEMS APPORACH:

The term systems approach; system analysis or system procedures are used in literature at various levels of sophistication. At a layman’s level, they indicate systematic thinking, step-by-step problem solving and considering many variables not in isolation of each other but as interacting with each other studying the phenomenon or process as a whole and not in bits and pieces.

The approach was introduced in industry and then expanded into non-military government agencies. Today scientific, systematic approach to problem solving decision – making and planning is widely used in social service and educational profession. Today, it is used in the field of education as a strategy to manage and improve the process and products of education.

The system approach is based on the concept of a system.

**a) System:**

The emergence of the principal of wholeness is the starting point of systems concept. A very simple example of a system is "bicycle". In bicycle various part work as a whole. Our digestive system, blood circulation system are also examples of a system.

The word system has been defined differently individuals. A meaningful beginning of system concept emerged with the work of Bertalantly (1951) and boulding (1956), which also provided the foundation for general system theory.
Ackoff defines a system as
"A system is the set of interrelated and interdependent elements."\(^6\)

The Webster's dictionary defines a system as
"A regularly interacting or independent group of items forming a undefined whole."\(^7\)

On the basis of above definitions the characteristics of a system may be summarized as below:

* A system is a general term applicable to many fields including instruction and education.
* A system is a dynamic and integrated whole.
* A system represents a complex but systematic organization of interrelated and interdependent elements.
* In a system, all the parts of elements have their respective roles, which have to be specified in relation to each other and in relation to the purposes to be achieved by the system.
* System, as a whole, functions more effectively and achieves better results than any sub-system/part or combination of the effects of individual parts.
* System is a self-governing, self-maintaining and self-regulated structure.

b) Systems Approach:

"Systems approach is a technique based on the system concept and its basic parameters for understanding, predicting and controlling the operation of a system in a given environment to achieve the pre-determined objectives in an intelligent, efficient and economy way."\(^8\)

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"Systems approach is one of the techniques which aims at finding the most efficient and economically intelligent methods."  
Kershaw and Mickean

"Systems approach is an educational tool developed to make the educational adventure more successful, holistic, responsive, responsible, logical, orderly, self-correctable and flexible, rather than wholly intuitive, unordered, undefinable and doubtful."  
Kaufman

From the above definitions, clearly systems approach is a technique. Systems approach indicates systematic thinking and step-by-step problem solving. The purpose of the system approach is to get the best overcome by using all available resources. The systems approach is concerned with identifying goals and determining and evaluating the means for accomplishing these goals. Identifying and organizing the goals and objectives requires a clean specification of the objectives of each element in the total system in relation to terminal goals or mission of the system as a whole. It also requires prorating the goals and the objectives, which implement each goal.

The systems approach involves monitoring progress. The system is initiated and is being maintained, with feedback to direct adjustments in the operating system. Evaluation is an integral part of the system approach. This requires checking the amount of quality of accomplishments, checking contributions of the elements in the process towards goal achievement and using the results of the evaluation to make improvements and to design new system.

In brief, systems approach refers to a scientific method of problem solving, decision making and planning.

c) Steps in Systems Approach:

There are three major steps involved in a system approach, namely

I. System analysis.

II. System design and development

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III. System operation and evaluation
Let us try to describe these steps.

I. System analysis: This step is concerned with the task of analyzing a system in the form of identifying its elements, the organization of these elements, the function or performance of these elements individually or as a whole in order to determine the need to make adjustment to ensure the achievement of system, namely, inputs, process, outputs and environmental constraints.

II. System design and development: This second step is related with the task of synthesizing. Here attempts are made to design and develop the system on the basis of the finding of the first step.

The main activities undertaken in this step are as follows:

a) Determination of the objectives of a system.

b) Selection of appropriate devices, methods, strategies and approaches.

c) Formulating a scheme of comprehensive programme for the working of system in relation to its parameters and stipulated objectives.

III. System operation and evaluation: This step is concerned with the actual operation of a system and its evaluation in terms of the objectives for providing necessary feedback to bring desirable improvement and modification in the structure and functioning of the system. It can be done in some of the following ways:

a) By manipulating the elements or inputs of the system.

b) By manipulating the functions of elements or inputs.

c) By manipulating the process and interaction among the elements of the system.

d) By manipulating environmental constrains of the system.

d) System Approach to Education:

The system approach in education is likely to solve various educational problems related with the organization and management of the process and
products of education. In brief, the purpose served by system approach in education may be summarized as follows:

* It can effectively improve the instructional system.
* It can help in managing and improving the school affairs by bringing efficiency in the school administration and management.
* It may help in seeking maximum effective utilization of the man, and material resources connected with the process of education.
* It may help in having systematic educational planning (institutional, regional or national) in terms of long-range and specific short-range objectives.
* It may help in bringing improvement in the examination and evaluation system.
* It may help in maintaining controlling and improving the guidance services of the school.
* It may help in improving training and development programmes.
* For study of theories of learning and the utilization of their knowledge in the development of instruction.
* To design remedial instruction, plan curriculum, effective improvement in his own professional competence.
* For designing communication channels to develop school community relationship and relationship with superior authorities.
* It helps educational planners to analyze the goal of the systems in terms of the pattern of expenditure.
* To prepare instructional system materials.
* For developing a training course for school administration.
* For planning and administrating programs for non-formal and adult education.
* In Educational Technology for preparation of Teaching aids

e) Systems Approach to Instruction

The concept of Instruction has been changing in recent years due to development of new technology in the field of education.
Instruction has the following characteristics:

- It is a process of communication.
- It is a process of adding behavioral development.
- It is creative planning and execution of educational environment.
- It involves active utilization of educational media.
- It includes abilities to test the pupil development.

The process of instruction may be viewed as a system consisting of certain interactive and inter-related elements operating in a systematic organized and regulated way to achieve stipulated instructional objectives.

According to Hunnum and Briggs "Instructional system may be viewed as composed of various inter-related components functioning together to achieve a purpose."  

The basic parameters involved in the instructional system may be represented diagrammatically as given below:

![Diagram of Instructional System](image)

**Fig. 2.2 STRUCTURE OF INSTRUCTIONAL SYSTEM.**

System approach to instruction helps in understanding, controlling and improving the structure and functioning of the system in view of effective instruction.

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realization of instructional objectives. It helps in providing best possible solution to the problems related to planning, process and product of instruction.

2.8 REVIEW OF THE RELATED STUDIES:
The researcher has decided to review the studies related to the study on hand for better planning, designing and developing the multimedia instructional system.

With a view to reviewing the related studies, the researcher has gone through the following volumes of Educational Research.

1. The 3rd Indian Year Book of Educational Research, NCERT, New Delhi, 1968.
8. website: http://www.ncert.nic.in

Besides, the researcher had also gone through different periodicals on Education such as The Progress of Education Published by Pune Vidyarthi Griha Prakashan, Pune. University News Published By Association of Indian Universities, Journal of All India Association for Educational Research, published by All India Association for Educational Research and various research papers published in other countries.
2.8.1 **Review of Related studies in India:**

There are 22 studies at doctorate level and five research projects related to different areas of computer or multimedia. The classification of the studies is tabulated in the following table.

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Sub area</th>
<th>Ph.D</th>
<th>Project</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Computer Assisted Instruction (CAI)</td>
<td>06</td>
<td>03</td>
<td>09</td>
</tr>
<tr>
<td>2</td>
<td>Attitudes towards computer</td>
<td>01</td>
<td>00</td>
<td>01</td>
</tr>
<tr>
<td>3</td>
<td>Use of computer</td>
<td>04</td>
<td>00</td>
<td>04</td>
</tr>
<tr>
<td>4</td>
<td>Multimedia strategy and materials without computer</td>
<td>07</td>
<td>00</td>
<td>07</td>
</tr>
<tr>
<td>5</td>
<td>Multi-media Instruction with computer</td>
<td>04</td>
<td>02</td>
<td>06</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>22</strong></td>
<td><strong>05</strong></td>
<td><strong>27</strong></td>
</tr>
</tbody>
</table>

A brief review of the above studies is undertaken in the following paragraphs.

1. **Computer Assisted Instruction (CAI):** Computer assisted or aided instruction is an educational procedure, which is supported and assisted by computer. Jeymani (1991), Rose, A.S.V (1992), Agarwal (1997), Rande (2004) and Suwanna, R (2005) worked on CAI.

   **Jeymani, P. (1991):** developed a CAI package in physics for class XI students. The effectiveness of simulation model of teaching was found out. The CAI package was found effective than traditional method of teaching the same.

   **Rose, Antony Stella. V. (1992):** worked on effectiveness of computer assisted instruction with special reference to underachievers. It was an...
experimental study. CAI with teacher support system was found more effective than CAI without teacher support system for underachievers. The two CAI strategies above are found superior to the traditional method of instruction.

RANADE, M. D., (2004): developed computer assisted study material on multiple intelligence for teacher educators. The CAI package contained 93 slides. The study was an experimental and used pretest – posttest – single group design. The package was found effective in bringing learning and evoking positive reactions towards use of CAI in teaching – learning.

SINGH, R. D.; AHLUWALIA, S. P.; And VERMA, S.K. (1991): studied the effectiveness of computer-assisted instruction in teaching of mathematics in their research project. The students, who used in computer, stored more and showed significantly highly favorable attitude towards mathematics than those who did not use computer and learned through the conventional method.

DUBEY, A. AND GAOSANDHE, V (1999): developed computer assisted material on the topic 'Pollution' of std IX. It was an experimental study the sample used was purposive. Pretest-Posttest single group design was used to measure the effectiveness of CAI, in terms of achievement. The CAI material was found effective.

AGARWAL, R. (1997): made a comparative study of conceptual understanding by programmed instruction and computer assisted instruction. The CAI was found effective.

SUWANNA, R. (2005): worked on computer assisted instruction for primary school students and found that CAI is effective.

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NAGAR, NIRMAL (1988): examined the usefulness of computer in teaching mathematics in schools. This was a survey report of three projects and ten research studies carried out in other countries. The major findings are computer assisted teaching (CAI) of mathematics benefited both teacher and learner, helped the learners to use their creativity by exploring new areas, computer facilities in the school are not adequate and sufficient.

SURI, A. (2005): tried to find out efficacy of computer simulated instruction at secondary stage in acquisition of biological concepts as related to intelligence and cognitive style. The computer simulated instruction was found effective.

2. Attitudes towards computer: The attitude of teacher and students towards computer in teaching learning process was studied, by.


3. Use of computer: The computer is used in many activities related to education. There are four studies at Ph.D level in this regard.

BOSE, K (1997): studied the effectiveness of computer programme as remedial strategies for overcoming specific learning disabilities.

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22 BOSE, K. "Studying the effectiveness of computer programme as remedial strategies for overcoming specific learning disabilities." Department of IASE, Jamia Millia Islamia, New Delhi University News, mar1997
BISWAL, A(1995): developed computer based time space personal management system.


MULLICK, S. P. (1979): compared a multimedia programme with a book format programme of the same content of class VI. He used six pairs of matched group with respect to intelligence. Analysis of variance of six cells was used for analyzing the gains in achievement. The multimedia programme was found superior to the book format programme.


23 BISWAL, A. "Development of computer based time space personal management system", Maharaja Sayajirao Uni. of Boroda, Vadodara University News Mar 1995


in his study and experimented on 180 students of class IX and X. He found that multimedia methods are more effective.

**BASU, M. K. (1981)**: studied effectiveness of multimedia programmed materials in teaching of physics. The sample consisted of 400 learners of std. IX that was further divided into five groups. 5x3x3 factorial design was used in the experiment with five groups, three levels of instruction and three levels of abilities. He used analysis of covariance in analyzing and interpreting data. The multimedia semi-programmed instruction was found better than multimedia semi programmed instruction, branching programmed instruction was found better than multimedia linear and multimedia hybrid programmed instruction. The strategies of multimedia programmed instruction enable the learners to reach the level of mastery learning.

**RAVINDRANATH, M. J. (1982)**: developed a multimedia instructional strategy for teaching biology to std VIII students in twelve different units. The final validation of the strategy was done through experimentation by using pretest – posttest parallel group design. The multimedia instructional strategy was found effective to the extent that 70% of the experimental group students obtained 60% and above in all units tests. They developed scientific attitude significantly higher and the strategy was found quite feasible in terms of time for completing the course.

**VARDHINI, V. P. (1983)**: tried out a multimedia instructional strategy for teaching physics and chemistry at secondary level. Pretest- posttest single group experiment was used to validate the strategy. Validity of the strategy was also established from reaction expressed by the students. The strategy

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was found valid against the criterion of scientific attitude. A significant relationship was found between scientific attitude and achievement. Visual projections with teacher explanation and those with taped commentary were found equally effective in terms of achievement.

KRISHNAN, S.S. (1983)\(^\text{31}\): developed a package for teaching a course on audio-visual education including variety of audio-visual materials. The package was tested by single group experimentation. The package was found effective.

MENON, M.B. (1984)\(^\text{32}\): developed a multimedia strategy in organizing a course in educational technology for postgraduate students. He used experimental method for validation for the strategy. At different strategy of implementation of the strategy, the students’ attitude towards the multimedia approach went on increasing in a favorable direction and the students scored 75% and more marks.

5 Multimedia Instruction with computer: There are four doctorate level studies and two projects on multimedia instruction with the help of computer and/or using systems approach in the development. Wagh (1991), Shesharantam (1995), Datta (1998) and Bahulikar (2002) did their work at doctorate level and Bhatnagar and others (1991) and Shikhare (2003) at project or M.Phil level.

WAGH, S.K.(1991)\(^\text{33}\): developed a multimedia instructional system for remedial measures in fractional numbers by using systems approach to instruction. The multimedia instructional system was containing charts, slides, filmstrip, transparencies, audiocassettes etc. It was 2x2x6 factorial design experimentation used to test the hypotheses. Common errors committed by students in fractional numbers and their operations were


found out by using a battery of diagnostic tests. Remedial measures were planned and a multimedia system was developed by using system approach to instruction. The multimedia instructional system was found effective than traditional instructional system in improving the performance on all six computational skills in fractional numbers. The effect of the system on the performance of the students in fractional numbers was not found dependent on sexes and levels of skills when sex levels were averaged. System and sexes jointly did not affect the performance of the students in fractional numbers at different levels of skill when systems and sexes averaged over the levels of skills.


DATTA.N.K.(1998): did an experimental study on relative effectiveness of computer assisted instruction and multimedia instructional strategy in teaching of physics in relation to learners cognitive styles and found that multimedia instruction strategy is more effective.

BHAULIKAR, JAYASHREE(2002): developed study material in environmental education for B.Ed. pupil teachers. She has also developed a multimedia instructional system for the same. The study was based on descriptive method. Its purpose was to collect detailed information about the present setting of teaching the subject to suggest best practices and standards. Researcher prepared teaching material in written and in CD format. The whole teaching programme was found useful and effective in bringing about interaction among the students and in creating interest about

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36 BHAULIKAR, JAYASHREE., : Development of a Course of Studies And Material in Environmental Education as a part of B.Ed Syllabus And a Study of Its Effectiveness.Pune.uni 2002
the subject. The students found the developed material fascinating and useful.

BHATNAGAR, ASHA. AND GUPTA, NIRMALA (1991)\textsuperscript{37}: Prepared a multimedia package on development and career guidance in which audio-video programme briefs, programme scripts were included. The programme was tried out on various target groups and finalized into multimedia package. In it 10 audio and 2 video programmes, and one volume of print material were prepared. This was independent study.

SHIKHARE, V.P (2003)\textsuperscript{38}: In his study at M.Phil level, developed multimedia instructional system on educational technology for B.Ed. pupil teachers. He used system approach in his study. The system was linear multimedia instructional system. The validation of the developed system was done through experimentation by using four-group pretest-posttest experimental design. He found that the present setting of teaching of educational technology in B.Ed. colleges was unsatisfactory. Developed multimedia instructional system helped the pupil teachers from expt. group in performing better than those from control group in performing better than those from control group. Developed multimedia instructional system was found effective and useful than the conventional instructional system.

Criticism: The researcher reviewed 27 studies, which are related to computer or multimedia. He found that - 

1. Most of the studies (nearly 9) are on computer assisted instruction (CAI) for the different subjects. The researchers developed CAI package and tried to find out their effectiveness under controlled conditions. Computer assisted instruction was found effective, useful and time consuming.


2. The studies on use of computer in education proved its effective use in remedial teaching, personal management and distance education. The attitude of teachers and students towards use of computer in teaching-learning was also found favorable.

3. There are seven studies on developing multimedia strategies without the use of computers and six studies with the use of computer and/or system approach.

   The studies on developing multimedia strategies without the use of computers were the studies before the arrival of computers in India. The use of more than two media – like audio and visual – is called as multimedia and in most studies slides/filmstrips are used with audiocassettes. Most of the studies are on programmed learning. The multimedia packages were found to be superior in all seven studies.

   The studies on developing multimedia instruction with the help of computer and/or using system approach are very few in number. The multimedia instructional system developed and used in various subjects were found very effective, useful and superior in all six studies.

4. Out of the 27 studies, none is on development of multimedia instructional system on computer education for B.Ed. pupil teachers. There is not a single study on use of latest multimedia technology with the help of computer software.

5. Hence, the researcher feels that there is a great need of developing multimedia instructional system on the elective subject 'computer education' with the help of latest teaching and by using systems approach.

2.8.2 Review of the Related studies in other countries.

There are 10 studies at research project level, which are related to different areas of computer or multimedia. The classification of the studies is tabulated in the following table.
<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Sub area</th>
<th>Studies</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Ph.D</td>
<td>Project</td>
</tr>
<tr>
<td>1</td>
<td>Attitudes towards computer</td>
<td>00</td>
<td>03</td>
</tr>
<tr>
<td>2</td>
<td>Use of computer</td>
<td>00</td>
<td>06</td>
</tr>
<tr>
<td>3</td>
<td>Multi-media Instruction with computer</td>
<td>01</td>
<td>00</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>01</td>
<td>09</td>
</tr>
</tbody>
</table>

A brief review of the above studies is undertaken in the following paragraph:

1. Attitude towards computer: There are three studies at project paper level in this regard the attitude of teacher and students towards computer in teaching – learning process was studied by

   SUE TRINIDAD, JEAN MACNISH, JILL ALDRIDGE & BARRY FRASER\(^{39}\): This paper indicates that teachers are making significant progress in their transition towards teaching in an ICT-rich environment. Most of the students hold positive attitudes towards their experiences and feel that the ICT-rich environment being developed at school encourages students to become more self-directed in their learning.

   BRIAN FERRY AND SHIRLEY AGOSTINHO\(^{40}\): studied comparison between experts in which one had expertise in pedagogy and curriculum design but had experience with the use of the web and the other had little experience with pedagogy and curriculum design, but had expertise in using web. The paper explains how the authors collaborated to develop deeper understanding of their roles as teacher and users of information technology.

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\(^{40}\) BRIAN FERRY AND SHIRLEY AGOSTINHO., Synergetic partnerships: Towards more effective professional development in IT use in tertiary teaching, University of Wollongong, Australia., http://www.aare.edu.au/pap/abs01.htm
WAN NG AND RICHARD GUNSTONE: investigated science teachers' attitude towards the use of computer-based technologies in their teaching. They have found teachers with attitude towards the use of computer-based technologies in their teaching were effective and professionally developed.

2. Use of computer: The computer is used in many activities related to education. There are six studies at project paper level.

PHILIP C CLARKSON AND RON TOOMEY: studied the use of computer in teaching mathematics at secondary level. It appears that the emphases in the external curriculum, lack of professional in-service, and the teachers already demonstrated success in teaching mathematics obtained the exploration of advanced computer applications.

BRIAN FERRY, JULIE KIGGINS, GARRY HOBAN AND LORI LOCKYER: investigated how different types of computer-mediated communication were used to support an alternative approach to initial teacher education that relied on the formation of a knowledge building community. The findings showed that the students preferred to use forums available to all participations. They also found that many of the skills they used in mediating face-to-face discussion could be transferred to the on-line situation.

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43 BRIAN FERRY, JULIE KIGGINS, GARRY HOBAN AND LORI LOCKYER.: Use Of Computer-Mediated Communication To Form A Knowledge-Building Community In Initial Teacher Education, Faculty of Education, University of Wollongong – Australia Northfields Avenue Wellington, N.S.W., Australia 2522., http://www.aare.edu.au/pap/abs 01.htm
HELEN J. FORGASZ & NIKE PRINCE\textsuperscript{44}: studied the effect of using computers for the teaching and learning of mathematics. Teachers of these students also answered a survey on their professional background, computer ownership and use, and their beliefs and practices in teaching mathematics with computers. The findings showed superiority of computer for the teaching and learning of mathematics.

PAMELA. N. MATTERS\textsuperscript{45}: The study was related to pre-service teacher internship program. This paper describes current research which shows that ICT, telementoring and uninterrupted periods of teaching in a preferred area of interest heightens motivation and expertise of beginning teacher interns as they enter the profession.

CAROLE STEKETEE, JAN HERRINGTON & RON OLIVER\textsuperscript{46}: studied Do computers enhance learning? at Ph. D. level. It proved that implementation of computers helps in quality learning within the distributed learning environment.

MARGIE BECK\textsuperscript{47}: studied the use of IT in teaching. The major findings were use of IT in teaching confidence and also it helps to develop professionally.


\textsuperscript{45} PAMELA. N. MATTERS.: Beginning teacher internships, telementoring and ICT – newfangled or new ways? Journeys of discovery, James Cook University, Australia., http://www.aare.edu.au/pap/abs 01.htm


\textsuperscript{47} MARGIE BECK.: Teachers and IT - Integrating the two into the Curriculum, Australian Catholic University, http://www.aare.edu.au/pap/abs 01.htm
3. Multi-media Instruction with computer: There is single study in doctorate level on multimedia instruction with the help of computer. **BELINDA HO**\(^48\): studied comparison between the group that used only transparencies in their teaching and the group that used both transparencies and power point slides. The researcher found that the group which is treated with both transparencies and power point slides achieve more than the group which is treated with only transparencies.

**Criticism:** The researcher reviewed 10 studies, which are related to computer or multimedia. He found that-

i. Most of the studies (nearly 9) are on use of computer in teaching – learning process. The researchers proved that the use of computer helps to develop teacher confidence, professionalism, and quality learning. It also helps to study mathematics at secondary level.

ii. There are three studies on attitude towards computer. It helps students to become more self-directed in learning. It is also proved that experts with experience of use of web are superior than the experts without experience of use of web.

iii. The uses of power point slide with computers found very effective, useful and superior related to the group, which used only transparencies.

iv. Out of 10 studies, there is not a single study on use of latest multimedia technology with the help of computer software, for the B.Ed. pupil teachers.

v. Hence, the researcher feels that there is great need of developing multimedia instructional system on the elective subject 'Computer Education and Information Technology'.

\(^{48}\) BELINDA HO.: From using transparencies to using PowerPoint slides in the classroom, City University of Hong Kong, http://www.aare.edu.au/pap/abs 01.htm
with the help of latest technology and by using system approach.

2.9 CONCLUDING REMARKS:

The chapter was devoted to some theoretical concern regarding computer education, multimedia and system approach to instruction along with the review of related studies. The review of related literature and studies helped the investigator in designing his research work. He decided to use system approach to multimedia instruction. The details are elaborated in the next chapter.
CHAPTER III
SYSTEMS APPROACH TO MULTIMEDIA INSTRUCTION