“Keep close to experience; add as little of your own as possible; if you have to add something, be mindful to give an account of every step you take”

-E. M. Urban

Chapter – I

INTRODUCTION
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1.1 PERMEABLE

"Teaching is the profession that teaches all the other professions."

Teachers lie at the core of any living society. They are important mediators of social change, social reconstruction and social rejuvenation. The role of teacher education as a process of nation building is universally recognized. Its objective is man-making and producing enlightened citizens. Teachers being so vitally important for any society, the task of their preparation and education assume equal importance. But teacher education in INDIA is neither contemporary nor reality based. Ideally parents should be concerned about the preparation of those who are to teach their children, but this has not happened in India, historically teacher education has suffer from “congenital malaise” (Goodlad 1999). Its soggy knowledge base and thinly grounded theoretical instruction, non-alignment of its theory and practices, absence of a professional gradient and the unique constraint of its organization around multiple school subjects have turned it into what many view as peripherally detached sleepy back waters of the academic.

Educational Psychology is the scientific discipline that addresses the questions “Why do some students learn more than other?” and “What can be done to improve that learning?” It contributes to a better understanding of the aims of education by defining them, making them clearer; by limiting them, showing us what can be done and what can not; and by suggesting new features that should be made parts of them. To achieve the aims of education in modern world, it makes sense to take an innovative approach to teaching that can prove better in the long run than letting it just filter in for the highly-motivated teachers.

Information and communication technology (ICT) has become, within a very short time, one of the basic building blocks of modern society. The incorporation of Information and Communication Technologies in education and training programmes has profound influence in teaching and teacher preparation. The student accesses knowledge and information through Internet, TV, satellite and cable.
network and digital media to synchronise learning mediated through these multiple delivery mechanisms.

By transforming the computer into an instructional tool in a classroom, the computer will become the most popular tool (Brown, 1998). The multimedia programme allows students to work at their own pace and supports connections and comparisons that a traditional text does not. An environment in which the student is "empowered to control their own learning" is said to foster "deep learning" which is self-motivated and self-directed (Latchem, 1993). Multimedia environments allow users to explore and undertake a range of tasks that closely mirror those of the real world. In this way, you do not have to be constrained by verbal descriptions of visual activities. When students are able to convert learning into a world in which the leaning processes naturally unfolds, higher levels of cognition are attained (Hedberg & Brown, 1997). Because attention tends to lapse some ten to eighteen minutes into a typical classroom lecture, teachers need to find ways to engage students into the classroom lecture. Video and web-resources reengage students. Brief digital sound and video clips can accentuate a point and add an element of surprise to the lecture causing students to pay closer attention (Stone, 1999).

Computer Education is now a part of our school education but teacher education institution have hardly bothered to harness ICT to improve their programs, for this teacher education has to transform itself, the educational system needs to come to terms with the new challenges and have to take the full advantage of modern media facilities.

Educational systems around the world are under increasing pressure to use the new Information and Communication Technologies to teach students the knowledge and skills they need in the 21st century. "Through computers the use of multimedia has created novel modes of learning and greatly contributed to the restructuring of instructional environments in schools" (Relan & Gillani, 1997). With the presence of multimedia computers in today's classrooms, educators now face many more challenges. Instructors find themselves with the responsibility of teaching in today's sophisticated environment. Some researchers, like Lewis (1999), supported the idea
that in the 21st century, students learn concepts at a higher level of thinking when they are interwoven with multimedia products. So for a pre-service teacher education program without an integration of Information and Communication Technology, it could not be said to be a complete one.

Writers on teacher education such as Kline (1994) claimed that multimedia had unique potential for pre-service teacher education programs. Multimedia were seen to have special significance for teacher education because of growing expectation that teachers must be technologically literate in order to provide relevant instruction in schools. Most good teacher Educators always assume that they have a long way to go, before they become the kind of educators they really want to be; so they try hard not to miss any opportunities for growth and development. So an educator can become a proactive practitioner by adopting new methods of teaching. Improving as an educator is always continuing to hunt for what works the best for the students in a specific time frame and keeping in mind the syllabus prescribed for that particular class. So that means enriching oneself with innovative technology to deliver in the most effective manner.

One of the most rapidly changing and exciting areas of education in the world today is development of computer-based teaching materials, especially Multimedia Learning packages that run on personal computers. These new technologies offer students and teachers access to materials as never before. Through the condensed storage capabilities of computers, multimedia can deliver large amounts of information in ways that make it manageable, approachable, and useful. Multimedia makes it possible to access illustrations and photographs, sound and video, as well as large amounts of text. Multimedia programmes present learning information to teachers, students and scholars in newly engaging and meaningful ways. The integration of multimedia programmes into classrooms and libraries promises not only to change the kinds of information that is available for learning, but the ways that learning takes place. One of the advantages of using multimedia is to convey information quickly and effectively to all students and keep them interested in learning (Savage and Vogel, 1996).
The multimedia approach in teaching-learning scenario means a strategy, which incorporates more than one technique/media of instructional unit. But it is not just a collection of a few media or techniques; rather it is planned combination of several technique/media with special reference to instructional objectives because different potentialities for realizing varied objectives. The Multimedia Approach aims at the maximum utilization of effectiveness of different techniques and media in proper combination to acquire the desired end.

1.2 Importance of Educational Psychology for Pre-service Teachers

"The teacher needs psychology to bridge the lives of the young and the aims of education in our democratic society". - Skinner

Modern education is based and founded on psychology. The child is imparted education only after making a thorough study of his interests, aptitudes, potentialities, intelligence and personality. Today education and psychology are complementary to each other. Drever (1930) is of the opinion that educational psychology is an essential element of education. Without its help, the problem of education cannot be solved. Both education and psychology are concerned with behaviour. The researches of psychology have a heavy impact on other aspects of education. In the words of Jha (1946), “Education has to depend on psychological findings for what is done and how it is done.” He further says that “the process of education is entirely at the mercy of psychology.” According to Davis (1943), “Psychology has made a distinct contribution to education through its analysis of pupil’s potentialities and differences. It has also contributed directly to knowledge of pupil’s growth and maturation during the school years.”

Educational Psychology is as crucial to teacher education as physics is to engineering or anatomy is to medicine. Although the anatomy teacher suggests no surgical techniques, one can imagine the consequences if a surgeon were to operate without a sound knowledge of anatomy. A similar relationship exists between educational psychology and teaching. Educational psychology advocates no particular teaching method or learning theory, but a variety of choices that would
help one to understand standard behaviour and thus improve one’s teaching techniques (Travers, 1979).

Educational Psychology is the science of education which deals with the problems of teaching and learning and helps the teacher in his task of modifying the learner’s behaviour and bringing about an all-round development of his personality. Therefore, while in psychology the scope of study and the field of operation are extended to cover the behaviour of all living organisms related to all their life activities, in Educational Psychology, the scope of such behavioural study has to be limited within the confines of the teaching-learning process, i.e. studying the behaviour of the learners in relation to their educational and the all-round development of their environment, specially for the satisfaction of their educational needs and the all-round development of their personality. In the words of Skinner (1958), “Educational psychology covers the entire range of behaviour and personality as related to education.” Davis (1943) in ‘Applicability and applications of psychology with particular reference to classroom learning’ pointed out the significance of educational psychology as, “Psychology has made a distinct contribution to education through its analysis of pupil’s potentialities and differences as revealed by means of various types of psychological tests. It has also contributed directly to the knowledge of pupil’s growth and maturation during the school years.” A great deal of educational psychology is concerned with the better understanding of the intellectual, emotional, social and even physical growth of children-phenomena in which parents and teachers should be vitally interested (Lovell, 1958).

Educational Psychology helps the teacher to become a better teacher, and the learner to become a better learner. In the education of teachers, educational psychology makes discipline a scientific tool, a precision instrument by which teachers can clarify goals, increase their perspective of the learning process, and learn to evaluate not only their pupils but also themselves. Blair (1947) in ‘The Psychological Interpretation of Teaching’ stated the importance of educational psychology to the teacher in these words, “Modern teacher, if he is to succeed with his work should be a specialist who understands children, how they grow, develop, learn and adjust. He
should be diagnostician, who can discover special difficulties of children and at the same time possesses the requisite skill for carrying forward the necessary remedial work. He should also be performing important educational and vocational guidance functions. No person untrained in the methods of psychology can possibly fulfil the obligations and tasks which are the responsibilities of the teacher.”

According to Blair, Jones and Simpson (1966) “educational psychology helps teachers make wise decisions.” Everyday, and in many ways, teachers makes decisions that influence the pupil, school and community, learning how to make judgements and to take decisive action, at times plan fully and carefully, but often forced speedily by the demands of the situation, require the teacher to understand himself, his pupils and processes of learning and intellectual development. These understandings are essential parts of educational psychology which select from the total field of psychology those facts and principles that have a direct bearing upon growth, learning and adjustment processes.

Educational Psychology equips the teacher with such knowledge as can make him competent to direct or guide learning, motivate pupils to learn, help pupils develop desirable attitudes, improve teaching techniques and achieve those personal qualities that are conducive to successful teaching (Crow and Crow, 1964).

The teacher’s position is like that of medical practitioner who has to study his patient before giving prescription. The teacher who knows his pupils and the psychological principles, but does not know how to diagnose and improve his own behaviour and his relationship with his pupils may be ineffective. Educational Psychology functions as an essential aid to the work of the teacher. It therefore, assists him to develop competence in studying children, in utilizing psychological principles, and in evaluating his own teaching methods (Blair et al., 1954).

Without the knowledge of educational psychology teacher is like a rudderless boat sailing aimlessly in the sea. The knowledge of educational Psychology helps the teacher to develop proper attitudes; assists the teacher to set up appropriate educational situations; helps the teacher in teaching their pupils sympathetically and impartially and with most suitable methods and techniques; helps the teacher in
understanding his own job and social relationship; helps him in the organisation of curriculum and proper guidance programme; helps him in planning out the proper evaluation techniques; helps him in handling gifted, backward, delinquent and problem children; helps him in creating interest by using audio-visual aids and reducing fatigue and by encouraging joint participation in the lesson. Ultimately, it helps in the realization of the aim of the education, i.e., the harmonious development of personality. Hence, we can say that when “the rule of thumb fails, the laws of psychology, and their application can bring fruitful results.”

1.3 CONCEPT OF MULTIMEDIA

In the simplest form of definition, Multimedia can be described as: Two or more media combined to provide information about a subject or concept. Media (both digital and analog) can be any of the following: Text, drawings, graphics, photographs, film, video, wireless, audio, animation, web, and so on. Combining two or more of these elements into a computer based presentation creates a multimedia presentation.

![Figure 1.1 Concept of Multimedia](image-url)
According to Starr (1996), “Multimedia is computing our way to Educational Reform”. The concept of multimedia has existed for many years. There is lot of confusion about what exactly Multimedia is. A simple way of defining multimedia is that it denotes the combination of several media to transport information in several forms from one point to another. The technology of using text and words, diagrams, graphics, sounds and video images collectively to show everything more effectively is called as Multimedia.

In a most general way, multimedia is defined as a system which exploits the computer to combine text, graphics, animation, audio and video into a single synchronised production or presentation. Under this definition, CD ROMs, internet, pen drive and films are multimedia delivery mediums. Planning, storyboarding, editing and authoring are the steps of development of Multimedia. The main focus in this definition is the capability of the computer to exploit hardware and software to integrate different elements of the multimedia. These elements may be developed independently by various media sources into a multimedia user interface or presentation.

1.3.1 DEFINITION OF MULTIMEDIA
Definitions of multimedia available on the web and books are:-

- A combination of multiple media types, including text, graphics, animation, audio and video is called Multimedia.
  (www.actewagl.cm.au/education/Glossary/default.aspx)

- Generic description of the generation and transfer of voice/data/video traffic between users. Applications to exploit multimedia to the full are text, graphics, audio, video and animation.
  (www.nettedautomation.com/glossary_menu/glossary_m.html)

- A form of communication combining text with graphics, page layout, video, audio, animation, and so forth.
  (www.dakno.com/glossary.php)
• The use of several media, such as movies, slides, music, and lighting in combination normally for the purpose of education or entertainment.
(www.publicspeakingcourse.com/glossaryk-o.htm)

• Writing and filmmaking encompassing more than one medium at a time, script-wise, usually refers to CD-ROM games or Internet-based programming.
(www.screenwriting.info/glossary.php)

• Computer-controlled presentations combining three or more of the following elements: text, graphics, animation, full-motion images, still video images and sound
(www.src.iisc.ernet.in/Computinfacilities/systems/cluster/vac7.0/html/glossary/czgm.htm)

• The combination of audio, video, animation and graphics. Multimedia software presents information in all these contexts. Multimedia computers are required to run these types of programmes.

• Presenting data in more than one medium, such as combining text, graphics and sound.
(www.m2ketch.com/hardware_glossry.htm)

• Software programmes that combine text and graphics with sound, video, animation. A multimedia PC contains the hardware to support these capacities.
(www.gbdpro.com/glossary3.html)

• A term used to describe a range of products that have some audio and/or visual basis; for example, encyclopedia programmes are labelled as being “multimedia”.
(www.youngmers.com/dictionary/3/)

• “Multimedia is the combination of a variety of communication channels into a co-ordinated communicative experience for which an integrated cross-channel language of interpretation does not exist”. (Elsom-Cook, 2001)

• This is a software that combines graphics, audio and video to make us a media presentation.
(www.its.strath.ac.uk/helpdesk/glossary)
• “Multimedia can be defined as an integration of multiple media elements (audio, video, graphics, text, animation, etc.) into one synergetic and symbiotic whole that results in more benefits for the end user than any one of the media elements can provide individually”. (Reddi, 2003)

• Systems that support the interactive use of text, audio, still images, video, and graphics. Each of these elements must be converted in some way from analog form to digital form before they can be used in a computer application. (tr.wou.edu/ntac/documents/fact_sheets/glossary.htm)

• The integration of audio, video, graphics and text. (mason.gmu.edu/-montecin/netterms.htm)

• This originally indicated a capability to work with and integrate various types of things including audio, still graphics, and especially video. (Ambron and Hooper, 1988)

• Multimedia is the integration of multiple forms of media. This includes text, graphics, audio, video, etc. For example, a presentation involving audio and video clips would be considered a multimedia presentation. (srdc.msstate.edu/ecocommerce/curricula/farm_mgmt/glossary.htm)

From the general definitions, it is clearly evident that multimedia encompasses a wide spectrum of applications and technology. Any one or more of the following media and / or a combination of Audio, Text, Graphics, Animation and Video is generally employed in all Multimedia Projects in the field of education.

1.3.2 ELEMENTS OF MULTIMEDIA

The elements used in multimedia have all existed before. Multimedia simply combines these elements into a powerful new tool, especially in the hands of teachers and students. Interactive multimedia weaves five basic types of media into the learning environment: text, video, sound, graphics and animation.
Text - Out of all of the elements, text has the most impact on the quality of the multimedia interaction. Generally, text provides the important information. Text acts as the keystone tying all of the other media elements together. It is well written text that makes a multimedia communication wonderful. Text is used in multimedia for different purposes such as-

- Title texts
- Body texts
- Miscellaneous texts

Audio - plays a vital role in the making of a multimedia. Sound is used to provide emphasis or highlight a transition from one page to another. Sound synchronized to screen display, enables teachers to present lots of information at once. In multimedia audio is put in the form of—

- Natural Sounds
- Music
- Dialogues
- Narrations
While developing multimedia, audio recording is a serious business and needs great effort and expertise.

Video - is made up of a series of frames of slightly varied images “which”, when shown in rapid succession gives the impression of movement. To give smooth motion, PC needs to display over 25 frames per second. Each frame is a separate image so even a short video clip takes up huge amount of space on disk.

Animation literally means to bring something to life. A computer based animation performed by a computer using graphical tools to provide visual effects. It is yet another feature of multimedia capabilities. Two-Dimensional (2-D) Animation is the most common type today, such as cartoons. However, 3-D Animation has mostly been confined to the engineering field like Computer Aided Design (CAD). As 3-D Animation technology matures and becomes more competitive, this feature will also get into applications like on-line tutorials, simulations and virtual classrooms.

![Animation Diagram](image)

**Figure 1.3 Types of Animation**

Graphics play a major role in any multimedia application. All formats of graphics can be presented in a multimedia. An image represents a still picture in digital form by using bits to specify the colour of each of many pixels. An image is a spatial representation of an object, a two-dimensional or three dimensional scenes or another image. It can be real or virtual. An image is a still picture/photograph used for adding visual effect to multimedia. In computer vision, an image is usually recorded image such as video image or a picture. In computer graphics, an image is always digital in nature.
1.3.3 TYPES OF MULTIMEDIA

The multimedia programmes are mainly of two types-

- Linear
- Non-Linear

![Multimedia Diagram]

Figure 1.4 Multimedia Programme Linear and Non-linear

(A) Linear – Early multimedia was linear in nature. In linear multimedia, the end user receives a programme, which plays a sequence of sound, video and images without any control over the presentations content.

(B) Non-Linear – In contrast to linear, if the programme lets the user control the sequence by selecting different options, it is called Interactive Multimedia (IMM) or Non-linear multimedia.

Interactive and Non-Interactive Multimedia:

"The term 'interactive multimedia' is a catch-all phrase to describe the new wave of computer software that primarily deals with the provision of information. The 'multimedia' component is characterized by the presence of text, pictures, sound, animation and video; some or all of which are organized into some coherent program. The 'interactive' component refers to the process of empowering the user to control the environment usually by a computer" (Phillips, 1997).

A clear distinction can be made between 'interactive' multimedia and 'non-interactive' multimedia on the basis of interactivity level. Interactivity relates to communication between the multimedia system and its user; i.e. it requires input
from its audience. Interactive media may also be accessed to various sequences by the user, whereas non-interactive multimedia tends to be linear in sequence. Interactive multimedia has been called a “hybrid technology”. It combines the storage and retrieval capabilities of computer database technology with advanced tools for viewing and manipulating these materials.

Multimedia has a lot of different connotations, and definitions vary depending on the context. In the context of school education, interactive multimedia may be defined as any package of materials that includes some combination of texts, graphics, still images, animation, video and audio. These materials are packaged, integrated and linked together in such a way that offers and analyzes indexing features with capacity to create good teaching-learning environment.

The most obvious benefit of interactive multimedia is that "a virtually limitless array of resources can be incorporated into the lesson plan, providing learning experiences that otherwise would be unavailable to students" (Lamb 1992). Multimedia is capable to deliver large amount of material in multiple forms in an integrated environment that allows the students to have the wonderful reading, listening and viewing experience. By allowing users to control the sequence and the pacing of the materials, multimedia packages facilitate great individualisation in learning. Multimedia allows students to proceed at their own pace in a tailored learning environment. Furthermore, multimedia can be a powerful learning and teaching tool because it engages multiple senses.

"As humans, we seem hard-wired for multiple inputs. Consider that we remember only about 10% of what we read; 20%, if we hear it; 30%, if we can see visuals related to what we’re hearing; 50%, if we watch someone do something while explaining it; but almost 90%, if we do the job ourselves-if only as a simulation. In other words, Interactive Multimedia-properly developed and properly implemented—could revolutionize education". (Menn, 1993)

The use of Multimedia for education is increasing day by day both in formal as well as non-formal sectors i.e. illustrated stories to support the language teaching, demonstration of the experiments or to prepare the animated pictures to explain the
Multimedia packages can enrich the experiences of the children and help the teachers to enrich the text and study materials. Now a days Multimedia Programmes are developed on various themes. The development of multimedia package involves listing of the concepts/sub concepts, programme briefs and content outlines. Planning for the pre-production includes preparation of story board, development of the script, systematic collection, the creation of the graphics and then the actual production including 2-D/3-D animation/graphics programming with the sound and visual recordings on the computer and lastly testing and dissemination with the target groups. Occasionally television camera shots are also added to the computer graphics resulting into the virtual marriage of the television with the computer for better results. All media programmes whether audio, video or computer aided generally originate from a given theme of a topic which is the basic step in planning and production. The themes or ideas are processed and refined thoroughly and expanded further in the form of the programme outline or a programme brief.

Today, Multimedia is considered as the seamless digital integration of text, graphics, animation, audio, still images and motion video in a way that provides wonderful experience to the user. The evolution of Multimedia is a story of the emergence and convergence of these technologies.

1.4 HISTORY OF MULTIMEDIA

History of Multimedia is a story of invention, ingenuity and vision. In order to understand multimedia we need to understand its historical background. We are living in the information age with multimedia permeating every aspect of life from commercial to education. To understand the history of multimedia, we need to peep into the history and development of various technological aspects which paved way for the development of multimedia.

Early computers, large machines of computing dinosaur age that ended in the late 1970s, were single-medium devices. They had no monitor screens and their only
output was on paper. With the microcomputers of the mid 1970s came monitor screens and computer could show text and some crude pictures on a TV type of screen. By the early 80’s machines were starting to appear with a built-in loudspeaker so that sound also could be obtained. It was at this point of time the PC was put to some serious use. In the 1990’s, the word multimedia started to appear and since then, there has been no looking back in the development and progression in the field of multimedia. In order to understand the history of multimedia we need to have an insight into the development of the computers.

• In 1975, the first personal computers were marketed. Its features included a low processor power and black and green text-only screens. These were used in applications like accounting and inventory control.

• By 1980, the personal computers had been augmented in technology by adding hard disk storage and simple graphics. These could be used in statistics too.

• By 1987, the capabilities of personal computer had increased manifolds. These were capable of displaying colour, providing more advanced graphics, sounds and animation. These were mainly employed in word processing and desktop publishing.

• Since 1995, we have the capability of integrating digital video, sounds, animation and text into one, hardware and software package. There is an increasing emphasis on communication capabilities and sharing information over networks such as the internet. These have now become popular in applications like simulations, internet, communications and presentations.

• History of animation can be traced from the early 1800s to just before the advent of the personal computer. In a modern age animation is widely used in the entertainment industry and also being applied in education in the form of Multimedia.

“The historian, with a vast chronological account of a people, events and inventions parallels it with a skip trail which stops only at the salient items, and can follow at any time contemporary trails which lead him all over civilization as a particular epoch. There is a new profession of trailblazers, those who find delight in the task of establishing useful trails through the enormous mass of the common record. The
inheritance from the master becomes, not only his additions to the world's record, but for his disciples he entire foundation on which they are erected”. (Bush, 1976)

As these technologies developed along separate paths for disparate purposes, visionaries saw the possibilities of growth. Technological aspect refers to the stepwise development from the phase of development of the printing press to the emergence of the modern form of multimedia.

1.4.1 THE EVOLUTION OF MULTIMEDIA

Evolution of multimedia can be woven around five themes developed over a timeline, Visionaries, Text, Processing and Software, Audio and Telecommunication, Computers, Video and Animation.

Visionaries - Innovations of the outstanding thinkers had a direct impact on the explosion of the technological age. So the ingenious idea of the programmable computer can be traced back to the innovations of visionaries.

Text, Processing and Software - Inventions and innovations that spawned the development of software enabling computers to move from mathematical processing of technology, which creates and delivers multimedia.

Computers - From academic and corporate worlds, we can trace computer development from gigantic, noisy, bulky dinosaur computers to the role of sleek, handy and efficient desktop personal computer and laptop of today.

Audio and Tele-Communication - From the telegraph signal to cellular telephones and the development from analog signal to digital transmission of voice.

Video and Animation - From manually manipulated negative film and hand drawn sketches, video and animation developed to sophisticated digital creation and rendering of motion.

So the history of Multimedia can be best understood by understanding the development in these five fields.
### Table 1.1

#### History of Multimedia

<table>
<thead>
<tr>
<th>Time &amp; Vision</th>
<th>Text, Processing &amp; Software</th>
<th>Computers</th>
<th>Audio &amp; Telecommunication</th>
<th>Video &amp; Animation</th>
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</thead>
<tbody>
<tr>
<td>1455</td>
<td>Printing Press Gutenberg and Caxton, movable type printing</td>
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<td>1780 FRANKLIN</td>
<td>Franklin discovers electricity</td>
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<td>1822 BABBAGE</td>
<td>Charles Babbage designs the Difference Engine</td>
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<tr>
<td>1833 LADY BYRON</td>
<td>Babbage designs Analytical Machine, often considered to be the first general-purpose computer. Lady Byron writes programs for the machine</td>
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<td>1837 MORSE</td>
<td>Telegraph receiver and transmitter</td>
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<td>1839</td>
<td></td>
<td></td>
<td>Daguerreotype: photographs produced using a paper negative</td>
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<td>1854 BOOLE</td>
<td>George Boole: develops binary mathematical language of 1's and 0's (Boolean Algebra)</td>
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<td>1867</td>
<td>Remington Manual Typewriter</td>
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<td>1876 BELL</td>
<td>Telephone</td>
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<tr>
<td>1879 EDISON</td>
<td>Granted a phonograph patent</td>
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<tr>
<td>1886</td>
<td>Burroughs: First commercially successful adding machine.</td>
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<tr>
<td>1888</td>
<td>Mood Music for Film: Musical scores sent along for organ accompaniment Gramophone: disks</td>
<td>Film: Sequential photographs with sprockets manually pulled</td>
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<tr>
<td>Year</td>
<td>Event</td>
<td>Details</td>
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<tr>
<td>1890</td>
<td>HOLLERITH</td>
<td>Tabulating Machine for the U.S. Gov. Census using punch cards. The tabulating machine later became IBM.</td>
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<td>1920</td>
<td></td>
<td>Manually rotated at 70 rpm through a projector</td>
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<td>1925</td>
<td></td>
<td>Commercial radio: KDKA Pittsburgh</td>
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<td>1927</td>
<td></td>
<td>Electronically recorded sound discs AT&amp;T's Bell labs allow recording of whole symphonies</td>
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<tr>
<td>1927</td>
<td></td>
<td>&quot;Talkies&quot;: The first commercial talkie film using optical sound recording.</td>
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<td>1927</td>
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<td>Juke Box: Automatic Music Instrument Company - coin operated phonograph</td>
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<tr>
<td>1927</td>
<td></td>
<td>Telephone becomes operational between London and New York</td>
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<td>1927</td>
<td></td>
<td>&quot;The Jazz Singer&quot; starring Al Jolsen. First public demonstration of T.V.</td>
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<tr>
<td>1928</td>
<td>DISNEY</td>
<td>&quot;Steamboat Willie&quot; first cartoon with a fully synchronized soundtrack</td>
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<td>1931</td>
<td>ZUSE</td>
<td>Conrad Zuse First calculator.</td>
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<tr>
<td>1932</td>
<td></td>
<td>Magnetic tape BASF introduces magnetic tape recording</td>
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<td></td>
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<tr>
<td>1933</td>
<td></td>
<td>Dudley Vocoder - voice code</td>
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<tr>
<td>1936</td>
<td>TURING</td>
<td>&quot;Turing's Machine&quot; defined as capable of computing any calculable function</td>
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<tr>
<td>1937</td>
<td></td>
<td>&quot;Snow White and the Seven Dwarfs&quot; the first full-length animation is released.</td>
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<td>Year</td>
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<tr>
<td>1939</td>
<td>ATANASOFF</td>
<td>John Atanasoff and Clifford Berry design a prototype of the ABC computer (the first automated digital computer).</td>
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<td>1940</td>
<td></td>
<td>First colour T.V.broadcast</td>
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<td>1941</td>
<td></td>
<td>&quot;Colossus&quot; built for the British military from Alan Turing's design</td>
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<tr>
<td>1943</td>
<td></td>
<td>Zuse – Z3: First machine to work on a binary system rather than decimal system.</td>
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<tr>
<td>1945</td>
<td>BUSH</td>
<td>&quot;As we may think&quot; in the Atlantic Monthly</td>
<td></td>
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<tr>
<td>1946</td>
<td>MAUCHLY</td>
<td>ENIAC Electronic Numerator Integrator and Calculator the first successful high speed digital computer. However, it used the same concepts that Atanasoff and Berry used to build the ABC computer.</td>
<td></td>
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<tr>
<td>1948</td>
<td></td>
<td>Shockley, Bardeen and Brattain develop the transistor. More reliable and cheaper to run than vacuum tubes.</td>
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<tr>
<td>1951</td>
<td></td>
<td>UNIVAC Computer used magnetic tape for buffer memory.</td>
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<td>1952</td>
<td></td>
<td>IBM 701: First electronic stored computer that used vacuum tubes, RAM, punch cards and was the size of a piano.</td>
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<td>1953</td>
<td></td>
<td>Electric typewriter</td>
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<td>1954</td>
<td></td>
<td>Transistor radio: First commercial use</td>
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<td>Year</td>
<td>Event</td>
<td>Description</td>
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<tr>
<td>1956</td>
<td>First Transatlantic telephone cable</td>
<td>CBS broadcast First network broadcast using video tape.</td>
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<tr>
<td>1957</td>
<td>Sputnik launched</td>
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<td>1958</td>
<td>CRAY: Builds the CDC 1604 for Control Data Corporation. The first fully transistorized supercomputer. Texas Instruments develops the first Integrated Circuit. Solves the problems of speed, size and wiring.</td>
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<td>1959</td>
<td>Second generation computer introduced by IBM. Used transistors instead of vacuum tubes.</td>
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<tr>
<td>1960</td>
<td>Removable disks</td>
<td>Paul Baran sees a communications network different than the traditional point to point links. He envisioned a &quot;fishnet network&quot;.</td>
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<tr>
<td>1964</td>
<td>&quot;Understanding Media&quot; postulates the global village.</td>
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<tr>
<td>1965</td>
<td>Xanadu hypertext project</td>
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<tr>
<td>1969</td>
<td>Development of hypertext editing system</td>
<td>Dolby labs produces Dolby noise reduction for pre-recorded tapes.</td>
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<td>1970</td>
<td>Fourth generation computer by IBM uses chips to reduce</td>
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<tr>
<td>Year</td>
<td>Event</td>
<td>Notes</td>
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<tr>
<td>1971</td>
<td>4004 chip developed by Hoff. Computers can now be owned by individuals.</td>
<td></td>
<td>Phillips laserdisc playback only deck PONG, first commercial video game</td>
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<td>1972</td>
<td>Metcalf outlines ideas for Ethernet</td>
<td>Kahn &amp; Cerf present ideas for structure of Internet</td>
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<tr>
<td>1974</td>
<td>Intel 8080 microprocessor which was to be used in many PC's.</td>
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<tr>
<td>1975</td>
<td>Microsoft is founded by Bill Gates.</td>
<td>DND takes over ARPANET</td>
<td>SONY Betamax VCR with a one hour, ½ inch video cassette tape.</td>
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<td>1976</td>
<td></td>
<td>JVC introduces VHS format.</td>
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<td>1977</td>
<td>Apple was founded by Steven Jobs and Steve Wozniak</td>
<td>Email provided to 100 researchers</td>
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<td>1978</td>
<td>First commercially available cell phone</td>
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<td>1979</td>
<td>VisiCalc: the first spreadsheet Wordstar: word processing package is released.</td>
<td>Walkman: SONY introduces a portable audio cassette player. First MUD, MUD1, by Richard Bartle and Roy Trubshaw at U of Essex Beginning of on-line services with CompuServe and The Source</td>
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<tr>
<td>1980</td>
<td>Word Processing Machine Single purpose machine with limited storage on magnetic material.</td>
<td>SONY introduces the consumer camcorder</td>
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<tr>
<td>1981</td>
<td>The MS-DOS, or Microsoft Disk</td>
<td>Adam Osborne completed the first Apollo Computer unveiled the first</td>
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<tr>
<td>Year</td>
<td>Operating System</td>
<td>portable compute</td>
<td>work station</td>
<td>Remarks</td>
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<tr>
<td>1982</td>
<td>Lotus 1-2-3, software writes directly into the video system of the IBM PC</td>
<td>First digital audio 5&quot; compact disc.</td>
<td>Computer-generated graphics in movies step forward with Disney's &quot;Toon.&quot;</td>
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<td>1983</td>
<td>First PC clone</td>
<td>Musical Instrument Digital Interface (MIDI) introduced</td>
<td>Internet is born TCP/IP protocol</td>
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<td>1984</td>
<td>W. Gibson in <em>Neuromancer</em> coins the term &quot;cyberspace.&quot;</td>
<td>Apple Computers introduces the Macintosh with the first mouse driven GUI (Graphical User Interface).</td>
<td>3 1/2-inch &quot;microfloppy&quot; diskette DNS: domain name server introduced voicemail developed</td>
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<tr>
<td>1985</td>
<td>Desktop publishing Aldus PageMaker for the Macintosh</td>
<td>NSFNET: linking five university supercomputer centres (550 mg)CD-ROMs evolve from CDs on which music is recorded.</td>
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<tr>
<td>1986</td>
<td>Optical transistor patented, a component central to digital optical computing.</td>
<td>SONY Betamax removed from consumer shelves</td>
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<tr>
<td>1988</td>
<td>Robert Morris' worm flooded the ARPANET.</td>
<td>3D Graphics: 3D graphical supercomputers Pixar's &quot;Tin Toy&quot;: the first computer-animated film</td>
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</tbody>
</table>
### History of Multimedia

Clark (1977) further focuses on the concept of multimedia and the glittering world created by it “Before you become too entranced with gorgeous gadgets and mesmerizing video displays, let me remind you that information is not knowledge, knowledge is not wisdom and wisdom is not foresight. Each grows out of the other and we need them all.” Clark (1997) impresses upon the fact that multimedia attracts everyone, but needs to be used judiciously.

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
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<tbody>
<tr>
<td>1989</td>
<td>Handwriting recognition is introduced by grid with a touch sensitive pad on a laptop computers.</td>
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<tr>
<td>1990</td>
<td>IBM, Tandy AT &amp;T, and others announce the software specifications for multimedia platforms. ARCHIE.</td>
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<td>1991</td>
<td>GOPHER</td>
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<td>1992</td>
<td>BERNERS LEE</td>
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<tr>
<td>1993</td>
<td>Mosaic developed by M. Andreessen</td>
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<td>1994</td>
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<td>1995</td>
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</table>
So Multimedia by itself can be fruitful. “It is the competence of the teacher on which depends the success and failure of the Multimedia in the field of Education”. - Clark.

Today, Multimedia is made possible and affordable because of increase in storage and speed and decrease in size and cost; this yields an increase in performance and availability. Electronic Communications can be broadly classified in two categories:

- Analog
- Digital

In the analog form of electronic communication, information is represented as a continuous electromagnetic wave form. Digital communication represents information in binary form through a series of discrete pulses. A digital signal is made up of on and off pulse of electricity.

Digital media record audio as binary computer code. Computers process, store and communicate information in binary form, i.e., in the combination of 1’s and 0’s which has specific meaning in computer language. A binary digit (bit) is an individual 1 or 0. Multiple bit streams are used in a computer network.

With the development of excellent graphics and emergence of stereo sound multimedia, the computers have become excellent device for effective interaction and entertainment. The multimedia revolution has changed forever, what computers can do for us by giving those new ways to present information, and act as powerful source of information and communication.

1.5 BENEFITS OF MULTIMEDIA IN THE CLASSROOM

The simplicity and power of multimedia enriches teacher’s creativity and leads to multi-sensory student learning. It is also a whole lot of fun!

At one time, multimedia was considered to be a very technical venture. When teachers talked about using multimedia in the classroom, they probably imagined a gaggle of sophisticated components being orchestrated by a human with five or six arms. Those were the days when just about everything you needed to explore, learn, and communicate about a topic – using multimedia – came with its own separate cord.
Multimedia is no more a big hassle, since computers today come already equipped with everything we need, such as speakers for sound, vivid colour, the ability to play video clips, and even internal CD-Rom drives. It is making a great difference in the development of Multimedia Learning Package in the field of Education.

“The most exciting thing about Multimedia is that it reaches all the senses, and that is why, its use in the field of education is even more justified”, says Young, Chairman of the Department of Technology/Cognition at the University of North Texas, Denton. “Students are given more fodder for their imaginations.” (Young, 2005).

Educationists like Young have piled up articles, anecdotes, and their own research studies to draw conclusions about using Multimedia in the classroom. “I am comfortable enough about multimedia to know that it is making a difference in learning”, Young says, “Something good is definitely happening with Multimedia”.

Marsh Academic Dean for Worcester Country School, Berlin, Md., agrees. Her school uses multimedia right through from the kindergarten to the senior grade. She says both her students and teachers find it exciting to use the encyclopaedias, research programmes, presentation tools, and curriculum- specific CD-ROMs that come under the banner of Multimedia. (Marsh, 2007). “It’s very difficult to measure anything that’s not black and white, “How can you measure self-esteem, when a child who does not do well with traditional instruction suddenly excels using Multimedia? I’ve seen students staying for school, compelled and interested in a subject matter when teachers used multimedia approach. Multimedia takes children far beyond what would normally be learning through the textbook. Multimedia works wonders”.

1.5.1 BENEFITS TO THE LEARNER

“Multimedia is liked and preferred by students in place of traditional teaching methodology”, (Marsh, 2007)

Students enter school already audio and visually sophisticated due to exposure to TV Programmes at home they’re accustomed to high-resolution graphics, stereophonic
sound, and interactive video. "Students seem to have a compatible relationship with multimedia from the start," (Young, 2005).

Numerous studies have also shown that student's academic achievement improved when taught through multimedia approach (Kulik, 1994 and Patil, 2006). According to Capper and Copple (1985) the users of computer-assisted instruction learned as much as 40 percent faster than those receiving traditional teacher-directed instruction. Various explanations have been put forward with regard to the cognitive benefits provided by the use of various communications technologies in preparing multimedia learning package for enhancing student's conceptual understanding. Selinger (2004) claimed that multimedia content helps to illustrate and explain difficult concept in ways that were previously inaccessible through traditional teaching resources and methodologies. Chandra (2002) has also reported the use of different multimedia in bringing about conceptual change. Bosco (1986), Fletcher (1989) and Najjar (1996) reported that interaction which results during teaching – learning process as a result of different multimedia have a strong enhancing influence on the learning of the pupils by improving their retention and their speed of learning. They found that Novelty associated with multimedia enhanced interest in learning. Students felt motivated to learn with computers after seeing their usefulness in teaching – learning. (Ranade, 2004 and Madan, 2009) Through Multimedia teachers can take advantage of student’s multi-sensory abilities to support and enhance traditional forms of learning.”(Marsh, 2007)

Multimedia helps the learners in understanding the concepts faster, creates interest, increases their participation, makes classrooms lively and boosts their achievement. Multimedia is very useful for students with special needs, since it has multi-sensorial approach.

1.5.2 BENEFITS TO THE TEACHER

The beauty of Multimedia is that it gives teachers a creative medium without requiring them to be certified “techies”.
"With modern user friendly computers, it is so easy to use multimedia that teachers don't even need a lot of technical training" Marsh (2007) says. Teachers can handle it without any high-tech training.

Multimedia offers the educator many benefits including: satisfying educational objectives, increasing students understanding, demonstrating events, showing places, conducting experiments which would otherwise be impossible.

The teachers can fit the Multimedia Programmes right into their class curriculum. Rather than viewing multimedia as an afterthought to the main instruction, teachers can turn to it as a tool to reach a wide variety of learners. Multimedia offers teachers an immediate entryway into the student's learning process and as teachers become familiar with the benefits of using multimedia in their classrooms, they are bringing their own strengths and creativity to bear on how multimedia fits their style of teaching. "Multimedia provides educators with the tools to bring learning alive for students" (Lamb, 1992).

"You just introduce a good multimedia program to a teacher", says Marsh, "and he or she will find a million ways to use it".

If the teacher wants to use multimedia in the classrooms, the computer should have various components that make it a "Multimedia" computer. So a multimedia PC is a must in today's classroom. The cost-effective Multimedia Classroom can prove a blessing in the field of education.

Multimedia has invaded the classroom around the world. It has been felt by the educationists internationally that presentation software such as PowerPoint has greatly enhanced the classroom environment and has proved to be an effective presentation device, but Indian schools have get not realised the potential of Multimedia in the classroom.

"Using Multimedia effectively in the Teaching-Learning Process can do wonders. Textual information, but the way they are presented can improve the learning process of students". (Allied, 2007).

With the increasing demand to teach via computers, it is important for teachers to become familiar with using multimedia. Over the past two decades, there have been
numerous studies on how visual information incorporated into instruction can foster meaningful learning. Initially researchers focussed on illustrations that accompanied text, but with computer instruction different presentation modes are easily presented. Anderson (1976) discovered that illustrations along with narration by teacher or in pre-recorded form have developed increase student’s recall and comprehension. Other studies have supported the same finding. Multimedia and its effectiveness have been endorsed by dual coding theory and its contiguity-effect. Dual-coding theory proposes that people have two separate pathways or systems in working memory to process information. One system processes verbal information, and the other processes visual information. If both of these systems are used to learn information, then the information may be more likely to be remembered and recalled.

Mayer and Gallini (2007) have connected the Redundancy effect in order to prove the supremacy of multimedia over traditional method of teaching. Redundancy effects emphasizes upon the narration versus Text in Multimedia Learning. When instructing via multimedia, there is an option to present verbal information through an auditory narrative or through on-screen text.

Mayer and Gallini (2007) found that coordinating text with pictures improved learning. They found that students who were presented text with a narrative by the teacher scored significantly higher on retention, matching and transfer tests.

In the past, a teacher or student had to consult many sources and use several media to access the needed information but multimedia has made it all very simple now. By integrating media teachers are able to create healthy learning environments. There has already been a growing acceptance of it in educational settings at international levels and soon in our country also multimedia would be playing a vital role in the field of education.

1.5.3 MULTIMEDIA AS A SOURCE OF EDUTAINMENT

Edutainment is an informal term used to describe combining education with entertainment, especially multimedia entertainment. It provides relatively equal
emphasis on enjoyment and learning. Many programmes for learning fall into this category i.e. Multimedia Encyclopaedias, Dictionaries and Thesaurus. Similar to the traditional book and dictionaries, multimedia version contains words, their meaning and synonyms and antonyms. However, they are better than traditional ones by presenting the information in a more dynamic and involving way. Navigating the e-dictionary is quicker with each traceable with ease.

The Multimedia story-books provide a new platform of interaction to learner by life­like animated characters. Multimedia stories offer new world of adventure to children. The children can progress through story at their own pace, and can be effective in helping a child to learn. The principle on which the story-books work is that entertainment and education can be a powerful combination. Children are introduced to an anchor/character which often narrates the story to them. Apart from their environment value, the titles and sub-titles also help children to recognize words. Short animation illustrates the meaning of difficult words or phrases in the story in an interesting manner. So learning of language takes place effortlessly.

In times to come, computer will replace the actual classrooms. Multimedia based education will greatly enhance and enrich education by providing the teacher's a new role of facilitator, and with the opportunity of individual attention, and enabling students to move at their own pace. So the multimedia will not entertain but also enrich and enhance the present dull and drab education system which is in dire need of revival. So multimedia will prove as a great source of edutainment for students.

1.6 STATEMENT OF THE PROBLEM

EFFECTIVENESS OF A MULTIMEDIA LEARNING PACKAGE IN EDUCATIONAL PSYCHOLOGY FOR PRE-SERVICE TEACHERS

1.6.1 OPERATIONAL DEFINITION OF THE KEY TERMS

In the present study, a few terms have been frequently used that have got specific meaning for the present investigation. Given below are the operational definitions of these terms.
1) **Effectiveness**: Empirical usefulness with respect to achievement of objectives.

2) **Multimedia Learning Package**: The word Multimedia simply means being able to communicate in more than one way. So Multimedia Learning Package (MMLP), by definition has the capacity to deliver large amounts of materials in multiple forms meant for teaching, and to deliver them in an integrated environment that gives students the reading, listening and viewing experience through amalgamation of text, audio, video, graphics and animation.

Distinction may be made between the terms multi-media (multiple media) and multimedia. Multi-media (multiple media) implies the use of more than one media such as television video, tape slide and graphics aids like charts, poster, kit and projected aids to explain the specific concept where as multimedia implies the use of technology through computers to deliver the lesson using various elements of media-like text, graphics, audio, video and animation. There may be use of one or more mediums to present a concept depending on the need.

1.7 **OBJECTIVES OF THE STUDY**

The seven objectives of the study are:

1. To develop the Multimedia Learning Package for pre-service teachers.
2. To validate the Multimedia Learning Package for pre-service teachers.
3. To develop Online Achievement Test for the students of experimental group.
4. To develop Opinionnaire to seek the opinion of teacher-educators about the effectiveness of multimedia as a teaching–learning strategy for pre-service teachers.
5. To study the mean achievement scores of two groups of pre-service teachers in Educational Psychology before the experimental treatment.
6. To compare the mean achievement scores of two groups of pre-service teachers taught Educational Psychology with and without the use of Multimedia Learning Package after the experimental treatment.
7. To compare the mean gain achievement scores of two groups of pre-service teachers taught Educational Psychology with and without the use of Multimedia Learning Package after the experimental treatment.

1.8 HYPOTHESES

In terms of hypotheses, the objectives of the study would translate themselves as:

H1 At the end of experimental treatment, the group of pre-service teachers taught Educational Psychology through MMLP (Multimedia Learning Package) scored significantly higher on the achievement test than the group of pre-service teachers taught through the traditional method.

H2 At the end of experimental treatment, the group of pre-service teachers taught Educational Psychology through MMLP (Multimedia Learning Package) showed significantly higher gain score on the achievement test than the group of pre-service teachers taught through the traditional method.

1.9 DELIMITATIONS OF THE STUDY

The present study was delimited to:

- Pre-Service teachers of two sections of B.Ed. of Pradeep Memorial Comprehensive College of Education, Delhi.
- Multimedia Learning Package based on five topics of Educational Psychology. Five topics were selected from the syllabus of various universities of Educational Psychology of B.Ed.
  - Growth and Development
  - Learning
  - Motivation
  - Personality
  - Basic Statistics
- 45 days of the academic session.
1.10 NEED FOR THE STUDY

“Teachers to be taught and trained” is a relatively growing concept found in societies all over the world, for this many learners do professional training (B.Ed.) to improve their teaching skills and undergo professional training. Learning of Educational Psychology encompasses several important objectives at pre-service level. The mode of teaching-learning of Educational Psychology affects pre-service teachers thinking. In modern age of Science and Technology besides print media, audio, video, broadcast teleconferences, computers etc. are used for communication. Educational usage of various multimedia techniques is rapidly increasing. Its power to present information in ways, not previously possible and its integration of resources allows for the creation of rich learning environments thus leading to effective learning process and great output. For qualitative improvement in teacher education in teaching learning process, Multimedia can prove as a big breather as it is capable of sustaining the interest of the learners, through visuals and audio inputs. It also brings in the elements of the outer world into the classroom. It can help learners in understanding the complex concepts in a very simple way. Today more emphasis is laid upon the experience rather than rote learning. In teacher education a number of media are used to teach student. Keeping the above factors in mind, the researcher decided to develop Multimedia Learning Package to teach Educational Psychology to the pre-service teachers in an effective way.

1.11 JUSTIFICATION OF THE STUDY

(1) Novelty of the project: Need-based systematic Multimedia Learning Package, produced so far in the field of education, are very few as the organizational structure and the mechanism for the production of these packages is distinct and rigorous as compared to the other media.

(2) Lack of syllabus specific MMLP: It was felt by the researcher that there is dearth of syllabus based Multimedia Learning Package for pre-service teachers. The packages for teaching-learning process have to be specifically designed, keeping in view the interactivity level and syllabus of the target group. The process of learning,
structured in multimedia package is the future of the education. For development of syllabus based MMLPs, the content has to be sequenced systematically, by involving the subject matter specialist, the educators, the child psychologist, the producer, scriptwriter and if such a vast group of people is not available, an educator alone can handle it. So the educator plays a pivotal role in the development of these learning packages as the educator know condone also how it can be presented. Multimedia based entertainment packages are in plenty, but syllabus based learning packages are not readily available as yet. Multimedia enriched classroom is still an alien concept in our country. So the researcher took up the study to develop Educational Psychology MMLPs for pre-service teachers and find the effectiveness of these MMLPs for teaching of Educational Psychology.

1.11 POST-SCRIPT-SEARCH FOR A NEW PARADIGM
Multimedia Learning Package can provide a breakthrough in the massive problems faced by the Educational Psychology educators in the teaching learning process. Significance of Multimedia can’t be ignored in the field of education. So undoubtedly one of the most rapidly changing and exciting areas of education in the world today is the development of computer-based teaching materials, especially interactive multimedia package that run on personal computers. These new technologies offer students and teachers access to materials as never before. Through the condensed storage capabilities of computers, multimedia can deliver large amounts of information in ways that make it manageable, approachable, and useful. And by making it possible to access illustrations and photographs, sound and video, as well as large amounts of text, multimedia package present learning information to educators, teachers, students, and scholars in newly engaging and meaningful ways. Multimedia can be used in education for:

- CAL (Computer Aided Learning),
- CBT (Computer Based Training courses),
- Reference Systems-Dictionaries, Thesaurus, Encyclopaedias,
- Simulations-High tech 3-D effects for learning some complex concepts,
Virtual environments—bringing elements of outer world in the classroom. Multimedia classrooms are the future of education and the integration of multimedia programmes into classrooms promises not only to change the kinds of information that is available for learning, but the way that learning takes place.