Chapter – I
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1.1 PREAMBLE
The importance of environment has been recognized in India since long and according to Vedas, a relationship between man and nature is of mutual respect and kindness. Several animals have been considered as vehicles of God or Goddess; Hindus worship trees and plants. The people of ancient India protected the environment from pollution and degradation by all means. Not only that they protected the external environment but also the conductive environment generated by yagyas. At the same time they protected their psychological and cultural environment by obeying the moral and religious norms, maintained high values of life and quality of environment, as the quality of environment has a direct impact on the quality of man.

“Everything is good, as it comes from
the hands of nature,
that everything degenerates in the
hands of man.” Rousseau (1768)

The unprecedented increase in population and intensity of human activities, which have occurred largely in this century, has been brought about by the growing mastery of science and its application. This had produced prosperity, improved standard of life and expanded opportunities beyond what earlier generations could have imagined but these developments have damaged and deteriorated the ecological systems and caused widespread destruction of natural resources base, on which human life and well being depends upon. The cooperation of world’s people is essential to mitigate or avert these environmental risks. Student’s participation is essential in any environmental programme to protect our environment from further degradation and reduce the environmental problems occurring due to such activities.

Environment ethnologically means surroundings. It is the natural world of land, sea, air, plants and animals that exists around us. In layman’s language environment
encompasses everything that is around us. According to Douglas and Holland “The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behavior and the growth, development and maturity of living organisms.”

According to Anastasi “The environment is everything that affects the individual except his genes.” The components of the environment are:

Figure-1.1 Components of Environment

1.2 ENVIRONMENTAL EDUCATION

Environmental Education (EE) is an effective tool for developing environmental awareness. In 1977, Inter-Governmental Conference on EE, organized at Tbilisi, Georgia, emphasized on the following objectives of EE.

Awareness – to help social groups and individuals acquire an awareness of sensitivity to the total environment and its allied problems.

Knowledge – to help social groups and individuals gain a variety of experience in, and acquire a basic understanding of the environment and its associated problems.
Attitude – to help social groups and individuals acquire a set of values and feelings of concern for the environment, and the motivation for actively participating in environmental improvement and protection.

Skills – to help social groups and individuals acquire the skills for identifying and solving environmental problems.

Participation – to provide social groups and individuals with an opportunity to be actively involved at all levels in working towards resolution of environmental problems.

Understanding – to develop a basic understanding of structure, processes and problems of environment, interdependence of environmental components.

Ability – to develop an ability for evaluating environmental components and educational programmes in terms of ecological, economic, social, cultural, aesthetic and educational factors.

According to the Belgrade Charter the aim of Environmental Education is to develop a citizenry which is aware of and concerned about the total environment and its associated problems and that has the knowledge, attitude, motivation, commitment and the skills to work individually and collectively towards solutions of current problems and prevention of new ones.

This is reflected in our constitution also, wherein it states that – It shall be the duty of every citizen to protect and improve the natural environment, including forests, lakes, rivers and wildlife and to have compassion for living creatures. {Article 51 A (g)}

The National Policy of Education 1986 states, “There is paramount need to create a consciousness of the environment. It must permeate all ages and all sections of society, beginning with childhood. Environmental consciousness should involve teaching in the schools and colleges. This aspect will be integrated in the entire educational process.”

Accordingly, the National Curriculum for Elementary and Secondary Education, 1986 incorporated socio-cultural, political and economic considerations as well as some pedagogical concerns. Ever since, the National Curriculum Framework for School Education (NCFSE – 2000) highlighted the need for including environmental
concerns at all the level of schooling sincere efforts have been made in this regard by infusing the components of Environmental Education (EE) i.e (i) Learning about the environment; (ii) Learning through the environment implying a systematic exploration through a variety of activities; and (iii) Learning for the environment by developing a genuine concern for sensitivity towards its protection and preservation, as part of different disciplines.

The seriousness of India initiative in the area of environment is also explicit in the fact that the Supreme Court of India in one if its judgments (2003) directed the NCERT to prepare model syllabi of environmental education as a compulsory subject for implementation throughout the country. At the elementary level, an integrated approach has been used, where teaching of environmental concerns and challenges are a part of science, social science, mathematics and other subjects. Here the coverage is related to the child’s surroundings, health and hygiene along with suitable field activities and observations. Emphasis is laid on maximum use of school and home surroundings as well as other settings. It helps in promoting awareness and appreciation about the local environment. Children’s participation in simple projects related to different environmental issues and problems serves two purposes First it acquaints and sensitizes them towards environmental problems, and concerns, and secondly it inculcates in them healthy personal and social attitudes and behavior towards environment.

1.3 ENVIRONMENTAL AWARENESS

Environmental awareness is a broad philosophy and social movement regarding concerns for environmental conservation and improvement of the state of the environment. The ability to observe daily condition and surrounding to make on the spot decision to either avoid danger or take advantage of the opportunities offered In 1972 at Stockholm an International Workshop was held on Environmental Education to discuss various aspects of environmental problems.

UNESCO in cooperation with the UNEP launched the ‘International Environmental Education Programme (IEEP) in 1972. IEEP aimed at assisting governments, national, international and regional institutions to incorporate Environmental
Education. In 1975, IEEP organized the Belgrade Workshop concerned with Environmental Education. In 1977 the Inter-Governmental Conference on Environmental Education was organized at Tbilisi, Georgia: in Rio-de-Janeiro (Brazil) in 1992, the United Nations Conference in Environment and Development (UNCED) organized a meeting of 160 countries for global awareness towards environment.

The UN World Conference on the Environment in Stockholm in 1972, the Global Forum in 1992, the Earth Summit held in Rio de Janeiro 1992 and in Johannesburg in 2002, and activities organized by the government and non-government organizations of different countries generated awareness among masses towards environment; consequently efforts are being made to resist environmental degradation.

In India the National Policy on Education 1986/1992 and 9th Five Year Plan (1997-2000) have given a great impetus to the government to promote environmental concerns.

The awareness towards environment should be aroused from childhood, as children are the future decision makers. They should be aware of their responsibilities and duties towards the social and ecological environment.

In order to realize the objectives of EE i.e. generating awareness, developing attitudes, values and skills and promoting participation and action among children, a teacher has to adopt different transaction modalities of EE so as to make it more meaningful. At the elementary level, the entire transaction needs to be woven around the child’s immediate environment and it must also be built upon the child’s inherent curiosity, observation and ability to correlate at that age. For the effective programme of Environmental Education our teachers themselves should possess enough environmental awareness and skills of achieving objective related to their students. If the concerned teacher does not use required motivational aids, appropriate strategies and transaction modalities for teaching environmental issues desired results cannot be achieved. Majority of the teachers, while teaching, follow conventional method of classroom teaching. As a result of which “Environmental education, such an
interesting and varied nature topic, becomes dry and least interesting for most of the students.”

The phenomenon of under achievement in classrooms in our country has been brought out in the survey of research in education (Buch 174, 179, 1987, 1991, NCERT 1997). The large number of failures in examinations is yet another symptom of the problem. The cause has been identified to be poor learning by the student which in turn implies ineffective instruction. The under achievements cause tremendous wastage of resources invested in our education. The obvious inference is that most of the children are underachievers in our school as their achievement is far below the limits of their ability and capacity. Many children of average intelligence also achieve far below the limits of their ability and capacity. Hence, to raise the achievement level, the quality of education in the classroom and to make the effective use of school curriculum, it is required to select and implement appropriate teaching learning strategies. The appropriateness of teaching strategies is determined by the proper synchronization of educational objectives, nature of subject matter and nature of the learner and his environment. What is required is, teachers should educate students with the help of plethora of interactive media, learner centered approaches and strategies of evaluating environmental education (EE).

Amongst such approaches, teaching Environment through Multimedia approach is one of the interactive strategy to deal with the young minds. In this approach computer-based teaching materials are developed which run on personal computers. 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 teaching method environment allows users to explore and undertake a range of tasks that closely mirrors 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 the learning
process 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 teaching. Video and web-resources re-engage students. Brief digital sound and video clips can accentuate a point and add an element of surprise to the teaching causing students to pay closer attention (Stone, 1999).

Multimedia method of teaching 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 method of instruction is to convey information quickly and effectively to all students and keep them interested in learning (Savage Vogel, 1996).

The multimedia method of teaching, 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 a planned combination of several techniques/media with special reference to instructional objectives because of different potentialities for realizing varied objectives. The Multimedia method of teaching aims at the maximum utilization of effectiveness of different techniques and media in proper combination to acquire the desired end for teaching such a varied subject to the students effectively with better retention powers, as Plato put it memorably: 'The purpose of education is to make the individual want to do what he has to do.'
1.4. 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.

![Multimedia Concept Diagram]

Figure 1.2 Concept of Multimedia
According to Starr (1996), "Multimedia is computing our way to Educational Reform". The concept of multimedia has existed for many years. There is a lot of confusion about what exactly is Multimedia?. 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.

1.4.1. SOURCES OF MULTIMEDIA

In the strictest sense of the word, multimedia simply means "more than one medium."

Multimedia has come a long way from its humble roots to today's cutting-edge modern animation and interactivity.

In the real world, though, when most people talk about multimedia, they are talking about computer multimedia. The word has come to represent the realm of computer graphics, video games, on-screen presentations, and a whole world of other possibilities.

Where Did It All Begin? That is hard to say, but one of the earliest and best-known examples of multimedia was the video game Pong. Developed in 1972 by Nolan Bushnell (the founder of a then-new company called Atari), the game consisted of two simple paddles that batted a square "ball" back and forth across the screen, like tennis. It started as an arcade game, and eventually ended up in many homes.

A New Revolution In 1976, another revolution was about to start as friends Steve Jobs and Steve Wozniak founded a startup company called Apple Computer. A year later they unveiled the Apple II, the first computer to use color graphics. The computer revolution moved quickly: 1981 saw IBM's first PC, and in 1984 Apple released the Macintosh, the first computer system to use a graphical user interface (GUI). The Macintosh also bore the first mouse, which would forever change the way people interact with computers.

In 1985, Microsoft released the first version of its Windows operating system. That same year, Commodore released the Amiga, a machine which many experts consider to be the first multimedia computer due to its advanced graphics processing power.
and innovative user interface. The Amiga did not fare well over the years, though, and Windows has become the standard for desktop computing.

**Innovations**: Both Windows and the Macintosh operating systems paved the way for the lightning-fast developments in multimedia that were to come. Since both Windows and Mac OS handle graphics and sound – something that was previously handled by individual software applications – developers are able to create programs that use multimedia to more powerful effect.

One company that has played an important role in multimedia from its very inception is Macromedia (formerly called Macromind). In 1988, Macromedia released its landmark Director program, which allowed everyday computer users to create stunning, interactive multimedia presentations. Today, Macromedia Flash drives most of the animation and multimedia you see on the Internet, while Director is still used to craft high-end interactive productions.

Each new development of each passing year is absorbed into next year’s technology, making the multimedia experience better, faster, and more interesting. Thus, we can state that the technology of using text and words, diagrams, graphics, sounds and video images collectively to show everything more effectively is called as Multimedia. To understand what is multimedia the theories related to it will give an explicit explanation about it.

### 1.4.2. THEORIES OF MULTIMEDIA

Multimedia is defined as the usage of two or more medias (audio, video, animation) to educate or express to the audience an idea or a fact. These paragraphs are going to focus on the “Cognitive Theory of Multimedia Learning (Mayer).” The human brain tends to grasp concepts faster once they are represented in both a pictorial and word form, this phenomena is what Mayer tries explaining by assuming three different theories by Allan Paivio (dual coding theory), Alan Baddeley (model of working memory), and Dr. John Sweller (cognitive load theory) respectively;

- There are two separate channels (auditory and visual) for processing information (sometimes referred to as Dual-Coding theory);
• Each channel has a limited capacity (similar to Sweller’s notion of Cognitive Load);
• Learning is an active process of filtering, selecting, organizing, and integrating information based upon prior knowledge.

According to the theory, the learner possesses a visual information processing system and verbal information processing, such that auditory narration goes into the verbal system whereas animation goes into the visual system. In multimedia learning, the learner engages in three important cognitive processes. The first cognitive progress, selecting, is applied to incoming verbal information to yield a text base and is applied to incoming visual information to yield an image base. The second cognitive process, organizing, is applied to the word base to create a verbally-based model of the to-be explained system and is applied to the image base to create a visually-based model of the to-be-explained system. Finally, the third process, integrating, occurs when the learner builds connections between corresponding events (or states or parts) in the verbally-based model and the visually-based model. The model is explained more fully in Mayer (1997), and has generated a series of experiments yielding five major principles of how to use multimedia to help students understand a scientific explanation.

Multiple Representation Principle pictures - The first principle is simply that it is better to present an explanation in words and pictures than solely in words. For example, students who listened to a narration explaining how a factory pollutes our natural resources (air, water, soil) while also viewing a corresponding animation generated twice as many useful solutions to subsequent problem-solving transfer questions than did students who listened to the same narration without viewing any animation (Mayer & Anderson, 1991, 1992). Similarly, students who read a text containing captioned illustrations placed near the corresponding words generated about 65% more useful solutions on a subsequent problem-solving transfer test than did students who simply read the text (Mayer, 1989; Mayer & Gallini, 1990). We call
this result a multimedia effect. The multimedia effect is consistent with a cognitive theory of multimedia learning because students given multimedia explanations are able to build two different mental representations a verbal model and a visual model - and build connections between them.

**Contiguity Principle:** When giving a multimedia explanation, present corresponding words and pictures continuously rather than separately. The second principle is that students better understand an explanation when corresponding words and pictures are presented at the same time than when they are separated in time. For example, students who listened to a narration explaining how plastics pollutes the land and water thereby killing many terrestrial animals due to its consumption and aquatic animals due to eutrofication while also viewing a corresponding animation generated 50% more useful solutions to subsequent problem-solving transfer questions than did students who viewed the animation before or after listening to the narration (Mayer & Anderson, 1991, 1992; Mayer & Sims, 1994). Similarly, students who read a text explaining how tire pumps work that included captioned illustrations placed near the text generated about 75% more useful solutions on problem-solving transfer questions than did students who read the same text and illustrations presented on separate pages (Mayer, 1989; Mayer, Steinhoff, Bower, & Mars, 1995). We call this result a contiguity effect, and similar patterns have been noted by other researchers (Chandler & Sweller, 1991; Sweller & Chandler, 1994; Sweller, Chandler, Tierney and Cooper, 1990; Paas & Van Merrienboer, 1994). This result is consistent with the cognitive theory of multimedia learning because corresponding words and pictures must be in working memory at the same time in order to facilitate the construction of referential links between them.

**Split-Attention Principle:** When giving a multimedia explanation, present words as auditory narration rather than as visual on-screen text. The third principle is that words should be presented auditorily rather than visually. For example, students who viewed an animation depicting the formation of lightning while also listening to a
corresponding narration generated approximately 50% more useful solutions on a subsequent problem-solving transfer test than did students who viewed the same animation with corresponding on-screen text consisting of the same words as the narration (Mayer & Moreno, in press). Sweller and his colleagues call this asplit attention effect (Chandler & Sweller, 1991; Mousavi, Low & Sweller, 1995; Sweller, Chandler, Tierney and Cooper, 1990). This result is consistent with the cognitive theory of multimedia learning because the on-screen text and animation can overload the visual information processing system whereas narration is processed in the verbal information processing system and animation is processed in the visual information processing system.

**Individual Differences Principle:** The foregoing principles are more important for low knowledge than high-knowledge learners, and for high-spatial rather than low-spatial learners. The fourth principle is that multimedia effects, contiguity effects, and split-attention effects depend on individual differences in the learner. For example, students who lack prior knowledge tended to show stronger multimedia effects and contiguity effects than students who possessed high levels of prior knowledge (Mayer & Gallini, 1991, Mayer, Steinhoff, Bower & Mars, 1995). According to a cognitive theory of multimedia learning, students with high prior knowledge may be able to generate their own mental images while listening to an animation or reading a verbal text so having a contiguous visual presentation is not needed. Additionally, students who scored high on tests of spatial ability showed greater multimedia effects than did students who scored low on spatial ability (Mayer & Sims, 1994). According to a cognitive theory of multimedia learning, students with high spatial ability are able to hold the visual image in visual working memory and thus are more likely to benefit from contiguous presentation of words and pictures.

**Coherence Principle:** When giving a multimedia explanation, use few rather than many extraneous words and pictures. The fifth principle is that students learn better from a coherent summary which highlights the relevant words and pictures than from
a longer version of the summary. For example, students who read a passage explaining the steps in how lightning forms along with corresponding illustrations generated 50% more useful solutions on a subsequent problem-solving transfer test than did students who read the same information with additional details inserted in the materials (Mayer, Bove, Bryman, Mars & Tapango, 1996; Harp & Mayer, 1997). Sweller and his colleagues refer to this as the redundancy effect and Multimedia learning they have found a similar pattern of results (Bobis, Sweller & Cooper, 1993; Chandler & Sweller, 1991). This result is consistent with a cognitive theory of multimedia learning, in which a shorter presentation primes the learner to select relevant information and organize it productively.

Mayer while finishing his Cognitive theory came up with many more theories which after experiment led to many different conclusions. Some of which weren’t entirely in his favour and the theories were left out, many which are still being tested and many that were proven correct. The three points mentioned above can be combined into two theories which are Dual Coding and Limited capacity. The third theory was called Science of Instruction; following paragraphs will be related to these theories which will be a part of the main theory of Cognitive Load.

According to Dr. John Sweller theory during complex learning activities the amount of information and interactions that must be processed simultaneously can either under-load, or overload the finite amount of working memory one possesses. Once overloaded the meaningfulness of the study is lost and the human brain doesn’t recall information easily; that is it exceeds its WM (Working Memory) limit. The theory in general states that every human being has a different WM limit which allows him or her to process and organize information based on prior knowledge. Mayer along with Deleeuw (2008) compared three commonly used measures of cognitive load and found that they responded differently to extraneous, intrinsic, and germane load.

- Extrinsic / extraneous load put onto learner by poor design.
- Intrinsic: (the complexity of your content) – listen to the audio, translate it, construct a response and pronounce it quickly – the number of cognitive
activities you have to perform. When you have greater intrinsic load, you have to attend more to cognitive load.

- Germaine load – the good stuff. When people are learning we want people to be engaged with their working memory.

Multimedia once produced needs to be delivered, this can be done by various methods; the Internet as mentioned earlier is not only one of the biggest and extensive form of multimedia but is also a great source to deliver finished multimedia. Movies and music are types of multimedia transferred via the Internet. CD (compact disks) and pen drives/USB drives to different parts of the world. Movies are a great way to provide information via documentary’s based on various ongoing issues and have proven to be a very helpful medium to educate the general population.

Science of instruction is another one of Meyers’ many different theories; the two ways to make learning easier and interesting are based on this theory which states that; there are different techniques and methods which can be applied to make learning easier and faster. Researchers found that a student tends to learn information faster once it has some irrelevant yet interesting illustrations included. The illustrations even though irrelevant is used as a sign to recognize, retain and regenerate the information learned.

Multimedia is used as one of the biggest forms of education all around the world. The internet which probably is one of the biggest forms of multimedia can easily be compared to a maze with infinite knowledge. This multimedia is used by students all around the world to learn different foreign languages or to continue on with their education from any part of the world without the help of teachers.

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 synchronized 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.

1.4.3. 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/glossaryjenew/glossaryjn.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.srec.iisc.ernet.in/Computingfacilities/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_glossary.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 its 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.won.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. \( (srdc.\ msstate.\ edu/ecommerce/curricula/farm\ jngmt/glossary,\ htm) \)

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.

1.4.4. 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 multimedia interaction. Generally, text provides the important information and acts as the keystone, tying all of the other media elements together. It is a 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
- Narration
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 a disk.

Animation literally means to bring something to life. A computer based animation is performed by 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.

![Figure 1.3 Types of Animation](image)

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.

1.4.5. TYPES OF MULTIMEDIA
The Multimedia programmes are mainly of two types-

- Linear
- Non-linear

![Multimedia Programme Linear and Non-linear](image)

(A) Linear - Early multimedia was linear in nature. In linear multimedia, the end
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
presentation 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 these concepts in the Mathematics, Environmental Sciences and other subjects. 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 end of the form of the programme outline or a programme brief.

Today, multimedia is considered as the seamless digital integration of text, graphics, on, 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.
1.5. 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.

1.5.1. THE EVOLUTION OF MULTIMEDIA

Evolution of multimedia can be woven around five themes developed over a time line: 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 deliver 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

<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>
</tr>
</thead>
<tbody>
<tr>
<td>1455</td>
<td>Printing Press Gutenberg &amp; Caxton, movable type printing</td>
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<tr>
<td>1780</td>
<td>Franklin discovers electricity</td>
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<tr>
<td>1822</td>
<td>Charles Babbage designs the Difference Engine</td>
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<tr>
<td>1833</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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<tr>
<td>1837</td>
<td>Telegraph receiver and transmitter</td>
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<tr>
<td>1839</td>
<td>Daguerreotype photographs produced use a papil negative</td>
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<td>Year</td>
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<tr>
<td>1854</td>
<td>BOOLE George Boole:</td>
<td>develops binary mathematical language of 1's and 0's (Boolean Algebra)</td>
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<tr>
<td>1867</td>
<td>Remington Manual Typewriter</td>
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<tr>
<td>1876</td>
<td>BELL Telephone</td>
<td>Telephone</td>
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<tr>
<td>1879</td>
<td>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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<td>1888</td>
<td></td>
<td>Mood Music for film: Musical scores sent along for organ accompaniment</td>
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<td></td>
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<td>Gramophone: disks</td>
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<td></td>
<td>manually rotated @ 70 rpm</td>
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<td></td>
<td></td>
<td>through a projector</td>
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<tr>
<td>1890</td>
<td>HOLLERITH Tabulating Machine for the U.S. Gov. Census using punch cards.</td>
<td>The tabulating machine later became IBM.</td>
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<tr>
<td>1920</td>
<td></td>
<td>Commercial radio: KDKA Pittsburgh</td>
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<tr>
<td>1925</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>1928</td>
<td>DISNEY</td>
<td>&quot;Steamboat Willie&quot; first cartoon with a fully synchronized soundtrack</td>
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<td>1131</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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<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>
<td></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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<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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<tr>
<td>1940</td>
<td></td>
<td>First colour T.V. broadcast</td>
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<tr>
<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>
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<tr>
<td>1945</td>
<td></td>
<td>Memex</td>
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<tr>
<td>1946</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>
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<tr>
<td>1948</td>
<td>Shockley, Bardeen and Brattain develop the transistor. More reliable and cheaper to run than vacuum tubes. Open reel tape recorder by Magnecord</td>
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<tr>
<td>1951</td>
<td>UNIVAC Computer used magnetic tape for buffer memory.</td>
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<tr>
<td>1952</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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<tr>
<td>1953</td>
<td>Electric typewriter</td>
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<tr>
<td>1954</td>
<td>Transistor radio: First commercial use of transistor radio developed in 1947 @ Bell labs</td>
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<tr>
<td>1956</td>
<td>First Transatlantic telephone cable CBS broadcast First network broadcast using video tape.</td>
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<td>1957</td>
<td>Sputnik launched</td>
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<tr>
<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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<tr>
<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>
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<td></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>1963</td>
<td>CAD (Computer Aided Design) Sketchpad uses the first light pen. Phillips first compact audio cassette. First home video tape recording</td>
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<tr>
<td>1964</td>
<td>McLuhan &quot;Understanding Media&quot; postulates the global village. Third generation of computers included the photo printing of conductive circuit boards to eliminate wiring.</td>
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<td>1965</td>
<td>Nelson Xanadu hypertext project</td>
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<tr>
<td>1969</td>
<td>VanDAM Development of hypertext editing system Dolby labs produces Dolby noise reduction for prerecorded tapes</td>
<td></td>
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<tr>
<td>1970</td>
<td>Fourth generation computer by IBM uses chips to reduce size and cost.</td>
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<tr>
<td>1971</td>
<td>Intel 4004 chip developed by Hoff.</td>
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<tr>
<td>1972</td>
<td>Computers can now be owned by individuals.</td>
<td>Phillips laserdisc playback only deck PONG, first commercial video game</td>
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<tr>
<td>1973</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>
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<tr>
<td>1976</td>
<td>GATES</td>
<td>SONY Betamax VCR with a one hour, 1/2 inch video cassette tape.</td>
<td></td>
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<tr>
<td>1977</td>
<td>JOBS &amp; WOZNIAK</td>
<td>JVC introduces VMS format.</td>
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<tr>
<td>1978</td>
<td>Apple was founded by Steven Jobs and Steve Wozniak</td>
<td>Email provided to 100 researchers</td>
<td></td>
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<tr>
<td>1979</td>
<td>VisiCalc: the first spreadsheet Wordstar: word processing package is released.</td>
<td>First commercially available cell phone</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 Operating System</td>
<td>Adam Osborne completed the first portable compute</td>
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<td></td>
<td>Apollo Computer unveiled the first work station</td>
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<td>Event 2</td>
<td>Event 3</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>
<td></td>
</tr>
<tr>
<td>1983</td>
<td>First PC clone</td>
<td>Musical Instrument Digital Interface (MIDI) introduced</td>
<td>Internet is born TCP/IP protocol</td>
<td></td>
</tr>
<tr>
<td>1984 ENGLEBART</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>
<td></td>
</tr>
<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></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 “Toy Story”: the first computer-animated film to win an Academy Award.</td>
<td></td>
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<tr>
<td>1989</td>
<td>Handwriting recognition is introduced by grid with a touch sensitive pad on a laptop computers.</td>
<td>Battery powered, fully functional notebook computer. Corporation for Research and Education Networking (CREN) is formed by merging CSNET into BITNET.</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>
<td>IBM, Tandy AT &amp; T, and others announce the hardware specifications for multimedia platforms. The birth of the World Wide Web Tim Berners-Lee, develops HTML (HyperText Markup Language).</td>
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<tr>
<td>1991</td>
<td>GOPHER PGP encryption released by Phillip Zimmerman</td>
<td>National Science Foundation lifts ban on commerce on the Internet.</td>
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<tr>
<td>1992</td>
<td>Mosaic developed by M. Andreessen</td>
<td>Internet goes interactive; shopping, banking, live concerts, radio broadcasting, spamming.</td>
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<tr>
<td>1993</td>
<td>Private ISP becomes big business Netscape goes public</td>
<td>Maxis released SimCity, a sophisticated video game launching a new genre 'simulation'.</td>
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<td>1994</td>
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<td>1995</td>
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</table>

History of Multimedia helps in understanding the concept and ingredients 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.

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 O'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.

1.6. BENEFITS OF MULTIMEDIA METHOD OF INSTRUCTION IN THE CLASSROOM

The simplicity and power of multimedia method of teaching enriches teacher's creativity and leads to multi-sensory student learning. It is also a whole lot of fun!
At one time, multimedia method of instruction 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 come with its own separate.

Using Multimedia method of teaching is no more a big hassle, since computers today come already equipped with everything we need, such as speakers for sound, vivid color, 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 method of teaching 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 method of instruction in the classroom. "I am comfortable enough about multimedia method 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 encyclopedias, research programmes, presentation tools, and curriculum- specific CD-ROMs that come under the banner of Multimedia method of instruction. (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 conventional instruction suddenly excels using Multimedia instruction? I've seen students staying for school, compelled and interested in a subject matter when teachers used
multimedia method. “Multimedia method takes children far beyond what would normally be learning through the textbook. Multimedia method works wonders”.

1.6.1 BENEFITS TO THE LEARNER

"Multimedia method of instruction is liked and preferred by students in place of conventional 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 taught through multimedia method of instruction (Kulik, 1994 and Patil, 2006). According to Copper and Copple (1985) the users of computer-assisted instruction learned as much as 40 percent faster than those receiving conventional 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 conventional teaching resources and methodologies. Chandra (2002) has also reported the use of different multimedia method of teaching in bringing about conceptual change. Students felt motivated to learn with computers after seeing their usefulness in teaching - learning. (Ranade, 2004, Madan, 2009, Nidhi, 2010, and Kiran, 2010).

The use of Multimedia learning opportunities would certainly empower students and give them the chance to develop the self confidence, knowledge & skills necessary to survive in this information age and inspire them to become lifelong learners (Craig, David G.).
As technology becomes more affordable, accessible and user friendly, teachers are also discovering how multimedia application can be used as a powerful instructional tool.

Through Multimedia method of instruction teachers can take advantage of student's multi-sensory abilities to support and enhance conventional forms of learning."(Marsh, 2007) Multimedia method helps the learners in understanding the concepts faster, creates interest, increases their participation, makes classrooms lively and boosts their achievement.

1.6.2. BENEFITS TO THE TEACHER

The beauty of Multimedia method of instruction 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 method offers the teachers many benefits like - 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 method offers teachers an immediate entryway into the student's learning process and as teachers become familiar with the benefits of using multimedia method of instruction in their classrooms, they are bringing their own strengths and creativity to bear on how multimedia fits their style of teaching. "Multimedia provides teachers 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 method of instruction 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 method of instruction 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 yet not realized the potential of Multimedia method use in the classroom teaching.

Multimedia method 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) found that coordinating text with pictures improved teaming. 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 multimedia method of teaching, 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 method of instruction would be playing a vital role in the field of education.
The modern trends in the educational system refer to a range of technologies which include computer work stations, display facilities, hardware, software recording and processing systems for sound, still and motion pictures, graphic calculations and a wide range of communication facilities. The children the present system has been born into this time of change in the learning styles. Since the society heavily depends on ICT in many aspects, it will expect the schools to familiarize pupils with computers and their applications in learning the subjects during their schooling. Hence, Technology in education aims not only at making education widely available but also improving the quality of education.” Thus, the need and application of technology in education is inevitable.

1.6.3. 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 category i.e. Multimedia Encyclopedias, Dictionaries and Thesaurus. Similar to the traditional books 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.

Multimedia method of instruction makes learning playful where children see the depletion of environment in the form of a video and inculcate in themselves the awareness about the environment and the steps they can take in their small day to day life activities to stop polluting the environment in their neighbourhood and conserve it. Children can demonstrate ways and means of protecting the environment, understand the process of the 3 R’s – Reduce, Recycle and Reuse. Short animation illustrates the importance of planting trees and not polluting the environment by
dumping wastes on land and water thereby disturbing the ecological cycle of nature in an interesting manner.

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.

1.7. NEED FOR THE STUDY
This millennium is characterized not only by population explosion but also by galloping advancement of science and technology. In modern age of Science and Technology besides print media, audio, video, broadcast teleconferences, computers etc. are used for communication and educational usage of various multimedia techniques is rapidly increasing. Its power 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 the teaching learning process in class VII students to make them aware of the environment, Multimedia can prove to be 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 learning or acquiring concepts strategy play an important role. The present status of environmental science as a subject taught to children of 13-14 years is a synthesis of various approaches. Many of these are well established and recognized components of environmental science as offered by many school examining boards and curriculum planners. As a result the necessity of introducing environmental science to enhance
environmental awareness at elementary level is felt. Hence, to make teaching of environmental science in schools according to the needs of 21st century, the whole thrust has to change from 'memory based' learning to comprehensive based learning. Each concept of environment should be very clear to the students. In modern education system a number of media is used to teach students. Keeping the above factors in mind, the researcher decided to develop Multimedia Learning Package to bring Environmental Awareness among students of class VII studying Environmental Science in an effective way so that they can protect and conserve the environment from all environmental pollution and degradation.

1.7.1. 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, the mechanism for the production of these packages is distinct and rigorous as compared to 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 class VII students. The programmes for the children have to be specifically designed, keeping in view the interactivity, the target age group; otherwise the programme will be irrelevant if it is shown to another age group. The process of learning structure in the programme, has to be sequenced systematically by involving the subject matter specialist, the teacher, the child psychologist, the producer, script writer and the researcher. All these elements will help in making the programme suitable and appropriate for the students, for whom it is designed and produced. Feedback for the target audience is an essential component of the programme. Thus, this multimedia method of instruction containing syllabus specific material will prove to be a boon for the students in developing environmental awareness in environmental science.
1.7.2 STATEMENT OF THE PROBLEM
EFFECTIVENESS OF TWO METHODS OF INSTRUCTION: MULTI MEDIA AND CONVENTIONAL CLASSROOM INSTRUCTION FOR DEVELOPING ENVIRONMENTAL AWARENESS AMONG ELEMENTARY SCHOOL CHILDREN.

1.7.3 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) Methods of Instruction They are primarily descriptions of the learning objective-oriented activities and flow of information related to the content of the subject between teachers and students. It is also a way of doing something systematically in orderly arrangement.

3) Multimedia Method of Instruction The word Multimedia method simply means being able to communicate in more than one way. So, Multimedia method of instruction, 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.

4) Conventional Method of Instruction The word conventional method of instruction means communication between the teachers and students through the
chalk and talk method with the help of prescribed text books. It emphasizes more on rote learning.

5) **Environmental Awareness** It is a broad philosophy and social movement regarding concerns for environmental conservation and improvement of the state of the environment. To be aware of the fragility of the environment and of the interdependence between the environment and mankind.

6) **Elementary School Children** Students studying in class-VII between the age group of 13-14 years are taken for study in this research.

### 1.7.4 OBJECTIVES OF THE STUDY

The objectives of the study are to

1. develop the Multimedia Learning Package in Environmental Science for developing Environmental Awareness among class VII students.
2. develop Achievement Test on Environmental Awareness to measure the Environmental Awareness of class VII students.
3. develop Opinionnaire to seek the opinion of teachers on Multimedia Learning Package.
4. compare the mean Achievement scores on Environmental Awareness of two groups of class VII students taught Environmental Science with and without the use of Multimedia Learning Package before the experimental treatment.
5. compare the mean Achievement scores on Environmental Awareness of two groups of class VII students taught Environmental Science with and without the use of Multimedia Learning Package after the experimental treatment.
6. compare the mean gain Achievement scores on Environmental Awareness of two groups of class VII students taught Environmental Science with and without the use of Multimedia Learning Package after the experimental treatment.
1.7.5. HYPOTHESES

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

**H1.** There will be no significant difference in the Environmental Awareness of class VII students taught Environmental Science through MMLP and Conventional Method of teaching before the experimental treatment.

**H2.** There will be no significant difference in the Environmental Awareness of class VII students taught Environmental Science through MMLP and Conventional method of teaching after the experimental treatment.

**H3.** There will be no significant difference in the mean gain scores of two groups of learners on the criterion awareness test in Environmental science when taught with MMLP and Conventional method of teaching after the experimental treatment.

1.7.6. DELIMITATIONS OF THE STUDY

The present study is delimited to

1) Class VII students only.
2) One school of Gurgaon only.
3) Only five topics from the prescribed syllabus of Environmental Science.
4) 50 working days of the academic session.

1.8 POST-SCRIPT-SEARCH FOR A NEW PARADIGM

Multimedia Learning Package can provide a breakthrough in the massive problems faced by the Environmental Science teachers 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, Encyclopedias,
• 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 informal that is available for learning, but the way that learning takes place.