CHAPTER – II

DEVELOPMENT OF MULTIMEDIA

INTERACTIVE
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2.1 INTRODUCTION

This chapter describes the Development of Interactive Multimedia CD Based Learning Courseware for Environmental Chemistry. In this study, multimedia CD is used as a media which is more efficient in the field of effective teaching and learning. Instructional technology is used towards improving the learning skills and brings effective performance of the individual. Effective achievement depends on the learner’s involvement and interaction with the instructional material effectively. The multimedia CD used for teaching and learning must be capable of describing all the information that the content requires.

2.2 VARIOUS MEDIA USED IN EDUCATION

Over few decades, media play a major role in effective learning and teaching. Audio-visual media like radio, televisions, audio-video instructions, video compact disc, computer aided learning, teleconferencing etc., have become important components of learning and teaching. By using satellite technology, teleconferencing and video conferencing interactions are provided between student and tutor in the teaching learning process. Integration of media in teaching-learning process has several advantages.
2.3 COMPUTER IN EDUCATION

Computers have changed the entire dimension of the educational field. Therefore, it is only natural that the role of computers in education has been given a lot of importance in recent years. Computers play a vital role in every field. They aid industrial processes, they find application in medicine; they are the reason why software industries developed and flourished and they play an important role in education. This is also why the education system has made computer education a part of curriculum. Considering the use of computer technology in almost every sphere of life, it is important for everyone to have at least the basic knowledge of using computers. Let's look at what role computer technology plays in the education sector. Computer technology Manali Oak (2012) has a deep impact on the education sector. Thanks to computers, imparting education has become easier and much more interesting than before. Owing to memory capacities of computers, large chunks of data can be stored in them. They are enabled in quick processing of data with very less or no chances of errors in processing. Networked computers aid quick communication and enable web access. Storing documents on computers in the form of soft copies instead of hard ones helps save paper. The advantages of computers in education primarily include:

2 Storage of information
3 Quick data processing
4 Audio-visual aids in teaching
5 Better presentation of information
6 Access to the Internet
7 Quick communication between students, teachers and parents

Computer teaching plays a key role in the modern education system. Students find it easier to refer to the Internet than searching for information in fat books. The process of learning has gone beyond learning from prescribed textbooks. Internet is a much larger and easier-to-access storehouse of information. When it comes to storing retrieved information, it is easier to do on computers than maintaining hand-written notes.

2.4 MULTIMEDIA IN EDUCATION

The world is changing rapidly and the field of education is experiencing these changes in particular as it applies to media services Asichkhan (2011). In olden days, the educational institution had an isolated audio-visual department are long gone. The growth in use of multimedia within the education sector has accelerated in recent years, and looks set for continued expansion in the future. Teachers primarily require Barker (1999) access to learning resources, which can support concept development by learners in a variety of ways to meet individual learning needs. The development of multimedia technologies for learning offers new ways in which learning can take place in colleges and the home. Enabling teachers to have access to multimedia learning resources, which support constructive concept development, allows the teacher to focus more on being a facilitator of learning while working with individual students.
Extending the use of multimedia learning resources to the home represents an educational opportunity with the potential to improve student learning.

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. Since the mode of learning is interactive and not linear, a student or teacher can choose what to investigate next. For example, one does not start on the first page of a linear document and read to the end. Interactive multimedia learning mode is more like constructing a spider’s web, with one idea linked to another, allowing choices in the learner’s path.

The multimedia technologies Reiber (1994) that have had the greatest impact in education are those that augment the existing curriculum, allowing both immediate enhancement and encouraging further curriculum development.

**2.5 MULTIMEDIA APPLICATION IN EDUCATION**

Multimedia can be used in a variety of ways, and a multimedia Presentation can be put together in a variety of different formats. In education, multimedia can be used as a source of information. Students can search encyclopaedias such as Encarta, which provide facts on a variety of different topics using multimedia presentations. Teachers can use multimedia presentations to make lessons more interesting by using animations to highlight or demonstrate key points. A multimedia presentation can also make it easier
for pupils to read text rather than trying to read a teacher’s writing on the board. Programs which show pictures and text whilst children are reading a story can help them learn to read; these too are a form of multimedia presentation.

2.6 DEVELOPING EDUCATIONAL MULTIMEDIA PACKAGE

Multimedia technology is becoming increasingly popular in the field of education. Interactive multimedia courseware in particular, developed on a CD is adding a new and interesting dimension to both teaching and learning. This new approach can effectively complement the conventional methods of learning and teaching. The multi-sensory input of this media provides possibilities for higher performance ratings and higher retention. With effective feedback, this method makes learning and teaching more meaningful. Students with different learning abilities can work at their own place, time and pace; and with interactivity and self-assessment it can make learning a highly personalized, independent and a rewarding experience. The learner can also set her/his own view of the information available to him/her. A significant aspect of multimedia in education is related to authoring or developing multimedia. Multimedia authoring as a form of computing has made it possible for students and teachers to construct knowledge and discover worlds which do not exist in conventional methods of learning or teaching. Above all, this new experience has defined a new concept of edutainment a combination of education and entertainment.
2.6.1 TEXT IN MULTIMEDIA

Text is the most common medium of presenting information. It is also used to communicate a concept or an idea. It should effectively complement the other media. Factors that influence the textual communication are typeface, font and style, kerning, antialiasing, animation, special effects, special characters and hypertext. While dealing with text in multimedia it is very important to note that it is not the only means of communication. In multimedia, text is most often used for titles, headlines, menus, navigation and content. Overcrowding of text on a single page should be avoided. It is recommended that text should be presented in combination with graphics.

2.6.2 AUDIO IN MULTIMEDIA

Audio is another vital media in a multimedia presentation. Audio is available in different file formats and the appropriate file format is chosen to maximize its performance. Sound editors play an important role for converting file formats and also for enhancing the quality of sound. In most cases sound files are imported and edited for a multimedia application.

2.6.3 DIGITAL AUDIO

The sound recorded on an audio tape through a microphone or from other sources is in an analog (continuous) form. The analog format must be converted to a digital format for storage in a computer. This process is called 'Digitizing'. The method used for digitizing sound is called sampling.
**Sound File Formats**

The most common sound file formats are:

**WAV**  Window wave format

**AIFF**  Audio Interchange File Format -(wave form for use on MAC)

**AU**  Wave format developed by SUN Microsystems

**MP3**  Compressed file format using MPEG1Layer3 compression

**QT**  Digital audio quick time movies that contain only audio can be used in multimedia applications.

**SWA**  Shock Wave Audio files compressed up to a ratio 176:1

The choice of the right format to use depends upon the file size, the nature of application and the operating system.

**Video in Multimedia**

Video in multimedia is an extremely useful communication tool for presentations. It illustrates ideas and concepts besides capturing real world events. Video files occupy enormous space and so there are two choices to recommend

1) Use very short video clips (not exceeding a minute or two)
2) Use highly compressed video files like MPEG.AVI files that can be transformed to MPEG files.
Video Formats

The most commonly used video formats are:

AVI     File format developed by Microsoft for windows. It is also known as video for windows (VFW).

MOV, MOOV,QT Files belong to Apple Quick Time Movie. Flattened quick time video clips can be viewed on Unix workstations and on IBM compatible PC with media players.

MPEG, MPG MPEG files use the MPEG-1 video compression routine. MPEG video clips can be viewed with IBM compatible PC and on Unix workstations.

Color Depth for Digital Video

Digital video set at 24-bit are recommended for windows for an 8-bit or 16-bit images video performances through video editing.

Video Compression

As digital video files occupy a large bandwidth and extremely large space as compared to audio and graphics file formats, reducing the file size is of utmost importance. A number of CODEC methods are available to meet this requirement. The MPEG format for example uses inter-frame compression to get compression up to 200:1. This large compression is achieved at the expense of the quality of video. The inter-frame compression involves cutting out the visual information that is not noticeable to the human eye.
Video Editors

The popular software for video editing are Adobe Premiere 6.0, Pinnacle systems, Studio DV, Apple's Movie 2.0.1 and Cool Edit. For editing the analog video is first digitized through a video capture and then the appropriate software is used for editing. If a DV camcorder is used for video shooting then the video can be transferred to PC directly for editing. It is very important to note that video takes enormous disk space as much as 200MB per minute. So preview of the video and editing are done separately to suit one's requirement. The safest rule is to keep the video file size to absolute minimum.

The PC must be adequately equipped with a minimum of 20GB hard disk and a minimum of 128MBRAMand with a good AGP card with 32MBVRAM.

Graphics in Multimedia

Graphics is the most commonly used element of multimedia. The richness of multimedia and the effective communication are through graphic presentations. The attributes of color, texture, pattern and animation enrich a multimedia presentation.

2.7 ANIMATION IN MULTIMEDIA

A very popular and a chief element of multimedia is animation. Animation is designed as a simulation of movement created by displaying a series of pictures or frames. Animation strictly is a visual illusion. It builds dynamism, energy and motion to inanimate objects. It also adds the dimension of time to graphics. Computer animation is relevant to multimedia as all the
presentations are developed on the computer. The key concepts of computer animation are: key frames and tweening.

2.7.1 KEY FRAMES

Major frames of animation are created first. These frames define the key frames in which many changes take place. They are the 'key' points of animation. Key frames are specified to show how the moving objects will behave with time.

2.7.2 TWEENING

Tweening is the process of generating intermediate frames between two images to give the appearance that the first image evolves smoothly into the second image. Tweening is a key process in computer animation. A software programme can automatically generate the in between frames.

2.7.3 SOFTWARE TOOLS

Software used for animation determines the quality of computer animation produced. Some very popular animation software packages for windows are 3D Studio Max, Adobe Premiere, Soft Image, Animator Studio, Flash, etc. Software packages for Mac include Adobe Premiere, Elastic Reality, Strata Studio pro, etc.

2.7.4 ANIMATION FILE FORMATS

The file formats for animation depends on the nature of software used. Based on this, you will have .dir (for Director), .fla (for flash), .max (for 3d studio max), .dcr (for shockwave animation file), etc.
2.7.5 INTERACTIVITY

Interactivity can be understood as interplay between different elements of an environment. In human context, interaction can be between people to people or between people to objects. Multimedia itself is not inherently Interactive. It can be made interactive through authoring software. In interactive multimedia, it is the user's interaction with the programme that is explored. According to Crawford (1990) a good program establishes an interaction circuit through which the user and the computer are apparently in a continuous communication. Researches into learning styles show that students learn better through specific modalities such as visual, oral and kinetic. The goal of interactive multimedia is to provide to the student the choice of these modalities in a learning environment. Rhodes and Azbell (1985) have identified three levels of interactivity:

(6) **Reactive** There is little learner control of content structure

(7) **Coactive** Providing learner control for sequence, pace and style

(8) **Proactive** Learner controls both structure and content

2.7.6 PROTOTYPING

A prototype is a miniature version of the final product. It is an incomplete product with either a reduced functionality or with a reduced set of features or both. Prototyping is a well established technique for arriving at a high quality finished product. Prototype is just the subsystem of the whole
system. At any given time different subsystems are in different stages of production.

2.7.7 PROTOTYPE DESIGN

Prototyping forms a part of user - centered design in which the user is involved at all stages of system development process of requirements specification, design, evaluation and revision. Solution is arrived at by successive approximation and iterative design. For multimedia development, some of the components of the multimedia lesson are prepared to integrate them and demonstrate a prototype of what the final product would look like. It is at this stage that suggestions and critical feedback are received to improve the design of the programme in terms of interactivity and instructional design.

The development of multimedia courseware is a complex process of Integration and Interaction. It is an integration of a technology with learning; it is an interaction of the technology with the learner and the teacher. Both integration and interaction require planning, design and implementation. Planning involves the identification of goals, the end users and the available resources. In this section we have discussed the various components of multimedia, and have given some tips on how to prepare them, especially about their types and quality in multimedia programmes.

The multimedia technology is changing rapidly in performance and decreasing in price. With better design of prototypes and with new or improved insights into the learning process the role of multimedia in education becomes more relevant and exciting.
2.8 CONCLUSION

Interactive Multimedia is very much used for both the tutor and the students in many ways for better understanding of concepts. It provides enough complexity and flexibility in learning concepts. It stimulates and generates a lot of excitement to the learners. This technology is a benefit to the learners. Hence an attempt is made to develop an Interactive Multimedia CD-Based Learning Courseware for Environmental Chemistry at Under Graduate Level to find out its effectiveness over the traditional method. The next chapter deals with the review of related literature in detail.