CHAPTER – IV
DEVELOPMENT OF MULTIMEDIA
PROGRAMME FOR HUMAN ANATOMY

4.1 INTRODUCTION

The objective of this study is to develop a multimedia programme in perceiving human anatomy among higher secondary students. For this purpose the investigator developed the multimedia programme for human anatomy.

4.2 DEVELOPMENT OF MULTIMEDIA PROGRAMME

The process of development of multimedia programme includes various phases such as analysis, designing, developing, evaluation and implementation.
Figure 4.1. Development of multimedia programme

4.2.1 ANALYSIS PHASE

Analysis phase includes the selection of content and software analysis.
4.2.1.1 Selection of the content

The sample selected for the present study is the XI standard students of Higher Secondary course and the content area is selected from the XI standard Zoology subject prescribed for the State Board of Secondary Education of Tamil Nadu Government. One of the units from Zoology subject namely ‘Human Anatomy’ was selected for the investigation as it is essential for the students who may go for higher education such as medicine, physiotherapy, nursing, and also for self awareness. Students may not be aware of the structure, functions, diseases and treatment of the internal organs. Hence in order to explain the working mechanism of internal organs and new techniques involved in transplantation of organs, and operation, the need for multimedia programme is felt.

While selecting the topics for the experiment, care has been taken to include the topics prescribed by the State Board of Education. The investigator consulted with the teachers who handle Zoology at higher secondary level in order to identify the content area which requires more explanation and visual presentation. During the discussion, the investigator could clearly mark out the content area for the study.

To decide the content area for the topic the investigator referred various books, encyclopedia, and websites. After thoroughly studying the available material and consulting the experienced teachers, the following content areas were selected for multimedia programme.
Figure 4.2. Details of the unit and content area included in the study

4.2.1.2 Software analysis

The investigator developed the Multimedia programme using the latest software packages, which were compatible with most of the computer systems widely used. Some of the software packages used in the development of the courseware were Nuendo 2.0, Sony Sound Forge 6.0, Adobe Photoshop CS 2, Autodesk 3ds Max, Adobe Premiere Pro, Adobe After Effects 7.0 and Adobe flash CS 2.
Figure 4.3. Software packages used in the multimedia programme

Nuendo is a digital audio workstation. The package is aimed at audio and video post-production market segments but with optional modules can also be used for multimedia creation and audio sequencing.

Adobe Photoshop is a graphics editing program. It is mainly for media editing, animation and to make professional standard DVD, provide
non linear editing and special effect services such as background, textures and so on. For developing the multimedia programme, the buttons, pictures and the still images were developed in Adobe Photoshop CS.

Autodesk 3ds Max, formerly 3D Studio Max, is a modelling, animation and rendering package. Autodesk 3ds Max was used for making 3D animations. It has strong modelling capabilities, flexible plugin architecture and a long heritage on the Microsoft Windows platform.

Adobe Premiere Pro is a real-time, timeline based video editing software application. Adobe premiere was used for video and audio editing and combining the voice with the visuals to make the audio understandable.

Adobe After Effects is primarily used for creating motion graphics and visual effects. Adobe After Effects allows users to animate, alter, and composite media in 2D and 3D. Adobe After Effects was used for compositing i.e., to combine the animation and images with the text (labeling the parts) and with that to make a single movie.

Adobe Flash CS 2 was used to make the final CD of the presentation by creating the buttons and making them interactive with final video which comes with audio and joining with particular buttons through programming with action script 2.0 built in this software.

Sony Sound Forge (formerly known as Sonic Foundry Sound Forge) is a digital audio editing suite by Sony Creative Software which is aimed at
the professional and semi-professional markets. Sonic Sound Forge was used for editing the voice based on the visuals and topics of the subject.

4.2.2 DESIGNING THE FEATURES OF MULTIMEDIA PROGRAMME PHASE

Designing the features of multimedia programme includes the various steps such as system environment, flow charting, voice recording, animations, text blocks, text, movie, buttons, learning interactions(quiz program), entertainment(games), gallery and scripting for multimedia programme etc.

4.2.2.1 System environment

The multimedia programme was developed under strict compliance of the software engineering concepts. The investigator with the help of the software engineer developed this multimedia programme. The multimedia programme will work on any multimedia enabled computer with all Windows family of operating systems.

4.2.2.2 Flow charting

A flowchart is essential before developing a multimedia programme. It shows a product, which starts with the front page then moves to a title screen then moves to a main page and then moves to home page. Multimedia programme starts with the front page, moves to title screen, moves to a main page and then to a home page. From the home page, the
user can access any level of programme. From the home page, the user can access the menu page for each content area separately. From the menu page, the user can access the texts with animation items or return from text page to the home page or to the menu page as shown in the Figure 4.4., 4.5., 4.6., 4.7., & 4.8.

Figure 4.4. Front page of multimedia programme
Figure 4.5. Title screen of multimedia programme

Figure 4.6. Main page of multimedia programme
Figure 4.7. Home page of multimedia programme

Figure 4.8. Multimedia programme with menu page of each contents
4.2.2.3 Voice recording

The voice recording was done in tight acoustic room in 16 bit track digital audio studio. The recorded voice was edited and added to each sub-topic.

4.2.2.4 Animations

In the present multimedia programme, 2D or 3D animations are introduced for each sub-topic. Animations, through visual perception, upgrade instruction about the content to a great extent. (Figure 4.9.)

Figure 4.9. Multimedia programme with animation effect
4.2.2.5 Text blocks

In the multimedia programme, the static text blocks are used at the left side of the layout and the texts are added at the left side to the movie as shown in the Figure 4.9.

4.2.2.6 Text

In the present multimedia programme, the text is presented in concise, informative and interesting manner in the text blocks. The text is also added for the title and label of parts of the pictures as shown in the Figure 4.10.

Figure 4.10. Text page of multimedia programme with text and movie
4.2.2.7 Movie

The movie for each sub-topic is kept at the centre of the layout. In each movie, provisions for ‘Play’, ‘Stop’, ‘Pause’, ‘Mute’, and increasing or decreasing the sound volume were given in the present multimedia programme as shown in the Figure 4.10.

4.2.2.8 Buttons

In the multimedia programme, an ‘Enter’ button is provided in the front page to enable the user to access the title screen, the ‘Next’ button is provided in the title screen to enable the user to enter the main page and an ‘Start’ button is provided in the main page to enable the user to enter into the home page. In the home page four separate buttons for each content area and two buttons for ‘Quiz’, ‘Gallery’ and ‘Games’ are provided at the bottom of the home page from where the user can access the quiz, gallery and games directly as shown in the Figure 4.4., 4.5., 4.6., & 4.7.

In the menu page, many buttons for each sub-topic are provided from where the user can access the text with animations for each sub-topic separately (Figure 4.8.).

In the multimedia programme, in the text page twelve buttons are used. Of these, the nine buttons namely, ‘Home’, ‘Exit’, ‘Quiz’, ‘Games’, ‘Gallery’ and four separate buttons for each content area remain constant in all the stages, so as to enable the user to navigate/browse from one level to another level. Another three buttons at the bottom of the every stage,
namely, ‘Previous’, ‘Next’ and ‘Return to menu’ are provided to enable the user to go to the previous stage or to the next stage or to the menu page of each content respectively (Figure 4.10.). Sound is added to each buttons. The sound plays when the button is clicked.

4.2.2.9 Learning interactions (quiz program)

In the multimedia programme, interaction for the students exists in the form of Quiz for the four content areas, namely, Circulation, Respiration, Excretion and Reproduction. The quiz questions are arranged sequentially and frame by frame. Each question in the quiz is considered an interaction. Above all, 10 questions from each content area are presented in the quiz for response by the students.

In the multimedia programme, the multiple choice learning interaction is designed for the four topics namely, Circulation, Respiration, Excretion, and Reproduction. The multiple choice questions are presented contentwise. The learners have to respond to the multiple choice questions from among the four alternatives. The students have to respond to each question before moving on to the next question. The quiz templates contain a mechanism that counts a cumulative score for each content area separately. After responding to all the questions of each content area, the cumulative score of that content area will be displayed at the end. Provision to view the correct answer for each content area separately has been incorporated. (Figure 4.11.)
4.2.2.10 Entertainment (Games)

In the present multimedia programme, entertainment for the students exists in the form of games for the four content areas, namely, Circulation, Respiration, Excretion, and Reproduction. The games are arranged sequentially and frame by frame. Two types of games namely jigsaw and picture puzzle were given. (Figure 4.12. & 4.13.)
Figure 4.12. Multimedia programme with jigsaw game

Figure 4.13. Multimedia programme with picture puzzle game
4.2.2.11 Gallery

In the present multimedia programme, the gallery which has the collection of the pictures related to the content was presented for each content area separately. (Figure 4.14.)

![Figure 4.14. Multimedia programme with Gallery](image)

4.2.2.12 Scripting for Multimedia Programme

After deciding the content area for multimedia programme, the investigator classified each content area into various topics for making it logically sequenced. According to the learning principle and by keeping in mind students’ ability to grasp one idea at a time, each topic is divided into different sub-topics. Each sub-topic is presented in each frame with colour and 3D animated pictures.
While preparing the script, the investigator ensured proper use of language that was easy to understand and simple to remember. To get the attention of the students and to make the learning more interesting, effective, apt illustrations and visuals were included in the script. To enhance the students understanding of the various concepts, colourful and meaningful 3D animations were used in the script. The organization and arrangement of the frames is done in a logical order. For the purpose of self evaluation and entertainment, quiz programs and games were presented in each content area. After completing the scripting of the content, the script was given to a software engineer to convert the content into an electronic format.

4.2.3 TECHNICAL DESIGN OF MULTIMEDIA PROGRAMME PHASE

Four content areas from the human anatomy, which are the part of the Biology subject in the higher secondary course, were programmed into a multimedia programme using the recent softwares Adobe Photoshop, Adobe flash, Adobe Premiere Pro, Adobe After Effects and Autodesk 3ds Max, Nuendo, Sony Sound Forge. These softwares permit colourful figures, graphics and pictures that make the content interesting. These softwares are Windows-based and user friendly.

The software packages provide ease of simulation and animation that help in easy understanding of content. They have provision for presenting multiple windows on screen at a time. This helps the researcher in presenting the text, visuals and figures at the same time. They provide operational ease in adding the narration and background music.
The recording was done in tight acoustic room in 16 bit track digital audio studio. The voice was recorded with the software called Nuendo 2.0 in wave format. Recorded audio which was in wave format was imported into audio editing software called Sony sound forge 6.0 with which the audio can be separated according to the topics and sub-topics. The audio files for each sub-topic were saved in the wave format.

Animation and image editing were done in Autodesk 3d studio Max 8.0, a 3D animation software that enables audio timing.

The software called Adobe Photoshop CS 2 was used for image editing and to scan the pictures from different books. The scanned pictures can be edited to view in the screen with this software. The background layout for the presentation was designed with this software and saved in PSD file format.

All the rendered images from Autodesk 3d studio Max 8.0 and Adobe Photoshop CS 2 were imported into Adobe After Effects 7.0. The process of adding the title and labeling the parts of the picture to make the final movie was done with this software. The final movie was exported in AVI format.

The software Adobe Premiere Pro was used to add audio to video in the final movie which was in AVI format.

The scripting for the presentation was done with Adobe flash CS2. The AVI format of the final movie from Adobe premiere was converted
into FLV. format with the software Adobe flash. The designed layout from Adobe Photoshop was imported into Adobe flash and kept as background. The FLV. movie for each and every topic and sub-topic was imported into Adobe flash and kept as frame by frame timeline. The FLV. movie which has video and audio was kept at the centre of the layout and the text for the movie was added at the left side of the movie. A button was created in flash for each subtopic. Motion, animation and linking of pages were done with buttons. The buttons were programmed to link the movie with the help of action script 2.0. The same programming script was used to create quiz and games. Finally the presentation was exported as EXE format as shown in Fig. 3.15.

**4.2.4 DEVELOPMENT PHASE**

In the development phase, the development of the programme, preliminary administration (Pilot study) and correction/revision of the programme are included. After the completion of the development of multimedia programme on the basis of design, it was edited with reference to i) level of accuracy, ii) level of difficulty, iii) level of clarity of operational instructions, iv) level of clarity of presentation, v) level of difficulty in relation to the concerned level of the student, vi) extent of availability of graphic presentation, colour and sound, vii) level of ability to motivate students. After editing the developed content, a preliminary administration (Pilot study) was carried out by the investigator on the target students consisting of randomly selected 30 students in order to check whether the multimedia programme would prove to be effective and to confirm its appropriateness for the level of understanding of the students.
On the basis of the preliminary administration (pilot study), necessary corrections, modifications, refinements, etc., were made in the final draft. The final draft of the DVD was applied to the experimental group. A copy of the newly developed multimedia programme DVD is enclosed with this thesis. In the multimedia programme, the write and delete permissions were denied and provisions for copy and print were given.

4.2.5 EVALUATION PHASE

Evaluation and approval of the multimedia programme was done by the technical experts and subject experts to judge whether the treatment given to the subject is pedagogically valid.

In the present investigation, once the entire content of the programme is developed, a test DVD was created. In order to eliminate errors and make the system accurate, efficient and valid before final implementation, the DVD was given to the various subject experts, teachers who were handling Zoology subject at higher secondary level, multimedia technical experts, educational technologists and educational psychologists. They were requested to check the content accuracy, organization of the content, suitability of the illustrations, colour combinations, ease of use and other visual and design aspects of the multimedia programme. The necessary changes were made in the programme on the basis of the recommendations of the technical, educational, psychological and subject experts. The validity of the multimedia programme was established by content validity.
4.2.6 IMPLEMENTATION PHASE

In the implementation phase, the experimental group students were availed for the multimedia programme by the investigator. The Multimedia programme was stored in a main Server of LAN. Many users can access the server as client. The achievement test in human anatomy developed by the investigator was used to measure the effect of the multimedia programme particularly the mastery of content among the students.

In addition, the tools for attitude towards Biology, attitude towards multimedia programme, achievement motivation, attention and perceptive skills were developed and used to find out the impact of multimedia programme on these variables.

4.3 CONCLUSION

In this chapter, the process of development of multimedia programme is described. The next chapter deals with the analysis and interpretation of the data.