

## CHAPTER 3

### DEVELOPMENT AND COLLECTION OF DATA

This chapter explains under what field of research this project belongs and will deal with the different stages of the project namely the development and implementation of the software, the video, the tests and how the different instruments were used to obtain the research data.

This table representing the layout of this chapter is arranged into seven columns with the main topic on the left and the lower order topics to the right. The first column contains the headings research in general and the project. The research in general is divided into an introduction, instructional technology research, and developmental research. The project is subdivided into development and research. Under development the topics introduction, multimedia and tests are covered. Multimedia is subdivided into production, implementation and problems encountered. Under tests the format and development are discussed. Examples of the interface are mentioned under development. The topic production is subdivided into video and presentations. Both these topics are divided into how it works and components of the interface. The components of the interface are: images, text, sound, and examples. Under components of the interface for presentation is a heading navigation and actions. The questions of the questionnaire are represented in Table 3.3.

**Table 3.1: Layout of Chapter 3**

Research in general	Introduction					
	Instructional technology research					
	Developmental research					
The project	Development	Introduction				
		Multimedia	Production	Video	How the video works	
					Presentations	Components of the video
				Text		
				Components of the presentation Interface		Sound
						Examples from the video
				How the presentations work		Images
		Components of the presentation Interface		Text		
		Components of the presentation Interface		Sound		
		Components of the presentation Interface		Navigation and actions		
		Components of the presentation Interface		Examples of the interface		
		Implementation				
		Problems encountered				
		Tests	Format			
	Development		Examples of the test Interface			
	Problems encountered					
	Instruments		Questionnaire	Purpose		
				Design		
				Different types of questions		
				Distribution and collection		
		Layout of the questions				
		Questionnaire Matrix				
	Records	Test results				
Criteria for selecting learners		SRS				
		Additional credits				
Relationships between responses and records		Statistical analysis				
Learner profiles						
Research						

### 3.1 Research in general

The usual sequence is to do research, to acquire basic knowledge and then to use this knowledge to advance technologically.

#### 3.1.1 Introduction

Stokes (1997) suggests a classification whereby research is placed into a matrix that is called Pasteur's quadrant. The following table represents Pasteur's quadrant. The domain that belongs in each of the four blocks of the quadrant is explained.

**Table 3.2: Pasteur's quadrant**

<p style="text-align: center;"><b>Bohr</b></p> <p style="text-align: center;">Pure basic research</p> <p style="text-align: center;">Work inspired by the quest for understanding but not by potential use.</p> <p style="text-align: center;"><b>1</b></p>	<p style="text-align: center;"><b>Pasteur</b></p> <p style="text-align: center;">Use-inspired basic research or strategic research</p> <p style="text-align: center;">Work inspired by both the quest for understanding and its potential use.</p> <p style="text-align: center;"><b>2</b></p>
<p style="text-align: center;"><b>Exploration of particular phenomena</b></p> <p style="text-align: center;">Work inspired by neither use nor the quest for understanding</p> <p style="text-align: center;"><b>4</b></p>	<p style="text-align: center;"><b>Edison</b></p> <p style="text-align: center;">Pure applied research</p> <p style="text-align: center;">Work inspired by potential use but not by the quest for understanding</p> <p style="text-align: center;"><b>3</b></p>

This study falls under quadrant number two because in this study an attempt is made to acquire insight into learner perceptions of the traditional histology course and an attempt is made to investigate the possible success of a full or partial multimedia histology course.

### 3.1.2 Instructional technology research

One of the many types of research is instructional technology research. In this type of research different goals can be pursued (Reeves, 2000), such as:

- Theoretical goals;
- Empirical goals;
- Interpretivist goals;
- Post modern goals;
- Developmental goals;
- Action goals.

In this study developmental goals are pursued.

### 3.1.3 Developmental research

According to van den Akker (1999), developmental research focuses on complex and innovative tasks. Usually very few validated principles are available for structuring and supporting the design and developmental activities of the programs that are developed. This type of research aims at making practical as well as scientific contributions.

Reeves (2000) is of the opinion that developmental research should provide direct benefits to all stakeholders. Reeves (2000) stated that he is increasingly convinced that if instructional technologists want to contribute to meaningful educational reform they should do developmental research because this type of research focuses on complex and real problems critical to human learning and performance.

Under the topic “Use of technology in biology” The Multimedia Research Group, University of Natal Durban (S.A., Online) reports that we need to build a strong research culture in South African institutions on the use of computer technology in education.

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Presentation of these research findings to colleagues and university authorities could play a major role in challenging preconceived ideas by those who find technology threatening.

Teaching histology with the aid of multimedia computer presentations (E-learning system for a specific target group – medical learners) is a complex task that needs lots of innovation. No guiding design principles aimed at histology specifically could be found in the literature. The development of the programs provides a practical direct solution while the research part of the study tries to make a scientific contribution. This study is an effort to contribute to meaningful educational reform.

This study also forms part of an effort to build a research culture on the use of computer technology in education and will hopefully contribute in changing preconceived ideas that may exist amongst faculty members.

In this study an effort was made to follow the guiding principles of Plomp (2002), namely:

- Pose significant questions that can be investigated;
- Link research to relevant theory;
- Use methods that permit direct investigation of the question;
- Provide a coherent and explicit chain of reasoning;
- Replicate and generalize across studies;
- Disclose research to encourage professional scrutiny and critique.

In an effort to comply with these principles the following was done. A list of design and research questions that should be investigated was compiled. The literature was searched for answers to these questions. Research instruments were used to investigate the research questions. The findings will be discussed in relation to other studies, and will be published.

## 3.2 The project

The project consisted of two parts namely the development of the multimedia study material and the research part where the effectiveness, acceptability and success of the learning material were investigated.

### 3.2.1 Development

The development will deal with the development of the multimedia including the video and the computer presentations as well as the development of the tests and the problems encountered during development.

#### 3.2.1.1 Introduction

Due to the lack of suitable study material to implement a telematic course in histology, computer presentations had to be developed. This part of the project dealt with the creation of the study material. The development of the multimedia involved the following:

- Literature search to gather information regarding the development of study material;
- Accumulating the necessary graphics - digital images and drawings;
- Mastering the software to compile the programs;
- Creating the video and the computer presentations.

#### 3.2.1.2 Multimedia

The multimedia for this study consisted of a video and multimedia computer presentations. In this section the production, implementation and the problems encountered during these processes will be dealt with.

##### 3.2.1.2.1 Production

Here the processes that the multimedia went through before the video and the computer

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presentations were ready to be used by the learners as well as the end product that was used by the learners are discussed.

**➤ Video**

The purpose of the video was to replace the microscope as the tool for revision of the practical histology. All slides that are viewed during the year in the practical histology sessions are included in the video. It consists of 441 slides and takes three hours to view. The learners only needed to view the topics that were covered during the two blocks of this study.

Video is linear. Interactivity between the video and the learner is limited to playing, stopping, fast forwarding and rewinding the video. Video is in the same linear format as a lecture. The linear format takes the learner through the study material in a specific sequence.

**❖ How the video works**

The video starts with a slide indicating the topic. This is followed by a sequence of images usually from a low magnification to a high magnification where the features of the tissue are vocally explained with the aid of indicators. In most cases the indicators appear on the screen as they are mentioned. Animations are also used, for instance to indicate the flow of ocular fluid from the anterior chamber in the eye through the pupil into the posterior chamber.

**❖ Components of the video**

The video contains images of the slides that the learners usually observe during histology practicals. No drawings or text pages were included in the video. Text that was used was kept to a minimum while a vocal explanation was used to illicit the characteristics of the images.

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## ◇ Images

The images used in the video were either digitised video images, scanned slides or images photographed with a digital camera. Indicators like arrows, lines and annotations of different colours were used to highlight and explain the features of the different tissues. Care was taken to make sure that the colour of the indicator used is clearly visible against the background.

## ◇ Text

The minimum text was used in the video. Fine structures that are visible on the Super VGA monitor are often not visible on the television monitor, due to the lower resolution of the latter. This also influenced the font that could be used. To make sure that text was clearly readable a font of 36 or bigger had to be used. The colour of the text was selected to contrast with the background.

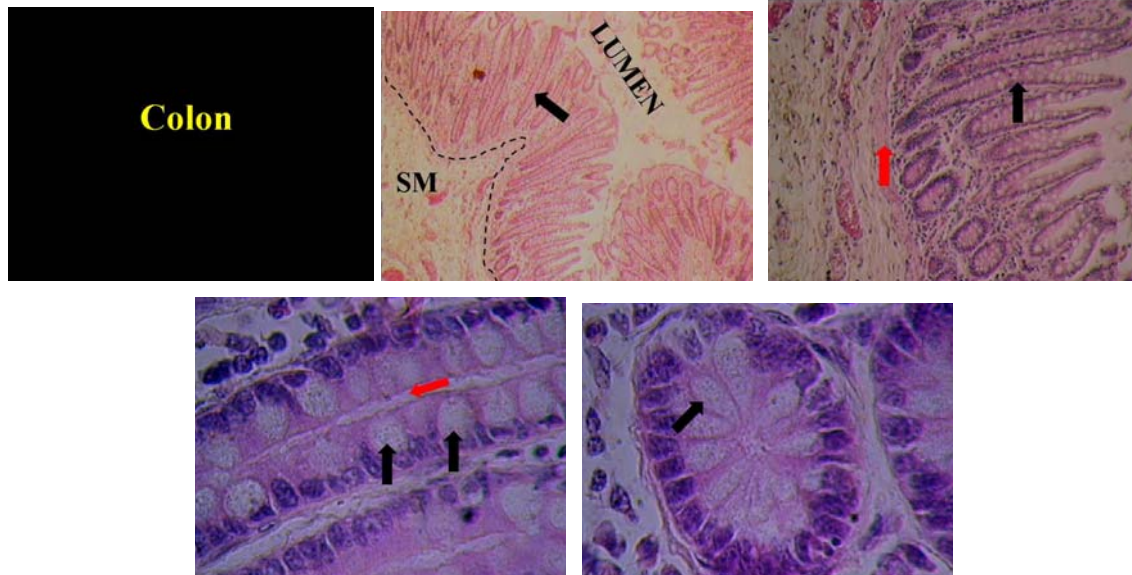
## ◇ Sound

Sound plays an important role in the video. The different indicators, annotations and abbreviations used are explained vocally. The Windows sound recorder was used to make the recordings that were used in the video. The microphone that was used was not of a very high quality. Due to these factors the sound was one of the problem areas of the video which was not always of a high standard.

## ◇ Examples from the video

The following sequence of images explains the histology of the colon.





**Figure 3.1: Examples from the video**

The first slide indicates the topic. In the second slide the *lumen* is annotated, the arrow indicates the glands in the *colon* while the dotted line indicates the *basement membrane*. The SM indicates the *submucosa*. While the learner watches the slides there is a vocal explanation of the different features on the screen. The black arrow in the third slide indicates an *intestinal gland* while the red arrow indicates the *submucosa*. The red arrow in the fourth slide indicates the lumen while the black arrows indicate goblet cells.

#### ➤ Presentations

The presentations that were used to make the video were developed first. When developing presentations for use on a computer, a number of additional features, not available on video, can be added. Due to the fact that the resolution is better on the super VGA screen than on the television monitor, fine detail can be displayed as well as smaller text fonts. Sound can also be played on demand. The presentations that were made for the video tape were used as a starting point for the creation of interactive presentations.

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The histology course is divided into two sections. Each section is presented by a different lecturer. Complete multimedia tutors were developed on the following topics:

- Epitheliums
- Common Connective tissues
- Cartilage
- Bone
- Muscle
- Lymphatic system
- Neurohistology
- Oralhistology
- Olfactory epithelium
- Ear

These presentations consist of a total of 588 slides (pages).

### ❖ How the presentations work

When designing multimedia software one has to decide between a linear and a nonlinear format.

Non-linear programs are suitable for acquiring information on a specific topic. If multimedia is developed for the purpose of replacing a lecture (which is linear) it has to be linear to expose the learner to the work in a specific sequence. When a learner has gone through the work in a linear fashion and has been exposed to all the facts, the learner can then use the multimedia in a non-linear way to revise the work.

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The multimedia for this project was designed in this way. The learner had two options, linear or non-linear. The linear option takes the learner through the work in an organized way while the non-linear option takes the learner directly to a topic.

When the computer presentations were developed, simplicity was kept in mind. The computer skills of the learners for which these presentations were developed varied from no skills to skilled. It was decided that no computer skills should be required for using these tutors. Menus and navigational buttons should be intuitive and easy to understand. An interface was decided upon and was used throughout the presentations. Grey was selected as a background colour. The various buttons were made colourful in an effort to make the screen pleasant to look at.

Clicking on an icon on the desktop starts the program. The program starts as a menu offering different topics. Different colours were used for the different topics. The idea was to highlight the available topics. Below is an example of the topics menu.

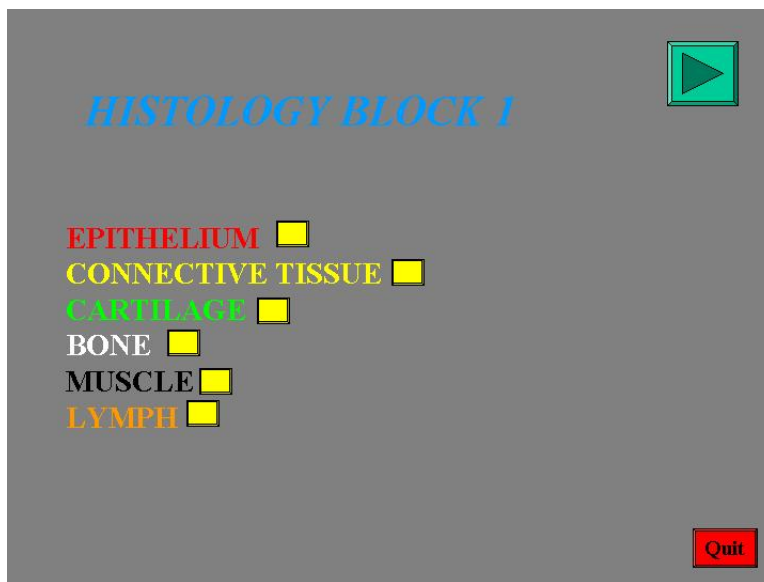
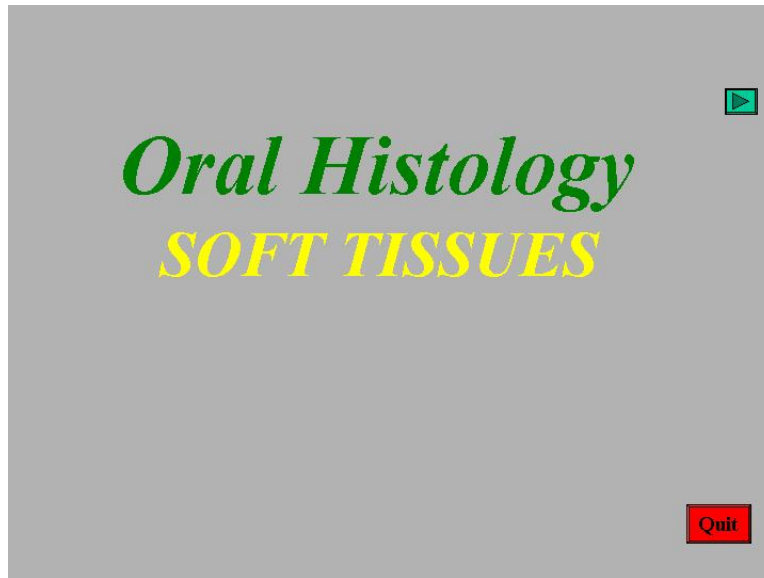


Figure 3.2: Menu of the multimedia computer presentations

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Selection of a topic from this menu takes the learner to an opening page with the title of the tutor. Below is an example of the opening page of the tutor on the soft tissues of the mouth. A user could at any time leave the program by quitting.



**Figure 3.3: Opening page of the multimedia computer presentations**

Advancing from this page takes the learner to a menu where he or she must decide between the linear and the non-linear way of using the presentations. Choosing the interactive presentation starts the tutor (linear) from the beginning. Choosing the slide menu (non-linear) takes the user to a specific page in the program. Below is the example of this menu.

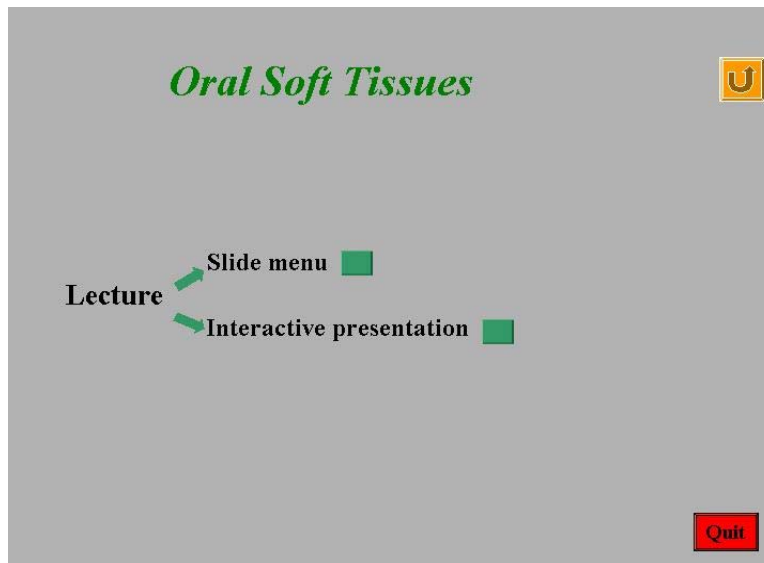


Figure 3.4: Selection page of the multimedia computer presentations

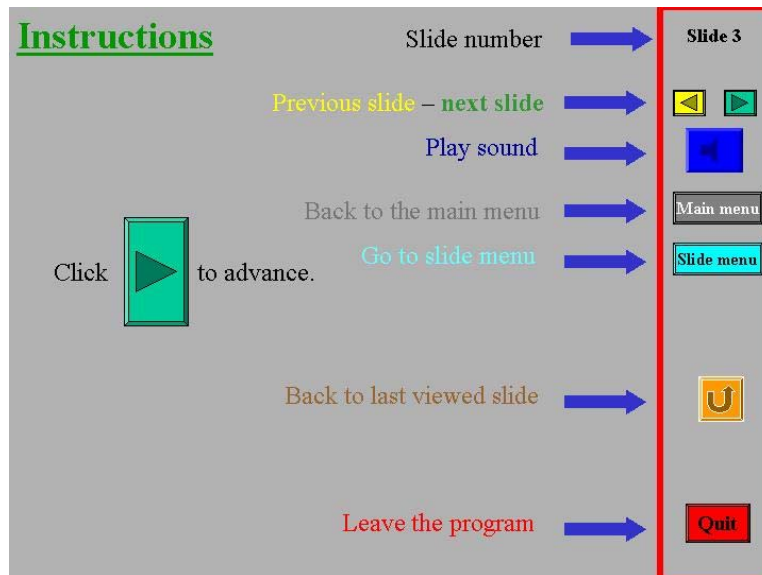
Selecting the slide menu will take the learner to a menu where a specific slide in the program can be accessed. The idea was that a learner could revise any part of the program or start at any point in the program for revision purposes. Below is an example of a slide menu.



Figure 3.5: Slide menu of the multimedia computer presentations

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The other option is to go to the interactive presentation. When choosing this option a screen with instructions on how the navigational and action buttons work, is displayed. The navigation and action buttons were placed on the right of the screen. This left a square block for text or a picture on the left hand side. Below is the example of the instruction screen.



**Figure 3.6: Instructions page of the multimedia computer presentations**

When clicking on the advance button of the instruction screen the interactive presentation starts. The slides in the tutor contain images (micrographs, electron micrographs or drawings) and text.

#### ❖ Components of the presentation interface

The interface consisted of a graphical component with text, sound and various navigational buttons.

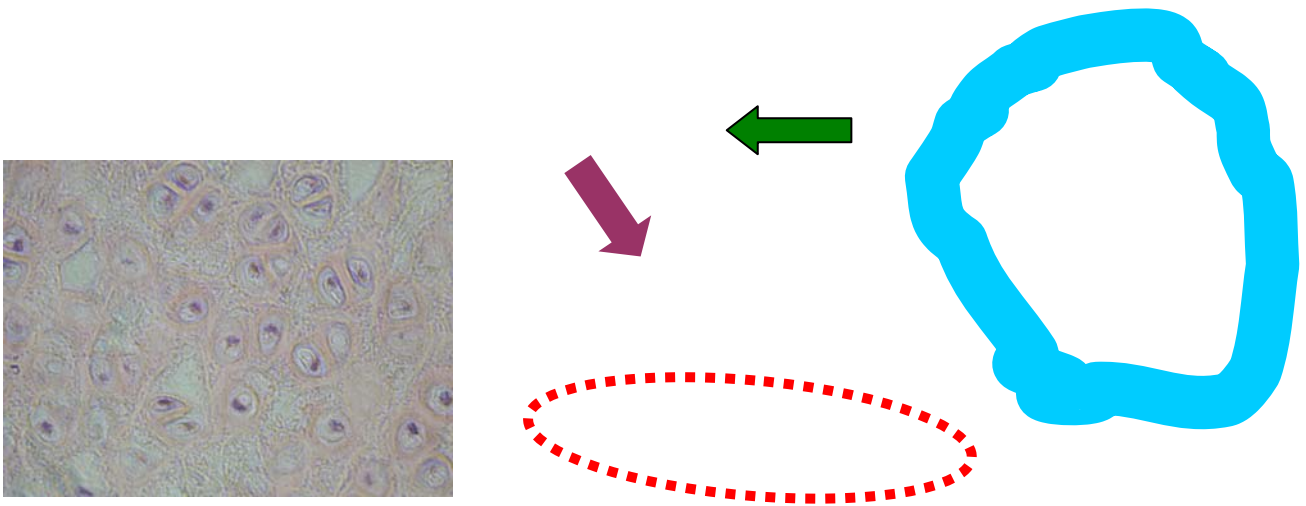
#### ◇ Images

Different methods were used to acquire images for the presentations. Digitised (grabbed) images from a video camera, digital photographs, scanned photographs,

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slides and drawings were used. The pictures were made as large and clear as possible. In some instances successive screens were used to build up a drawing to teach learners how to make the drawing.

Various indicators were used with the images to point out structures, areas or layers. Arrows, braces, lines, shapes like blocks or circles of various colours and sizes were used. Very little text was used on the images. Care was taken to make sure that the colour of the indicator used is clearly visible against the background. Below is an example of an image plus examples of some of the indicators used in the presentations.




**Figure 3.7: Examples of the elements of the multimedia computer presentations**

#### ◇ Text

The text screens that are used are the notes given to the learners. Explanations were kept as concise and clear as possible. Text was put at the bottom of the screen explaining the indicators used with the different graphical elements in the tutors.

Indicators were used instead of text. Instead of writing “arrow” an arrow of the same colour and direction as was used in the image was used in the text. Below is an example of how an indicator is used in the text.

“The  indicates the stratum corneum”.

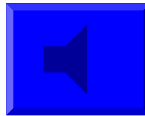
**Figure 3.8: Example of an arrow used with text**

The text used was 18 font size Times New Roman. This was found to be a readable size and font on a 14” screen.

### ◇ Sound

Voice recordings for the presentations were made using the Windows sound recorder. The recordings were used to explain the graphical images and the indicators used. The voice recordings could be played by clicking a button. This could be done over and over if wanted. The button below was used for playing the sound.

Play commentary

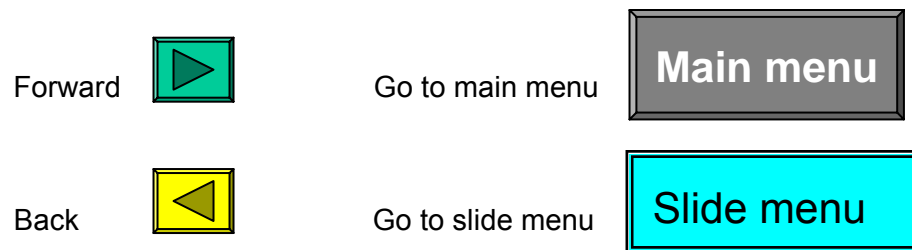


**Figure 3.9: Button for playing a sound file**

### ◇ Navigation and actions

The navigation and actions bar was put on the right hand side of the screen. Colourful and self-explanatory buttons were chosen for these actions.

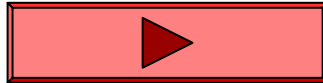
Navigational buttons provided were:







Link in the text to a relevant drawing or image somewhere else



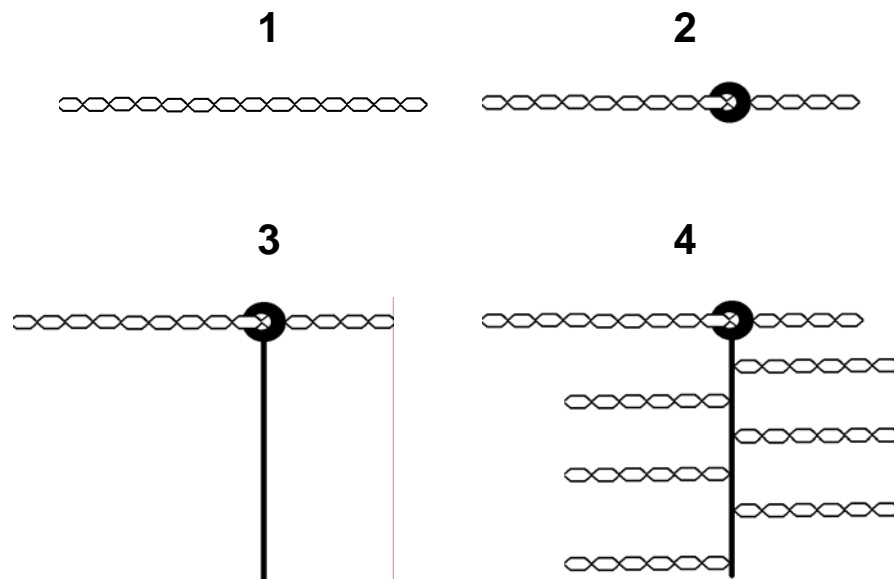
**Figure 3.10: Navigation buttons**

Navigation is done by the hyperlink function of PowerPoint. From any screen the user can go backwards and forwards, go to the main menu, the slide menu or to the last viewed slide. The user can also quit the program.

#### ◇ Examples of the interface

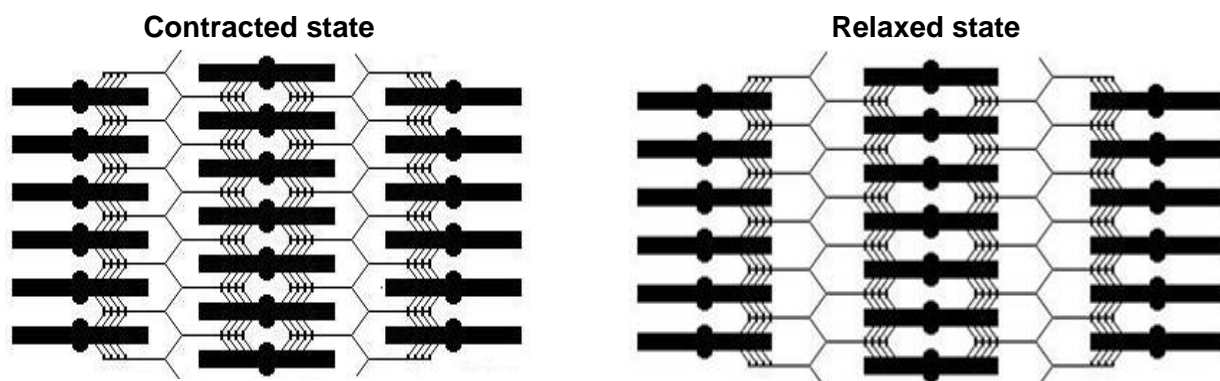
In the example below a drawing of the *hyaluronic acid* found in cartilage with its linking protein, protein core and *chondroitin sulphate* chains were taken apart and reassembled to show the learner how to make a drawing of this structure.

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**Figure 3.11: Example of how to make a drawing**

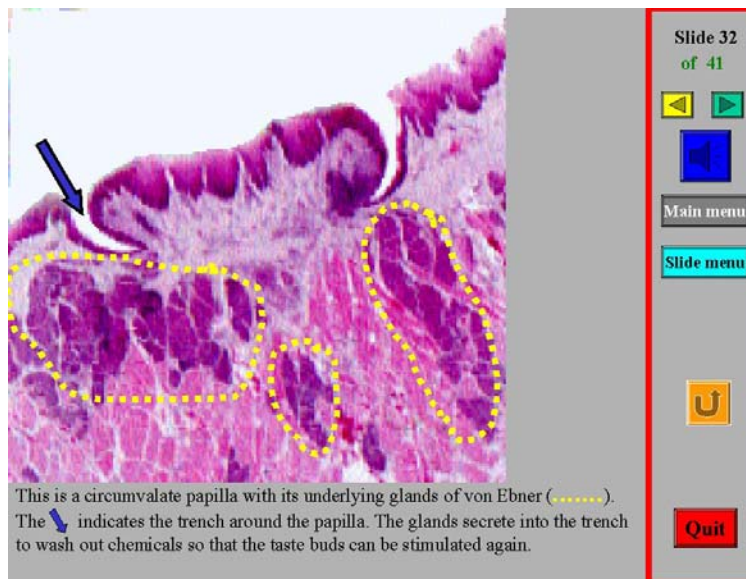
Simple animations were also used to explain certain actions. In the two drawings below the two stages of muscle contraction are shown. Alternating between the two drawings illustrates how the different bands in muscle change during contraction.



**Figure 3.12: Example of an animation**

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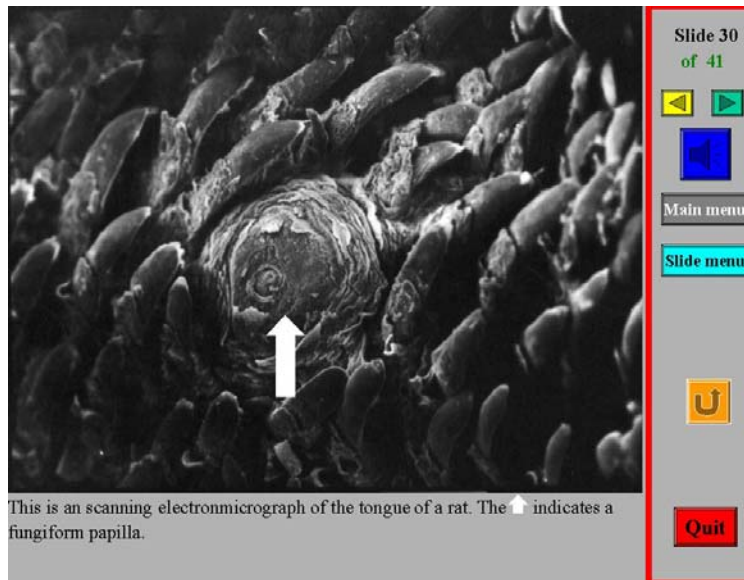
The teaching and understanding of the morphology of tissues has relied and still relies at most universities on practical work where learners use the microscope to find examples like the following image which is a cross section through a valate papilla. The yellow dotted lines indicate the underlying serous glands while the blue arrow indicates the trench of the papilla. On the right hand side are the navigational buttons. The blue button links to a sound file which gives an explanation of the slide.



**Figure 3.13: Example of a micrograph**

Another way of studying histology is through scanning electron micrographs. Scanning electron micrographs give a different perspective on the three dimensional structure of tissues. Scanning electron micrographs like the one below of the fungiform papilla surrounded by filiform papillae were included in the presentations.

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**Figure 3.14: Example of a scanning electron micrograph**

Microscope slides only provide two dimensional information. Researchers have applied various techniques like serial sections and scanning electron microscopy (like figure 3.14) to determine the three dimensional structure of tissues. From this information drawings of the three dimensional structure of tissues could be made. These drawings complement the microscope slides and play a major role in the understanding of histology. Below is an example of one such drawing which was used in the presentations. This drawing shows the arrangement of the attachment between epithelium on the surface and the underlying *connective tissue* (CT) in the mouth.

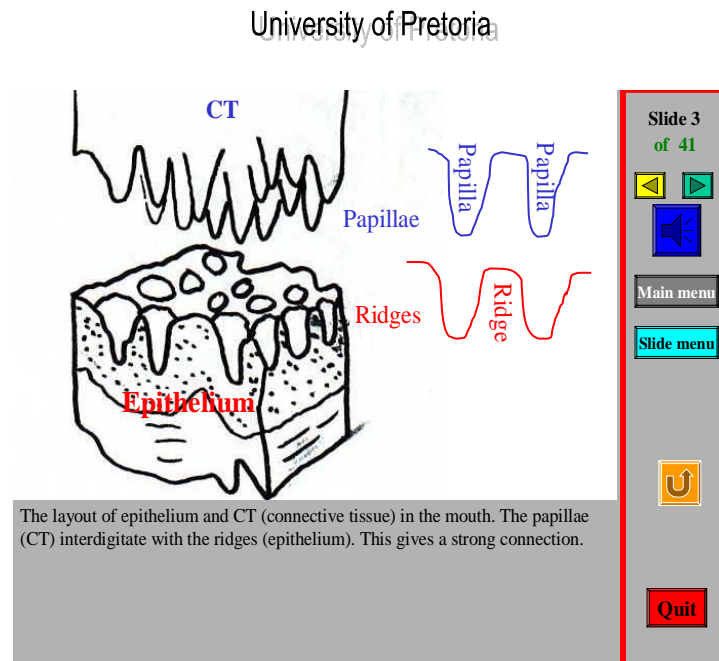


Figure 3.15: Example of a drawing

The notes that the learners receive was also included in the presentations. Text was provided in the presentations for reference purposes. It was however not intended that the learners should study from the screen. The text was written as briefly and simply as possible. Sometimes a link to the relevant drawings was included like in the example below. No sound file was included with the text pages.

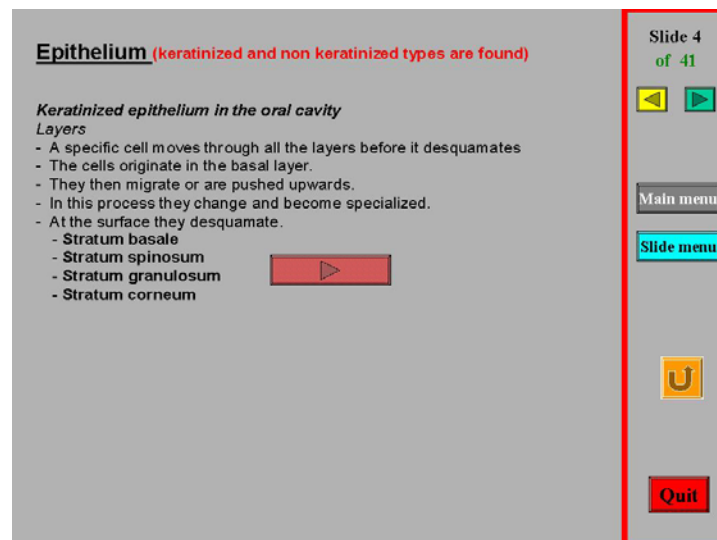


Figure 3.16: Example of text used in a multimedia computer presentation

### 3.2.1.2.2 Implementation

During the first block we had the use of twelve computers in a small computer centre. Twelve learner volunteers were selected for the first session and given short instructions on how to start the program and how to navigate through the different options of the program. They were then left to carry on. I attended the first session to solve any possible hiccups that may have occurred. No problems were encountered. Soon after being introduced to the multimedia computer presentations the learners were learning effectively.

The learners were told that they could use the multimedia programs instead of attending the lectures and the practicals. They were however still free to attend the lectures and the practicals. Every time there was a lecture or a practical these learners could then go to the computer centre to do the multimedia histology programs. The centre was also available during normal working hours for them to visit. The programs were also made available on the computers of the computer centre of the university. The problem here was that only five of these computers have sound cards therefore on most of the computers the sound option was not available. The programs were also written onto a CD. Learners could order copies of the CD for use at home. Thirty learners bought CDs for use on their own computers.

During the first block, which started in February and lasted for four weeks, the basic tissues are covered. After the lecture was given a practical was done on each topic. The topics done were:

- Epitheliums (2 lectures)
- Common Connective tissues (2 lectures)
- Cartilage
- Bone
- Muscle
- Lymphatic system (2 lectures)

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The function of the first part of the course is to give the learner an understanding of the basic tissues that make up all the different systems of the body. It is important that this basic knowledge is mastered before the histology of the systems is studied.

During the second block that started in April and lasted five weeks the same format as for the first block was followed. The following topics were covered:

- Neurohistology (2 lectures)
- Oralhistology (3 lectures)
- Olfactory epithelium
- Ear

### **3.2.1.2.3 Problems encountered**

The problems encountered during the implementation of the programs had mainly to do with the number of learners we are dealing with ( $\pm 380$ ) and the lack of facilities.

Although we selected a group of volunteers the other learners very soon found out about the programs and started to use them whenever they saw an empty station. It soon developed into a first come first serve situation. To prevent learners other than the volunteers from using the programs would have been impossible and also unfair.

Our lectures are not compulsory with the result that even during other anatomy lectures the 12 computers, which were later increased to 15, were all occupied. Learners were prepared to miss other lectures to get a chance to study the multimedia computer presentations.

The fact that there were no problems reported was an indication that the programs were user friendly enough or that the learners could sort out the problems that they encountered amongst themselves.

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Some of the CDs that were made available to the learners for personal use were brought back due to the fact that the CD Rom could not read the CD. This was found to be a hardware problem because upon testing the CD in another CD Rom the CD was found readable.

### 3.2.1.3 Tests

A way of testing had to be developed to suit the facilities that were available to us. Tests were developed in the form of PowerPoint presentations. Tests were conducted in a practical laboratory. The tests were shown to the learners on a 54 cm video screen. A video converter that plugs in between the video card on the one side and the SVGA monitor of the computer on the other side was used. This converter has a video out plug for a PAL monitor. This signal was then amplified by a video amplifier and distributed to a number of overhead monitors.

#### 3.2.1.3.1 Format

Tests were not included in the tutors. Tests were conducted at the end of each of the two blocks. Learners wrote a separate practical and theory test. The histology theory test formed part of a combined test that was written on gross anatomy, embryology and neuroanatomy. Each test, practical and theory, consisted of short questions and MCQs. In the case of the theory test 25 questions were short questions and 25 were MCQs. In the case of the practical test, the first test consisted of 30 questions, 15 had to be answered by writing down the answer and 15 questions were MCQs. The second test had the same format except that the test consisted of 40 questions. The multiple choice part of the test was answered on a computer form that was marked with an optical scanner while the written part of the test was answered on paper.

#### 3.2.1.3.2 Development

Previously tests were conducted using full screen video images. Learners were asked to identify the tissue and give reasons for the identification. It was found that learners



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studied the reasons beforehand and then only had to identify the tissue to know what reasons to give. Often the reasons given for identification by the learner were not present in the tissue shown on the monitor. It was decided that learners should rather be able to identify specific structures in a tissue than only to identify the tissue. A system of testing was developed where specific structures, layers or cells are indicated and asked. It was decided to explore the possibility of making the practical tests a multiple choice test.

**❖ Examples of the test interface**

For the purpose of this study two interfaces were developed. The one had the image on the left and the question at the top together on the same screen while the second interface was the same but with the multiple choice options added to the right of the screen. With a little experimentation the right size for the image and the font for the text were decided on. For the question at the top of the screen a 44 font was used while the options were written using a 32 font. It was important that the quality of the image be as good as possible. It was decided that 30 seconds be allowed to answer each question. A 30 second rest period was given after every ten questions.

The following is an example of one of the practical MCQs.

Identify the layer.

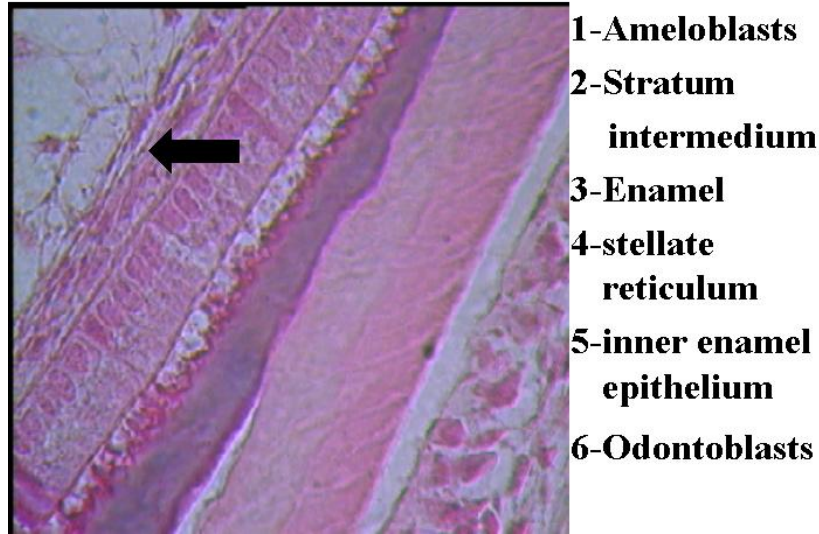
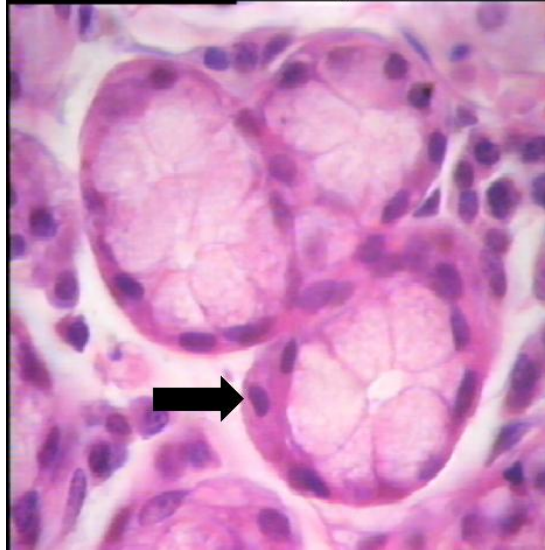


Figure 3.17: Example of a practical MCQ

In this example the learner is asked to identify one of the layers of the enamel organ. The layers that are visible are used as the options for the multiple choice question. The arrow points at the stratum intermedium.

The following is an example of a practical question where the answer had to be written down.

Identify this structure.



**Figure 3.18: Example of a written practical question**

This is a question on the salivary gland. The arrow in points to a structure called the demilune. The learner had to write the answer.

#### 3.2.1.3.3 Problems encountered

The testing ran very smoothly from the start. The biggest problem was the large number of learners that had to be accommodated during a test. The learners were divided into three or four groups so that they wrote the test in groups of about 90. This required that learners that had finished the test were prevented from coming into contact with learners that still had to write the test.

#### 3.2.2 Research

The second part of this chapter deals with the instruments that were used for data collection.

### 3.2.2.1 Instruments

Data was collected through the use of the following instruments.

- Questionnaires;
- Retrieval of information from the departmental records;
- Retrieval of learner records from administration;
- Statistical analysis to determine relationships between the different sets of information.

#### 3.2.2.1.1 Questionnaire

The questionnaire was used to gather feedback from the learners that attended the second year anatomy class.

##### ► Purpose

The purpose of the questionnaire was to gather information regarding the learners' experiences and perceptions of the histology course for MBChB II and BDS II presented at MEDUNSA. The teaching of the course included lectures, practicals and also the additional teaching material (SI) that has been discussed (videos (VSI) and multimedia computer presentations (MSI). Each questionnaire gathered 124 values that were put into a database. This data could then be analysed.

Relationships between the marks obtained in the different tests that were written and the answers given in the questionnaire could be determined. Only one questionnaire was given to the learners at the end of their second block just before the tests on the work done during that block.

### ➤ Design

The purpose of the questionnaires was to supply answers to some of the research questions dealing with study habits, perceptions, preferences, experiences and reasons for actions during the running of the course. The questionnaire had to be simple, clear and relevant and had to supply the needed information. Length was not considered when drawing up the questionnaire. The questions in the questionnaire were all of the closed type. Some of the questions came from the literature but many of the questions were compiled to address issues that I felt are important for the study.

### ➤ Different types of questions

The following types of questions were included in the questionnaire.

- Sifting questions – if a certain response is given, follow-up questions must be answered;
- Choose only one – respondent must choose only one option;
- Choose all relevant – respondent can choose any number of options;
- Ranking questions – respondent must rank options;
- Likert scales – measure intensity of feelings.

Questions were asked about all aspects of lectures, practicals, studying, the multimedia offered, tests, internet use, facilities and how the learners would like their course to be compiled.

### ➤ Distribution and collection

Learners were informed beforehand about and asked whether they were willing to fill in a questionnaire on the histology course and the multimedia study material that was offered to them. It was explained to them that the information gathered by the questionnaire was needed to obtain insight into their likes and dislikes and that the information would be used to the advantage of future histology learners.

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The questionnaires were given to the learners after a lecture and they were given enough time was given to complete the questionnaire after which the questionnaires were taken in. There were 201 out of a total of 380 learners present at the lecture when the questionnaire was handed out. Out of the total of 201, six learners handed in their questionnaire without filling in anything. One questionnaire had a page missing. The anatomy number was also asked in the questionnaire so that learner responses could be compared to the marks obtained in the tests. 53 learners did not fill in their anatomy numbers, possibly because they wanted to remain anonymous. Of the 141 learners that completed the questionnaire and could be identified by their anatomy numbers, 13 learners were dental learners and the rest were medical learners.

A limitation of the way in which the questionnaire was distributed was that it was only filled in by learners present in class on that specific day. The regular non-attendees did not take part in this study.

#### ➤ Layout of the questions

The responses can be divided into two groups, namely:

- Ratings: Learners had to either rate a statement or an option by arranging them in a sequence or had to judge something like a lecture giving it a rating;
- Selection: Here learners had to select one or more options from a list.

#### ➤ Questionnaire matrix

The table below shows the design of the questionnaire. There are two main columns Questions on and Question groups. The “Questions on” column is divided into four columns. The left hand column contains the main aspects covered in the questionnaire, the subject preferences, facilities, learning and tests. Learning is divided into tutored learning, self learning, favourite ways of studying and how learners would like their course. Tutored learning is divided into lectures which comprise ratings, attendance, presentation and practicals. Self learning is divided into the prescribed book, internet

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and multimedia computer presentations which again is divided under use, evaluation, technical aspects, and value. The last topic under self learning is the video. In the fifth column are the question groups asked in the questionnaire.

Table 3.3: Layout of the question topics and question groups

Questions on:		Question Groups		
Subject preferences		What is the learner's favourite subsection?		
		What are the reasons for this selection?		
Facilities		What video facilities do learners have at home?		
		What computer facilities do learners have at home?		
		Can learners afford computers?		
L E A R N I N G	T U T O R E D	Lectures	Ratings - How do learners rate their lectures?	
			Attendance	Why do learners not attend lectures?
				Did you leave a lecture or lectures and why?
				Do learners concentrate during lectures?
				Are there too many lectures?
				Are certain lectures more important?
		Presentation - Which is the best way to present a lecture?		
	Practicals - Why do learners not attend or leave practicals?			
	Prescribed book - To what extent is the prescribed book used?			
	Internet - To what extent is the internet used?			
	S E L F	Multimedia computer presentations	Use	To what extent were the computer presentations used?
				Why were the computer presentations not used?
				Why did learners only use some of the computer presentations?
				How much time did learners spend using the computer presentations?
				Were the presentations enjoyable to use?
				Did learners spend more time on histology because of the presentations?
		Did learners help one another with the presentations?		
		Evaluation – What was the interface like?		
		Technical aspects - Were there navigational errors and technical problems?		
		Value	Do the learners feel presentations improved recollection?	
			Does the learner feel that his marks improved because of the presentations?	
			Is a computer presentation better than a lecture?	
	Did presentations change the learner's attitude towards the subject?			
	Video	How many times did learners watch the video?		
		What problems were encountered?		
	Favourite ways of studying			
How would learners like their course		Can multimedia replace the traditional course?		
		Do learners think multimedia can replace the microscope?		
		Do learners prefer computer presentations or video?		
Tests - Is effort rewarded?				



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Under the following headings each question that was asked in the questionnaire will be discussed giving the motivation behind the question. Hypotheses regarding the responses to the questions will also be mentioned.

The questions from the questionnaire are given just above the table in which the options are given. When a question has only a few options the options are given in the form of a short description.

❖ Subject preferences

The questions attempt to test the popularity of the different subsections of the anatomy course as well as the reasons for a subsection being popular or unpopular. Whether a subject is popular or not may have a major influence on motivation.

◆ What is the learner's favourite subsection?

From years of experience as a histology lecturer and from being a learner myself I know that there is a tendency amongst learners to dislike Histology. Learners often start the course with the perception that histology is a subject that is neither interesting nor enjoyable. This perception is carried over from year to year. This question tests that perception. Learners had to rate the subsections of anatomy by arranging them from 1 to 4.

**Question**

Which subsection of anatomy do you prefer most: 1 for most preferred and 4 for least favourite.

Options were the four subsections of anatomy namely gross and neuroanatomy, embryology and histology.

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◆ <b>What are the reasons for this selection?</b>
---

This question attempts to find the reasons why learners prefer one subsection of anatomy above another.

**Question**

Why do you enjoy this subsection most? Rate the options by numbering from 1 to 4.

Options included more relevant to the medical course, better presented, easier and more interesting.

◆ <b>Facilities</b>
---------------------

The following questions attempt to determine whether the learners used MEDUNSA's facilities, their own facilities or facilities somewhere else. The response to this question will also give an indication of what facilities learners have at home, what their financial situation is and to what extent they rely on facilities from the university.

◆ <b>What video facilities do learners have at home?</b>
--

The answer to this question indicates what percentage of respondents have access to video machines. Video machines at home mean fewer learners using the facilities at the university. It also means that these learners have access to multimedia supplied on video.

**Question**

If you watch the video where do you normally watch the video?

Options for this question included the library, residence, own video machine, friend's video machine or a borrowed video machine.

◆ **What computer facilities do learners have at home?**

The purpose of the following question is to test the learner's knowledge on the technical side of computers.

**Question**

What computer did you use the program on? Write in the MHz.

The options for this question included the different Pentium models on the market as well as a computer at MEDUNSA.

◆ **Can learners afford computers?**

Do learners not have computers because they cannot afford them or do they not have a use for them? A value was given to a computer because many learners would not know how much a computer cost. In the question a value of R5000 was decided upon because a decent second hand computer or even a new computer can be bought for this amount.

**Question**

Can you afford a computer of R5000?

The options that the respondents had to choose from included a yes or a no as well as "If it is really worth it I will make a plan".

### ❖ Learning

The questions in this section investigate the ways in which the learners learned. It is expected (although there was no penalty for not doing so) of learners to attend the practicals and the lectures. Every learner received a set of notes. A histology handbook is prescribed to which was often referred to during the lectures and the practicals. Videos were available for personal use or could be viewed in the library. The multimedia computer presentations that were developed for this study were available for personal use (on a CD rom) or could be viewed on the 15 computers that were made available for the learners. It was impossible for all the learners to use the multimedia computer presentations as much as they would have liked to (except for the ones that bought the CD and have their own computers) because of limited facilities.

### ◇ Tutored learning

The questions on learning are divided into four groups. Learning that takes place while learners are taught by a lecturer (lectures) or where learners are under supervision of a lecturer (practicals) are grouped under tutored learning.

### □ Lectures

In the following questions we try to determine the perceptions about lecture attendance and the issues that play a role in lecture attendance.

A limitation of the study is that learners that regularly do not attend lectures were not present when the questionnaires were filled in.

### ■ Ratings – How do learners rate their lectures

This question was asked to determine how learners rate the histology lectures which will also indicate how they rate the lecturers that give the lectures. Lectures can be assessed in three ways:

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- Learners can evaluate the lecturer.
- Marks obtained in the test can be analyzed and used to evaluate the lecturer.
- Graduates can be evaluated once they have completed their studies.

The first two ways are used in this study. This question is the first way in which a lecturer can be evaluated.

If no clear pattern emerges from this question it will confirm what Stuard (1978) said when he stated that ratings of lecturers by learners are not reliable.

For the purposes of the statistical analysis this question had to be broken up into a question for each lecture.

**Question**

Rate the presentation of the LECTURER for each course component below.

Use the scale:

- |  |             |
|--|-------------|
| <b>1</b> = Outstanding                   | <b>(O)</b>  |
| <b>2</b> = Very good                     | <b>(VG)</b> |
| <b>3</b> = Good                          | <b>(G)</b>  |
| <b>4</b> = Not good                      | <b>(NG)</b> |
| <b>5</b> = Bad                           | <b>(B)</b>  |
| <b>6</b> = Very bad                      | <b>(VB)</b> |
| <b>7</b> = No comment – I did not attend | <b>(NC)</b> |

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Table 3.4: Ratings of lectures

<b>Block 1</b>	O	V G	G	N G	B	V B	N C
Epitheliums	1	2	3	4	5	6	7
Connective tissues	1	2	3	4	5	6	7
Cartilage	1	2	3	4	5	6	7
Bone	1	2	3	4	5	6	7
Lymphoid system	1	2	3	4	5	6	7
Muscle	1	2	3	4	5	6	7
Respiration	1	2	3	4	5	6	7
Vascular system	1	2	3	4	5	6	7

<b>Block 2</b>	O	VG	G	NG	B	VB	NC
Neurohistology	1	2	3	4	5	6	7
Soft tissues of the mouth	1	2	3	4	5	6	7
Tooth development	1	2	3	4	5	6	7
Eye histology	1	2	3	4	5	6	7
Ear and olfactory epithelium	1	2	3	4	5	6	7

#### ■ Attendance

The attendance of lectures in the anatomy course is not compulsory. We do not have a way of compelling the learners to attend lectures. Many learners do not attend the histology lectures. We are aware of this because the lecture hall that we use can only accommodate 300 learners and there are 380 learners in class, therefore if all the learners attend, some would have to sit on the steps. This has never been the situation; because the class was never full we know that many learners did not attend the lectures.

#### ◆ Why do learners not attend lectures?

In the questionnaire we are trying to find the main reason why learners do not attend lectures and practicals. Only learners that stayed away or left the lectures or practicals had to answer these questions. Learners that did not answer these questions were the

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ones attending lectures and practicals. For the purposes of the statistical analysis this question had to be broken up into a question for each lecture and practical topic.

### **Question**

If you **DID NOT ATTEND** or **LEFT** any histology lectures below, please give your **MAIN** reason.

**Table 3.5: Reasons for not attending or leaving a lecture**

<b><i>Epitheliums</i></b>
I find it difficult to concentrate in class
I did not like the way the lecture was presented
I have too many lectures to attend
I do not like the topic
I would rather put effort into reading gross anatomy
Personal reasons
I study the notes
I study the prescribed book
I watch the video
I use the histology multimedia programs

◆ **Did you leave a lecture or lectures and why?**

During lectures learners often leave the lecture hall. The following two questions attempt to determine what the extent of this problem is and secondly what the reasons are for leaving the lecture.

### **Question**

Have you ever left a histology lecture before the end?

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The respondents had to choose between never, once, regularly and every time.

### **Question**

If you did leave a histology lecture, or lectures, before the end which of the following is/are applicable?

**Table 3.6: Reason for leaving a lecture**

It was during the same lecturer/s lecture/s
I could no longer concentrate
The lecture was too long
I could study the work on my own from the notes or textbook
The lecture was boring
I decided rather to look at the video or computer presentation
I was tired because I had not had enough sleep

### **◆ Do learners concentrate during lectures?**

If a learner attends a lecture but loses concentration during the lecture he or she obviously does not gain much from attending the lecture.

As a lecturer one often becomes aware of learners not paying attention during a lecture. Some learners even sleep during lectures. Because of the size of the class it is difficult to know what the extent of this problem is. Questions under this heading attempt to determine how many learners have concentration problems during lectures and what they think the reasons for these problems are.

### **Question**

Are you unable to concentrate during lectures?



**Table 3.7: Concentration during lectures**

Never
Sometimes
Only when listening to certain lecturers
When the lecture gets too long
Never during the first lecture
Only when I have not had enough sleep

◆ <b>Are there too many lectures?</b>
---------------------------------------

The question on the number of lectures gave various options. Option one determines whether a learner feels strongly about the number and contents of the lectures. The third option is to determine how many learners do not have a problem with lectures, the length and content. The other options suggest solutions to the problems. A learner that did not use the multimedia programs or does not like multimedia programs could choose option two or four as a solution. Options five and six suggest multimedia programs as a solution to the problems stated in the first question.

The idea behind this question was to see which option catches the learner's attention.

### **Question**

Do you think you have to attend too many lectures?

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**Table 3.8: Number of lectures**

Yes, because there is too much to absorb
No, but I would prefer longer breaks in-between
No, I can sit through the lectures and concentrate all the time
The lectures should be shorter and certain topics should be left for self-study
Some lectures should be replaced by computer presentations
All lectures should be replaced by computer presentations

◆ **Are certain lectures more important?**

This question tries to determine the learner's perception of the importance of attending the lectures in the different subjects and not the importance of the different subjects. It is possible that the importance of attending a lecture is determined by the availability of the information given in the lecture. If the information cannot be gathered from another source the learners may see attendance of that specific lecture as important.

**Question**

Which lectures do you think are vital and cannot be missed?

The options under this question included the four subsections of anatomy (gross and neuroanatomy, embryology and histology) as well as the option that if a lecture is missed it can be caught up later.

**Question**

For what reason(s) should these lectures not be missed?

**Table 3.9: Reasons for not missing a lecture**

The information cannot be found anywhere else
The lecturer clears up difficult concepts
The lecturer gives useful tips for the test
The lectures are enjoyable
My sense of duty does not allow me to stay away

■ Presentation – Which is the best way to present a lecture?

When data projectors became available some lecturers adopted the new technology. This way of lecturing makes lecturing much easier for the lecturer and also allows more options, like video, to be included in the lecture. Many lecturers however still use slides, transparencies and the blackboard for lecturing.

This question was asked to determine whether learners think that lecturing from a computer with the aid of a data projector results in a better lecture than when the traditional way is used.

**Question**

How would you rate a lecture given with the aid of a computer and a data projector?

**Table 3.10: Presentation of a lecture**

Better than a traditional lecture (Using the chalk board, slides and overhead projector)
Not as good as a traditional lectures
The same as a traditional lecture
Some are better, while others are not
I wish all my lectures were given in this way

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□ Practicals – Why do learners not attend or leave practicals?

Practicals form a major part of the histology course. Traditionally the practical sessions were used to teach learners to identify normal tissues and cells. This knowledge is important in the third year when the pathology of these tissues is studied.

The practicals like the lectures are not compulsory. Because of the large class, the same practical has to be repeated three times. No attendance is taken during the practicals but from the empty seats in the practical laboratory we know that many learners do not attend the practicals. Many learners also leave the practicals before the end. The following question was repeated for each practical topic.

**Question**

If you **DID NOT ATTEND** or **LEFT** any practicals below, please give your **MAIN** reason.

**Table 3.11: Reasons for not attending or leaving a practical**

<b><i>Epitheliums</i></b>
I do not need to attend the practical I watch the video
I do not need to attend the practical I study the Multimedia programs on histology
The practicals are not necessary
I have difficulties with the microscope
Histology slides are confusing, I would rather put an effort into gross anatomy
Personal reasons

◇ Self learning

This heading was chosen for studying that learners conduct outside the official schedule without any supervision from a lecturer. This includes reading from the prescribed book, looking for information on the internet, using the multimedia computer presentations and the video.

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 Prescribed book – To what extent is the prescribed book used?

A histology handbook is prescribed for the second year histology course. Lecturers refer to this book during practicals and lectures.

During lectures and practicals I have noticed that very few learners have the handbook. The following question about the use of the handbook was asked to determine if and in which way the learners used the handbook.

**Question**

Which ONE of the following is true with regard to the prescribed histology book?

**Table 3.12: Use of the prescribed book**

No I have not read the prescribed book
I have just looked up a few things
I have studied from the book
I started to study from the book, but gave it up
The book is too complicated

 Internet – To what extent is the internet used?

The use of the internet was also investigated. At MEDUNSA learners have to pay a fee to get access to the internet. The responses to this question will give an indication of the facilities and also the utilisation of the facilities available to the learners.

The following question was asked to determine how many of the respondents have access to the internet at MEDUNSA and also outside the university. The second question was asked to determine whether learners also use the internet for academic purposes or just to visit entertainment sites.

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**Question**

Do you have access to the internet?

The respondent had to choose one or more of the following options: no internet access or a yes I had internet access at either MEDUNSA, at home or at a friend's.

**Question**

If your answer to the previous question is YES then answer this Question.

**Table 3.13: Learners and histology on the internet**

I looked for histology on the Internet
I found histology websites on the Internet
I found histology of the same standard as our course
The histology that I found on the Internet was as good as the presentations that are available to us
I found histology that was better than the presentations that are available to us
The histology that I found is not applicable to our course

Multimedia computer presentations

A large section of the questionnaire is used for questions on the multimedia computer presentations. For the purpose of this study it is important to gain information regarding the perceptions of learners about multimedia computer presentations. The questionnaire addresses the questions of time spend, the affectivity and various other aspects of the user interface as well as the programs themselves. These questions attempt to determine the quality of the presentations that were developed for this study.

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■ Use
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The following questions probe whether the presentations were used and to what extent they were used which will help to indicate whether learners perceived the presentations as valuable for gaining knowledge more effectively.

◆ To what extent were the computer presentations used?
--

This question will indicate if learners that started to use the presentations kept on using the presentations or found them not worth the effort and stopped using them. It will also indicate whether learners found only some of the presentations worthwhile.

**Question**

Did you use the multimedia computer presentations that were available?

**Table 3.14: Use of the multimedia computer presentations**

Did not use it
Used some of it during Block 1
Used some of it during Block 2
Used only the multimedia for Block 1
Used only the multimedia for Block 2
Used it all

◆ Why was the computer presentations not used?
--

This question on the reasons why learners did not use the presentations will indicate whether the learners simply do not want to use computers for learning, whether some did not know about the presentations, whether the lack of facilities prevented the learners from using the presentations or whether the learners found the presentations unsatisfactory.

**Question**

I did not make use of the multimedia programs available because: (Choose the primary reason).

**Table 3.15: Reasons for not using the multimedia computer presentations**

Do not know about computers
Did not know about the programs
Did not have time
Looked at it but decided it was not worth it (do not need it)
The computers were always occupied

◆ Why did learners only use some of the computer presentations?

Some learners may have used the multimedia computer programs but quitted for some reason or other. The reasons why learners did not persist in using the programs are investigated under this heading.

**Question**

I used some of the multimedia programs available because: (Choose the primary reason).

**Table 3.16: Reason for only using some of the multimedia computer presentations**

I struggled with the computer
The computer programs were too difficult to use
Some of the programs were good and others were not good
I decided it was not worth it (do not need it) after I started to use it
The computers were always occupied



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◆ How much time did learners spend using the computer presentations?

Information about the time learners spend utilizing the computer presentations is important. This information can be useful in determining the facilities required. A possible problem with this question will be that the time indicated by the respondent may not be the time he or she may have wanted to spend on using the programs but was the only time they could find an available computer.

**Question**

How much time did you spend on the histology multimedia?

The various time options range from 2-4, 4-6, 6-8 or more than 8 hours.

◆ Were the presentations enjoyable to use?

If the hypothesis that histology is not a popular subject is true, ways of improving the popularity of the subject should be found. If a computer presentation that is enjoyable to use can be introduced this will do much to improve the learners' attitude towards the subject.

**Question**

Are the programs enjoyable to use?

**Table 3.17: Enjoyment of the multimedia computer presentations**

Yes
No, I prefer to read the notes
No, I prefer to watch the video
No, I prefer to read the prescribed book
No, but it is better than reading the notes

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◆ Did learners spend more time on histology because of the presentations?

If the multimedia computer presentations are enjoyable to use, one would expect learners to spend more time using the presentations than they would have spent using the notes and prescribed book.

**Question**

Did the multimedia computer presentations made you spend more time on histology than you would have if the presentations were not available?

The respondent had to either choose a yes or a no or could indicate that the programs made no difference to the time spent studying histology.

◆ Did learners help one another with the presentations?

Interaction between learners (teaching others) is an important way of acquiring knowledge (National Training Laboratories, 1998., Online).

**Question**

Was it difficult to get help when you had a problem with the program?

Respondents had to either say yes or no.

**Question**

Could your fellow learners help you with a problem?

The respondent had to choose between sometimes, always or sometimes the problem could not be solved.

**Question**

Did you help some other learner with a problem?

Respondents had to indicate that they either never, once or a couple of times helped a fellow learner.

<p>■ Evaluation – What was the interface like?</p>
--

The following questions were asked to determine if the user interface that was developed was generally acceptable to the learners and how the learners experienced the programs.

Respondents had to categorise their answers under always, sometimes or no.

The questions on the interface enquire about the following aspects of the interface:

**Table 3.18: Aspects of the interface**

Acceptability of colours
Acceptability of font type and size
Text readable and easy to follow
Pictures and text well laid out
Pictures used effectively
Is the program easy to use
Instructions clear and easy
Is the navigation easy

**Question**

Does using the program get easier as you use the program more and more?

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**Table 3.19: User friendliness of the multimedia computer presentations**

Yes, it gets easier
No, it is clear from the beginning
No, it is still complicated after having used it a couple of times

**Question**

Is the use of speech helpful/necessary?

The options under this question varied from speech is important, not important, seldom used and unnecessary.

**Question**

Is the work well explained?

The respondent had to choose between always, most of the time, some topics are well explained and no topic is well explained.

**Question**

Is the work systematically explained?

This question enquires about the sequence of the work. Options varied from mixed up in all cases, mixed up in some cases, not bad but could be improved and correct.

**Question**

Were there many errors in the programs that you can identify?

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This question on errors in the programs gave the option of many, few and couldn't find any.

■ Technical aspects – Were there navigational errors and technical problems?

Technical problems and navigational errors will cause frustration, waste time and can discourage learners from using the presentations.

The following two questions enquire about possible navigational errors which means links in the presentations that did not work and also about technical problems where the computer that the learner used could not run the presentations.

**Question**

Were there navigational errors in the programs that you can identify?

This question on navigational errors in the programs gave the option of many, few and couldn't find any.

**Question**

Were there many technical problems when you used the programs?

**Table 3.20: Technical problems**

Never
Program wouldn't run
A red cross was displayed sometimes
Computers crashed
CD rom wouldn't read the CD

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<p>■ Value</p>
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A number of questions were asked to determine the learner's perceived value of the multimedia computer presentations.

The following factors are thought to influence the value of the multimedia computer presentations, namely: recollection of knowledge; improvement of marks; improvement on a lecture and change of attitude of the learner.

<p>◆ Do learners feel presentations improved recollection?</p>
--

This question merely tests a perception as there is no real test to compare recollection in the same individual after using multimedia computer presentations and after using the conventional way of studying.

**Question**

Do the programs make it easier to remember the work? (Is your recollection better?)

This question gave the options yes, no and no difference.

<p>◆ Does the learner feel that his marks improved because of the presentations?</p>
--

This question is related to the previous question because better recollection will lead to better marks, as histology is mainly a subject of facts that must be remembered.

**Question**

Did you do better in the topics where programs are available?

The options for this question were yes, no, sometimes and no difference.

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◆ Is a computer presentation better than a lecture?

This is a very important question in this study. Learners will have to make a judgement on the grounds of what they have experienced when using the multimedia computer presentations and what they experienced when they attended lectures.

### **Question**

A multimedia session done on a computer is better than a traditional lecture:

**Table 3.21: Multimedia computer presentation versus a lecture**

No
Depends on the lecture
Depends on the computer presentation
A good computer presentation is better than any lecture
A computer presentation is for revision

◆ Did presentations change the learner's attitude towards the subject?

If the hypothesis that histology is the least popular of the subsections of anatomy is true, the reasons for this unpopularity must be investigated. If possible an effort must be made to increase the popularity of histology amongst the learners. This question will determine whether we can change or have changed the attitude towards histology with the multimedia computer presentations.

### **Question**

Did the programs change you attitude (rating of) towards histology? Did it make you enjoy histology more?

The respondent had to decide whether the programs changed his attitude towards histology a little, a lot or not.

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## □ Video

The following questions are related to the issues around the three hour video on the practical aspects of the histology course. Questions address the use and popularity of the video as a study aid. The facilities available and the time spent watching the histology video is probed.

## ◆ How many times did learners watch the video?

This question attempts to verify the time learners spend studying the video. From conversations with learners it became clear that they assume that by sitting and watching the video a couple of times they are guaranteed a good mark for the practical test. The results from this question will be related to the marks obtained during the practical test.

**Question**

How many times did you watch the video?

Respondents had to choose between once, twice, three times, four times and more than four times.

## ◆ What problems were encountered?

The purpose of the question was to determine what frustrations regarding the facilities would be chosen if a number of potential complaints are given as options.

**Question**

When you watched the video in the library the following applied:



**Table 3.22: Video in the library**

I had problems finding a booking
I could easily find a booking
The video machines are always in working order
The video machines are not always in working order
The quality of the video is satisfactory
The quality of the video is not always good

#### ◇ Favourite ways of studying

This question will test the popularity of the alternative ways of presenting information (video and multimedia computer presentations) against the traditional ways of presenting learners with information (lectures, slides studied under the microscope and reading textbooks).

#### **Question**

Rate the following from 1 to 6 in terms of your preferred methods of studying histology.

The respondents had to rate all the various components of the histology course, namely: notes prescribed book, video, multimedia, lectures and practicals.

#### ◇ How would learners like their course?

In the following questions the learners are questioned on their opinions of multimedia in general and what they think the future of multimedia is in the teaching of histology after having been exposed to the multimedia that was developed for this study.

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◆ Can multimedia replace the traditional course?

This question tests the perception that the learners have developed of multimedia while using the multimedia that was developed for this study.

### **Question**

What is your considered opinion on the histology course and the availability offerings of a multimedia environment?

**Table 3.23: Replacing the traditional course with a multimedia histology course**

Multimedia can completely replace the histology course
Multimedia histology should be supported by practicals and lectures
Multimedia histology should be supported by lectures
Multimedia histology should be supported by practicals
Multimedia should only be additional, for those interested

◆ Do learners think multimedia can replace the microscope?

The issue that is addressed in this question is whether the learners feel they need a microscope or not to study histology properly. This question is related to the questions above. If the response to the questions above is negative, this question will determine if the learners will accept replacement of the microscope as a teaching tool.

### **Question**

Is the multimedia on a computer better than using a microscope?

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Respondents had to choose from much better, not better, the same and the computer can completely replace the microscope.

◆ Do learners prefer computer presentations or video?

Most people would assume that multimedia computer presentations would be preferable to video. Multimedia computer presentations include all the information that is presented on the video and more, and because it is interactive it should therefore be a better learning experience. From the literature we know however that the learners tend to prefer the way of studying that requires the least effort (Heidger et al, 2002). This question was asked to see whether this is also true for our group of respondents.

### Question

Do you prefer a video to an interactive computer presentation?

**Table 3.24: Video versus multimedia computer presentations**

Yes, I would prefer to use videos as an additional way of studying histology
I would like to watch the histology video in addition to computer presentations
Videos are not necessary when you have interactive computer presentations

❖ Tests – Is effort rewarded?

Questions were also asked regarding the perceptions around tests. Learners should feel that a big effort should result in good marks. Sometimes learners feel that when they write a test they are not rewarded for the effort they have put into their studies. This is a problem when a subject consists of different subsections because a learner can decide to rather spend time on another subsection and try to compensate in this way.

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The theory and the practical tests are two separate tests. The same question is asked for the theory and for the practical tests in histology.

**Question**

If I put in a big effort into practical histology:

The respondents had to choose from doing well, may still fails get an average mark, rather spend time on the theory part of histology or rather spend time on the other subsections of anatomy.

**Question**

If I put a big effort into the theory of histology:

The same options as in the previous question applied here except that the one option was to rather spend time on the practical part of histology.

**3.2.2.1.2 Records**

The data base that was compiled using the information collected from the questionnaires was supplemented by data retrieved from the learner records. Only data from learners who wrote their names on the questionnaires were used. The following information was added to the data base.

➤ Test results

The histology part of the two tests that were written at the end of the two blocks were out of a total of 170 and the gross anatomy made up the rest to give a total of 600. The histology was divided into a practical part where multimedia computer presentations were available to the learners as additional study material and a part where no multimedia presentations were available. The written section of histology was similarly divided into the same two sections. The marks obtained in the written test on gross

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anatomy were also included in the data base containing additional records as well as the marks obtained in the practical test on gross anatomy.

**Table 3.25: Test information**

<b>1</b>	<b>Written Histology /60 multimedia computer presentations available</b>
<b>2</b>	<b>Written Histology /30 multimedia computer presentations not available</b>
<b>3</b>	<b>Practical Histology /55 multimedia computer presentations available</b>
<b>4</b>	<b>Practical Histology /25 multimedia computer presentations not available</b>
<b>9</b>	<b>Written – Gross Anatomy /210</b>
<b>10</b>	<b>Practical – Gross anatomy /220</b>

The marks for the different parts of histology, where multimedia presentations were available and the parts where multimedia presentations were not available, had to be retrieved from the learners' personal files because the marks are not usually recorded in this format.

#### ➤ Criteria for selecting learners

Learners are selected for the MBChB and BDS courses on marks obtained in the matric exam (SRS rating) and on courses passed or degrees obtained from MEDUNSA or other institutions (additional credits).

#### ❖ SRS ratings

To calculate the SRS value that is used for selection of learners at MEDUNSA only two matric subjects are taken into account namely: mathematics and science. Marks are awarded for the symbols obtained. (See Table 1.2). The SRS ratings on which the

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learners were selected were retrieved from the learner records and added to the data base.

#### ❖ Additional credits

The data base also included a field indicating whether a learner has additional credits or not. A value could not be given to the credit because these credits are often subjectively awarded by the dean. A number of learners are foreign and therefore do not comply exactly with the requirements.

#### 3.2.2.1.3 Relationships between responses and records

From studies reported in the literature (Oliver, 1999) it is known that when comparisons are made between learners that were taught with the use of multimedia or any other method of E-learning and learners that were taught the traditional way there is no significant difference in the outcomes.

#### ❖ Statistical analyses

Because the marks were available it was decided to do an analysis.

**The following comparisons were made:**

##### **1. SRS ratings correlated with the total histology mark**

This was done to see what influence the selection criteria have on performance.

##### **2. The marks of the learners with additional credits compared to the marks of the other learners.**

This was done to see whether the more experienced learners do better.

**3. The marks on the section for which multimedia computer presentations were available were compared between the following three groups.**

- Used none of the multimedia computer presentations
- Used some of the multimedia computer presentations
- Used all the multimedia computer presentations

This was done to determine if there was a significant difference among the three sets of marks.

**4. The number of times a learner watched the histology video compared to the practical histology mark.**

This was done to see whether there is a correlation between the number of times a learner watches the video and the mark that he obtains in the histology practical test.

**5. The histology marks obtained by the learners that indicated histology as their favourite subject compared with their gross anatomy marks.**

This was done to see whether the motivation factor may have a significant influence on a learner's performance.

In the last three comparisons (3,4 and 5) the gross anatomy mark obtained was used as a co variant.

### 3.2.2.2 Learner profiles

The responses from the questions were used to put together a profile of the average MEDUNSA learner under the following headings.

- Subject preferences of the average MEDUNSA learner;
- Study preferences of the average MEDUNSA learner;

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- The average MEDUNSA learner and the internet;
- The average MEDUNSA learner and lectures;
- The average MEDUNSA learner and practicals;
- How the average MEDUNSA learner would like his course;
- The average MEDUNSA learner's financial situation;
- The average MEDUNSA learner and multimedia;
- Academic background.