

**STUDENT NURSES PERCEPTIONS AND ATTITUDES TOWARDS ANATOMY
AND PHYSIOLOGY IN LIMPOPO, SOUTH AFRICA**

by

FLORAH MOKGADI MONISI

submitted in accordance with the requirements for
the degree of

MASTER OF ARTS

in the subject

NURSING SCIENCE

at the

UNIVERSITY OF SOUTH AFRICA

SUPERVISOR: DR M E CHAUKE

NOVEMBER 2018

Dedication

To GOD, my pillar, rock and comforter, who say, “The wise store up knowledge, but the mouth of a fool invites ruin.”

Proverbs 10:14

Student number: 7284055

DECLARATION

I declare that **STUDENT NURSES PERCEPTIONS AND ATTITUDES TOWARDS ANATOMY AND PHYSIOLOGY IN LIMPOPO, SOUTH AFRICA** is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references and that this work has not been submitted before for any other degree at any other institution.



Florah Mokgadi Monisi

Date: 01 November 2018

ACKNOWLEDGEMENTS

My deepest gratitude belongs to God, my Creator and Father, for the grace and strength to complete this study. The idiom says perseverance is the mother of success, which means you only succeed when you persevere when you don't get weary or discouraged.

My sincere thanks and appreciation to the following people for making this study what it is:

- My supervisors, Dr ME Chauke, for her support, encouragement and guidance, and everything I learned from her.
- Limpopo Department of Health, for permission to conduct the study.
- Limpopo College of Nursing, especially Sovenga, Thohoyandou and Giyani Campuses, for permission to conduct the study.
- My husband, Godfrey Laurenti Monisi, for his love, patience, support and sense of humour.
- My one and only daughter Lebogang and my two grandsons Kamogelo and Pheny, for their love, support, understanding, patience, happiness and laughter.
- The participants, second-year students (group 2017), for their courage in participation, time, understanding and cooperation.
- All the lecturers from Sovenga, Thohoyandou and Giyani Campuses, for their sacrifice in using their periods, support, time and assistance with data collection.
- The statistician, Victor Netshidzivhani, for his detailed statistical data analysis and making it look so easy.

STUDENT NURSES' PERCEPTIONS AND ATTITUDES TOWARDS ANATOMY AND PHYSIOLOGY IN LIMPOPO, SOUTH AFRICA

STUDENT NUMBER: 7284055

STUDENT: MONISI FLORAH MOKGADI

DEGREE: MASTER OF ARTS

DEPARTMENT: HEALTH STUDIES, UNIVERSITY OF SOUTH AFRICA

SUPERVISOR: DR ME CHAUKE

ABSTRACT

The purpose of the study was to describe the perceptions and attitudes of student nurses towards anatomy and physiology. The study was conducted in the nursing education setting at three campuses of one college of nursing in the Limpopo Province of South Africa. A non-experimental, quantitative, descriptive research design was utilised, with a survey and a self-administered questionnaire as data collection method and instrument respectively. Probability sampling was utilised to select a sample of 2nd year student nurses registered for the 4-year diploma at the selected college of nursing. Data was analysed by means of Statistical Package of Social Sciences (SPSS) version 24.0.

The results revealed both positive and negative perceptions and attitudes towards anatomy and physiology. Positive attitudes and perceptions were that the subject is enjoyable, easy, interesting and relevant to nursing practice. Negative attitudes were shown towards the classroom as not being conducive to learning and towards teaching methods that were not interactive. Recommendations were made to include interactive, evidence-based teaching learning methods in anatomy and physiology.

Key Terms

Anatomy, attitudes, perceptions, physiology, student nurses

TABLE OF CONTENTS

DEDICATION	ii
DECLARATION	iii
ACKNOWLEDGEMENTS	iv
ABSTRACT.....	v
CHAPTER 1	1
OVERVIEW OF THE STUDY	1
1.1 INTRODUCTION.....	1
1.2 BACKGROUND INFORMATION ABOUT THE RESEARCH PROBLEM	1
1.3 RESEARCH PROBLEM.....	2
1.4 RESEARCH PURPOSE AND OBJECTIVES.....	3
1.5 RESEARCH QUESTIONS.....	3
1.6 SIGNIFICANCE OF THE STUDY.....	3
1.7 DEFINITIONS OF KEY CONCEPTS.....	4
1.8 PARADIGMATIC GROUNDING OF THE STUDY.....	5
1.9 RESEARCH DESIGN AND METHODS	7
1.10 SCOPE OF THE STUDY	7
1.11 STRUCTURE OF THE DISSERTATION	7
1.12 CONCLUSION.....	8
CHAPTER 2	9
LITERATURE REVIEW	9
2.1 INTRODUCTION.....	9
2.2 PURPOSE OF THE LITERATURE REVIEW	9
2.3 SCOPE OF THE LITERATURE REVIEW	9
2.4 LITERATURE REVIEW.....	10
2.4.1 Anatomy and physiology as the prescribed subject in the curriculum of nurses.....	10
2.4.2 Importance of anatomy and physiology as the basics in nursing.....	10

2.4.3	Attitude of students towards subjects.....	11
2.4.4	Perceptions of students towards subjects.....	12
2.4.5	Factors involved in Student attrition in anatomy and physiology	13
2.4.6	Reasons for student enrolment to nursing	13
2.4.7	Remediation	14
2.4.8	Recommended approaches and methods used in teaching anatomy and physiology	14
2.4.9	Contributory factors to student's poor performance	15
2.4.10	Factors rendering anatomy and physiology as a difficult subject	16
2.5	CONCLUSION.....	17
CHAPTER 3		18
RESEARCH DESIGN AND METHODS.....		18
3.1	INTRODUCTION.....	18
3.2	THE RESEARCH PURPOSE AND OBJECTIVES	18
3.3	RESEARCH DESIGN	18
3.3.1	Quantitative design	19
3.3.2	Descriptive study design.....	20
3.3.3	Non-experimental designs	20
3.4	RESEARCH SETTING.....	20
3.5	RESEARCH METHODS	21
3.5.1	Population	21
3.5.2	Sample, sampling methods and sample size.....	21
3.5.3	Data collection.....	22
3.5.4	Data analysis.....	26
3.6	ETHICAL CONSIDERATION.....	27
3.7	CONCLUSION.....	29
CHAPTER 4		30
ANALYSIS, PRESENTATION AND DESCRIPTION OF THE RESEARCH FINDINGS DATA ANALYSIS AND INTERPRETATION		30
4.1	INTRODUCTION.....	30
4.2	DATA MANAGEMENT AND ANALYSIS.....	30

4.3	RESEARCH RESULTS.....	30
4.3.1	Biographical data	31
4.3.2	Student nurses' perceptions and attitudes of participants towards anatomy and physiology.....	36
4.4	OVERVIEW OF RESEARCH FINDINGS	47
4.4.1Description of student nurses attitude towards anatomy and physiology	47
4.4.2	Description of student nurses perceptions of anatomy and physiology .	47
4.5	CONCLUSION.....	48
	CHAPTER 5	49
	RESEARCH FINDINGS, CONCLUSIONS, RECOMMENDATIONS AND LIMITATIONS OF THE STUDY	49
5.1	INTRODUCTION.....	49
5.2	RESEARCH DESIGN AND METHODOLOGY	49
5.3	SUMMARY AND INTERPRETATION OF THE FINDINGS	50
5.3.1	Demographical profile of the respondents	50
5.3.2	Student nurses' perceptions and attitudes towards anatomy and physiology	52
5.3.3	Relevance of subject to nursing practice	54
5.3.4	Methods used in teaching anatomy and physiology	54
5.3.5	Students responses on anxiety to anatomy and physiology	55
5.4	RESULTS	55
5.5	CONCLUSION.....	57
5.6	RECOMMENDATIONS	57
5.7	CONTRIBUTIONS OF THE STUDY	59
5.8	LIMITATIONS OF THE STUDY	59
5.9	CONCLUDING REMARKS	59
	LIST OF REFERENCES.....	61
	ANNEXURES	67

LIST OF ANNEXURES

Annexure A: Ethical Clearance from Unisa Research Ethics Committee.....	68
Annexure B: Permission to Conduct the Study Limpopo Provincial office.....	69
Annexure C: Permission from Thohoyandou Campus	71
Annexure D: Permission from Giyani Campus	73
Annexure E: Permission from Sovenga Campus.....	74
Annexure F: Questionnaire.....	76
Annexure G: Consent form.....	80
Annexure H: Letter from statistician.....	81

LIST OF TABLES

Table 4.1: Gender of participants (n=131).....	31
Table 4.2: Highest qualification.....	32
Table 4.3: Grade 12 (n=131).....	33
Table 4.4: Number failed in Biological science (n=131).....	34
Table 4.5: Students' attitude towards anatomy and physiology (n=131).....	38
Table 4.6: Students' perceptions of anatomy and physiology (n=131).....	42
Table 4.7: Teaching methods and assessment tools used in anatomy and Physiology (n=131).....	46
Table 4.8: Student nurses' perception of the usefulness of teaching methods and assessment tools (n=131).....	46

LIST OF FIGURES

Figure 4.1: Gender of participants (n=131.).....	31
Figure 4.2: Previous nursing experience.....	32
Figure 4.3: Subjects failed in Biological science.....	34
Figure 4.4: Formative average tests marks	35
Figure 4.5: Difficulty in learning anatomy and physiology	42
Figure 5.1: Response in correlation to the research questions	58

CHAPTER 1

OVERVIEW OF THE STUDY

1.1 INTRODUCTION

Anatomy and physiology are core course components within undergraduate nursing curriculum. They are critical courses in the pre-registration nursing programs necessary for student nurses' success in future theory and clinical courses and eventual safe practice as a registered nurse (Levey 2009:43). Research has shown that success in anatomy and physiology correlates with both success later in the program and with passing state licensure examinations. Montayre and Sparks (2017: 217) state that nurses who have mastered biological sciences, including anatomy and physiology are confident and competent practitioners providing clinically effective patient care.

There is ample evidence of high failure rate in anatomy and physiology among student nurses globally, and in nursing education institutions across South Africa (Brown, White, Bowmar & Power 2017; Crane & Cox 2013, Gultice, Witham & Kallmeyer 2015, Higgins-Opitz & Tufts 2014, White, Madigan and Drinkwater 2011; Mohudi 2013). Consequently, student nurses fail to earn the minimum grades required to progress in the course sequence, thereby taking longer time to complete the course. In addition, high failure rate causes high dropout rate of student nurses as they terminate the course before completion (Ali 2008 cited in Manson 2014:4; Last & Fullbrook 2003:449 cited in Manson 2014:1).

1.2 BACKGROUND INFORMATION ABOUT THE RESEARCH PROBLEM

At the college of nursing where the study was conducted, anatomy and physiology are taught as a biological sciences subject within the basic nursing curriculum. Other biological sciences subjects offered at the college include biochemistry, microbiology, parasitology, pharmacology and biophysics. Anatomy and physiology are offered in the first and second level of training (Northern Province College of Nursing Curriculum 1997 [NPCNC]) and they are presented over four teaching blocks in an academic year. The content is taught over 40 hours per week in each teaching block.

According to the learning outcomes in the curriculum, learners are expected to be able to

- Acquire knowledge and comprehension of anatomy and physiology
- Effectively apply the knowledge of anatomy and physiology in nursing to manage health problems of individuals and provide safe, efficient and effective patient care.
- Interpret the anatomical and physiological functioning of the human body (NPCNC 1997).

Various teaching strategies such as lecturers, group discussions, peer group presentations, assignments, library visits and videos are used for anatomy and physiology. The timetable is drawn in such a manner that different subjects alternate with anatomy and physiology daily to allow integration of all subjects (NPCNC 1997).

Formative assessment involves four 50 marks tests each, 25% of which comprise objective item questions and the remaining 25% structured questions. The summative assessment consists of 25% objective item questions and 75% structured questions, which are moderated by the university to which the college is affiliated. The selected college of nursing has set a target of 80% pass rate in summative assessment in every subject including anatomy and physiology. While student nurses reach this pass rate target in other biological science subjects, anatomy and physiology are considered the most difficult courses by student nurses for the students fail to reach the college's target pass rate (NPCNC 1997).

1.3 RESEARCH PROBLEM

Statistics at the college of nursing where the study was conducted show poor performance in anatomy and physiology as compared to other subjects. The student nurses perform poorly in anatomy and physiology despite the available support systems at the nursing college for students. According to the summative results, an average of 26% second year student nurses failed anatomy and physiology between 2011 and 2015 (Senate and Provincial summative reports 2011-2015). The recorded pass rate is below the averages of other subjects in summative assessment of the college results.

In addition, statistics show that only 60% of student nurses completed their programme in record time because of the failure rate in anatomy and physiology, which often delays student nurses' progress through the programme. (Senate and Provincial summative reports 2011-2015).

1.4 RESEARCH PURPOSE AND OBJECTIVES

The purpose of this study was to describe the student nurses' perceptions and attitudes towards anatomy and physiology.

In order to accomplish the purpose of the study, the following objectives were formulated:

- Describe students nurses' views about anatomy and physiology
- Describe students nurses' thoughts about anatomy and physiology
- Describe students nurses' feelings about anatomy and physiology
- Describe the students nurses' behaviour towards anatomy and physiology

1.5 RESEARCH QUESTIONS

- What are the student nurses' perceptions of anatomy and physiology?
- What are the student nurses' attitude towards anatomy and physiology?

1.6 SIGNIFICANCE OF THE STUDY

Social psychological research and cognitive psychology have shown that behaviour and learning are sometimes unconsciously influenced by the perceptions and attitudes of an individual towards a particular course, and this often determines how well students learn and understand the subject matter (Ferguson & Bargh 2004 in Bryant, Goud, Srinivasan & Vijayalakshmi 2016:13). Understanding student nurses' perceptions and attitudes towards anatomy and physiology would help nurse educators to develop and implement appropriate and supportive interventions to change the identified negative perceptions and attitudes.

These perceptions and attitudes may serve as significant barriers to learning and are associated with poor performance in anatomy and physiology.

The research findings have the potential to contribute to the body of knowledge regarding perceptions and attitudes towards anatomy and physiology among student nurses. The findings may also be used to offer recommendations for possible changes in the presentation of the course content which may lead to changes in approaches to teaching and learning, and may increase students' motivation to continue doing their best.

1.7 DEFINITIONS OF KEY CONCEPTS

- **Anatomy and physiology**

Anatomy is the study of the structure of the body and the physical relationship between the body structures (Shier, Butler & Lewis 2013: 12; Waugh & Grant 2014:4) while physiology refers to the study of how the body systems work and the way in which their integrated activities maintain life and health of the individual (Shier, Butler & Lewis 2013:12). For the purposes of this study, anatomy and physiology are biological sciences subjects done in the second year of a diploma in nursing at the selected college in Limpopo, leading to registration as a nurse (General, Psychiatric and Community) and Midwife.

- **Attitudes**

Attitudes refer to the way that one thinks and feels about somebody/something, the way that one behaves towards somebody/something that shows how one thinks and feel (Oxford Advanced Learner's Dictionary 2014:24). In this study, attitudes refer to second year student nurses' thoughts, feelings and behaviour towards anatomy and physiology.

- **Perceptions**

Perceptions refer to the ability to see, hear, or become aware of something from a specific framework or worldview (Oxford Advanced Learner's Dictionary 2014:7). In this study, perceptions mean student nurses' views on anatomy and physiology

- **Student nurses**

Student nurses are individuals undergoing education and training in basic nursing at an accredited institution that has complied with the prescribed standards and conditions (DOH, 2008:5). For the purposes of this study, student nurses are 2nd year student nurses registered for a diploma in nursing at the selected college in Limpopo, leading to registration as a nurse (General, Psychiatric and Community) and Midwife.

1.8 PARADIGMATIC GROUNDING OF THE STUDY

The paradigmatic grounding of the current study is positivism. Babbie (2007) in De Vos, Fouche and Delport (2011:513) defines a paradigm as a framework and perspective based on human philosophies and assumptions about the world around them, as well as the interpretation of reality. Polit and Beck (2012: 11) further explain a paradigm as a broad view of complicated parts of the world and that it relates to the social examination of the manner in which humans respond to the nature of what is happening in real life.

A paradigm is used as an analytic strategy to help intergrade structures and process. The basic components of the paradigm include conditions, interactions and emotions, and consequences (Polit and Beck 2012: 574).

Positivism is an approach to research based on a belief in universal laws, and objective reality (Holloway & Wheeler 2010:22; Polit & Beck 2012:12). It is rooted in the belief in the existence of a social and physical reality 'out there' (realist ontology) that is driven by natural laws (objectivist epistemology) as well as the appropriate ways of going about finding knowledge (methodology) and that reality can be quantified when positivism is used to guide the study.

The positivist researcher therefore works with an observable social reality whereby personal beliefs are kept at bay so as not to influence the phenomenon under study. Researchers using positivism are concerned about facts, measurable behaviour as well as cause and effect. Its methods rely heavily on quantitative measures, with relationships among variables commonly shown by means of statistics. Parahoo (2006:50) explain that the quantitative paradigm adopts a deductive approach to research, the research process is objectively constructed, and its findings are replicable and generalizable.

The critique against quantitative paradigm is its scientism and lack empirical observations leading to an understanding of human phenomenon. Scientism is defined as the belief that only the scientific method can produce hard evidence worthy of being called science and that other ways of producing knowledge are inferior (Parahoo 2006:57). Furthermore, it is reductionist in that it intends to reduce the ideas into small, discreet set of ideas to test (Creswell 2009:7) thus missing integrated narrative description and deep understanding of human experience.

Assumptions on which the study was founded

Assumptions are statements taken for granted or considered true, even though they have not been scientifically tested (Burns & Grove 2009: 688). Positivism was a proper approach to address assumptions about participants in study from the scientific evidence of collected data, statistically. The meta-theoretical tenets of the philosophical underpinnings of the study yielded the following assumptions;

- Negative perceptions and attitudes toward anatomy and physiology serve as significant barriers to learning and are associated with poor performance in anatomy and physiology among student nurses
- Quantitative research would be appropriate to the study of perceptions and attitudes of student nurses towards anatomy and physiology as is hard to argue with the results but the researcher can make predictions from data.

- A questionnaire with closed-ended questions and scales will be suitable to gather quantitative data from a large number of respondents easily and economically.
- The participants are autonomous people who will share information willingly and will give honest responses to the questionnaires.
- Statistics will provide an adequate scientific foundation to ensure reliability and validity of the research instrument.

1.9 RESEARCH DESIGN AND METHODS

A quantitative descriptive survey design was used to achieve the objectives of the study. The design was non-experimental in nature. The research methods include the description of the study setting, population, sampling as well as data collection and analysis methods. The discussion of related ethical issues and measures taken to enhance the validity and reliability form part of the research methods. Details regarding the research design and methods used in this study are discussed in chapter 3.

1.10 SCOPE OF THE STUDY

The study was conducted in three of the five campuses of one college of nursing in Limpopo, as the other two campuses of the same college do not have the level two (second year) student nurses.

1.11 STRUCTURE OF THE DISSERTATION

This dissertation was organized into five chapters as follows;

Chapter 1; Focuses on the overview of the study and serves as an introduction to the study.

Chapter 2; Presentation of the relevant literature reviewed

Chapter 3; Discussion of the research design and methodology used in the study

Chapter 4; Presentation of data analysis and the research findings

Chapter 5; Discussion of the conclusions of the study, interpretation of the research findings and recommendations.

1.12 CONCLUSION

In this chapter, the background and introduction of the study was presented. The study discussed the meta-theoretical grounding of the study, research problem, purpose and objectives, research design, methodology of the study and an outline of the dissertation study. The study set out to address research questions based on demographic variables, classroom attendance, learning patterns and support by lecturers, to find out whether these variables play a role in the performance of student nurses in anatomy and physiology.

The following chapter focuses on review of the relevant literature.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter focus mainly on literature relevant to the phenomena under the study, which is student nurses' perceptions and attitudes towards anatomy and physiology. According to Grove et al (2013:97), a literature review is a written and well-organized presentation of what has been published about a research topic by scholars.

2.2 PURPOSE OF THE LITERATURE REVIEW

The purpose of the literature review was to familiarise and widen the researcher's knowledge base of trends and developments in the anatomy and physiology teaching. By reviewing literature, the researchers was able to understand the meaning and nature of the identified research problem (De Vos et al 2011:134). In addition, the literature review enabled the researcher to identify what is already known about attitudes and perceptions of students towards anatomy and physiology and knowledge gaps in literature. According to Grove, Burns and Gray (2013:40) literature reviews give the researcher impetus for conducting the study and help avoid unintentional duplication. The same authors state that, when literature review is done for a study that is quantitative in nature, the process is aimed at directing the development and implementation of the study and ultimately producing a written report thereby adding to the body of knowledge for the research area.

2.3 SCOPE OF THE LITERATURE REVIEW

A computer-assisted search was conducted using the keywords attitudes, perceptions, student nurses, and anatomy and physiology. The reviewed literature comprised various reports and research conducted on student nurses' perceptions and attitudes towards anatomy and physiology globally including the country of the study, South Africa.

2.4 LITERATURE REVIEW

The results of the literature pertinent to the study are presented in the paragraphs that follow.

2.4.1 Anatomy and physiology as the prescribed subject in the curriculum of nurses

The American Association of Colleges of Nursing (AACN) has “reaffirmed its position that baccalaureate education is the minimum level for entry into professional nursing practice in today’s complex healthcare environment” (AACN 2008:7).

The South African Nursing Council (SANC) has legislated for the inclusion of biological and natural sciences (anatomy, physiology, chemistry, biophysics, microbiology and parasitology) and pharmacology in the 4-year undergraduate preregistration-nursing programme (SANC, Regulation 425 of 1985).

In the Kentucky Community and Technical College System (KCTCS), the first semester class includes basic chemistry, cell structure, cell physiology, metabolism, tissues, integumentary, skeletal, muscular, and nervous systems. The second semester extends the study of the interrelationship of structure and function and includes the endocrine, reproductive, cardiovascular, lymphatic, digestive, respiratory, and urinary systems (KCTCS 2014:244).

2.4.2 Importance of anatomy and physiology as the basics in nursing

If nursing students disregard the importance and relevance of bioscience to their professional role, it might have implications for the standard of their practice (Rafferty and Kyriacos 2016:36). Nursing, midwifery, and paramedicine students all share common academic content regarding the need to understand basic human anatomy and physiology (Brown, White, Bowmar & Power 2014:302).

The knowledge and foundation gained in anatomy and physiology assist students to succeed in healthcare professions and to pass licensing exams (Sturges & Maurer, 2013:7). Support for the integration of active learning pedagogy in the undergraduate courses in the field of science and technology has been increasing (Freeman, Eddy, McDonough, Smith, Okoroafor, Jordt & Wenderoth, 2014:8410).

In the study by Rafferty and Kyriacos (2016:35) nursing students considered anatomy, physiology and pharmacology to be relevant for practice and microbiology to some extent but not biophysics and biochemistry. According to the Department of Anatomy in the Faculty of Medicine at Kocaeli University (2011), the anatomy course analyses human anatomy, the various structures in the body and how these structures relate to each other (Friedel & Treagust 2005:204).

Physiology is one of the major components of the curriculum in a number of life science courses, including the study of life, cells, tissues, and organisms as well as their functions (Borges & Mello-Carpes 2013:93). There is good research evidence that competent knowledge of bioscience can enhance nursing practice (Friedel & Treagust 2005:204).

2.4.3 Attitude of students towards subjects

Attitude in general can be summarised as being positive or negative; it is logical, therefore, to also consider a positive or negative cognitive attitude, and a positive or negative affective attitude (Brown et al 2016:1). The concept of an attitude towards science is somewhat nebulous, often poorly articulated and not well understood. (Osborne, Simon, & Collins 2003:1049). However a prevailing area of attitudes research discovered a link between students' attitudes toward a subject and their ability to succeed in a subject area however (Osborne et al 2003:1049). Cukljek, Juresa, Bile and Rezek (2017:41) state that students are coming with the idealistic perception of nursing, which can also contribute to withdrawal from the study program.

Students' attitude to a subject they are expected to study is rarely measured, yet a positive attitude may correlate with higher achievement, also a positive attitude toward learning new academic content may support ongoing professional education, helping to ensure flexibility within the workplace (Xu, Southam & Lewis 2012:33).

In the study by Tom, Coetzee and Heyns (2014:104), students viewed anatomy and physiology positively and reflected that the content of biological science increased their knowledge regarding the structure and functioning of the human body and were positive about linking biological science to their previous knowledge.

The nursing students indicated that biological science should not be 'feared' but should be viewed in a positive manner (Tom et al 2014:108).

Abdullahi and Gannon (2012:160) showed that a two-week pre-anatomy and physiology workshop improves students' performance and attitudes towards the course. Teaching pedagogy aimed at developing a positive attitude toward science can be implemented within a curriculum (Brown et al 2017:1).

The LETME (Link, Extract, Transform, Monitor and Extend) approach attempts to make academic skills more visible to at-risk students who have never successfully mastered basic study skills. This is accomplished by training faculty across all disciplines in teaching strategies that integrate both basic and higher order processing skills (Abdullahi & Gannon 2012:2).

Stetzik, Deeter, Parker and Yukech (2015:107) reported that students showed a predominantly negative attitude towards puzzles designed to enhance learning in human anatomy and physiology. Students' attitude can also be negatively affected if there is a disproportionate relation between the degree of perceived effort required to pass an assessment and the credit received for passing it, or if an assessment challenges the learning of the student in unfamiliar ways (Brown et al 2017:8).

2.4.4 Perceptions of students towards subjects

A students' attitude to a subject may also be influenced by their perception of the relevance of the subject to their chosen career ambition (Brown et al 2016:302). The second emergent theme was that nursing students questioned and perceived irrelevant the requirement of a separate anatomy and physiology course as part of their nursing curricula (Levey 2009:44), Levey further discovered that nursing students' perceptions of anatomy and physiology was influenced by the characteristic profile of the student and their life experiences.

Biological science was perceived to be the basis of knowledge for those who want to become professionals in the health and medical professions (Tom et al 2014:104). The general perception appears to be that new teaching techniques are best employed to complement the traditional dissections and prosecutions, rather than replace (Sugand, Abrahams & Khurana 2010:84).

2.4.5 Factors involved in Student attrition in anatomy and physiology

The Human Anatomy and Physiology Society (HAPS) assembled an Educational Research Task Force to address the issue of attrition in Anatomy and Physiology (Hull, Wilson, Hopp & Jackson 2016:38). Anatomy and physiology courses have some of the highest rates of failure and withdrawal of all courses given at the undergraduate level at any given institution (Hopper 2011:73). Hull et al (2016:39) further state that factors such as gender, socioeconomic status, linguistic status with relation to the program of study, characteristics of the institution and minority status played a role in attrition of students. The most common reasons for non-completion of the study are a failure during the study, personal and family reasons, and wrong choice of career, unrealized expectations about the study, and nursing and financial difficulties (Cukljek et al 2018:36).

In Australia, research on students' difficulties has revealed that most recurrent problems that lead to students terminating their studies include overloaded curriculum, loss of interest in the chosen area of study, perception of insufficient teaching and inadequate advice on overcoming academic problems (Zeegers & Martin 2001:32). Many factors force students into online education and can result in attrition from those courses (Caplan 2015: 9). Struggling students are more likely to drop courses than high-achieving students, the reductions in withdrawal rates under active learning (Freeman et al. 2014:8411).

A high number of anatomy and physiology students, fail to meet the required C+ or better grades needed in most allied health programs or give up in the early stages of the gateway science sequence (Gannon & Abdullahi 2013:1).

2.4.6 Reasons for student enrolment to nursing

To ensure the provision of high quality nursing care, it is important to ensure quality education and mindful selection of applicants who enrol and choose the nursing profession as a vocation (Cukljek et al 2018:36).

Research shows that students enrol nursing for altruistic reasons such as desire to help and care for the sick, economic reasons such as security of work place and their previous experience with nurses and health environment (Cukljek et al 2018:37).

2.4.7 Remediation

Some nursing students recommended that remedial classes be arranged for those students who do not understand biological science (Tom et al 2014:109). One potential predictor of Anatomy and Physiology success for high-risk students may thus be the completion of remedial coursework, placement in such courses is typically based on standardized test scores and/or placement exams (Aud, Wilkinson-Flicker, Nachazel & Dziuba 2013: 4).

2.4.8 Recommended approaches and methods used in teaching anatomy and physiology

Active learning engages students in the process of learning through activities and/or discussion in class, as opposed to passively listening to an expert. It emphasizes higher-order thinking and often involves group work (Freeman et al 2014:8413). To improve student engagement is generally acknowledged to have a positive effect on student learning, satisfaction, and retention (Hopper 2016:75). Deveci, Ocak and Çolak (2015:649) argue that in solving the problems encountered in anatomy education, the use of online media along with face-to-face learning enables the students to have access to the materials at will, to plan and steer their own learning, to evaluate themselves and to increase the student-student and student-teacher communication through forums.

Educators of anatomy and physiology for nursing students need to use a wide variety of teaching strategies, especially kinaesthetic, in order to better engage the students in their learning (Levey 2009:46). Virtual learning environment using blackboard, study group peers, online module resources, lecture PowerPoint's, learning enrichment activities, discussion rooms, projects, multiple review sessions, homework, laboratory, optional help-sessions, assignments case studies are suggested by Levy (2009:47).

In most of the medical schools of India, it is taught by means of didactic lectures, tutorials and practical classes (Gupta, Verma, Kaur & Singh 2014:16). According to the nursing students, competent nurse educators should facilitate biological science in a visual manner, that is, by including more laboratory experiences and making use of visual aids like videos (Tom et al 2014:109).

Students and faculty have expressed the belief that taking anatomy and physiology in the traditional format is more appropriate for students; and student learning is less effective in an online environment, although no data support this position (Caplan 2015:2). Student engagement (SENG) is generally acknowledged to have a positive effect on student learning, satisfaction, and retention (Hopper 2016:70).

Active learning increases student performance across the STEM disciplines (Freeman et al. 2014:8411). Anatomy and Physiology coursework requires both strong math skills to master physiology concepts and strong reading skills in order to master the large volume of information. When teaching physiology to nonscience major students, using an innovative form of instruction that may enhance their learning motivation and promote positive learning, outcomes is crucial (Lin, Liang, and Tsai 2012:42).

2.4.9 Contributory factors to student's poor performance

A student's early experiences at university may contribute to their academic success, and a negative attitude to a subject is perceived to be poorly connected to their interests, can present an education barrier (Brown et al 2016:302). The instructor's educational background and understanding of the nursing profession, as a scientist or nurse educator, affects the delivery of content and assessment of knowledge in anatomy and physiology (Friedel & Treagust 2005:207).

In traditional lectures students' attention drops quickly, they too often feel disengaged, the lecture pace does not suit all students, and retention of the material presented in typical lectures is low. Prior preparation in math/ science in high school and college, course load work, and family significantly impacted student's success in anatomy and physiology (Levy 2009: 47).

The effect of classroom format on the performance of student learning outcomes in a lab science course, such as anatomy and physiology, is unknown (Caplan 2015: 2).

The differences in abilities and learning styles of the students if not successfully addressed in the conventional large lecture class result in anatomy and physiology courses being of the worst failure and completion rates (Hopper 2011:72).

The studies analysed that active learning leads to increase in examination performance that would raise average grades by a half a letter, and that failure rates under traditional lecturing increase by 55% over the rates observed under active learning (Freeman et al. 2014:8410). The transition from secondary to higher education for most students can be a daunting process, yet potentially be a predictor for their academic success (Anderton, Chiu & Aulfrey 2016:202).

Anderton et al (2016:202) further stated that in a university setting, a diversity in students' backgrounds results in variability amongst students in terms of their educational background and thus, learning styles. Although theories of learning emphasize that the need for students to construct their own understanding have challenged the theoretical underpinnings of the traditional, instructor focused and "teaching by telling" approach (Freeman et al. 2014:8410). The high failure rate in anatomy and physiology translated into fewer students meeting the basic entry requirements to successfully progress into their selected program (Crane & Cox 2013:27).

2.4.10 Factors rendering anatomy and physiology as a difficult subject

Some students perceive this course as difficult to learn (Friedel & Treagust 2005:204) because of abstract physiological concepts and endless rote memorization of anatomical structures with unfamiliar vocabulary. The problem is further compounded by prior life experiences of the student (Levey 2009:44) Online programs target students with family and career responsibilities that cause difficulty, and often make it impossible for them to take traditional classes (Caplan 2014:7).

Understanding content is influenced by its complexity and anxiety (Rafferty and Kyriacos 2016:42). Physiology is an inherently complicated subject; therefore, physiology teachers need to conduct various methods of instruction for different types of students (Lin et al 2012:42).

Although theories of learning that emphasize the need for students to construct their own understanding have challenged the theoretical underpinnings of the traditional, instructor focused, “teaching by telling” approach (Freeman et al. 2014:8410).

The teaching of anatomy at a university level is currently in a state of flux (Anderton et al 2016:201). Student success in anatomy and physiology was found to be related to a decreased external workload and improved academic preparation (Caplan 2015:85). Results from Gwazdauskas, McGilliard and Corl (2014:6381) suggest that preparation for undergraduate anatomy and physiology appears better for biology students than other majors, although career objectives of non-majors in an undergraduate anatomy and physiology class might be part of the influence. Since physiology is sometimes a difficult course, physiology teachers need to be conscious that different teaching-learning strategies are preferable for helping different students learn (Borges & Mello-Carpes 2013:93).

Different methods are required to solve the existing problems in anatomy education, which has an important place in the foundation of medical education (Deveci, Ocak & Çolak 2015:649). The teaching of bioscience and its application to clinical practice needs to improve if nurses are to be credible members of the multi-disciplinary team (Friedel & Treagust 2005:204).

2.5 CONCLUSION

This chapter presented literature review pertinent to the study. The literature review presented studies done on the teaching of anatomy and physiology, with specific focus on attitudes and perceptions of student nurses regarding anatomy and physiology, recommended approaches and methods for use in teaching anatomy and physiology, as well as factors contributing to students’ poor performance in anatomy and physiology. The literature review enhanced the researcher’s understanding of the phenomenon under study. In the next chapter, the research design and methods used in the study are presented.

CHAPTER 3

RESEARCH DESIGN AND METHODS

3.1 INTRODUCTION

This chapter discusses the research design and methods used in the study. The chapter begins with a discussion of the research design and methods used to achieve the objectives of the study and to provide answers to the research questions. The methods include information on the research setting, population selected for the study, sampling procedures, specific method used for data collection and analysis, as well as the validity and reliability of the study. Ethical considerations related to the study are discussed in the last section of the chapter.

3.2 THE RESEARCH PURPOSE AND OBJECTIVES

As indicated in chapter 1, the purpose of the study was to describe the student nurses' perceptions and attitudes towards anatomy and physiology.

The objectives for this study were to:

- Describe student nurses' views about anatomy and physiology
- Describe student nurses' thoughts about anatomy and physiology
- Describe student nurses' feelings about anatomy and physiology
- Describe the student nurses' behaviour towards anatomy and physiology

3.3 RESEARCH DESIGN

Grove et al (2013:692) define research design as a blue print for the conduct of a study that maximises control factors that could interfere the study's desired outcome. It is the overall plan for addressing a research question or testing the research hypothesis including specifications for enhancing the study's integrity (Polit & Beck 2012:741).

Polit and Beck (2017:58) further explain that the research design indicates how often data will be collected, what type of comparisons will be made and where the study will take place. A quantitative and descriptive design was used for the purposes of the study. The design was non-experimental in nature.

3.3.1 Quantitative design

Quantitative research is a formal, objective, rigorous and systematic process of generating numerical information about the world (Burns & Grove 2015:32). From the many definitions of quantitative research by various authors, the following were identified as many of its characteristics;

- Quantitative research takes a positivist approach and the research processes are objectively constructed (Grove et al 2013:706). It takes the position that scientific knowledge is a direct reflection of a real and objective world.
- Quantitative research defines a single reality by careful measurement. It can be used to focus on measurable aspects of human behaviour (Brink 2012:10).
- It is usually concise; and it focuses on a relatively small number of specific concepts, which in the current study are perceptions and attitudes of student nurses towards anatomy and physiology.
- The sample should be representative of a large population. In the current study, a large sample was used, selected by using a probability sampling technique.
- Quantitative methods emphasize objectivity in the collection and analysis of the data, using structured procedures and formal instruments. A questionnaire and approved statistical methods were used in the current study to achieve objectivity.
- Reliability and validity of the data collection instrument are crucial in quantitative research. Validity and reliability of the current study's instrument are described in detail in 3.5.3.2 and 3.5.3.3 of this dissertation respectively.
- Quantitative research provides an accurate account of characteristics of particular individuals, situations, or groups. In the current study, the first section of the questionnaire pertained to the biographical data of the respondents.
- The findings are replicable and generalizable (Brink 2012:10).

The strengths of the quantitative research are in control and precision, achieved through sampling, design and precise and reliable measurement of a phenomenon. Another strength is that through experiments, the causes that influence the outcomes can be determined (Creswell 2009:7).

3.3.2 Descriptive study design

Burns and Grove (2015:31) state that a descriptive study is designed to gain more information about characteristics within a particular field of study. The purpose of descriptive designs is to provide a picture of a situation in real life and an accurate account of characteristics of particular individuals, situations, or groups. Descriptive designs allow researcher to gather information about the situation under study as it naturally happens (Grove et al 2013:215) and they may be used to develop theories, identify problems with current practice or determine what others in similar situations are doing (Burns & Grove 2015: 31). Parahoo (2014:165) further explain that the purpose of quantitative descriptive research design is to describe phenomena about which little is known. The design enabled the researcher to describe the phenomenon that was unknown, namely the student nurses' perceptions and attitudes towards anatomy and physiology.

3.3.3 Non-experimental designs

The design was non-experimental in nature because the researcher collected data without introducing any treatment or changes to the subjects. According to Polit and Beck (2012:223), some variables although possible to manipulate cannot be manipulated for ethical reasons in human studies.

3.4 RESEARCH SETTING

The study was conducted in the nursing education setting at three campuses of one college of nursing in the Limpopo Province of South Africa.

3.5 RESEARCH METHODS

The research methods refer to a systematic approach to the actual research process and includes stages of planning, structuring, execution, population, sampling, data collection and analysis (Polit & Beck, 2012:273). The research methods applied in this study comprised the description of the population selected for the study, procedures and strategies for data collection and analysis.

3.5.1 Population

A research population is the entire group of persons or objects that are of interest to the researcher (Brink et al 2012:131). The study population comprised student nurses registered for the programme of education and training leading to registration as a nurse (general, psychiatric and community) and Midwife (R425, 1985; paragraph (iii) as amended). The target population refers to the entire population in which a researcher is interested and to which he/she would like to generalise the study results (Polit & Beck 2012:744). The target population included student nurses registered and studying at the selected college of nursing. To be included in the study, the student nurses had to be in the second year level of training. The first, third and 4th year student nurses were excluded from the study.

3.5.2 Sample, sampling methods and sample size

Brink et al (2010:207) define a sample as a selected subset of the population, which represents the population while Polit and Beck (2012: 746) define it as a subset or portion of a population comprising those selected to participate in the research study. The process of selecting a portion of the population to represent the entire population is called sampling (Polit & Beck 2012: 742). Brink et al (2010:124), further explain sampling as a process of choosing the sample from the population in order to obtain information on the phenomenon under study. Probability sampling was used in order to ensure that each participant had an equal chance of being selected for participation in the study. The sampling size is the number of subjects who have given consent after being recruited to participate in the study (Grove et al 2013:708).

According to De Vos et al (2011:224), if the population under study is big, the percentage of the sample should be relatively small and if the population is small, the sample percentage should be large. The same authors further explain that the population is well represented if the sample is large and the researcher is able to make recommendations and conclusions than if the sample is small. The researcher used a sampling frame to select second year students for participation in the study. A sampling frame is a list of names of all members of the population where membership is described by criteria of sampling (Grove et al (2013:709; Brink et al 2010:124). There were one hundred and forty two (142) second year student nurses on the list. All the second year student nurses (142) were included in the study as the number was adequate for data analysis.

3.5.3 Data collection

Data is described as information that is gathered from counts, measurements responses or observations (Grove et al 2013: 507) while data collection is the precise and systemic gathering of information to address a research question (Polit & Beck 2012:725). Data collection as it occurred in this study is described in the paragraphs that follow.

Data collection method and instrument

A descriptive survey was used as a method of data collection using a questionnaire as a data collection instrument.

Survey

Surveys collect information on peoples' actions, knowledge, beliefs, intentions, opinions, attitudes, preferences and values via direct questioning (Polit & Beck 2012:744). A survey consists of asking questions of a representative cross-section of the population at a single point in time. The questions are often mailed to members of the target population, asked through personal face-to-face interviews, asked over the telephone, distributed electronically or handed out to self-contained groups such as students in a classroom, to answer and return.

The latter method was used in this study to ensure that data are collected within a short period of time and the return rate was enhanced. A great deal of information can be obtained from large representative samples or the entire population in an economical manner when a survey is used. In addition, surveys have the potential to generalize to large populations if appropriate sampling design and proper methods were implemented (Polit & Beck 2012:265).

Questionnaire

A self-designed, structured self-administered questionnaire was used to collect data. A questionnaire is a document used to gather self-report data via self-administration of questions. The use of structured questionnaires in research enhances the objectivity and supports statistical analysis (Polit & Beck 2012:297). The participants complete the questionnaire for themselves on a paper-and-pen instrument or directly onto the computer, responding to a series of pre-determined questions by the researcher (Polit & Beck 2012:265). Questionnaires gather information that can be easily quantified and analysed from a large number of participants. The paper-and-pen questionnaire was used in this study.

The researcher developed the questionnaire (Annexure F) in English. The questions that were formulated were guided by the objectives of the study and the review of the relevant literature. The questionnaire comprised the following sections;

Section A: Biographical information.

Section A contains eight (8) questions including gender, age, highest qualification, previous nursing experience, subjects done in grade 12, biological subjects failed and average test marks in anatomy and physiology. The purpose of obtaining such information was to secure a descriptive profile of participants and to ensure a basis for data analysis in relation to other sections of the questionnaire as per objectives of the study.

Section B: Perceptions and attitudes: Anatomy and physiology

The first part of this section contained thirty four (34) items, which focused on student nurses' perceptions and attitudes towards anatomy and physiology.

A four-point Likert scale was used to indicate the extent to which student nurses agreed or disagreed with the statements on perceptions and attitudes towards anatomy and physiology. The rating was as follows;

- 1: Strongly agree
- 2: Agree
- 3: Disagree
- 4: Strongly disagree

In the second part of section B, the respondents had to indicate the teaching methods and assessment tools used in anatomy and physiology (items 35-43). For items 44-52, the respondents had to rate the usefulness of the teaching methods and assessment tools used. The rating was as follows:

- 1: Very useful
- 2: Somewhat useful
- 3: Not very useful
- 4: Not useful at all

- ***Validity***

Validity expresses the extent to which a questionnaire or other data collection instrument measures what it purports to measure (Polit & Beck 2012:745). There are, however several varieties of validity that have been described to measure different aspects of the instruments. For the purpose of this study, content and face validity were applied.

Face validity

Face validity refers to the extent to which an instrument appears to be a valid measure of a given variable or construct on its surface (Bolarinwa 2015:195). It is established when an individual who is an expert on the research subject reviews the questionnaire items and concludes that it measures the characteristic trait of interest, namely

concept under study. Colleagues, study supervisors and the statistician were requested to determine the face validity of the questionnaire.

Content validity

Brink et al (2010:160) define content validity as the examination of the instrument in order to check if all features of variables to be measured have been included in the instrument. The procedure to establish content related validity as suggested by Polit and Beck (2012:205) was followed, and it includes

- *Exhaustive literature review*; the questionnaire was developed following extensive literature review to determine the boundaries of the study
- *Consultation with experts*; the draft questionnaire was submitted to the supervisor of the study at the University of South Africa (UNISA), a statistician who examined the questionnaire to determine whether all the component elements of the variable were measured. The supervisor and the statistician were requested to evaluate whether individual items were relevant and appropriate in terms of the construct and whether the items adequately measured all the dimensions of the construct. The feedback from supervisor and the statistician led to modifications of some items in the questionnaire.
- *Representatives of the relevant population*; a pre-test of the questionnaire was conducted on a sample of five (5) second year student nurses from one of the three campuses under study, none of whom was included in the actual study. Each student nurse will be requested to critically analyse all the questions in the questionnaire and to comment on the wording, order and clarity of questions, redundant questions, length of the questionnaire, the time required to complete the questionnaire and inadequate or confusing response categories (Polit & Beck 2012:337).

3.5.3.1 Reliability

Reliability refers to the accuracy and consistency of information obtained in a study. (Polit & Beck 2012:175). This approach assumes that there is no substantial change in the construct being measured between two occasions.

In this study, reliability was measured using Cronbach's Alpha coefficient, which is a method to evaluate the internal consistency of the instrument (Polit & Beck 2012:175). Cronbach's Alpha coefficient values for each of the research constructs are reported in chapter 4. The reliability of measures used in the current study were validated.

- Data collection process

Data was collected from 11th to 22nd June 2018 and questionnaires were distributed in the classroom setting to students who volunteered to participate in the study. Questionnaires and confirmed consent to participate in the study were completed, and were inserted in envelopes provided by the researcher and placed in boxes. A non-threatening environment was created for data collection.

3.5.4 Data analysis

Polit and Beck (2012:379) define data analysis as “the systematic organization and synthesis of research data”. Data analysis is conducted to put data in order and give meaning to the data (Grove et al 2013:691). The questionnaires were assigned unique identity numbers and they were checked for completeness and consistency before being entered into the computer files to create data set for analysis. The computer files were password protected to ensure confidentiality. Data was analysed with the assistance of the statistician using SPSS, Version 24.0.

Data collected for the study was cleaned, coded and analysed with the assistance of a statistical consultant to assist with the statistical measuring, analysis and reliable interpretation of data (Polit & Beck, 2012:404). Descriptive and inferential statistics were used and data was presented by means tables and figures in chapter 4 Of this study.

The response rate was satisfactory with a high percentage of 92 (n=131) than the once which were returned not completed 8% (n=11) If an individual failed to answer a particular survey question, the remainder of the information was considered if that person attempted the perceptions and attitudes portion. However, if a participant did not attempt the perceptions and attitudes section of the survey, that individual was removed from the investigation and some participants were absent 3% (n=4).

Prior to data analysis, the questionnaires were given unique identity numbers from 1-142 and they were checked and co-checked for completeness and consistency before data analysis.

Data were analysed with the assistance of the statistician using SPSS version 24.0 statistical software programme. Descriptive statistics that were performed included the mean, frequency distribution and percentages.

3.6 ETHICAL CONSIDERATION

Polit and Beck (2012:727) define research ethics as a system of moral values concerned with the degree to which research procedures adhere to professional, legal, and social obligations to the study participants. This research was conducted with strict ethical considerations of the principle of respect to persons, justice, beneficence and non-maleficence with regard to the institutions, participants, and the scientific integrity of the research (Polit & Beck 2012:335).

The institutions: Before the commencement of the study, ethical clearance was obtained from the Research Ethics Committee of the Department of Health Studies, University of South Africa (UNISA) (Annexure A). A written permission to conduct the study was obtained from the Provincial department of health (Annexure B) and the principals of the selected campuses of the college of nursing (Annexures C, D, E).

The respondents: The ethical principle of respect for persons was applied in this study. The ethical principle requires that people capable of deliberation about their choices must be treated with respect and be allowed to exercise self-determination (self-governance). Respect for persons recognises that dignity, well-being and safety interests of all research participants are the primary concern in research that involves human beings (Beckmann (2017:7). The principle of respect for persons means that a person must choose voluntarily whether to participate in research, based on the accurate (truth) flow of information given to participants regarding the risk and benefit of research. The basic rights of participants in research are included in the discussion about the principle of respect for persons and these include right to full disclosure about the research, anonymity and confidentiality, privacy and the right not to be harmed in any way.

Voluntary informed consent: consent is the clear permission that research participants give, indicating their agreement and willingness to take part in the study. According to Holloway and Wheeler (2010:55), LoBiondo-Wood and Haber (2010:252) and Polit and Beck (2012:158), research participants can only make informed decisions regarding their participation in the study if there was full disclosure about the research and that the participants have sufficient knowledge and comprehension of the research activities. To ensure that the participants were afforded the opportunity to make an informed choice, the researcher informed the participants in writing about the study aims, objectives, data collection method, interpretations of the data and expected outcomes. The voluntary nature of participation, the option to withdraw from the study at any time without penalty and the option to decline to participate in the study, were part of the information to participants. Informed consent was obtained from each participant after the researcher had ensured that participants understood the nature of the study and activities involved. The participants were requested to sign a consent form (Annexure F), indicating their willingness to participate voluntarily in the study.

Anonymity and confidentiality: Anonymity means that the researcher should ensure that no participant in the study is identifiable from any of the responses that they have given while confidentiality means that the information that the researcher obtains about and from the research participants should not be divulged to other people without the participants' permission. To ensure that the participants' rights to anonymity and confidentiality were protected, the researcher took the following measures:

- The participants were assured that all of the information given by them would be treated in strict confidence and would only be used for the purpose of the study
- The researcher made sure that the collected raw data were kept safe and confidential, locked up in a secure place and the files were password protected.
- Names of the participants were not written on the questionnaire and data were reported in a manner that did not identify or link the participants with the information.

Privacy: privacy describes the person's interest in controlling access to her personal information. In this study, the measures taken by the researcher described in 3.5.4.2 (respect for persons; informed consent) also addressed the right to privacy.

Justice: Justice is a principle, which states that all participants should be treated alike, and equitably (Grove, Burns & Gray 2013:172). Fair treatment denotes that research participants are selected fairly without social, cultural or sexual biases and risks or benefits fairly distributed based on the parameters of the study. In this study, the selection of study participants was based on the pre-determined eligibility criteria.

Beneficence and non-maleficence: This principle refers to the ethical obligation to maximise benefit and to minimise harm to research participants and it requires that the risks of harm posed by the research must be reasonable in the light of anticipated benefits. Harm can be physical, emotional, psychological, social and legal (Polit & Beck 2012:171). The participants were at no foreseeable physical harm given the fact that participation in the study involved completion of questionnaires. However, the researcher maintained confidentiality because breach of confidentiality can cause social and/or psychological harm. In addition, there were no expenses incurred by the participants for taking part in the study.

The scientific integrity of the researcher: Multiple relevant research publications were consulted in the process of conducting this study and all the consulted sources were acknowledged and cited accordingly. A supervisor was assigned to guide the researcher in ensuring that the sound research design and methods result in reliable and valid data and outcomes that address the research objectives.

3.7 CONCLUSION

The chapter dealt with the research methodology that was used for the study addressing the population, research setting, data collection instrument, data collection, and data analysis as well as ethical issues that were carried out throughout the study. In the next chapter, the analysis, description of the research findings, data analysis and interpretation of the findings will be presented.

CHAPTER 4

ANALYSIS, PRESENTATION AND DESCRIPTION OF THE RESEARCH FINDINGS DATA ANALYSIS AND INTERPRETATION

4.1 INTRODUCTION

In this chapter, data analysis and presentation, as well as description of the findings of the study are presented. The chapter begins with the description of data management and analysis, followed by the presentation of the results of the respondents' biographic data and their perceptions and attitudes towards anatomy and physiology. The researcher presented the data collection and analysis according to the research methods described in Chapter 3.

4.2 DATA MANAGEMENT AND ANALYSIS

One hundred and thirty one (131) of the 142 distributed questionnaires were returned, resulting in an acceptable response rate of 92%. Prior to data analysis, the questionnaires were given unique identity numbers from 1-131 and they were checked and co-checked for completeness and consistency before data analysis. Data were analysed with the assistance of a statistician using SPSS version 24.0 statistical software programme. Descriptive statistics that were performed included mean, frequency distribution and percentages. The statistics were presented as received from the data analysis software and the results were presented mainly by means of tables, figures and graphs.

4.3 RESEARCH RESULTS

The results of the study are presented in the order in which data were collected, starting with the demographic data followed by the student nurses' perceptions and attitudes towards anatomy and physiology.

4.3.1 Biographical data

Biographic data in this section included gender, age, highest qualification, previous nursing experience, subject done in grade 12, biographical subjects failed and average test marks in anatomy and physiology

4.3.1.1 Gender

There majority of respondents were females (n=98 (75%) as shown in figure 4.1

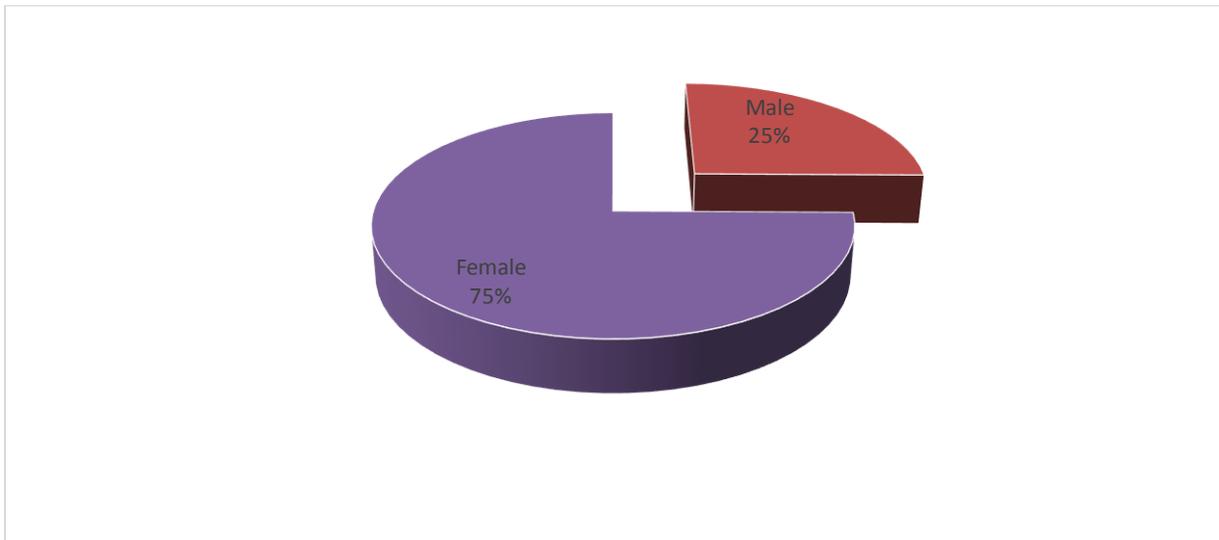


Figure 4.1: Gender of respondents (n =131)

4.3.1.2 Age

In table 4.1 the age ranges of the respondents are shown. More than half of respondents (n=67 (51.1%) are between the ages of 18 and 20 followed by 39 (29.8%) in the 21- 23 age range and 25 (19.1%) respondents in the 24-26 years age range.

Table 4.1: Age of respondents (n=131)

	Frequency	Percent
18-20 years	67	51.1
21-23 years	39	29.8
24-26 years	25	19.1
Total	131	100

4.3.1.3 Highest qualification

Table 4.2 shows the distribution of the highest qualification of respondents at entry to the nursing programme. The overwhelming majority of students n=119 (90.8%) had grade 12 as their highest qualification as compared to those with university and college highest qualification n= 12 (9.2%).

Table 4.2: Highest qualifications of participants (n=131)

	Frequency	Percent
Grade 12	119	90.8
University	6	4.6
College	6	4.6
Total	131	100

In South Africa, a National Senior Certificate (Grade 12) is an entry requirement into a nursing diploma programme. All students (n=131, 100%) had obtained a senior certificate to be admitted in the college.

4.3.1.4 Previous nursing experience

The majority of students (n=124(94.7%) had no previous nursing experience, while seven (5.3%) had nursing experience as follows: enrolled nursing two (1.5%) auxiliary nursing three (2.3%) and home based care (1.5%; n=2) and. See figure 4.2.

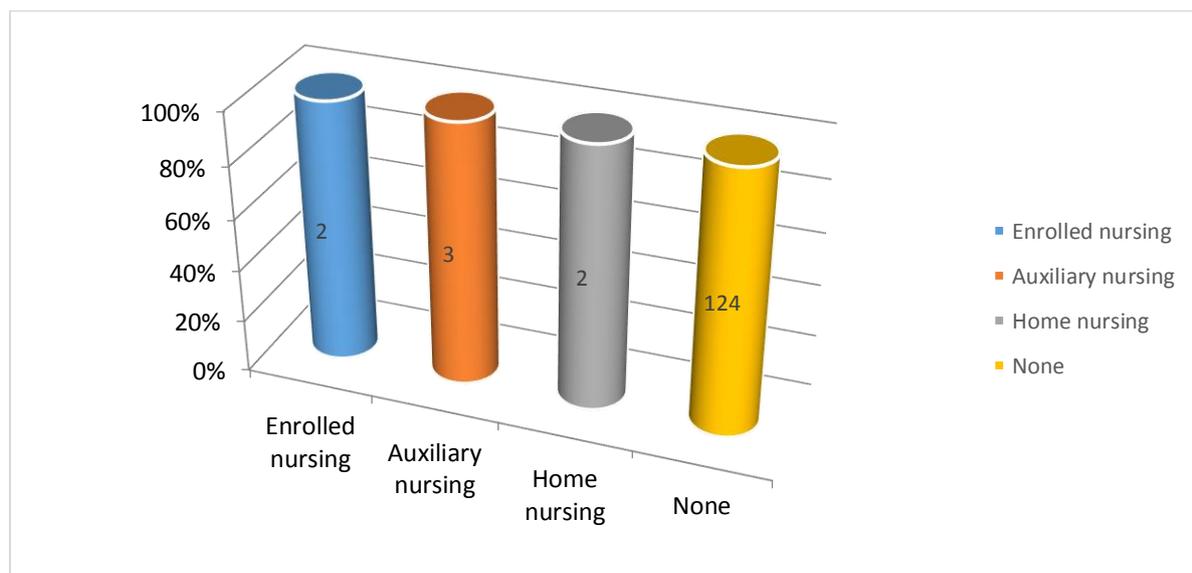


Figure 4.2: Previous nursing experience

4.3.1.5 *Subjects done in Grade 12*

Table 4.3 shows the distribution of the subjects done by respondents in grade 12. All the respondents almost all participants (n=131(100%) studied mathematics in grade 12 followed by 130 (99.2%) for home language, 129 (98.5%) for life science, physical sciences and life orientation.

Table 4.3: Subjects of respondents in grade 12 (n=131)

Subjects	Frequency	Percent
Life Sciences	129	98.5%
Physical Science	129	98.5%
Geography	63	48.1%
Hospitality	2	1.5%
Agricultural	49	37.4%
Mathematics	131	100%
Life Orientation	129	98.5%
Home Language	130	99.2%
Electrical technology	2	1.5%
Business studies	1	1.5%
Economics	5	4%
Accounting	11	8%
History	1	0.8%
Civil technology	1	0.8%
Religious studies	1	0.8%
Agricultural management practices	1	0.8%
First additional language	129	98.5%
Third additional language	3	2,4%
Information technology	1	0.8%
Dance studies	1	0.8%

4.3.1.6 **Biological subjects: Did you fail any of biological sciences subject?**

Table 4.4 shows the number of students who failed biological sciences subjects in nursing. Those who have failed responded with a yes response and those who did not fail any of the biological science subject responded with a no response. From the graph and table below indicated that only 4.6% participants had failed Biological sciences, however not all failed anatomy and physiology but other subjects in biological sciences thus pharmacology (0.8%) and applied sciences (0.8%).

Table 4.4: Number of failures in Biological sciences (n=131)

	Frequency	Percent
Yes	6	4.6
No	125	95.4
Total	131	100

4.3.1.7 **Indicate which biological science subject you failed**

The respondents were requested to indicate the biological science subject they failed, and their responses are shown in figure 4.3. The results show that the majority of respondents (n=124 (95.4) did not respond to this question.

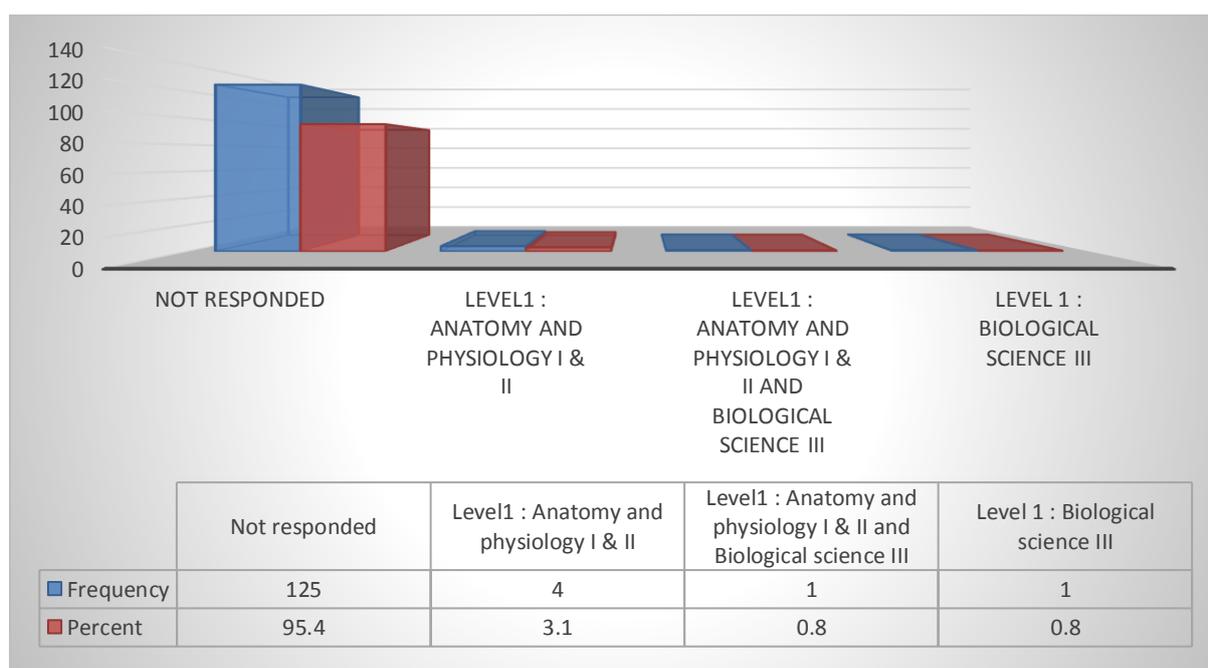


Figure 4.3: Subjects failed in Biological science

4.3.1.8 Formative average tests marks of respondents.

Figure 4.8 reflects the respondents' average test marks in anatomy and physiology. Fifty (38%) respondents obtained average test marks of between 70-79% and 60-69%, followed by 17 (13%) respondents with average test marks of between 80-89%. Thirteen (10%) respondents obtained average test marks of between 50-59%. One student obtained average of above 89%.

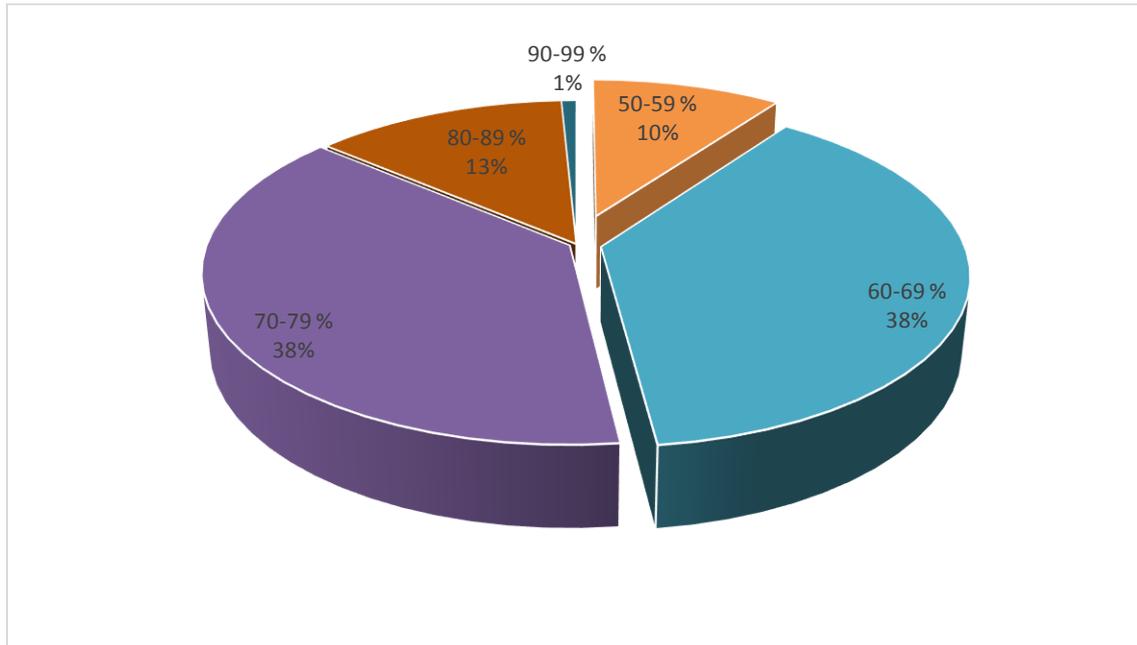


Figure 4.4: Formative average tests marks of participants in class

- **Summary of biographical data**

One hundred and thirty one (131) second year student nurses participated in the survey, the majority of whom were females. Accordingly, the female student nurses (75%) represented in the study shows the gender distribution in the nursing profession and at the college where the majority of students are female. Just more than half the number of participants 67(51.1%) were between 18-20 years of age, with an average age of 22 yrs.

The majority of students 119 (90.8%) had grade 12 as their highest qualification, showing that they met the entry requirements for training. The majority of students 124 (94.7%) had no previous nursing experience, while 7 (5.3%) had nursing experience of enrolled nursing 2(1.5%), auxiliary nursing 3(2.3%) and home based care 2(1.5%).

All the respondents 131 (100%) studied mathematics in grade 12 followed by 130 (99.2%) for home language and 129 (98.5%) for life sciences, physical science and life orientation. Many subjects done in grade 12 were science subjects, required for admission into health sciences and nursing programs. The subjects that respondents studied in high school were considered a pre requisite for entry into the R425 program. There was no significant association between the subjects and their performance in anatomy and physiology since the student responded the same in the entire questionnaire.

With regard to the question on the biological sciences subjects failed by the students, the results show that only 4 (3%) students failed anatomy and physiology in level 1 and 2(5%) failed pharmacology and applied sciences. Participants with qualification from tertiary level of education (n=12: 9%) and those with previous nursing experience n=7: 5%) did not fail any biological sciences subject and obtained above 60% marks in formative assessment. A large number of participants (n=124:95%) did not respond to this question since they did not fail any of the biological sciences subjects.

Fifty (38%) respondents obtained average test marks of between 70-79% and 60-69%, followed by 17(13%) respondents with average test mark of between 80-89%. Thirteen (10%) respondents obtained average test marks of between 50-59%. One student obtained an average of above 89% in anatomy and physiology. The results show that some students failed to meet the college's target pass rate of 80% and above in anatomy and physiology as stated in the statement of the research problem for the study.

4.3.2 Student nurses' perceptions and attitudes of participants towards anatomy and physiology

Section B of the questionnaire was designed to describe student nurses' perceptions and attitudes of towards anatomy and physiology, and the results are presented in tables 4.5, 4.6, 4.7 and 4.8 as well as figure 4.5.

- **Table 4.5** Attitudes (Items B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, B11, B12, B13, B14, B15 & B16).
- **Table 4.5** Perceptions (Items C22, C23, C24, C25, C26, C27, C28, C29, C30, C31, C32, C33, C34, C35, C36, C37, C38 & C39).

Tables used in this section are statistical summary of the responses. Descriptive statistics, namely frequencies and percentages were used to present the data. In the information presented in tabular form, the numbers 1, 2, 3 and 4 represent *strongly agree, agree, disagree and strongly disagree*, respectively.

The frequencies are presented both numerically and as percentages. All the 34 items in this section are placed in a rank order, and the student nurses' perceptions and attitudes towards anatomy and physiology are described as positive or negative. In the paragraph that follow, the results of Section B of the questionnaire are presented, starting with 4.5.

- **Reliability of the questionnaire**

In the current study, Cronbach's Alpha and Average inter-items correlations were conducted in order to assess the reliability of the measures. Table 4.7 provides the results for the tests that were elaborated. The descriptive statistics column indicates the mean value regarding responses otherwise described above as well as respective standard deviation values. The means shows the percentage on how the despondence rate the question based on a 4-point Likert scale.

Table 4.7: Internal consistency reliability values of scales

	Cronbach's Alpha	Average inter-item correlation	Item number
Attitude	0.020	0.001	16
Perceptions	0.337	0.029	18
Overall	0.307	0.015	34

4.3.2.1 Student nurses attitude towards anatomy and physiology

See table 4.5

Table 4.5: Students' nurse attitude towards anatomy and physiology (n=131)

Item No	Statements	Strongly agree	Agree	Disagree	Strongly disagree	Mean score
B1	The subject is important for your course	71%	15%	6%	8%	1.52
B2	Every nurse needs a good knowledge of the subject	73%	13%	5%	9%	3.5
B3	I absent myself from classes	11%	1%	7%	81%	3.57
B4	The subject is very interesting and easy	44%	36%	15%	5%	1.8
B5	The subject is simple to understand	13%	46%	29%	12%	2.4
B6	More support from college would be appreciated	66%	19%	9%	6%	1.54
B7	The subject causes me anxiety	21%	34%	28%	17%	2.41
B8	The subject is not interesting and difficult	8%	7%	36%	49%	3.25
B9	I am never absent in class	72%	16%	8%	4%	3.54
B10	The classroom environment is not conducive for learning the subject	26%	33%	21%	20%	2.45
B11	A lot of effort and time is required to master the course content	15%	6%	24%	55%	2.11
B12	It is difficult to link concepts of the subjects to patient care	15%	3%	34%	48%	1.88
B13	I enjoy the subject	29%	49%	18%	4%	1.97
B14	The subject is boring	9%	11%	42%	38%	3.08
B15	The lecturer expects too much to be learned at one time	22%	46%	24%	8%	2.18
B16	I feel overwhelmed by difficulties of work	15%	47%	30%	8%	2.31

The mean scores of students' attitude were divided into three aspects, namely the *importance* (B1, B2 and B6) *interest* (B3, B4, B13, B14) and the *difficulty* (B5, B7, B8, B10, B11, B15, B16) of anatomy and physiology.

- **Student nurses attitude towards the importance of anatomy and physiology (B1, B2, B3 & B6)**

B1: The subject is important for your course

According to the results, 93 (71%) student nurses gave item B1 a strongly agree rating while 20 (15%) gave an agreement rating. This result imply a positive attitude towards the importance of anatomy and physiology. Only 18(14%) student nurses gave the same item a disagreement rating.

B2: Every nurse needs a good knowledge of the subject

A large number of student nurses 97(74%) gave item B12 a strongly agree rating while 13 (10%) student nurses gave an agree rating. The results indicate positive attitude to the subject.

B3: I absent myself from classes

Item B3 obtained a strongly disagree rating from 106 (81%) students and a disagree rating from 9 (7%) students for the same item. For this item, a disagree rating meant a positive attitude towards attendance of anatomy and physiology classes. Only 16(9%) students gave agreement rating to the same item.

B6: More support from college would be appreciated

The high importance given to anatomy and physiology is exemplified by the greatest proportion of students 111 (85%) who gave B6 a strongly agree and agreement ratings, appreciating more support from the college.

Student nurses' interest in anatomy and physiology (B4, B13, B14)

B4: The subject is very interesting and easy

One hundred and ten (84%) students agreed that the subject is interesting and easy while 31 (16%) disagreed with the item. This suggests that anatomy and physiology lessons are interesting and easy, hence the positive attitude to class attendance (B3).

B13: I enjoy the subject

The students 101 (78%) indicated that they enjoyed the subject, while 30 (22%) students indicated that they did not enjoy the subject.

B14: The subject is boring

Item B14 obtained a disagreement rating from 105 (80%) student nurses and an agreement rating from 26 (20%). For this item, a disagree rating meant a positive attitude toward anatomy and physiology, that the students were not bored by the subject.

- **Student nurses' attitude towards the difficulty of anatomy and physiology (B5, B7, B8, B9, B10, B11, B12, B15, B16)**

B5: The subject is simple to understand

More than half of the students (n=77:59percentage) agreed that anatomy and physiology is simple to understand while 54 (41%) students disagree with the item. This finding is consistent with results in B4 where the majority of students agreed that the subject is interesting and easy.

B7: The subject causes me anxiety

Item B7 obtained an agreement rating from 72 (55%) students and a disagreement rating from 59 students (45%). This negative attitude is inconsistent with student nurses' positive attitude in B4, B5, B13 and B14 where the subject was found to be interesting and easy, simple to understand, enjoyable and not boring.

B8: The subject is not interesting but very difficult

One hundred and eleven (85%) students disagreed that the subject is not interesting and difficult while only 20 (15%) student nurses agreed that anatomy and physiology is not interesting and difficult. This finding is consistent with B4 where the majority of students agreed that the subject is interesting and easy, suggesting that anatomy and physiology lessons are interesting and easy, thus displaying positive attitude.

B9: I am never absent in class

Item B9 obtained a strongly agree rating from 115 (88%) students and a disagreement rating from 16 (22%) students. This finding is consistent with findings of B3 regarding anatomy and physiology class attendance, where a disagree rating meant a positive attitude. According to the results of both B3 and B9, student nurses attend, and are never absent from the anatomy and physiology classes.

B10: The classroom environment is not conducive for learning the subject

Students negatively viewed the classroom environment as not conducive for learning the subject evidenced by agreement rating from 77 (59%) students and disagreement rating of 53 (41%). This result is inconsistent with Item B14. According to the results, the students were not bored by the subject despite the classroom environment, which was not conducive to learning the subject.

B11: A lot of effort and time is required to master the course content

The majority of student nurses 103 (79%) disagreed that a lot of effort and time is required to master the course content while 28 (21%) student nurses agreed with the item.

B12: It is difficult to link concepts of the subjects to patient care

Item B12 obtained a disagreement rating from 107 (82%) student nurses and an agreement rating from 24(28%). For this item, a disagree rating meant a positive attitude toward anatomy and physiology, that it is not difficult to link concepts of the subjects to patient care.

B15: The lecturer expects too much to be learned at one time

According to the results, item B15 obtained an agreement rating from 89 (68%) student nurses and a disagreement rating from 24(18%).

B16: I feel overwhelmed by difficulties of work

Eighty one (62%), which is over half of the students feel overwhelmed by difficulties of work while 50 (38%) students do not feel overwhelmed by difficulties of work.

- Student nurses' perceptions of anatomy and physiology
Section B of the questionnaire was designed to describe student nurses' perceptions of anatomy and physiology, and the results are presented in figure 4.5 and table 4.6.

- **Table 4.6:** Perceptions (Items C22, C23, C24, C25, C26, C27, C28, C29, C30, C31, C32, C33, C34, C35, C36, C37, C38 & C39).

C 22: The subject is very interesting but very difficult

Figure 4.5 reflects students' perception of anatomy and physiology as a very interesting but very difficult subject n=79 (60%) compared to n=52 (40%) of students who reflected anatomy as not difficult.

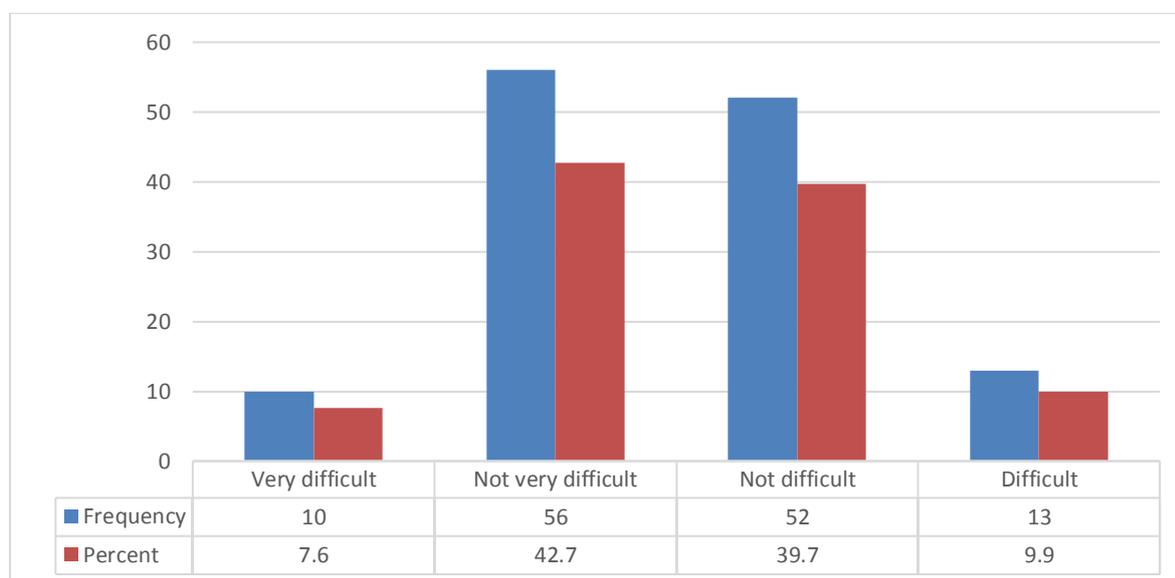


Figure 4.5: Difficulty of learning of anatomy and physiology

Table 4.6 Students' perceptions of anatomy and physiology (n=131)

Item No	Statements	Strongly agree	Agree	Disagree	Strongly disagree
C23	Prescribed reading materials are difficult to understand	7%	26%	52%	15%
C24	Lecturer is knowledgeable about the subject	47%	33%	11%	7%
C25	The subject is relevant to nursing practice	64%	24%	4%	8%
C26	Biological sciences needs more knowledgeable lecturers	66%	21%	8%	5%
C27	There is just lot of information to learn in a short time	8%	30%	40%	22%
C28	The content of the subject is too much	47%	30%	14%	9%
C29	Lecturers offer support throughout the block and when need arise	40%	42%	11%	7%
C30	I have fear I will fail biological science	10%	27%	36%	27%
C31	Lecturer is approachable in terms of consultations	40%	44%	11%	5%
C32	The teacher expect too many memorised facts and too little understanding	41%	47%	8%	4%
C33	I would like the subject better if the lecturer could explain everything in more simpler terms and in slow manner	20%	50%	24%	6%
C34	The teaching methods used are interesting and interactive	13%	30%	36%	21%
C35	The time allocated to teaching the subject is not enough	19%	29%	42%	10%
C36	I enjoy classes	53%	33%	11%	3%
C37	The subject is hard to learn	10%	9%	46%	35%
C38	A lot of memorising the facts with no connection between major concepts makes the subject difficult	38%	37%	10%	15%
C39	The subject places a high demands on my time and work than any other subject	24%	26%	35%	15%

C23: Prescribed reading materials are difficult to understand

Just above half of the students 68 (52%) gave item 23 a strongly disagree rating and 19 (15%) gave a disagreement rating. Only 44 (33%) students agreed with this item. For this item, a disagree rating meant a positive perception of prescribed reading materials for anatomy and physiology, not difficult to understand.

C24: Lecturer is knowledgeable about the subject

The results show that item C24 obtained a strongly agree rating from 61 (47%) students and an agreement rating from 43 (33%) students. Twenty-four (19%) students gave the same item a disagreement rating.

This finding is consistent with findings of B3 regarding the positive attitude towards attendance of anatomy and physiology class. Their confidence as part of their behavior indicated the trust they had in their lecturers as they indicated that their lecturers are knowledgeable about the subject.

C25: The subject is relevant to nursing practice

Item C25 obtained a strongly agree rating from 84(64%) students and an agreement rating from 31(24%) students. Sixteen (12%) students gave the same item a disagreement rating. The finding shows a positive students' perception of anatomy and physiology as relevant to nursing practice,

C26: Biological sciences needs more knowledgeable lecturers

The majority of student nurses 113 (87%) gave item C26 an agreement rating (strongly agree 66% and agree 21%) while 17(13%) gave the same item a disagreement rating.

C27: There is just lot of information to learn in a short time

Item C27 obtained a disagreement rating from 86(66%) students and an agreement rating from 45 (34%) students. The disagreement rating implied positive perception of information to be learn in anatomy and physiology.

C28: The content of the subject is too much

A large number of student nurses 100 (77%) gave item C28 an agreement rating and 31 (23%) students gave the item disagreement rating.

It is noteworthy that, while students disagree with the time versus information (C27), the majority agree that the content of the subject is too much.

C29: Lecturers offer support throughout the block and when the need arise

All 131 students (100%) responded to this question. Item C29 obtained a strongly agree rating from 36(28%) students and an agreement rating from 75(53%) students. Only 20 (15%) students gave the same item a disagreement rating. The finding show a positive students' perception of support offered by the lecturers throughout the block and when the need arises.

C30: I have fear I will fail biological science

Eighty-two (63%) student nurses disagree with this item, indicating that they do not have fear of failing biological sciences while 49 (37%) agree with the item.

C31: The lecturer is approachable in terms of consultations

The majority of student nurses 110 (84%) gave item C31 an agreement rating (strongly agree 41% and agree 44%) while 21(16%) gave the same item a disagreement rating.

C32: The teacher expects too many memorised facts and too little understanding

Item C32 obtained agreement rating from the majority of students 111(85%), (strongly agree 41% and agree 47%) and a disagreement from 20(15%) student nurses. This finding means negative perception of the teachers' expectations of learning anatomy and physiology

C33: I would like the subject better if the lecturer could explain everything in simpler terms and in slow manner

A large number of students 92(70%) agreed with the item while 39(30%) students disagreed with the item. The finding reflects a positive perception of the subject teacher's approach to teaching anatomy and physiology, that simpler terms and a slower pace be used.

C34: The teaching methods used are interesting and interactive

According to the results, the number of respondents that gave this item an agreement rating is 56 (43%) while those who gave it a disagreement rating were 75 (57%). This

finding suggests that more than half of the student nurses in the study perceived the teaching methods negatively, as not interesting and interactive

C35: The time allocated to teaching the subject is not enough

Just more than half the number of students 68 (52%) gave item C35 a disagreement rating and 63(48%) gave it an agreement rating, showing a positive perception of the time allocated to teaching the subject, that is enough.

C36: I enjoy classes

Item C36 obtained an agreement rating from 110(84%) students and a disagreement rating from .21 (16%) students. The disagreement rating implied positive perception of enjoyable anatomy and physiology classes. For item B13, a positive attitude towards the subject anatomy and physiology was implied by the results

C37: The subject is hard to learn

Only 26(20%) students agreed that the subject is hard to learn and 105 (80%) disagree with the statement. This finding is consistent with results in B4 where the majority of students agreed that the subject is easy.

C38: A lot of memorising the facts with no connection between major concepts makes the subject difficult

A large number of student nurses 98(75%) students agreed that a lot of memorising the facts with no connection between major concepts makes the subject difficult whilst 33 (25%) of students disagreed with the item.

C39: The subject places a high demands on my time and work than any other subject

According to the results, half of the students (50%) gave item C39 an agreement rating and the other half gave it a disagreement rating.

- **Teaching methods and assessment tools used in anatomy and physiology**

Table 4.7 shows the results of the students; perceptions of the teaching methods and assessment tools used in anatomy and physiology.

Table 4.7: Teaching methods and assessment tools used in anatomy and physiology (n=131)

Method	Frequency	Percent
Lectures	68	52
Practical laboratory sessions	52	40
Assignments	6	5
OSCE (Practical examinations)	24	18
Multiple choice questions	69	53
Quiz (learning games)	15	11
Simulation	22	17
Group discussion	28	21.4
Independent study	21	16

As shown in table 4.7, 69 (53%) students indicated that the most commonly used teaching and assessment tool was multiple choice questions, followed by the lecture method (n=68:52%). Fifty-two (40%) student nurses identified practical laboratory sessions while 28 (21%) students mentioned group discussions. Simulation and OSCE practical exams were mentioned by 22(17%) and 24(18%) students respectively. The least utilised teaching and assessment methods and tools was assignments by 6(5%).

- **Perceived usefulness of the teaching methods and assessment tools used in anatomy and physiology**

Various options from which the students could choose to indicate their perceived usefulness of the teaching methods and assessment tools used in anatomy and physiology were given. See table 4.8.

Table 4.8: Student nurses' perception of the usefulness of teaching methods and assessment tools used in anatomy and physiology (n=131)

Method	Very useful	Somewhat useful	Not very useful	Not useful at all
Lectures	30%	30%	20%	20%
Practical laboratory sessions	42%	8%	35%	15%
Assignments	6		5	
OSCE (Practical examinations)	24%	26%	40%	10%
Multiple choice questions	40%	20%	15%	5%
Quiz (learning games)	15		11	
Simulation	22%	28%	30%	20%
Group discussion	28		21.4	
Independent study	20%	40%	25%	15%

Sixty percentage of the students' perceived lecture method, multiple choice questions and independent study as useful teaching methods and tools for anatomy and physiology. This was followed by half of the students who selected practical sessions, OSCE and simulation as useful for anatomy and physiology. The rest of the methods fall below half percentage of students, which indicate negative perception and poor preference. The students indicated that teaching strategies like lectures and multiple choice questions influenced positively on their biological science performance and their attitude was positive to the two methods.

4.4 OVERVIEW OF RESEARCH FINDINGS

In the paragraphs that follow, an overview of student nurses' attitude and perceptions of anatomy and physiology are presented

4.4.1 Description of student nurses attitude towards anatomy and physiology

Nursing students indicated ambivalent attitude about their lecturers that were impacting positively on their biological science performance because majority 84% stated that they were approachable and 82% offer support but agree in high percentage that lecturers expects too much to be learned at one time (68%). They reflected again support from their lecturers. They negatively agree to methods used as not interesting and not interactive.

With environment, they showed a negative response as they agree to a non-conductive environment for the subject. Students (n=16) reported negatively of their absence in anatomy and physiology classes, the majority of students (n=115: 87.7%) stated that they seldom missed a lecture as 86% enjoy attending the class. This suggests that anatomy and physiology lessons are interesting and easy, difficult to others 60%, but still important which displays positive attitudes.

4.4.2 Description of student nurses perceptions of anatomy and physiology

Nursing students showed positive perception on the subject as 88% agreed that it is relevant to their nursing practice, 63% had no fear of failing the subject that shows confidence in the subject. Their confidence as part of their behavior indicated the trust

they had in their lecturers as they indicated that their lecturers are knowledgeable to the subject (80%) and are able to offer support in times of need (82%). Some students portrayed negative perceptions on time that lot of information is needed in a short time. Negative perceptions about the content that is too much.

The percentage of students 32% responded to prescribed course materials as difficult to understand as a negative perception which is overruled by 68% of students who reflected their positive perception that the material is not difficult, whilst 88% reported a positive perception that the subject is relevant to their practice and that anatomy and physiology needs more knowledgeable lecturers 87%.

4.5 CONCLUSION

In this chapter, the statistical analysis of data and the results of the study were presented. The results of the study were reported, and presented graphically according to the instrument. Descriptive and inferential statistics were used to analyse the data and to present the results. Statistical validity and scale reliability tests were performed prior to computation of descriptive statistics. Results were presented in relation to the attitude and perceptions of anatomy and physiology among second year students in the three campuses of one college of nursing in the Limpopo province of South Africa.

The significance of these results is discussed in chapter five, followed by the conclusions drawn, recommendations made, the limitations of the study and closing remarks.

CHAPTER 5

RESEARCH FINDINGS, CONCLUSIONS, RECOMMENDATIONS AND LIMITATIONS OF THE STUDY

5.1 INTRODUCTION

This chapter summarises the findings, presents the conclusions and limitations of the study, and makes recommendations for nursing education and further research. The purpose of the study was to describe student nurses' perceptions and attitudes towards anatomy and physiology. To achieve the purpose, the objectives of the study were to:

- Describe students nurses' views about anatomy and physiology
- Describe students nurses' thoughts and feelings about anatomy and physiology
- Describe the students nurses' behaviour towards anatomy and physiology

Accordingly, the study wished to answer the following questions: *What are the perceptions and attitudes of student nurses towards anatomy and physiology?*

Chapter 1 described the background, purpose and significance of the study. Chapter 2 discussed the literature review conducted for the study while chapter 3 covered the research design and methodology. Chapter 4 presented the data analysis and interpretation, and the findings.

5.2 RESEARCH DESIGN AND METHODOLOGY

A quantitative descriptive survey design was used to describe student nurses' attitude and perceptions of anatomy and physiology in the Limpopo College of Nursing that could affect their performance.

5.3 SUMMARY AND INTERPRETATION OF THE FINDINGS

5.3.1 Demographical profile of the respondents

Section A of the questionnaire elicited information pertaining to the demographic characteristics of respondents. The section addressed the following attributes pertaining to the respondents:

- Gender
- Age group of respondents
- Level of education
- Previous nursing experience

5.3.1.1 Gender

The pie chart (Figure 4.1) shows that female students constitute 75% (n=98) of the respondents while their male counterparts constitute the remaining 25% (n=33), this indicated more female than male student nurses at the selected public nursing college training to become registered professional nurses. The findings are congruent with the national trends that the female dominates the profession. There was no association between gender and perceptions or attitudes as all students had same response.

5.3.1.2 Age

The results of the investigation into the age group details of the 131 participants of the study are provided in Table 4.2. Of these 131 participants, majority of them were between 18 to 20 years constitutes 67(51%) while other were 39 (30%) fell between 21 to 23 years, and 25(19%) fell between 24 to 26 years. Organizing the ages of the total study participants into three groups (18 to 20, 21 to 23 and 24 to 26 years), and comparing the values to the general population of the college demonstrates the populations are similar.

5.3.1.3 Level of education

Table 4.3 shows the distribution of the highest qualification of students at entry to the nursing programme. Students on training with only grade 12 level were many n=119

(90.8%) as compared to those with university and college level n= 12 (9.2%). There was no significant association between highest qualifications obtained and the cohort.

5.3.1.4 Previous nursing experience

The majority of students (94.7%; n=124) had no previous nursing experience, 5.3% (n=7) had nursing experience ranging from Auxiliary nursing (2.3%; n=3) to home nursing (1.5%; n=2) and Enrolled nursing n=2 (1.5%). See table 4.4. Participants with qualification from tertiary level of education and those with previous nursing experience n=17 students (13%), agreed that anatomy and physiology is important, interesting and not difficult. Moreover, they never failed either in formative or summative assessment and obtained above 60% marks in formative assessment. Additionally, almost all (n=17) of participants believed that anatomy and physiology are simple to understand when presented in a lecture and discussion method. There is no correlation of highest qualifications obtained and the students as they performed equally with those with high qualifications. All students responded the same with no association between previous nursing experience and perceptions or attitudes of student nurses.

5.3.1.5 Subject studied prior nursing

Table 4.5 shows the distribution of the subjects undergone by students in their high school which some were considered as a pre requisite to entry to R425 program. The most commonly studied subjects in matric were mathematics almost all participants (n=131) 100% have done it whereas (n 129) 98% had done life science which is the basic of anatomy and physiology which also is a pre-requisite of entry to the R425 program, Physical sciences, with 98.5% of students (n=129). Only 48.1% of students (n=63) had studied Geography in matric. The least popular subjects were Life Orientation, Information technology and agriculture all at 0.8%. There was no significant association between the subjects and their performance in anatomy and physiology.

The results indicated that all the participants had adequate exposure to anatomy and physiology in their first level of training and answered the questionnaire with insight.

The study found that, with respect to the participants' perceptions and attitude towards anatomy and physiology, only 39.1% of the participants had experience with anatomy and physiology in their former institutes. It was understandable that prior to nursing, 100% were exposed to anatomy and physiology either in their high school or from the previous training.

5.3.1.6 *Average tests marks of participants in class*

Figure 4.8 reflects the average performance in anatomy and physiology of each participant in formative assessment tests. Majority of students n=117 (89%) obtained between 60-89% in formative assessments which shows a good performance as compared to the least participants with an average tests marks between 50-59% n=13 (9.9%). One student obtained above 89%. Students with high marks equally gave difference responses in perceiving the subject as those mostly with lower marks of 50% agree that the content of the subject is too much.

5.3.2 *Student nurses' perceptions and attitudes towards anatomy and physiology*

The following findings shows the positive and negative perceptions of anatomy and physiology among student nurses at one Limpopo College of nursing;

5.3.2.1 *Prescribed reading material*

Many students, above 50% perceived the prescribed reading material positively as not difficult to understand though some of student (77%) indicated that content of subject is too much. The positive perceptions of students about the reading materials was supported by Tom et al (2014:106), that some nursing students regard biological science content as straightforward, practical and easy to understand. The nursing students who participated in this study viewed the content of biological science positively as it increased their knowledge regarding the structure and functioning of the human body.

5.3.2.2 *Time*

The students perceived positively the time allocated to teaching the subject with a percentage of 52, only 48% are not comfortable with time allocated to teaching the

subject. Students further positively express the feeling of enough time in association with information to learn, thus a positive perception to time allocated to the subject though the feeling of 68% students indicated lot of expectations from lecturers to be learned at one time. Students had positive attitudes towards time allocation with negative attitudes towards lecturers' expectation in learning. The nursing students recommended that the time for presenting the biological science content should be balanced with the amount of content presented (Tom et al.2014:109).

5.3.2.3 Class environment

Even though the students had a negative attitude towards the class environment that it is not conducive for learning the subject, the majority of student nurses (n= 115: 88%) indicated that they never absent themselves in class. In addition, a positive attitude of *enjoy anatomy and physiology class* was shown by 86% who enjoyed the class and 78% who enjoyed the subject.

5.3.2.4 Subject

Positive attitude indicated by 88% of students who agreed that the subject is important and relevant to the nursing practice, with 59% who agreed that the subject is fundamental to the development of nursing skills. The attitudes were ambivalent towards the subject as half of the students agreed and half disagreed that the subject places a high demands on their time and work than any other subject. The subject is not hard to learn as agreed by 81% of students, they perceived positively as very interesting and easy subject by 80% students and above half of the students indicated that the subject is not boring or difficult. They were positive about linking biological science to their previous knowledge as this linkage promoted a better understanding of biological science.

Some students indicated anxiety (55%), which reflect a negative attitude towards the subject and 75% indicated negative perceptions as they indicated that a lot of memorising the facts with no connection between major concepts makes the subject difficult whilst some feel overwhelmed by the difficulties of work (62%). Biological science was perceived to be the basis of knowledge for those who want to become professionals in the health and medical professions.

They indicated that through biological science, understanding of what is normal is learnt and understanding of the abnormal is promoted in subjects like general nursing science and pharmacology (Tom et al.2014:107).

5.3.2.5 *Lecturer*

The students indicated negative attitudes towards the lecturers as they agreed that lecturers expect too much to be learned at one time, too many memorised facts and too little understanding. Many agreed that Biological science needs knowledgeable lecturers, which indicated a positive perception. About 82% of students showed positive attitudes as they agreed that lecturers offer support throughout the block and when need arise and that they are approachable and knowledgeable about the subject.

5.3.3 Relevance of subject to nursing practice

The high percentage of students (88%) indicated that the subject is relevant to nursing practice as supported in the study by Friedel et al (2010). Findings indicated that 80% of students rated bioscience as relevant to practice and were positive about linking biological science to their previous knowledge (school subjects and first year biological science) as this linkage promoted a better understanding of biological science.

5.3.4 Methods used in teaching anatomy and physiology

Almost half of the participants 51.9% (n=68) felt anatomy and physiology is more understandable when is presented in lecture method as compared to group discussion, independent study, simulation, quiz and assignments 49.1% (n=63) each of these carried only 20% and less (n=63). Students responded positively multiple choice as a preferred method of assessment with a high percentage of 53% compared to all the methods mentioned. OSCE received negative response as only 18% preferred it whilst is the most used strategy of assessment for the students. They communicated that the setting of short quiz tests encouraged studying (Tom et al.2014:107).

5.3.5 Students responses on anxiety to anatomy and physiology

Although many students reflected negative attitude towards anatomy and physiology, but still perceive it to be a very important and valuable subject of their nursing programme. In South Africa, high school biology is not a requirement for entry into the undergraduate nursing programme at many higher education institutions (Mohudi, 2013) and students might experience anxiety having to cope with certain bioscience courses for the first time. Perceived anxiety about studying bioscience may be linked to poor examination performance (Gresty and Cotton, 2003).

5.4 RESULTS

The positive and negative perceptions and attitudes were reflected from the following items:

- Classroom environment- Most of the students indicated negative attitudes towards the classroom environment that it is not conducive for learning but many had positive perceptions as they enjoy classes and never absent themselves in class.
- Subject – Most students showed positive attitude towards the subject as they agreed it is easy, interesting, simple and not boring. They perceive the subject as relevant to their practice as agreed by Brown et al (2016:302) in their study stated that students' attitude to a subject may also be influenced by their perception of the relevance of the subject to their chosen career ambition.

Students had positive attitude as they reflected that they enjoy the subject though they indicated negative attitude as it causes anxiety and overwhelming by the difficulties of work and that it is interesting but very difficult, they indicated an ambivalent attitudes as supported by Rafferty et al (2016:42), that understanding bioscience content is also influenced by anxiety. One factor that creates difficulty in bioscience learning is that nursing students in the tertiary sector have a wide range of different educational backgrounds and life experiences (Friedel et al. 2016:204). They confidently responded that they do not fear the subject which is a positive perception, it is contrary to Sturges et al (2016:28) in their study that anatomy and physiology courses are required of all health majors and are considered “difficult” by both faculty members and

students. Majority of students further agreed that the subject is simple to understand which reflected positive attitude meanwhile McVicar et al. (2010:) most of the respondents in their study reported that practising nurses had weak bioscience knowledge.

- Lecturers – Students displayed negative attitudes towards the lecturers as they expect too much to be learned at one time though they had positive perceptions towards them as they agreed that they give them support and have knowledge of the subject. Friedel et al (2016:209) reported that almost half of the lecturers in the study perceived that their science background was not good enough to understand all the bioscience needed in nursing.
- Time allocated to subject – Students had positive perceptions towards time allocated to the subject as they indicated that even if the information is a lot still the time is enough. They perceived bioscience study to be time-consuming (67% agreed or strongly agreed with Statement 11) and anxiety-provoking (58% agreed or strongly agreed with Statement 9), but they also perceived that it is an important subject for practicing nurses (Friedel et al 2016:209)
- Prescribed reading materials – Students showed positive perceptions of the prescribed reading materials as they indicated it is not difficult to understand though they negatively responded to the content has been too much.

A chi-square statistic was calculated to examine if there is an association between age, gender and attitude towards anatomy and physiology. The test was found to be statistically insignificant, $(1, n = 131) = 0.451, p >.05$. The results suggest there is no association between age, gender and attitude towards anatomy and physiology.

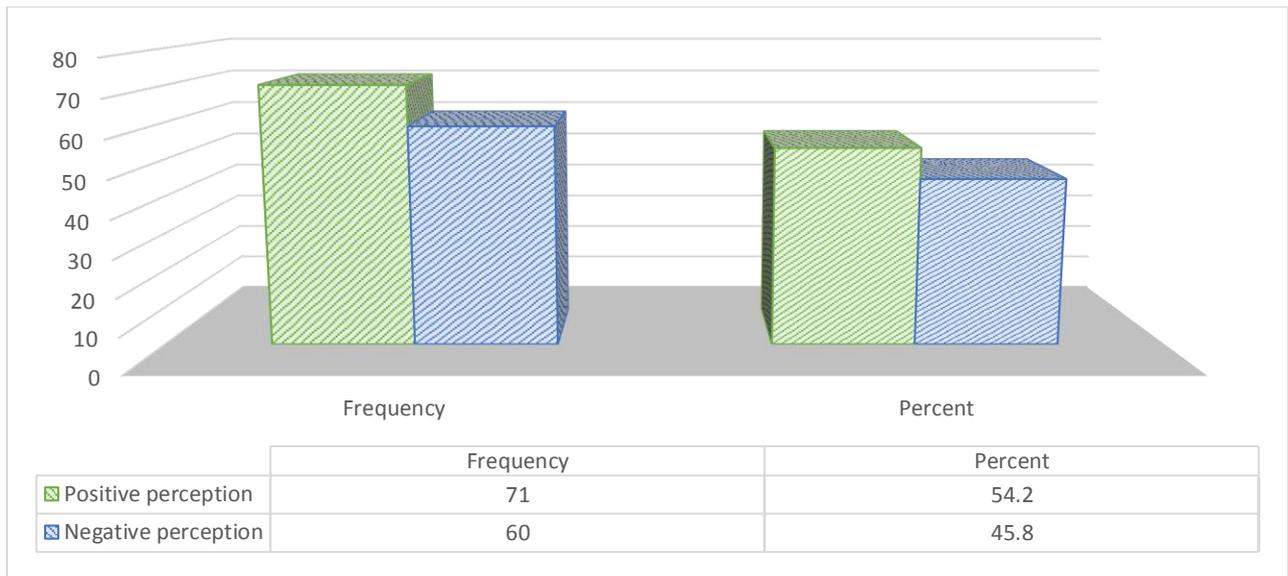


Figure 5.1: Response in correlation to the previous question

5.5 CONCLUSION

The purpose of the study was to describe the perceptions and attitude of student nurses towards anatomy and physiology that affect their performance. Several factors are affecting the academic performance in anatomy and physiology among students in a nursing education institution in the Limpopo Province. The main factors identified reflected negative perceptions on content of the subject, characteristics of educators, teaching and assessment strategies and anxiety caused by the subject. This study revealed that student nurses had positive and negative perceptions and attitudes towards the subject anatomy and physiology in different items as indicated above from chapter four and this chapter.

5.6 RECOMMENDATIONS

Based on the findings of the study, the researcher makes the following recommendations for the Limpopo College of nursing and for further research.

Nursing Education

- Nurse educators use methods that students preferred when presenting anatomy and physiology.

- Selection criteria to consider subjects done by students in their previous high school.
- Accompaniment of students by Biological science teachers to ensure correlation of the subject to nursing practice
- Competent nurse educators should facilitate biological science in a more visual manner, that is, by including more laboratory experiences and making use of visual aids like videos.
- Remedial classes be arranged for those students who do not understand biological science.
- It has been suggested that to achieve better learning outcomes and academic success, educators need to improve the student experiences and create lifelong learning attitudes and skills in their students

Management

- All stakeholders be involved, namely nursing education institution management, nurse educators, nursing students and Limpopo Department of Health to actively play their various roles towards the positive academic performance of nursing students in anatomy and physiology as supported by Borges et al (2013:93) stated that teachers/ facilitators help students become active in their learning by developing their own questions, drawing on their own experiences, analyzing and interpreting data, and drawing their own conclusions.
- Improvement of facilities and infrastructure as students indicated that their class environment is not conducive.
- Continue to consider the life science subject as one of the criterion for admission to training.

Research

- A qualitative study is proposed considering factors contributing to poor performance in anatomy and physiology as students were not able to elaborate much on their views and feelings towards the subject and yet most of their responses does not show negative perceptions and attitudes.

- Further research can be extended to an integration of other nursing subjects into anatomy and physiology as some students reflected unimportance of anatomy and physiology in nursing.
- A research may be conducted on perceptions of students towards content of anatomy and the lecturers knowledge of the subject, majority of students agreed that knowledgeable lecturers are needed and their perceptions were negative towards the content of the subjects.

5.7 CONTRIBUTIONS OF THE STUDY

This study has provided information regarding perceptions and attitudes of student nurses towards anatomy and physiology. The recommendations aim to equip the college with information to ensure that the performances of students' nurses are improved.

5.8 LIMITATIONS OF THE STUDY

The following limitations were identified during the study:

- The estimated sample size of 142 was not achieved as only 131 (92%) respondents participated in the study, thereby limiting generalization of results to other student populations. External validity is also jeopardised by missing data for 20 respondents that limited the interpretation of data and therefore the conclusions reached which has implications for implementation of the study findings.

5.9 CONCLUDING REMARKS

The study achieved its purpose of describing the perceptions and attitude of nursing students. This study provided insight into several factors that influence students' performance in anatomy and physiology. Campuses that their infrastructures deprive students from learning should be improved as some students commented about not conducive environment for learning. It may be concluded that students' state of life science knowledge do not influence the amount of support they need or their need for lecture attendance.

The various stakeholders, namely, nursing education institution management, nurse educators, nursing students and Limpopo Department of Health should be involved in the designing, planning and assessment of the biological science subject in order to ensure a positive perceptions and attitude for better performance in the subject.

List of references

- Abdullahi, A, & Gannon, M .2012. Improving college students' success in gateway science courses: lessons learned from an anatomy and physiology workshop. *American Journal of Health Sciences*, 3(3), 159-168.
- Ali, PA. 2008. Admission criteria and subsequent academic performance of general nursing diploma students. *Journal of Pakistan Medical Association* 58 (3). 128-32
- American Association of Colleges of Nursing. 2009. Support the Agency for Healthcare Research and Quality in FY 2009 [Internet].2009. American Association of Colleges of Nursing.
- Anderton,R, Chiu,L & Aulfrey,S. 2016. *Student Perceptions to Teaching Undergraduate Anatomy in Health Sciences*. School of Health Sciences, University of Notre Dame, Australia.
- Anderton, R, Evans, T & Chivers, P. 2016. Predicting Academic Success of Health Science Students for First Year Anatomy and Physiology. *International Journal of Higher Education* 5(1), 250.
- Aud S, Wilkinson-Flicker S, Nachazel T & Dziuba A .2013. *The Condition of Education 2013* (NCES 2013-037). Retrieved from <http://nces.ed.gov/pubsearch>, 15/03/2016.
- Borges S & Mello-Carpes P .2013. Physiology applied to everyday: the practice of professional contextualization of physiology concepts as a way of facilitating learning. *Federal University of Pampa, Uruguaiana, Rio Grande do Sul, Brazil* Submitted 25 September 2013.
- Brink, H, Van der Walt, C & Van Ransburg, G. 2010. *Fundamentals of research methodology for health care professionals*. 2nd edition. Cape Town: Juta
- Brink, H, Van der Walt, C & Van Rensburg, G. 2012. *Fundamentals of research methodology for health care professionals*. South Africa: Cape Town.

- Brown,S, White,S, Bowmar,A & Power, N. 2016. Attitude to Physiology in Undergraduate Nursing, Midwifery, and Paramedics Students. *Journal of Innovation, Auckland University of Technology*. 3(5):302-306
- Crane, J, & Cox, J.2013. More than just a lack of knowledge: A discussion of the potential hidden-impact of poor pre-enrolment science background on nursing student success in bioscience subjects. *International Journal of Innovation in Science and Mathematics Education (formerly CAL-laborate International)*, 21(2), 26-36.
- Cukljek S, Jureša A, Bile C & Rezek B.2017. *Changes in Nursing Students Attitudes towards Nursing during undergraduate*. University of Zagreb. Croatia
- De Vos AS, Strydom, H, Fouche, C.B and Delport, CS. 2011. *Research at Grass Roots for the social sciences and human service professions*.4th Edition. Cape Town. van Schaik Publishers
- Freeman, S, Eddy, S, McDonough, M, Smith, M, Okoroafor, N, Jordt, H & Wenderoth, M.2014. Active learning increases student performance in science, engineering, and mathematics. *Proc Natl Acad Sci U S A* 111(23), 8410-8415.
- Friedel JM & Treagust D.2005. Learning bioscience in nursing education: Perceptions of the intended and the prescribed curriculum. *Learning in Health and Social Care*. 4(4):203-216.
- Gannon, N & Abdullahi, A.2013. *Effect of Open Note Quizzes on Community College Science Students Grades and Attrition Rates*. University of New York, Bronx, NY 10453, USA. Received: April 22, 2013
- Grove, SK, Burns, N & Gray, JR. 2013. *The practice of nursing research appraisal, synthesis, and generation of evidence*. 6th edition. Saunders: Elsevier.
- Gultice, A, Witham, A & Kallmeyer R. 2015. Are your students ready for anatomy and physiology? Developing tools to identify students at risk for failure, *Advance Physiological Education*. 39(2):108-115.
- Gwazdauskas, F, McGilliard M & Corl, A. 2014. *Short communication: Characteristics of student success in an undergraduate physiology and anatomy course*. Virginia Polytechnic Institute and State University, Blacksburg 24061-0315.

- Higgins-Opitz, SB & Tufts, M. 2014. *Performance of first-year health sciences students in a large, diverse, multidisciplinary, first-semester, physiology service module*. Durban, South Africa (161)
- Hopper M .2011. Student Enrollment in a Supplement Course for Anatomy and Physiology Results in Improved Retention and Success. *Journal of College Science Teaching*. 40: 70-79.
- Hopper M .2016. Assessment and comparison of student engagement in a variety of physiology courses. *Advances in Physiology Education*. 40: 7078.
- Hull, K, Wilson S, Hopp R, Schaefer, A, Jackson, J.2016. *Determinants of Student Success in Anatomy and Physiology: Do Prerequisite Courses Matter? A Task Force Review*.
- Hennink, M, Hutter,I & Bailey, A. 2011. *Qualitative research methods*. Langford, Critical Public Health (111-112).
- Last, L & Fulbrook, P. 2003. Why do student nurses leave? Suggestions from a Delphi study. *Nurse Education Today*, 23(6), 449-458.
- Lin, Y, Liang, J & Tsai, C .2012. Effects of different forms of physiology instruction on the development of students' conceptions of and approaches to science learning. *Advances in Physiology Education*, 36, pp.42-47.
- Lovelace, M & Brickman, P .2013. Best practices for measuring students' attitudes toward learning science. *CBE – Life Sciences Education* 12, (606-617).
- Mathers N, Fox N & Hunn A. 2007. *Surveys and Questionnaires*. Yorkshire & the Humber.
- Maurer, Allen, Gatch, Shankar & Sturges. 2012. *Students' academic motivations in allied health classes*. *The Internet Journal of Allied Health Sciences and Practice*. 10(1), 1-12.
- Mellish, JM, Oosthuizen, A & Paton, F. 2010. *An introduction to the ethos of nursing*. 3rd edition. Sandton.

- Mohudi, CM. 2013. An analysis of college-based nursing students' performance in biological nursing science. *Master of Science in Nursing Dissertation*. University of the Witwatersrand, Johannesburg, South
- Montyre, J, Sparks, T. 2017. *Important yet unnecessary: Nursing students' perceptions of anatomy and physiology laboratory session*. Auckland University of technology, Auckland. p 216.
- Moxham, L. 2012. *Research and Evidence-Based Practice*. Nurse Education Sydney: Pearson Australia
- Ocak, M & Topal, A .2015. *Blended learning in anatomy education: a study investigating medical students' perceptions*. Kocaeli University. Turkey. Received 24 August 2014; accepted 25 December 2014; published on 27 April 2015
- Osborne, J, Simon, S & Collins, S .2003. Attitudes towards science: A review of the literature and its implications. *International Journal of Science Education* 25(9), pp.1049-1079.
- Parahoo, K. 2014. *Nursing Research: Principles, Process and Issues*. Palgrave Macmillan, London.
- Payne, G. 2014. Surveys, Statisticians and Sociology: A History of Quantitative Methods, *Enhancing Learning in the Social Sciences*. 74-89,
- Pera, S & Van Tonder, S. 2005. *Ethics in health care*. Juta, Lansdowne, South Africa
- Polit, F & Beck T .2012. *Nursing research: Generating and Assessing Evidence for Nursing Practice*. Lippincott Williams & Wilkins.
- Polit, DF & Beck, CT. 2010. *Essentials of nursing research: appraising evidence for nursing practice*. Philadelphia. Williams & Wilkins.
- Rafferty, B & Kyriacos, A .2016. *Final year nursing students' self-reported understanding of the relevance of bioscience*. Western Cape College of Nursing, Cape Town, South Africa. Received 25 February, 2016.

- Randolph, JJ. 2009. A guide to writing the dissertation literature review. *Practical Assessment. Research & Evaluation*. 14 (13): 1-13.
- Schwandt, TA. 2001. *Dictionary of Qualitative Inquiry* (2nd ed). California: Sage Publications.
- Shier, D, Butler, J & Lewis, R. 2015. *Hole's essentials of human anatomy and physiology*. McGraw-Hill Education. New York.
- Sturges, D, & Maurer, T. 2013. Allied health students' perceptions of class difficulty: The case of undergraduate human anatomy and physiology classes. *The Internet Journal of Allied Health Sciences and Practice* 11(4).
- Sturges, D, Maurer, T, Gatch, B, Shankar, P. 2016. Academic performance in human anatomy and physiology classes. *Internet journal of allied Health sciences and practice*. 40:26-31
- Sugand, K, Abrahams, P & Khurana, A. 2010. The anatomy of anatomy: a review for its modernization. *Anat Sci Educ*, 3(2), 83-93.
- Thalluri, J. 2016. Bridging the gap to first year health science: Early engagement enhances student satisfaction and success. *Student Success* 7(1), 37–48.
- Tom, B. 2016. *The Principle of Beneficence in Applied Ethics*, *The Stanford Encyclopedia of Philosophy*. Edward N. Zalta.
- Tom F, Coetzee I, Heyns T .2013. *Factors influencing academic performance in biological sciences among students in a nursing education institution in the Eastern Cape Province: An appreciative inquiry approach*
- UK Essays. November 2013. *Nursing Research Methodology*. Available from: <http://www.ukessays.com/essays/nursing/nursing-research-methodology-philosophy-quantitative-and-qualitative-research-nursing-essay.php?vref=1> [Accessed 17 April 2018].
- Waugh, A & Grant, A. 2014. *Ross and Wilson Anatomy and Physiology in Health and Illness, 13th Edition*. Elsevier eBook on Vital Source. Churchill Livingstone.

- Whyte, DG, Madigan,V & Drinkwater, EJ. 2011. Predictors of academic performance of nursing and paramedics students in first year bioscience. *Nurse education today*. 31 (8) 849-854
- Xu, X, Southam, D & Lewis, J .2012. Attitude toward the subject of chemistry in Australia: An ALIUS and POGIL. *Australian Journal of Education in Chemistry*, 72, pp.32-36.
- Zeegers, P & Martin, L. 2001. A learning-to-learn program in a first-year chemistry class. *Higher Education Research and Development* 20(1), 25-35.

ANNEXURES

Annexure A: Clearance certificate



**RESEARCH ETHICS COMMITTEE: DEPARTMENT OF HEALTH STUDIES
REC-012714-039 (NHERC)**

7 February 2018

Dear Florah Mokagadi Monisi

Decision: Ethics Approval

HS HDC/825/2018

Florah Mokagadi Monisi

Student No.7284055

Supervisor: Dr ME Chauke

Qualification: D Litt et Phil

Joint Supervisor: -

Name: Florah Mokagadi Monisi

Proposal Student nurses perceptions and attitudes towards anatomy and physiology in Limpopo, South Africa

Qualification: MPCHS94

Thank you for the application for research ethics approval from the Research Ethics Committee: Department of Health Studies, for the above mentioned research. Final approval is granted from 7 February 2018 to 7 February 2020.

The application was reviewed in compliance with the Unisa Policy on Research Ethics by the Research Ethics Committee: Department of Health Studies on 7 February 2018.

The proposed research may now commence with the proviso that:

- 1) The researcher/s will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.*
- 2) Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study, as well as changes in the methodology, should be communicated in writing to the Research Ethics Review Committee, Department of Health Studies. An amended application could be requested if there are substantial changes from the existing proposal, especially if those changes affect any of the study-related risks for the research participants.*
- 3) The researcher will ensure that the research project adheres to any applicable*



University of South Africa
Pretorius Street, Muckleneuk Ridge, City of Tshwane
PO Box 392 UNISA, 0003 South Africa
Telephone: +27 12 429 3111 Facsimile: +27 12 429 4190
www.unisa.ac.za

Annexure B: Permission letter from Provincial office



LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF HEALTH

Enquiries: Stander SS (015 293 6650)

Ref:LP_

Monisi FM
UNISA

Greetings,

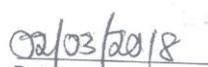
RE: Student nurses perceptions and attitudes towards anatomy and physiology in Limpopo, South Africa

The above matter refers.

1. Permission to conduct the above mentioned study is hereby granted.
2. Kindly be informed that:-
 - Research must be loaded on the NHRD site (<http://nhrd.hst.org.za>) by the researcher.
 - Further arrangement should be made with the targeted institutions, after consultation with the District Executive Manager.
 - In the course of your study there should be no action that disrupts the services, or incur any cost on the Department.
 - After completion of the study, it is mandatory that the findings should be submitted to the Department to serve as a resource.
 - The researcher should be prepared to assist in the interpretation and implementation of the study recommendation where possible.
 - The above approval is valid for a 3 year period.
 - If the proposal has been amended, a new approval should be sought from the Department of Health.
 - Kindly note, that the Department can withdraw the approval at any time.

Your cooperation will be highly appreciated.


Head of Department


Date

Annexure C: Permission letter from Thohoyandou Campus



LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA



DEPARTMENT OF HEALTH

LIMPOPO COLLEGE OF NURSING - THOHOYANDOU CAMPUS

P/Bag x 919

Shayandima

0945

Tel: 015 964 1516

28/03/2018

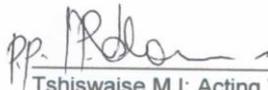
Enq: Ndou N.P

Cell: 079 646 3596

RE: PERMISSION TO CONDUCT A RESEARCH STUDY

1. The above matter bears reference.
2. Ms Monisi F M is hereby given permission to conduct a research titled "perceptions and attitudes of student nurses towards anatomy and physiology in Limpopo College of nursing, South Africa" at Thohoyandou campus as part study requirement.

Thank you


Tshiswaise M.I.: Acting Vice principal

Date: 28/03/2018

Annexure D: Permission letter from Giyani Campus



LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA



DEPARTMENT OF HEALTH
LIMPOPO COLLEGE OF NURSING: GIYANI CAMPUS

19-03-2018

MS. MONISI FM
36 TORTOISE STREET
SERALAVIEW
POLOKWANE
0699

PERMISSION TO CONDUCT RESEARCH AT GIYANI CAMPUS: YOURSELF

Permission is hereby granted for you to conduct research regarding student nurse's perceptions and attitudes towards anatomy and physiology.

Please make arrangements with the campus before coming, the academic activities should not be disturbed and the ethical principles should be adhered to.

Yours Truly

Vice Principal

E.T Rikhotso

Private Bag X9658 GIYANI, 0826
Tel: (015) 812 0330/1/2 or (015) 812 0123/0213 Fax: (015) 812 0123
Website: <http://www.limpopo.gov.za>

The heartland of Southern Africa – Development is about people!

Annexure E: Permission letter from Sovenga Campus



LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF HEALTH
LIMPOPO COLLEGE OF NURSING: SOVENGA CAMPUS

TO: Ms Monisi FM
FROM: Acting Vice Principal
Sovenga Campus
ENQ: Phiso R.G
DATE: 22 March 2018

RE: PERMISSION TO COLLECT RESEARCH DATA

1. The above matter bears reference
2. Permission to conduct research at Sovenga Campus is hereby granted
3. Research should be conducted in a way that will not interfere with college programmes and student learning

Hoping for positive response

Regards,

Acting Vice Principal

Private Bag XII122, SOVENGA, 0727
Doutbosdorp Road behind Mankweng Hospital, Sovenga, 0727 Tel: 015 267 1114 Fax: 015 267 9372
Website: <http://www.dhsd.limpopo.gov.za>

The heartland of Southern Africa –Development is about people!

Questionnaire	For office use only																																																																										
<p>INSTRUCTIONS</p> <ol style="list-style-type: none"> 1. This questionnaire is to be completed by individual student with no discussion with other students. 2. Please place a cross (X) in the appropriate box for items 1-8 <p>SECTION A: Demographical information</p> <p>1. Gender</p> <table border="1" data-bbox="316 667 847 705"> <tr> <td>Male</td> <td></td> <td>female</td> <td></td> </tr> </table> <p>2. Age</p> <table border="1" data-bbox="316 779 595 896"> <tr> <td>18-20</td> <td></td> </tr> <tr> <td>21-23</td> <td></td> </tr> <tr> <td>24-26</td> <td></td> </tr> </table> <p>3. Highest qualification</p> <table border="1" data-bbox="303 958 855 1111"> <tr> <td>Grade 12</td> <td></td> </tr> <tr> <td>University</td> <td></td> </tr> <tr> <td>College</td> <td></td> </tr> <tr> <td>Institute of technology</td> <td></td> </tr> </table> <p>4. Previous nursing experience</p> <table border="1" data-bbox="303 1178 628 1330"> <tr> <td>Enrolled nursing</td> <td></td> </tr> <tr> <td>Auxiliary nursing</td> <td></td> </tr> <tr> <td>Home nursing</td> <td></td> </tr> <tr> <td>None</td> <td></td> </tr> </table> <p>5. What subjects did you do in Grade 12 (Select only those that apply to you)</p> <table border="1" data-bbox="209 1429 1273 2038"> <tr> <td>Life Sciences</td> <td>Business studies</td> <td></td> </tr> <tr> <td>Physical Science</td> <td>Economics</td> <td></td> </tr> <tr> <td>Geography</td> <td>Accounting</td> <td></td> </tr> <tr> <td>Business Studies</td> <td>History</td> <td></td> </tr> <tr> <td>Hospitality studies</td> <td>Engineering Graphics & design</td> <td></td> </tr> <tr> <td>Agricultural sciences</td> <td>Civil technology</td> <td></td> </tr> <tr> <td>Mathematics</td> <td>Religious studies</td> <td></td> </tr> <tr> <td>Advanced programme mathematics</td> <td>Visual arts</td> <td></td> </tr> <tr> <td>Art</td> <td>Agricultural management practices</td> <td></td> </tr> <tr> <td>Mathematical Literacy</td> <td>First additional language</td> <td></td> </tr> <tr> <td>Life orientation</td> <td>Third additional language</td> <td></td> </tr> <tr> <td>Home language</td> <td>Information technology</td> <td></td> </tr> <tr> <td>Electrical technology</td> <td>Mechanical technology</td> <td></td> </tr> <tr> <td>Dramatic arts</td> <td>Computer applications technology</td> <td></td> </tr> <tr> <td>Design</td> <td>Dance studies</td> <td></td> </tr> <tr> <td>Consumer studies</td> <td></td> <td></td> </tr> </table>	Male		female		18-20		21-23		24-26		Grade 12		University		College		Institute of technology		Enrolled nursing		Auxiliary nursing		Home nursing		None		Life Sciences	Business studies		Physical Science	Economics		Geography	Accounting		Business Studies	History		Hospitality studies	Engineering Graphics & design		Agricultural sciences	Civil technology		Mathematics	Religious studies		Advanced programme mathematics	Visual arts		Art	Agricultural management practices		Mathematical Literacy	First additional language		Life orientation	Third additional language		Home language	Information technology		Electrical technology	Mechanical technology		Dramatic arts	Computer applications technology		Design	Dance studies		Consumer studies			
Male		female																																																																									
18-20																																																																											
21-23																																																																											
24-26																																																																											
Grade 12																																																																											
University																																																																											
College																																																																											
Institute of technology																																																																											
Enrolled nursing																																																																											
Auxiliary nursing																																																																											
Home nursing																																																																											
None																																																																											
Life Sciences	Business studies																																																																										
Physical Science	Economics																																																																										
Geography	Accounting																																																																										
Business Studies	History																																																																										
Hospitality studies	Engineering Graphics & design																																																																										
Agricultural sciences	Civil technology																																																																										
Mathematics	Religious studies																																																																										
Advanced programme mathematics	Visual arts																																																																										
Art	Agricultural management practices																																																																										
Mathematical Literacy	First additional language																																																																										
Life orientation	Third additional language																																																																										
Home language	Information technology																																																																										
Electrical technology	Mechanical technology																																																																										
Dramatic arts	Computer applications technology																																																																										
Design	Dance studies																																																																										
Consumer studies																																																																											

6. Have you failed any of the biological sciences subjects?

Yes	
No	

7. Indicate which biological science subjects you failed (one or more responses are possible)

Anatomy	1	
Physiology	2	
Biophysics & Biochemistry	3	
Microbiology & parasitology	4	
Pharmacology	5	

8. My average tests mark in Anatomy and physiology

	Anatomy		Physiology	
Below 50%	1		1	
50-59	2		2	
60-69	3		3	
70-79	4		4	
80 and above	5		5	

SECTION B: PERCEPTIONS AND ATTITUDES OF ANATOMY AND PHYSIOLOGY

Please indicate the extent of your agreement or disagreement with the statements 1- 52 on perceptions and attitudes of anatomy and physiology.

The rating is as follows;

- 1: Strongly agree**
- 2: Agree**
- 3: Disagree**
- 4: Strongly disagree**

Items	Anatomy				Physiology			
	1	2	3	4	1	2	3	4
1. The subject is important for your course								
2. The subject is relevant to nursing practice								
3. The time allocated to teaching the subject is not enough								
4. The subject is hard to learn								
5. Every nurse needs a good knowledge of the subject								
6. It is difficult to link concepts of the subject to patient care								
7. There is a just lot of information to learn in a short time								
8. A lot of effort and time is required to be able to master the course content								
9. The lecturer expects too much to be learned at one time								

10. The subject is fundamental to the development of nursing skills									
11. I would like the subject better if the lecturer could explain everything in more simpler terms and in a slow manner									
12. A lot of memorizing the facts with no connection between major concepts makes the subject difficult									
13. The subject places a high demands on my time and work than any other subject									
14. The subject is very interesting but very difficult									
15 The subject is not interesting and difficult									
16 The subject is very interesting and easy									
17. The teachers expect too many memorised facts and too little understanding									
18. Biological sciences needs more knowledgeable lecturers									
19. Prescribed reading materials are difficult to understand									
20. The content of the subject is too much									
21. Lecturers offer support throughout the block and when need arise									
22. I have fear I will fail Biological sciences									
23. Lecturer is approachable in terms of consultations									
24. Lecturer is knowledgeable about the subject									
25. I enjoy the subject									
26. The subject is boring									
27. I absent myself from classes									
28. The classroom environment is not conducive for learning the subject									
29. I enjoy classes									
30. The teaching methods used are interesting and interactive									
31. More support from the college would be appreciated									
32. The subject causes me anxiety									
33. I feel overwhelmed by difficulties of work									
34. I am never absent from class									

Please indicate teaching methods and assessment tools used in anatomy and physiology.

	Anatomy	Physiology
35. Lectures	1	
36. Practical laboratory sessions	2	
37. Assignments	3	
38. OSCE (Practical exams)	4	
39. Multiple choice questions	5	

40. Quiz/ learning games	6			
41. Simulation	7			
42. Group discussions	8			
43. Independent study	9			

Please rate the usefulness of the teaching methods and assessment tools selected from the list above

Rating

- 1: Very useful**
- 2: Somewhat useful**
- 3: Not very useful**
- 4: Not useful at all**

Items	Anatomy				Physiology			
	1	2	3	4	1	2	3	4
44. Lectures								
45 Practical laboratory sessions								
46. Group discussions								
47. Assignments								
48. Multiple choice questions								
49. OSCE (Practical exams)								
50. Quiz / learning games								
51. Independent study								
52. Simulation								

*MAKE SURE THAT YOU HAVE ANSWERED ALL QUESTIONS IN THIS QUESTIONNAIRE
THANK YOU FOR COMPLETING THIS QUESTIONNAIRE*

ANNEXURE G: Consent form

CONSENT FORM

My name is Florah, and I am a registered Masters student at the University of South Africa. I am conducting a study entitled Student nurses' perceptions and attitudes towards anatomy and physiology in the Limpopo College of nursing.

The purpose of the study is to describe the nursing students' perceptions and attitudes towards anatomy and physiology.

I would appreciate it if you can participate in my study. Participation in this study is voluntary and you have the right to refuse to take part in it and, the right to withdraw from it without explanation or consequences. Your participation in this study will provide us with valuable information regarding the nursing students' perceptions and attitudes towards anatomy and physiology. Your participation in the study will involve completion of a questionnaire that may take about 20 minutes.

You will not be required to write your name on the questionnaire and the information provided will be kept confidential and will not be accessible to other people.

The researcher will be the only one handling the information

Signing this consent means that you;

1. understand the purpose of the study and the researcher has answered all your questions satisfactorily
2. understand that the information will be held confidential
3. can withdraw at any stage of the study without any penalty or disadvantaged in anyway.
4. are not forced to answer things which make you feel uncomfortable.
5. willingly consent to participate in the study.

Signature of Participant..... Date.....