FACTORS CONTRIBUTING TO FAILURE OF STUDENT NURSES IN BIOLOGICAL NURSING SCIENCES: KWAZULU-NATAL COLLEGE OF NURSING

by

XOLANI LAWRENCE MHLONGO

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in the subject

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SUPERVISOR: PROFESSOR TE MASANGO

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DECLARATION

I declare that the dissertation titled **FACTORS CONTRIBUTING TO FAILURE OF STUDENT NURSES IN BIOLOGICAL NURSING SCIENCES: KWAZULU-NATAL COLLEGE OF NURSING** 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.

I further declare that I submitted the dissertation to originality checking software. The result summary is attached.

I further declare that I have not previously submitted this work, or part thereof, for an examination at Unisa for another qualification or at any other higher education institution.

20 November 2018

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SIGNATURE   **DATE**

Xolani Lawrence Mhlongo

FACTORS CONTRIBUTING TO FAILURE OF STUDENT NURSES IN BIOLOGICAL NURSING SCIENCES: KWAZULU-NATAL COLLEGE OF NURSING

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ABSTRACT

Biological nursing science, also known as Bioscience, is a difficult subject or module in nurse training and education worldwide. In the four-year comprehensive nursing diploma programme, Biological Nursing Science (BNS) is one of the core subjects taught in the first year. One of the major bioscience concepts integrated in the undergraduate nursing curriculum is Anatomy and Physiology (A&P). It is essential for students to pass A&P before enrolling for GNS because the two subjects provide details of the normal structures of the body and how they function, which is the foundation of GNS.

The failure of students in BNS (Anatomy and Physiology) enrolled for the Diploma in Nursing (General, Psychiatry and Community) and Midwifery is of great concern to the nurse educators and campus principals at the KwaZulu-Natal College of Nursing. The results for the BNS module between 2014 and 2017 indicated that students had problems with the course. Accordingly, the researcher wished to determine the factors that contributed to student failure in BNS (Anatomy and Physiology) in the KwaZulu-Natal College of Nursing.

The aim of the study was to identify factors that contributed to the BNS failure rate and make recommendations to improve the pass rate in BNS. The researcher used Jeffreys' (2013) NURS model as the conceptual framework to examine the influence of student profile characteristics, academic factors, environmental factors and psychological outcomes on Anatomy and Physiology performance. A quantitative, non-experimental, descriptive research design was selected to describe, explain, and predict factors contributing to students' failure in BNS. Data was collected from 114 respondents by means of a Likert scale-based self-administered structured questionnaire.

The study found that shorter breaks between lectures, which caused exhaustion; the one-day study time between examinations; two hours for the subject examination, and educators not involving students in lessons or providing after-class sessions were among the factors contributing to the high failure rate. It is recommended that the curriculum allow sufficient notional hours for teaching; learner support programmes be introduced to assist students who need help; examination timetables be adjusted to allow adequate study and preparation time, and educators involve students in active learning. Recommendations are also made for further research.

Key concepts

Biological Nursing Sciences (BNS); contributing factors; failure; performance; student nurses.

ACKNOWLEDGEMENTS

DEDICATION

I dedicate this study to the Queen of my heart; Mother Theresa Busisiwe Mhlongo, who discovered a calling for nursing in me before I could. "Thank you so much Makhumalo".

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LIST OF ABBREVIATIONS

A&P	Anatomy and Physiology
BNS	Biological Nursing Sciences
DNA	Deoxyribonucleic acid
ESL	English as second language
GNS	General Nursing Science
KZNCN	KwaZulu-Natal College of Nursing
NURS	Nursing retention and success model
SANC	South African Nursing Council

CHAPTER 1

ORIENTATION TO THE STUDY

1.1   INTRODUCTION

Nursing education, like many other areas of health profession education, continues to evolve and develop in order to best serve and support the clinical and professional roles of its students. It consists of theoretical and practical education and training, preparing nursing students for their duties as nursing care professionals. In the four year comprehensive nursing diploma programme (General, Psychiatry and Community) and Midwifery of 22 February 1985, as amended, Biological Nursing Science (BNS) also known as Bioscience is one of the core subjects taught in the first year of training (Montayre & Sparks 2017:218). The expectation is that on completion of their education and training, students should have good observational, analysis and problem-solving skills, since modern nursing requires awareness of interactions between anatomical and physiological systems in pathological processes (McVicar, Andrew & Kemble 2015:506).

Anatomy and Physiology (A&P) is one of the major BNS concepts integrated in the undergraduate nursing curriculum. It creates a solid foundation for nursing because nurses who have advanced knowledge of bioscience concepts are confident and competent practitioners; provide clinically effective patient care, and positively contribute to multidisciplinary team efforts resulting in the achievement of the patients' outcomes (Montayre & Sparks 2017:216)

The A&P module is essential for nursing students and an integral part of the programme for education and training of professional nurses in South Africa. A straightforward approach to the description of systems is presented in Anatomy and Physiology (A&P) in order to create a good foundation. Even though these systems are taught separately, it is strongly emphasised that they function co-operatively (Ross & Wilson 2015:20). The foundation provision of nursing care and the understanding of medical and surgical conditions are based on the application of knowledge gained in this subject (Department. of health studies 2010b:4).

1.2   BACKGROUND TO THE RESEARCH PROBLEM

Anatomy and Physiology (A&P) as a bioscience is critical for the education and training of professional nurses. Student nurses struggle with and find bioscience in nursing programmes challenging and anxiety provoking (Montayre & Sparks 2017:218). In the United Kingdom (UK), first-year students struggled with bioscience and organisational features, teaching strategies, and curriculum were contributory factors in the problem (McVicar et al 2015:507). Langtree, Razak and Haffejee (2018:135) found that nursing students' home languages, scientific way of thinking and an overloaded curriculum covered over a short period of time were among the factors responsible for poor performance in Ireland.

Adiei (2017:20) states that to ensure good academic progress for nursing students, Ghana made the entry requirements for nursing diploma programmes different to Western. English, Mathematics and science are the main entry requirements, with certain age restrictions as the core requirement. Applicants must be between the ages of 18 and 35 years. This means that applicants younger than 18 years and/or older than 35 years are restricted from applying even if they meet the entry requirements.

Nursing education in South Africa differs from other countries in the entry requirements and curriculum structure. Despite a BNS background at high school level, however, many South African nursing students struggle with BNS (Mohudi 2013:27). This raised the question in the researcher's mind of why there was continued failure in this subject despite the entry requirements. Craft, Hudson, Plenderleith, Wirihana and Gordon (2013:1403) found that, students' perceptions of and anxieties about BNS were related to poor performance in BNS. Craft et al (2013:1400) revealed students' perceptions and anxiety related to BNS are mostly encountered by the first-year nursing students.

The KwaZulu-Natal College of Nursing (KZNCN) is a public nursing college that is accredited by the South African Nursing Council (SANC) and administered by the KwaZulu-Natal Department of Health. Nursing education and training in KwaZulu-Natal (KZN) province is unified, which means that the college provides the same educational activities and curriculum across the province. The KZNCN has ten campuses, which are spread across the length and breadth of the province.   The campuses provide professional nursing (R425) education and training. The KZNCN is affiliated with the

University of KwaZulu-Natal and the University of Zululand. It is the only public nursing college in the province that provides nurses' education and training programmes.

One of the core modules of the four-year comprehensive diploma programme (R425) is the Biological Nursing Sciences (BNS) which are Anatomy and Physiology (A&P). A&P is done over a period of two semesters within a period of one year. A&P I is done and written in the first semester, and A&P II is done and written in the second semester. Students are expected to pass both subjects within one year to enable them to qualify for General Nursing Science I (GNS) in the first semester of the second year (Department of Health Studies 2010b:48). It is essential for students to pass A&P before enrolling for GNS because the two subjects provide details of the normal structures of the body and how these structures function, which is the foundation of GNS.

Students' A&P background in the four-year comprehensive nursing programme (R425) is ensured by strict entry requirements. Biology/Natural Science or Life Sciences are part of the admission requirements for the Diploma in Nursing. Without these subjects, the KZNCN does not admit applicants regardless of their points. This is to make sure that all accepted students have at least the foundation of A&P. Entry requirements before 2008 are as follows; Minimum matric points/score of 25, Biology or Natural Science and English Higher Grade (HG) or D Standard Grade (SG) and Entry requirements after 2008 are; Minimum matric points/score of 25 (excluding Life orientation), Life/Physical Sciences and Mathematics - Level 3 (L3) and Maths literacy and English - L4 (Department of Health Studies 2010a:1).

Previously if a student failed an examination (obtained 50%<) for a particular subject for the first time, he/she would be given a chance to write a second time. If he/she failed again in the second attempt, then demotion procedure would be implemented (Department of Health Studies 2010b:5).

However, this was amended in 2016 in preparation for the new qualification and to align with higher education standards. Starting from 2017, supplementary examinations were initiated for all students who obtained 40-49%. This means that students have four chances to pass the module before demotion procedure can be implemented (KZN College of Nursing 2016:2). It is further stipulated that if a student fails an examination, he/she will write a supplementary examination two weeks after the announcement of

results. If the supplementary examination is failed, the module will be repeated for the entire semester. If 40-49% is obtained in the second examination, a supplementary examination will have to be written again. If a student fails the supplementary exam for the second time, demotion procedure will then follow. This was first implemented for the May/June 2017 examinations. Since Anatomy and Physiology was part of the examinations written in this period, an 80% overall pass was obtained in the whole KZN province, which is below 100% pass rate which the College wishes to achieve. Supplementary examinations took place two weeks after the announcement of the results as per Circular 11/2016. The problem remains unsolved as 80% of the students that wrote the supplementary examination failed (KZN College of Nursing 2017:6).

1.3   STATEMENT OF THE RESEARCH PROBLEM

The failure of the first year student nurses in BNS (Anatomy and Physiology) enrolled for a four year comprehensive nursing diploma programme (General, Psychiatry and Community) and Midwifery of 22 February 1985, as amended is of great concern to the nurse educators and campus principals. An analysis of students' performance in biological sciences for the period 2014 to 2017 is given below (see figures 1.1 and 1.2).
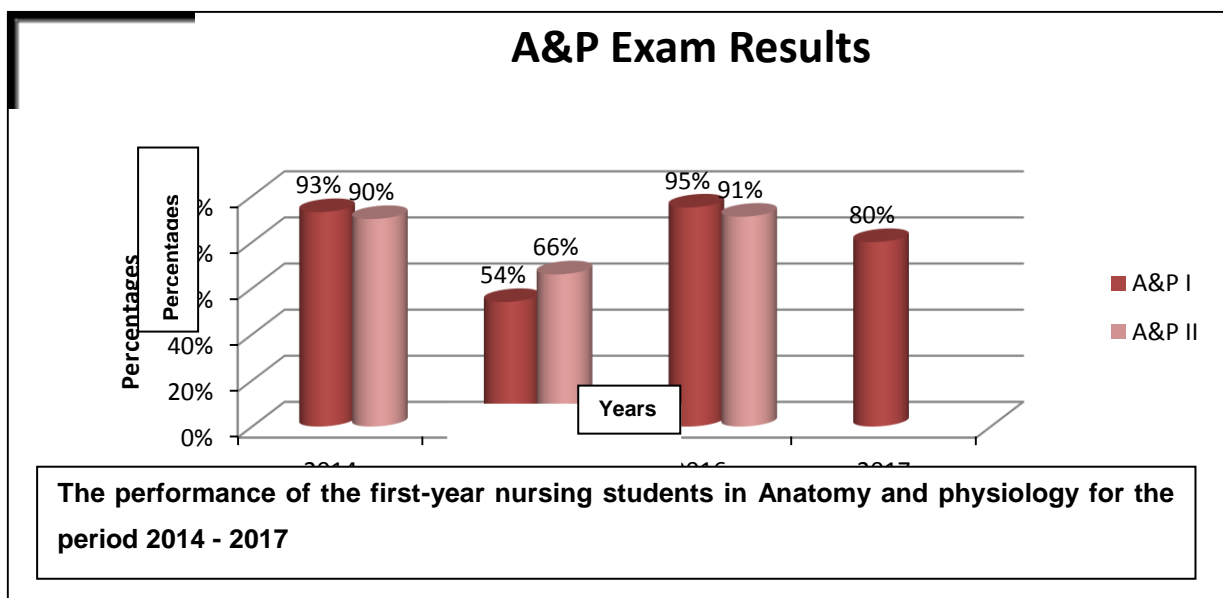
Figure 1.1 A&P examination results, 2014-2017

(Source: KwaZulu College of Nursing 2017:4)
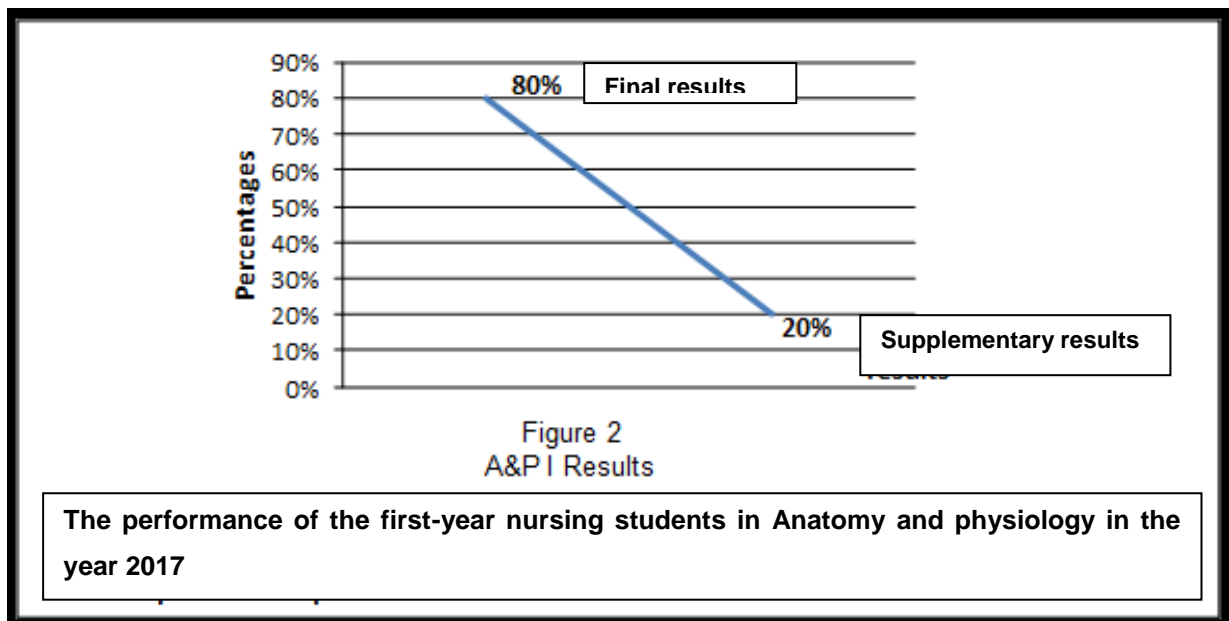
Figure 1.2 A&P I final examination results, year?

(Source: KwaZulu College of Nursing 2017:5)

Figure 1.1 indicates that performance in A&P was not constant but fluctuated. Figure 1.2 indicates that only 20% of the students who wrote the supplementary examinations passed.

The KZNCN wishes to achieve 100% for all students in all subjects. The results for the BNS module between 2014 and 2017 indicate that students had problems with the course. Accordingly, the researcher wished to determine the factors that contributed to student nurses failure in Biological Nursing Sciences (Anatomy and Physiology) in the KZNCN.

1.4 AIM OF THE STUDY

The aim of the study was to identify factors that contributed to failure among the first year student nurses registered for a four year comprehensive nursing diploma programme (R425) at the KZNCN and to make recommendations to improve the pass rate in BNS.

In order to achieve the aim, the objectives of the study were to

- determine the factors contributing to failure in the BNS subject at the college of nursing
- describe challenges faced by student nurses when studying BNS
- recommend strategies to overcome the problem

The study therefore wished to answer the following questions:

- What are the factors that contribute to the failure rate in BNS?
- What are the challenges faced by student nurses when studying BNS?
- What strategies should be recommended to overcome the problem?

1.5   SIGNIFICANCE OF THE STUDY

The KZNCN as part of the tertiary institution strives to produce sound and competent nurses who are able to function independently as professional practitioners. Good academic progress (without failure) for all student nurses is emphasised. The findings of the study should assist the BNS nurse educators to develop new learning strategies to assist all students from different backgrounds. The findings should assist and facilitate possible changes in presentation of the content. This, in turn, should help students to study and prepare for examinations. Social problems may affect performance. The findings should determine whether students' social problems, such as stress, affect academic performance. Recommended strategies, based on the findings, should assist students to overcome failure and improve their performance.

1.6   THEORETICAL FOUNDATIONS OF THE STUDY

A theoretical framework provides structure, direction and methods to address research questions.

1.6.1 Theoretical framework

The researcher used Jeffreys' (2015) Nursing Undergraduate Retention and Success (NURS) model to guide the study.
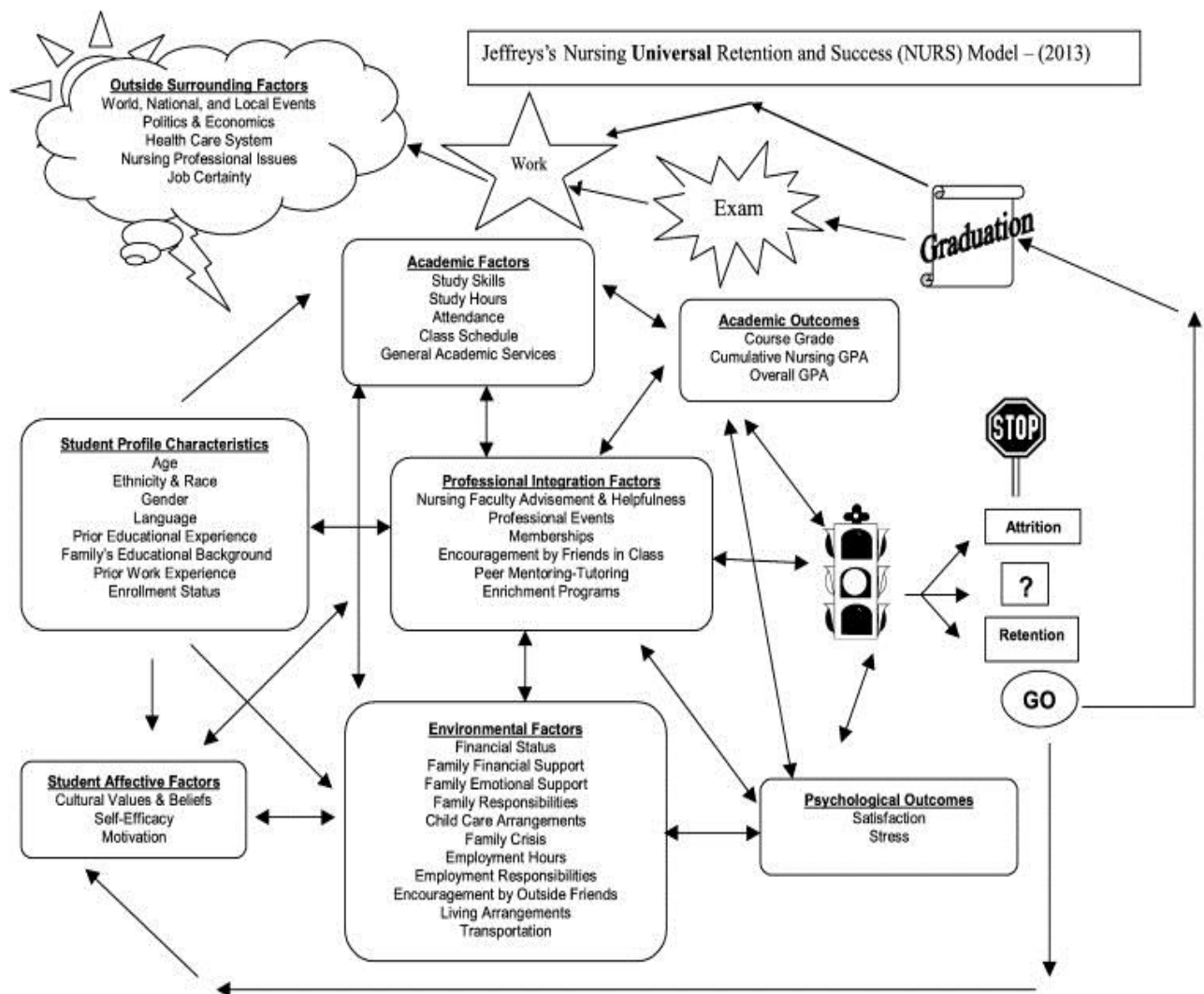
Adapted from Jeffreys's Nursing Undergraduate Retention and Success (NURS) Model – (2012).
In Jeffreys, M. R. (2012). *Nursing Student Retention: Understanding the Process and Making a Difference. (2nd Ed.).* New York: Springer, p. 12.
Adapted and reprinted with permission from Springer Publishing Company, New York, New York, USA.

Figure 1.3 Jeffreys' Nursing Undergraduate Retention and Success (NURS)
Model, 2015
(Source: Jeffreys 2015)

1.6.2 Jeffreys' NURS model

The purpose of Jeffreys' NURS model (2015) is to present a globally applicable organising framework for examining the multidimensional factors that affect nursing student success in order to identify students at risk, develop strategies to ensure

success, guide innovations in teaching and educational research, and evaluate strategy effectiveness (Jeffreys 2015). The researcher used the NURS model as the conceptual framework to examine the influence of student profile characteristics, academic factors, environmental factors and psychological outcomes on Anatomy and Physiology performance (see chapter 2 for full discussion). Figure 1.3 depicts the Adapted Model.
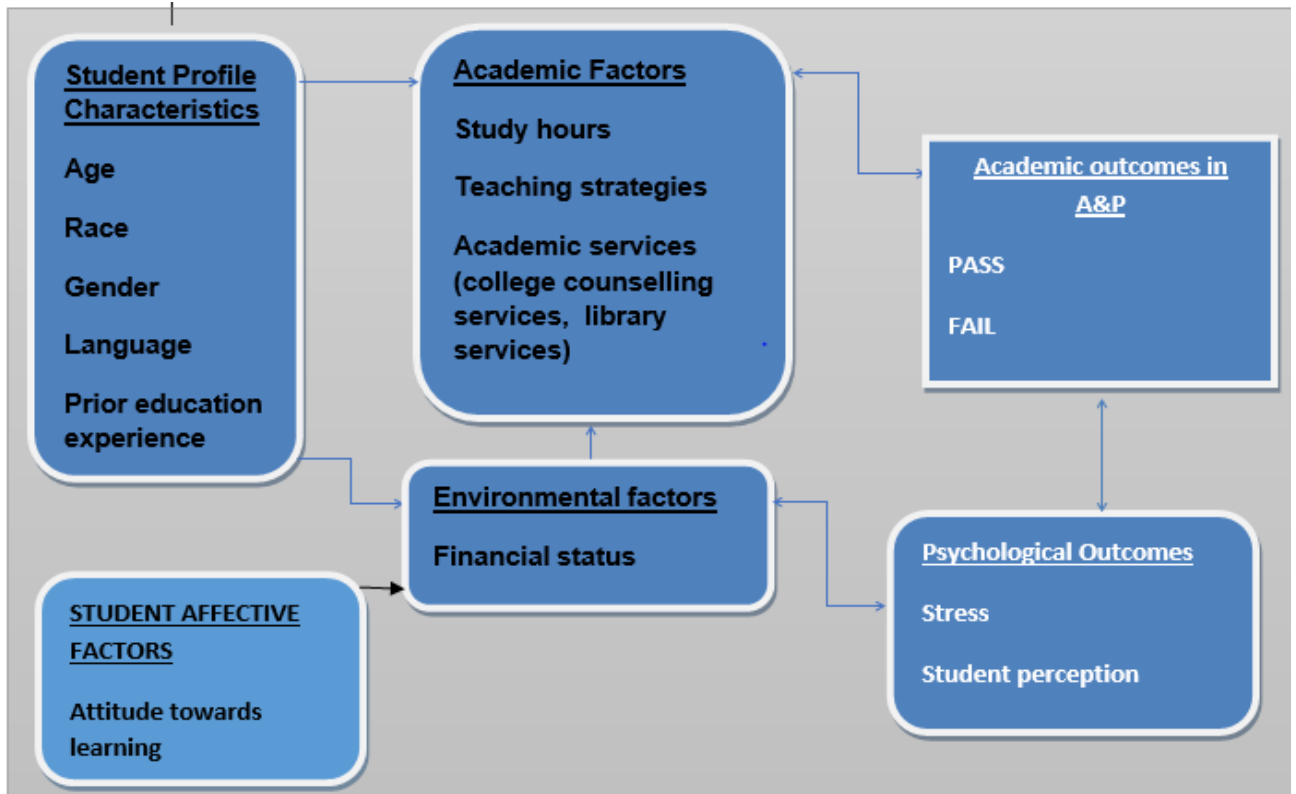
Figure 1.4 Adapted model for the study

(Adapted from Jeffreys 2015:12)

1.7   RESEARCH DESIGN

A research design is the plan for addressing a research question, including the specifications for enhancing the integrity of the study (Polit & Beck 2012:741). The researcher used a quantitative, non-experimental, descriptive research design to describe, explain, and predict factors contributing to students' failure in BNS.

Quantitative research is a formal, objective, systematic process in which numerical data are used to obtain information about the world. In quantitative research, deductive reasoning is used to generate predictions that are tested in the real world (Polit & Beck 2012:739). It is also a specification of the most appropriate operations which need to be

performed in order to test a specific hypothesis in a given condition (Bless, Higson-Smith & Sithole 2013:130). In non-experimental studies, the purpose is to explain and describe phenomena; there is no manipulation of variables or introduction of interventions (Brink, Van der Walt & Van Rensburg 2018:112).

1.8   RESEARCH METHODOLOGY

Research methodology refers to the methods used to conduct a study. Research methodology includes the setting, population, sample and sampling, data collection and analysis.

1.8.1   Setting

Polit and Beck (2012:744) describe a setting as the physical location and condition in which data collection takes place in a study. The study was conducted at the six campuses of the KZNCN that have second year level student nurses, since the study focused on students who had passed A&P.

1.8.2   Population

A population is "the entire aggregate of cases in which a researcher is interested" (Polit & Beck 2012:744). In this study, the population comprised of 170 (N=170) second year nursing students at the KZNCN.

1.8.3   Sample and sampling

Sampling is the process of selecting a part of the population to represent the total population (Polit & Beck 2012:290). A sample is a subset or portion of the accessible population identified for the study while sampling is a process of selecting the subset or portion of the population to represent the accessible population (Botma et al 2015:124).

Sample 1: Sampling of campuses

There are ten campuses in KZN, four of which are located in northern region and six in the southern region. Admission of the first year student nurses is done in an alternative

base. The two campuses in the northern region admit students in the same period while the other two, admits in the following intake. The same admission procedure applies in the southern region. The two campuses located in Pietermaritzburg alternate among themselves in the admission of students, and the other four located in Durban and one in Port Shepstone alternate among themselves. Due to larger population in these two cities, three campuses admit in the same period. Therefore, the total number of campuses that admit the first year student nurses within the same periods is six. There was no sampling approach used to select campuses. Campuses were selected based on the availability of the second student nurses in them. The Six campuses that were selected were then coded A, B, C, D, E, F for identification instead of using their names.

Sample 2: Sampling of respondents

Nursing College Campuses	Total number of 2nd year student nurses
A	26
B	17
C	34
D	33
E	35
F	25
Total campuses: 06	Total students: 170
Accessible Campuses: 06	Accessible students: 114

For the respondents' selection, the researcher used non-probability convenience sampling because it allowed the researcher to select the most readily available respondents in a study (Polit and Beck 2017: 724). Convenience sampling places primary emphasis on generalisation, ensuring that the knowledge gained is representative of the population from which the sample was drawn (Etikan, Musa and Alkassium 2015:2). The number of respondents accessible per campus was as follows; campus A=21, campus B=10, campus C=24, campus D=20, campus E=23 and campus F=16. The sample size for this study was 114 (n=114) and was determined by the number of accessible respondents during data collection and the number of returned questionnaires.

1.8.3.1 Inclusion criteria

- All six KZNCN Campuses that had the second year student nurses.
- Second year student nurses because they have recently passed BNS and have good experience with BNS.

1.8.3.2 Exclusion criteria

- All four KZNCN Campuses that did not have second year student nurses.
- First year student nurses because they were currently doing BNS.
- Third and fourth year student nurses, because they did their BNS in the first year level and they might have forgotten their experience with BNS.

1.8.4 Data collection

Data collection is the precise, systematic gathering of information relevant to the research purpose or objectives of the study (Polit & Beck 2012:723). In this study, data was collected by means of a self-administered structured questionnaire. The researcher developed a Likert scale-based self-administered questionnaire based on the rationale that Likert-scale questions are less invasive than interviews. In a Likert scale the response categories are typically "strongly agree", "agree", "disagree" and "strongly disagree" (Botma et al 2015:138).

The researcher pre-tested the questionnaire. A pre-test or pilot study is a trial run to determine whether the instrument is clearly worded and free from major biases and whether it solicits the desired information (Brink, van der Walt and van Rensburg 2018:94). Pre-testing is a method of checking that the questions work as intended and are understood by the individuals who are likely to respond to them (Hilton 2015:24). Data was collected from five participants who were not included in the main study. The questionnaire was adjusted according to feedback from the pilot study.

Data was collected for the study by means of the questionnaire one month after the pilot study.

1.8.4.1   Data-collection instrument

The researcher used a questionnaire to collect data. The questionnaire consisted of four sections:

Section 1 – Respondents' demographic information, including gender, race, year of matriculation, educational level, employment status before commencing training, and whether studying nursing was planned or not.

Section 2 – Respondents' academic performance, comprising three items: range of marks they obtained in biology or life sciences at school; overall performance in Anatomy and Physiology, and notional hours spent studying Anatomy and Physiology in a week.

Section 3 – Respondents' attitudes towards Anatomy and Physiology and their perceptions of the manner in which problems are resolved (comprising two items).

Section 4 – Respondents' general perceptions, comprising 20 items to which they indicated "strongly agree", "agree", "neutral" "disagree" or "strongly disagree" with the provided statements.

The validity of the research instrument refers to the extent to which the research instrument measures what it is actually intended to measure. Validity indicates whether the conclusions of the study are justified based on the design and interpretation (Botma et al 2015:174). In this study, the questionnaire was assessed for internal, content and structural or statistical validity.

1.8.4.2   Internal validity

Internal validity determined respondents' understanding of the operational definitions used in the study and was assessed by the responses from the pre-test.

1.8.4.3 Content validity

Content validity measures the scores of a research instrument and further enables examination of the operationalisation of the items under each construct. In this study, content validity was used to systematically analyse questionnaire items to determine whether or not the items were adequate. The statistician and research experts reviewed the contents of the questionnaire. Content validity was also encored by the literature reviewed.

1.8.4.4 Statistical validity

The statistical validity of the questionnaire was examined based on the Keiser-Meyer-Olkin criterion (Kayisoglu 2015:62). Operationally, the Keiser-Meyer-Olkin Measure of Sampling Adequacy (KMO-MSA) analysis was conducted to determine the adequacy of the sampling size. The KMO-MSA value, was computed using the SPSS statistical program, was based on the function below and the reliability of the instrument was ensured by the following:

$$\text{KMO} = \left(\sum\sum r_{ij}^2\right) \Big/ \left(\sum\sum r_{ij}^2 + \left(\sum\sum a_{ij}^2\right)\right); \text{ where } a_{ij} = \left(r_{ij} \bullet 1, 2, 3, ..., k\right)$$

Where aij ≈ 0.0, then the variables are measuring a common factor and the KMO value ≈ 1.0. Conversely, where aij ≈ 0.0, then the variables are not measuring a common factor and the KMO value ≈ 0.0

1.8.4.5 Scale reliability

The Cronbach's (Tavakol & Dennick 2011:53) alpha coefficients were computed to determine scale reliability (internal consistency) of questionnaire items under each dimension. Cronbach's alpha coefficient is a statistical measure used to assess the extent to which if the same questions are asked to the same group of respondents under similar conditions, similar responses can be obtained. The higher the coefficient value, the higher the reliability of the responses. The Cronbach alpha coefficient was used to indicate how well various items were positively correlated to one another (Tavakol & Dennick 2011:53). Since the Cronbach alpha is based on the inter-item

correlations, strongly correlated items revealed a normal value which is 0.70 (Tavakol & Dennick 2011:54).

1.8.5 Data management and analysis

The raw data from the questionnaire was stored in the researcher's private laptop and a personal secure password. On completion of data capture and analysis the questionnaire was scanned to one USB and the hard copies of the questionnaire were destroyed by shredding. The USB will be kept in the researcher's office for a period of five years to prevent any leakage of the information to the participants. The data was analysed, using descriptive statistics and exploratory techniques (Brink et al 2018:167). Statistical factor analysis was used to explore the dimensionality of the questionnaire based on the function specified below:

$$\begin{bmatrix} X_1 \\ \dots \\ X_n \end{bmatrix}_{n \times 1} = \begin{bmatrix} \theta_{11} & \dots & \theta_{1m} \\ \dots & \dots & \dots \\ \theta_{n1} & \dots & \theta_{nm} \end{bmatrix}_{n \times m} \begin{bmatrix} f_1 \\ \dots \\ f_m \end{bmatrix}_{m \times 1} + \begin{bmatrix} e_1 \\ \dots \\ e_n \end{bmatrix}_{n \times 1}$$

Where X1 … Xn denotes dimensions of m subjects, θ11 ... θmn represents factor loadings, f1 … fm symbolise factor items, and e1 … en denote measurement errors. A statistician analysed the data, using the Statistical Package for Social Sciences (SPSS) version 24 data processing and statistical analysis. The results were presented in tables and diagrams.

1.9 DEFINITIONS OF KEY CONCEPTS

In this study, the following key concepts were used as defined below:

Biological nursing sciences (BNS)

BNS is an ancillary subject in the four-year Diploma Programme in Nursing offered at nursing colleges in South Africa. BNS is a subject that provides a good background and scientific basis for nursing practice (Department of Health Studies 2016)

Contributory factor

Collins English Dictionary (1999:348) defines contributory as "sharing in or being partly responsible (for the cause of something): a contributory factor". The *Oxford Advanced Learner's Dictionary* (2010:318) defines contributory as "helping to cause something", and *contribute* as "to be one of the causes of something".

A *factor* is defined as "one of several things that cause or influence something" (*Oxford Advanced Learner's Dictionary* 2010:526). *Collins English Dictionary* (1999:348) defines *factor* as "an element or cause that contributes to a result".

Failure

The *Oxford Advanced Learner's Dictionary* (2010:528) defines failure as "lack of success in doing or achieving something".
Collins English Dictionary (1999: 555) defines failure as "the act or an instance of failing; the fact of not reaching the required standard in an examination".

Student nurses

Student nurses refer to learners registered with the KZNCN for the four-year comprehensive nursing diploma programme (R425) and are currently in their second year level of study (Mohudi 2013:5).

1.10   OPERATIONAL DEFINITIONS

In this study, the following concepts are used as defined below:

Biological nursing sciences (BNS)

Biological Nursing Sciences (BNS) referred to Anatomy and Physiology which are done in the first-year level of comprehensive nurse training in the KZNCN.

Contributory factor

A contributory factor referred to a component that has an impact on the failure of student nurses in Biological Nursing Science.

Failure

Failure referred to students' inability to achieve a minimum expected outcome of 50% pass. It indicated an examination mark of 49% and below.

Student nurse

A student nurse referred to a nurse who is in the second-year level of the four-year Diploma in Nursing at a public nursing college, and is registered with the SANC as a student.

1.11   ETHICAL CONSIDERATIONS

Ethics deals with matters of right and wrong. When humans are used as study participants, care must be taken in ensuring that their rights are protected (Polit & Beck 2012:748). Accordingly, the researcher obtained permission to conduct the study, obtained informed consent from the participants, and observed the ethical principles of beneficence, respect for persons, autonomy and justice (Polit & Beck 2012:748).

- **Approval and permission**

The researcher obtained ethical clearance and permission from the Higher Degrees Committee of the Department of Health Studies, University of South Africa (Ref No.HSHDC/786/2017; see Annexure 1). Permission to conduct a research study was requested (see Annexure 2) and obtained from the KwaZulu-Natal Research Database Board (Ref. No. KZ_201803_012; see Annexure 3). Permission was also requested (see Annexure 2) and obtained from the College Principal and the principals of the six campuses in the study (see Annexure 3).

- **Privacy and confidentiality**

The participants were assured of privacy, confidentiality and anonymity. Privacy was assured by completing the questionnaire in a quiet classroom with no interruptions. Anonymity was assured as no names were written on the questionnaire. The data was treated in strictest confidence and kept under lock and key. No one had access to the data. In addition, the researcher provided two boxes for the respondents to place their informed consent forms and completed questionnaires separately after data collection.

- **Autonomy**

The principle of autonomy includes the right to self-determination and the right to full disclosure. The right to self-determination is based on the ethical principle of respect for persons and indicates that people are capable of controlling their own destiny. The respondents' right to self-determination was ensured by explaining the purpose and significance of the study to them; obtaining their informed consent, and emphasising that participation was free and voluntary, and that they had the right to withdraw from the study at any time should they wish to do so (Polit & Beck 2012:171).

- **Beneficence and non-maleficence**

The right to protection from discomfort and harm is based on the ethical principle of beneficence, which holds that one should do good and, above all, do no harm.

It is important that the research not only does not harm, but also potentially contributes to the wellbeing of others (Bless et al 2013:29). The respondents were assured that their participation or information they might provide would not be used against them in any way. In addition, the study and results would be made available to the nurse educators and the respondents.

- **Justice**

The right to fair treatment is based on the ethical principle of justice. This principle holds that all people should be treated equally and fairly (Polit & Beck 2012:172). Thus, people should not be discriminated against in research on the basis of race, gender,

disability, income level or any other characteristic (Bless et al 2013:29). The researcher used convenience sampling to ensure that the respondents' selection was fair because they were selected for reasons directly related to the study.

- **Informed consent**

Informed consent means that participants have adequate information about the research, comprehend that information, and have the ability to consent or decline participation voluntarily (Polit & Beck 2012:173). The researcher informed the respondents of the purpose and nature of the study, answered any questions they had, and gave informed consent forms to them (see Annexure 5).

- **Fidelity**

The principle of fidelity implies faithfulness and keeping promises or agreements, specifically between researcher and participant (Bless et al 2013:31). The researcher ensured that all the data obtained from the respondents was only used for research purposes and no respondents' data was discussed with anyone other than the supervisor.

1.12   SCOPE AND LIMITATIONS OF THE STUDY

The study was conducted at six out of eleven campuses of the college in the KZN province. Moreover, the study was limited to one of the nine provinces of South Africa, therefore the findings cannot be generalised to other provinces or nursing colleges.

1.13   STRUCTURE OF THE DISSERTATION

The dissertation consists of five chapters:

Chapter 1: Orientation to the study

Chapter 2: Literature review

Chapter 3: Research design and methodology

Chapter 4: Data analysis and interpretation and findings

Chapter 5: Findings, limitations and recommendations

1.14 CONCLUSION

This chapter outlined the purpose and objectives, theoretical foundation, research design and methodology and ethical considerations of the study and defined key concepts. Chapter 2 discusses the literature review conducted for the study.

CHAPTER 2

LITERATURE REVIEW

2.1   INTRODUCTION

Chapter 1 described the problem, purpose and significance as well as research design and methodology of the study. This chapter discusses the literature review conducted for the study.

A literature review is an organised, written presentation of what has been published on a topic (Burns & Grove 2009:92). A thorough examination of publications on the topic is essential to developing an understanding of a given area, to limiting the scope of the study, and to conveying the importance of studying the topic (Brink et al 2018:67). Williamson and Whittaker (2014:29) describe a literature review as a comprehensive summary and critical appraisal of the literature that is relevant to the research topic. Polit and Beck (2017:733) refer to a literature review as a critical summary of research on a topic of interest, often prepared to put a research problem in context.

2.2   PURPOSE OF A LITERATURE REVIEW

The purpose of a literature review is to conduct a critical and analytical appraisal of recent scholarly work on the topic that helps to determine what is already known about it. In quantitative research, a literature review directs the study's planning and execution. It also assists in the comparison of existing studies' findings with those of the current study (Brink et al 2018:58).

In this study, the researcher conducted the literature review to find out what has been published on factors that contribute and relate to BNS performance. The researcher used Jeffreys' (2015) Nursing Universal Retention and Success (NURS) Model as the theoretical framework to guide the literature review and study.

2.3   BNS IN NURSING EDUCATION AND TRAINING IN THE SA CONTEXT

Biological Nursing Science (BNS) also known as Bioscience is important for nurse training and education as it is one of the core modules in the first year. BNS consists of Anatomy and Physiology (A&P) subjects, both done in semester one and two as A&P I and A&P II. This module teaches the human body parts and systems and how those systems function. Nursing students use BNS to help them view all aspects of patients' lives to determine treatment options based on their whole biological make up.

The foundation of BNS consists of understanding the concepts, such as that tiny particles known as DNA determine the makeup of an organism that passes from parent to offspring. Since genetic factors play an important role in the biological makeup of a patient, student nurses need to have a firm grasp of this concept to provide effective care. The study of this module forms an integral aspect of the programme for the education and training of a nurse. The foundation for provision of nursing care, and understanding of medical and surgical conditions, is based on the application of knowledge gained in this subject (Department of Health Studies 2016:20).

2.4   SOUTH AFRICAN NURSING COUNCIL (SANC)

In South Africa, the SANC is the body responsible for setting and maintaining standards and regulating nursing education and practice. It is a financially independent, autonomous, statutory body, initially established in terms of the *Nursing Act, 45 of 1944* and currently functioning under *Nursing Act, 33 of 2005* (South Africa 2005:1). The purpose of the SANC is to set and maintain standards of education, training and practice, and to ensure mandatory guidance and additional advice on developing education programmes. One of the functions of the SANC is to accredit nursing education institutions (NEIs) and training programmes.

As the regulating body of the nursing profession since 1986, the SANC works in conjunction with the Department of Health in stipulating regulations relating to the minimum requirements for the education and training of a nurse (General, Psychiatry and Community) and Midwifery (Section 45[1] of *Nursing Act, 50 of 1978*). BNS is one of the core modules stipulated by the SANC in the curriculum for R425 of 22 February

1985 (SANC 1985). This indicates the importance of BNS hence students have to pass it to proceed to the second-year modules.

2.5   IMPORTANCE AND RELEVANCE OF BNS

BNS is important to nurses in order to understand how illnesses affect the human body. Nurses use BNS every day therefore it is essential that they learn about and understand genetic factors that may affect their patients. This knowledge assists nurses in determining treatment options and ruling out certain medical conditions. BNS assists student nurses in determining the future course of disease and illness. Since it is the responsibility of nursing professionals to ensure that patients receive proper care, BNS provides them with sufficient knowledge on how to render such care in order to restore balance in the human body. Sickness and illness occur when there is an imbalance in the human body. Studying BNS in nursing education and training equips nurses to detect that imbalance (Department. of Health Studies 2016).

A sound study of anatomy and physiology, with applied physics and chemistry, is fundamental to understanding the human body and its homeostatic needs and to nursing people with psychiatric, medical or surgical conditions and women who are pregnant. A straightforward approach to the description of systems is adopted in Anatomy and Physiology (A&P) in order to create a sound foundation. Even though the systems are taught separately, they are integrated in teaching so that they form integrated systems because these systems function cooperatively (Ross & Wilson 2015:20) The study of this module forms an integral aspect of the education and training of a professional nurse in South Africa. The foundation provision of nursing care and understanding of medical and surgical conditions are based on the application of knowledge gained in this subject This indicates how essential the A&P module is for nursing students preparing to become professional nurses. The importance and relevance of the module is stressed by ensuring that only students with a background knowledge of biological nursing sciences are admitted to nursing education and training programmes (Department of Health Studies 2010a).

2.5.1 Background knowledge of BNS

Background knowledge is one of the student profile characteristics that has an influence on students' academic outcomes (Jeffreys 2015:425) Background knowledge or prior education knowledge consists of information that is essential to understanding a situation or problem. In this study, the background knowledge referred to matriculation (Grade 12) subjects that contributed to nursing students' performance in BNS. The literature review wished to determine the influence of this characteristic on students' performance in their first year of study. Bioscience knowledge is significant in nurses' clinical practice and an integral part of preregistration in nursing courses. Cox and Crane (2014:12) state that success in science subjects determines students' performance in their first-year bioscience subjects and clinical practice. According to Andrew and Mansour (2014:311), bioscience subjects underpin curricular courses for health professionals to promote patient safety.

In Australia, Cox and Crane (2014:19) found a steady decline in the number of students selecting bioscience subjects in their final years of secondary school. Many students who chose nursing as a career but had not done bioscience in high school found the first year of study extremely difficult and suffered from anxiety due to their poor background in bioscience. In Ireland, McKee (2017:251) found that poor previous theoretical biological science significantly influenced bio-science examination results. McKee (2017:251) added that if appropriate strategies for dealing with the problem were not introduced both within the course and prior to entry, the problem would remain. Regarding the effect of background knowledge on students' performance in biological sciences, secondary school science was found significantly advantageous for bioscience and understanding what bioscience entails (Craft et al 2013:1402).

McVicar et al (2015:508) found that many nursing students struggled with bioscience due to poor science backgrounds, which led to failure. Gultice, Witham and Kallmeye (2015:109) found a connection between high school achievement in science and success in nursing courses. Students who failed or withdrew from Anatomy and Physiology I or Fundamentals of Biology I reported significantly lower averages in high school chemistry.

High schools and academic advisors should encourage students interested in the health sciences in general, and students interested in doing nursing, to take mathematics and science courses. Undergraduate institutions should develop supplemental or remedial courses specifically designed to improve success in Anatomy and Physiology (Harris, Hannum & Gupta 2004:171).

In a study on predictors of academic performance among second-year nursing students at a university in the Western Cape, Mthimunye, Daniels and Pedro (2018:198) found that students who scored high grades in Grade 12 science and mathematics performed better than ones with lower grades or with no science or mathematics background. Life sciences had a significant impact on the performance of nursing students. This indicated that there is a high correlation between background knowledge and performance in biosciences. SANC (1985:4) stipulates that "general nursing science (GNS) ought to be an obligatory module in nursing education and should form the basis of nursing science which requires an understanding of human biology, physical science, chemistry and pharmacology".

Mouton, Louw and Strydom (2012:285) maintain that the quality of secondary education has direct implications for students' performance at university level, with many learners subsequently underperforming through a lack of preparedness at school level. Prior education in or background knowledge of bioscience contributed to nursing students' performance. There was a correlation between high marks for matriculation (Grade 12) bioscience and good performance in BNS.

2.6   FACTORS AFFECTING STUDENT PERFORMANCE IN BNS

Several factors impact on student nurses' performance in BNS. This section discusses the influence of extrinsic and intrinsic factors on performance.

2.6.1 Extrinsic factors affecting performance in BNS

The researcher examined the impact of extrinsic factors like gender, contribution of home language in performance, teaching methods or strategies, and support programmes on performance in BNS.

2.6.1.1 Gender

Langtree et al (2018:132) found that 70.2% of student nurses in training were females compared to males. The study found no difference in the Anatomy and Physiology (A&P) results of male and female student nurses, which indicated that gender did not affect ability to study this subject and that the increased influx of males into the student nurse population did not adversely affect results obtained in A&P.

The nursing profession has traditionally been a predominantly female profession. However, no substantial variations have been found between male and female students regarding academic performance (Meadus & Twomey 2007:8; Mthimunye et al 2018:200).

2.6.1.2 Home language

In 2013, the Australian Bureau of Statistics (2013:30) reported that Australia was a culturally diverse country, with 26% of the population having been born overseas; 81% speaking only English; 49% of longer-standing migrants and 67% of recent arrivals speaking a language other than English at home, and 3.1% of recent migrants not speaking English at all. Furthermore, 27% of students in Australian universities came from backgrounds where English was a second/other language and this figure was reflected in the student nurse population. This indicated a need to meet the cultural and linguistic needs of Australia's multicultural health system.

An English as second language (ESL) background, where English is not the home language, has a negative effect on and leads to a high failure rate among students in first-year nursing education (Crawford & Candlin 2013:181; Langtree et al 2018:130). Approximately four to eight years of conversing in a second language are necessary for most students to become sufficiently competent in that language for academic success (Abriam-Yago, Yoder & Kataoka-Yahiro 1999:143; Langtree et al 2018:130) as students have difficulty with speed reading and language comprehension (Olsen 2012:26). Students' home language has an impact on their performance at first-year level. An evaluation of a blended learning approach in an A&P module for pre-registration health care students found that students experienced difficulty with new and complicated

terminology and concepts (White & Sykes 2012:6). Students thus found A&P the most challenging subject in the nursing programme.

A lack of speaking and listening proficiency hinders academic success. Olsen (2012:28) found that ESL nursing students were doubtful and hesitant to speak in class because of self-consciousness about their accents and fear of not being understood. Consequently, many students were less likely to ask questions in class, which affected their performance due to lack of participation.

Most international students who do not speak English at all, or who are ESL students find themselves in a new socio-cultural environment and have to adapt to a socio-cultural system that is different from their own when they pursue their academic studies in an English medium university (Crawford & Candlin 2013:184). More students in tertiary level education, including nursing programmes, studied and learned English at high school level as a second language. Crawford and Candlin (2013:184) found that ESL students are disadvantaged when studying A&P in the English language and interventions are required to improve their learning.

ESL students fail to follow lectures as the language is fast paced and students are expected to understand the language. This is a worldwide concern especially in respect of the high attrition rate of students in their first year of nursing education, due particularly to failure in A&P (Langtree et al 2018:134-139).

2.6.1.3   Teaching methods/strategies

Although students may have a good language background, nurse educators' and lecturers' teaching strategies influence students' performance in the course regardless of being ESL or English first language (EFL) students. Teaching methods/strategies are among the academic factors that influence academic outcomes (Jeffreys 2015:428). Teaching strategies refer to methods used to help students learn the desired course content and be able to develop achievable goals in the future. Brown Bowmar, White and Power (2017:491) point out that there are different methods and effective strategies available to assist students and increase their engagement in courses.

One teaching method is active learning (AL), which is an approach in which students become engaged participants in the classroom. AL motivates students to engage more meaningfully in their learning process. It includes students' willingness to learn by putting forward their opinions and offering comments during learning sessions (Herrmann, Nikendei, Keifenheim, Bosse, Lund, Wagner, Celebi, Zipfel & Weyrich 2013:76; Brown et al 2017:492)**.** Miller and Metz (2014:246) emphasise that an active learning instructional style encourages students to be responsible for their own learning in order to increase their desire to learn. Students are encouraged to take full responsibility for their learning through audience response systems and class debates. Brown et al (2017:492) maintain that nursing students tend to learn and understand physiology well when it is related to experiences in their work. Relating physiology to nursing students' experiences is part of an active instructional style, which appears effective as students' performance improves.

Boshra, Hasbum, Hafeez, Huynh and Hirulog (2017) argue that students' performance in the A&P course is only at a higher level in problem-based learning (PBL). PBL is a learning strategy where instructors provide students with a way to balance the level of difficulty and the degree of interest to best understand, remember and connect with the material. Boshra et al (2017) examined the effects of various teaching modalities in PBL on student motivation and academic performance in A&P class. Teaching modalities included videos for the respiratory system unit and case studies for certain systems and noticeable disease. Although no direct comparisons of student motivation across academic years were made, Boshra et al (2017) noted that students in 2016 performed slightly better (64%) than ones in 2014 and 2015 (63%) due to the implementation and emphasis of PBL. In their study, Miller, McNear and Metz (2013:350) found that although the majority of students preferred or opted for an engaging lecture format, some students still preferred the traditional lecture method.

In Australia, academic and technical staff developed activities for students that permitted discussion and allowed students to interact easily and repetitively with content. Interactive tables and posters that needed to be labelled and using prepared flashcards to promote group work were some of the activities used to enhance student experiences and promote hands-on learning. These activities were introduced in 2013 into the laboratory and tutorial classes for first-year Bachelor of Nursing anatomy and physiology students. The activities allowed staff and student participants to explore the

difficult aspects of anatomy and physiology, using many learning styles that may have been neglected in the past. The student participants and staff rated the implementation of these activities positively (Johnston, Hamill, Barton, Baldwin, Percival, Williams-Pritchard, Salvage-Jones & Todorovic 2015:418).

Some studies recommend flipped teaching, where interactive class-time is combined with online material in biomedical education. Dickson and Stephens (2014:52) found that students responded positively to lectures with kinaesthetic activities; for example, action-based classes, compatible teaching, and using objects and materials. These kinds of activities are usually only conducted in bioscience laboratories, but it was found that kinaesthetic activities can translate well into lectures with large numbers of students from diverse backgrounds. To ensure that all learning styles were catered for in lectures, the kinaesthetic activities were supported by graphics for visual learners and the spoken word for auditory learners. All learners were supported by synopsis notes which described the relationship between the kinaesthetic activities and the bioscience concepts. Dickson and Stephens (2014:61) found that the majority of the students agreed/strongly agreed that they were satisfied with this kind of teaching.

In a comparative study of different teaching and learning methods, Kharkar, Sales, Dase and Lande (2013:6) found that the participant medical students doing anatomy and physiology preferred both traditional and modern computer-assisted learning methods. The study found that 34% of the participants preferred classic chalk and board teaching in lectures. In 2015, Kumari, Yadav, Singh, Kaur and Gupta (2015:3910) evaluated anatomy teaching methodology and found that the majority of the participant students preferred LCD with chalk and board, a combination of traditional and modern teaching methods, while only a few preferred traditional methods.

Discussion is a strong teaching method. In a study in Kenyan secondary schools, Mukhwana (2013:68) found that discussion groups helped individuals to express their opinions freely. Discussion groups play a major role in assisting slow learners to sharpen their minds and enabling them to integrate complicated BNS terms that they did not understand in class.

In Oshana, Namibia, Pinehas, Mulenga and Amadhila (2017:63) found that participants felt that poor teaching strategies, lack of student-lecturer relationships, and

communication barriers hindered academic performance. According to Ganyaupfu (2013:60), educators should create an atmosphere conducive to learning in order to enhance students' performance. Lack of knowledge of course content frustrates students, which sometimes leads to negative attitudes and poor performance.

In the Eastern Cape, Tom, Coetzee and Heyns (2014:109) found that some students recommended that remedial classes should be offered for students who do not understand. Nursing colleges should provide practical facilitation and learning opportunities, and educational resources that include technology to improve students' performance (Tom et al 2014:111). Nurse educators should guide nursing students in effective study strategies like commencing studies as soon as the academic year begins, underlining important aspects, and summarising when reading and studying as individuals and groups (Tom et al 2014:113). In their study, White and Sykes (2012:9) found that the respondents felt that a mixed learning approach, including face-to-face contact, interactive group work and study groups, increased academic performance.

2.6.1.4 Support programmes

Support programmes interact independently or as a group that promote interest or increase knowledge or understanding by skill, study, instruction or experience. The literature review examined different support programmes used to facilitate student nurses' knowledge of BNS.

Scott, Louw and Kahn (2017:48) examined the value of supplementary anatomy workshops for improving undergraduate student performance. Classes were assigned to control or treatment groups, with the treatment group receiving instruction designed to help students develop a deeper understanding of anatomy vocabulary related to brain structures by making connections to these words in everyday life as well as to their understanding of Spanish. The control group had higher test scores than the treatment group. Scott et al (2017:47) found that the statistically significant increases in learning for both groups suggested the activity, problem, and project-based curriculum had the potential to be an effective type of instruction, especially for bilingual learners.

In Australia, Crawford and Candlin (2013:184) conducted a four-day programme focusing on general academic and subject specific (bioscience) writing that included

one-on-one sessions where students were provided with feedback on previous and current assignments. Feedback focused on referencing, grammar, structure, and clarity of expression. Despite the short duration and limited focus, the students described the individual sessions as one of the most helpful aspects of the programme. In their study on the language challenges facing students from the Democratic Republic of Congo (DRC) in a university in South Africa, Tshotsho, Mumbembe and Cekiso (2015:597) found that the establishment of teaching and learning centres where ESL students were taught language skills, such as grammar, vocabulary, and pronunciation, was most useful.

Supplementary anatomy workshops held quarterly during the medical academic year for undergraduate students improved participants' BNS performance (Scott et al 2017:48). Moreover, students who attended multiple workshops performed significantly higher than ones who attended a single workshop.

At the North West University (NWU), in Potchefstroom, South Africa, learning programmes have been designed to make learning more meaningful and effective for all learners (Oosthuizen 2016). Effective orientation programmes, at an institutional and faculty level, familiarise students with the demands of their learning programmes, the academic environment at the university, and the range of available support services. Interventions assist students to successfully manage their transition to university study by means of (i) effective systems for testing their levels of academic and language literacy; (ii) the provision of guidance on placement within study programmes, and (iii) programmes and facilities for the development of academic literacy, including competencies in reading, writing and information technology (Oosthuizen 2016)

2.6.2 Intrinsic factors influencing performance in BNS

The researcher examined the influence of intrinsic factors like student nurses' attitudes towards BNS and stress on performance.

2.6.2.1 Students' attitudes

Attitudes can alter every aspect of a person's life, including their education. Students'
attitudes towards learning determine their ability and willingness to learn. In Australia,
Chapman, Ward, Tiwari, Weimer, Duran, Guerra and Sale (2017:188) examined the
role of language in A&P instruction. The majority of the students were Spanish speaking
learners. The study found that there was no relationship between the students'
satisfaction and pass rate. Most of the students were satisfied with the course content,
the learning materials, the delivery styles and lecturers' support, therefore their
performance was enhanced.

Craft et al (2013:1399) found that students' perceptions and anxiety about studying BNS
included that it was more difficult than actual nursing subjects. This had a negative
impact on their performance. Craft et al (2013:1405) recommend that health science
faculties attempt to eliminate preconceptions about BNS and target improved supports.

In the United Kingdom (UK), Ashelford, Fell and Goacher (2014: 804) found that nursing
students were emphatic about the need to study and understand the biosciences
knowing that they would have to provide safe, holistic patient care and have credibility
with their patients and in the multi-professional team. At the same time, most students
who developed a negative attitude towards bioscience did not perform well as they
found learning and applying biosciences very difficult and became anxious particularly if
they had not studied life sciences prior to entering nurse education.

Pitt, Powis, Levett-Jones and Hunter (2013:128) found a significant relationship
between students' personal attitudes and academic performance. Students who were
emotionally stable and had positive attitudes towards learning did well in BNS. Although
the correlations were weak, such low correlations between academic performance and
personality attributes are common and can potentially provide insight into future
success (Pitt et al 2013:128). Tower, Latimer and Hewitt (2014:1013) found that nursing
students' attitudes towards BNS played a role in their performance. Students who had a
negative perception of BNS as a difficult subject and lacked self-efficacy did not perform
well.

Learners' attitudes are important for effective learning (Mensah, Okyere & Kuranchie 2013:134). Georgina and Yemisi (2014:34) maintain that attitude plays an important role in the learning of any subject because it touches the cognitive, affective and behavioural tendencies of the learner. Thus, the way individuals think, perceive, feel, value and act towards a particular subject influences their achievement. Sen, Yilmaz and Temel (2016:1026) point out that attitude has three dimensions, namely cognitive, affective and behavioural. These dimensions occupy an important place in science education. Furthermore, attitudes are an important learning output beside academic achievement. Sen et al (2016:1032) conclude that students' development of positive attitudes towards science courses is one of the fundamental objectives for effective learning.

Farkas and Marone (2015:128) found that specific career goals and study time, not learning preferences, were associated with better performance among students in an undergraduate anatomy and physiology course. However, the extent to which prior academic preparation, cultural norms, and socioeconomic factors influenced these results was not clear. Tom et al (2014:108) found that students' attitudes towards learning and their academic performance could be negatively affected if their perceptions that lecturers were knowledgeable, hardworking and dedicated were found not to be true.

In Baringo County, Kenya, Mbugua, Kibet, Muthaa and Nkonke (2012:87) found that the attitude of students towards lecturers and some modules determined their performance. Students who had a favourable attitude towards a specific module tended to perform well academically. Kumari et al (2015:3906) maintain that learning and performance are determined by willingness to learn. Students need to develop a positive academic self-concept through the internalisation of their social image in order to fulfil their goals.

The literature review showed that students' attitudes towards learning affected their academic performance. However, stress also has an impact on performance.

2.6.2.2   Stress

Psychological outcomes have an effect on academic outcomes (Jeffreys 2015). In Jeffreys' (2015) NURS model, psychological outcomes include stress and perceptions that students have or develop which adversely affect or contribute to how they perform.

The psychological outcome that has a major impact on learning and performance is stress.

Student nurses are frequently exposed to different stressors which may directly or indirectly affect their learning and performance (Labrague 2013:424). According to the NURS model, stress results from environmental factors (Jeffreys 2015:428). Psychological outcomes can be identified as a multi-dimensional phenomenon that is focused on a dynamic relationship between the individual and the environment (Emilsson, Gellersted, Nilsson, Berndtsson, Johansson & Pennbrant 2014:12). Ellawela and Fonseka (2013:25) maintain that some degree of stress is important to stimulate and motivate individuals to achieve their goals. However, at times stress can be a major barrier to concentrating, problem-solving, decision making, and other necessary abilities for students' learning, and result in failure (Emilsson et al 2014:13).

Sharma, Davey, Shukla, Shrivasta and Bansal (2014:54) found that occupational stress among staff nurses could improve performance and quality of life because individuals needed to experience challenges in their lives. Nursing is considered the most stressful profession in the world. Student nurses encountered high levels of academic stress during training and needed to develop coping behaviours and strategies (Shaban, Akhu-Zaheya & Khater 2012:1).

In a study on predictors of stress among United States (US) nursing students, Wolf, Stidham and Ross (2015:203) found that to cope with stress most students used positive thinking and social support. The students often engaged in positive thinking by telling themselves to stay focused, adapt and not worry, or that they could do it. In addition, the students mainly used emotion-focused rather than problem-focused coping. In a study on stress management in junior and senior nursing students in Ghana, Sossah and Asiedu (2015:16) found that the participants were exposed to different kind of stressors and sources of stress. Stress management differed according to the participants' age and level, but not in terms of gender.

A study on perceived stress and associated factors in Sri Lanka found that nursing undergraduates encountered several difficulties in addition to the common stressful indicators specific to nursing education (Ilankoon & Warnakulasooriya 2014). In a study among nursing students at the University of Paradenia, Sri Lanka, Damayanthi (2014:3)

found that stress in their study period often had negative consequences in their academic, professional and personal life. In addition to classroom learning, they had to acquire skills in laboratory and clinical settings and undergo extensive evaluation in theory and practical examinations.

In their analysis of stress coping strategies among Diploma nursing students in Ghana, Abasimi, Atindanbila, Gai and Mahamah (2015:31) found that nursing students were exposed to sources of stress such as separation from home, financial worries, regular clinical and educational assessments and frequently changing clinical environments.

Anxiety also has an impact on nursing students' performance. A study on the relationship between anxiety and academic performance of nursing students at the Niger Delta University, Bayelsa State, Nigeria found that anxiety was the common cause of students' bad performance (Afolayan, Donald, Onagoga, Bafeni & Juan 2013:25).

In South Africa, Janse van Rensburg and Surujlala (2013:6) found that female students were more affected by stress than males. In some cases, the transition from high school to tertiary level education caused anxiety and stress. In the United Arab Emirates, Gomathi, Ahmed and Sreedharan (2013:437) found that undergraduate health profession students used prayer and support to cope with stress.

The literature review indicated that stress impacts on students' performance and students respond to stress differently.

2.6.3 Influence of other factors on performance

Several factors affect student performance. Hull, Hopp, Wilson & Schaefer (2016:30) identified a number of factors that must be taken into account in any systematic evaluation of student success, including socioeconomic, linguistic and minority status for example, higher socioeconomic status positively correlates with student success. Hull et al (2016:38) state that the successful completion of undergraduate science courses also depends on students' existing skills and knowledge and the pedagogical approaches used by instructors in delivering the content.

In their study on factors affecting the academic performance of student nurses in Benguet State University College of Nursing, Alos, Caranto and David (2015:60) found five factors that contribute to student academic performance, namely personal condition, study habits, and home-related, school-related and teacher-related aspects. Study habits have an impact on performance as students who spent long hours studying performed better than ones who spent fewer hours studying or who did not study at all. Parents or guardians who have social, educational and economic advantages strengthen their children's success (Alos et al 2015:62). Teacher-related factors topped the list. The quality of teachers matters the most as it directly influences student academic performance. Teachers need to capture and hold students' attention and interest in the subject (Alos et al 2015:63).

In an NEI in the Eastern Cape Province, South Africa, Tom et al (2014:110) found that the shortage of educators, especially trained ones, together with inadequate resources were major contributory factors in students' poor performance in biological science. The Eastern Cape was always associated with poor results in BNS due to a shortage of nurse educators and resources therefore the majority of nursing students in the comprehensive four-year programme did not succeed.

2.7   ENTRY REQUIREMENTS

In Ohio, USA, Gultice, Witham and Kallmeye (2015:108) found that high failure rates in introductory science courses for students studying at the Christ College of Nursing and Health Sciences often delayed student entry into career pathways, decreased the diversity of applicants for professional programmes, lowered both student and instructor morale, and increased costs for students and the institution. Gultice et al (2015:110) therefore maintain that academic advisors and faculty members must help students select courses that are appropriate not only for their programmes of study but also for their stage of academic progress.

In Australia, competence in a prescribed pre-nursing course is a prerequisite for entry into the nursing programme as it indicates an applicant's academic aptitude for nursing (Olsen 2012:31). Adequate grade marks in A&P are expected from students in prerequisite courses which are used as assessments for commencing with the nursing

programme. These assessments contribute towards reducing student attrition in the nursing course. (White & Sykes 2012:8)

Langtree et al (2018:133) found a positive correlation between A&P1 and Matriculation Biology/Life Sciences results. Langtree et al (2018:135) state that students' performance in the prerequisite science course was a reliable predictor of academic performance in the nursing course. Consequently, prerequisite prescience courses should be set at a higher mark and students who do not perform well should not be accepted in the nursing programme. The entry requirements were raised in 2008 but are still low because they remain at a minimum score of 40% in Life Sciences or Science subjects. Langtree et al (2018:137) maintain that if the minimum requirements for such subjects were increased to at least 50%, it would be of benefit as only capable students would be accepted for the course.

In a study on first-year health sciences students' performance in a large, diverse, multidisciplinary, first-semester physiology service module, Higgins and Tufts (2013:168) found that the admission criteria used at the universities was not adequate enough for students to cope with physiology. These admission criteria led to Health Science students at the University of KwaZulu-Natal performing better in their professional modules compared to their bioscience modules. In their study on contributing factors leading to health science student success in anatomy and physiology, Harris et al (2004:170) found that the marks the students got in their high school mathematics and science subjects correlated with their results in Anatomy and Physiology.

2.8   THEORETICAL FRAMEWORK

Polit and Beck (2017:128) describe a framework as the overall conceptual underpinning of a study. If the study is based on a theory, the framework is referred to as a theoretical framework. The theoretical framework is the structure that holds or supports a theory of a research study.

The researcher used Jeffreys' (2015) NURS Model to guide the study. The model is based on retention and success, but in this study, the focus in the model was only on

success. The model guided the data analysis and the framework was the organising principle.

2.8.1 Understanding the background of NURS

Jeffreys' NURS model provides a framework for exploring the multidimensional factors that influence nursing student success. The NURS model is an organising framework for understanding and promoting undergraduate nursing student success (Jeffreys 2015:425) Psychological, organisational and economic frameworks have been used to understand college student success. The NURS model contains part of Tinto's theory of student success.

Tinto's theory of student success is the theory that explains student success behaviour in relation to the university context. In this theory, Tinto suggested that the degree to which a student is committed to studies and goals of the university, are predictive of student success (Tinto 1997:615; Schreiber, Luescher-Mamashela and Moja 2015: 5). Tinto's theory links the pre-university entry attributes of a student, such as family background, skills and abilities and prior schooling to the institutional experience and ultimately to educational outcomes, student retention and success. Key explanatory factors in Tinto's revised model are the student's intentions, goals and commitments; students' institutional experiences linked to the academic and the social system; academic integration and social integration; and the quality of student effort and learning (Tinto 1997: 601).

The main purpose of the NURS model is to present a globally applicable organising framework for examining the multidimensional factors that affect nursing student success in order to identify students at risk, develop strategies to ensure success, guide innovations in teaching and educational research, and evaluate strategy effectiveness. It also aims to provide a framework for connecting faculty and researchers worldwide in sharing dialogue, disseminating research findings, and encouraging collaborative partnerships that transcend geographic boundaries and unite in the common goal of optimising student success (Jeffreys 2015:426)

Jeffreys' NURS model indicates that undergraduate nursing students' academic performance and success is based on the interaction of student profile characteristics,

student affective factors, academic factors, environmental factors, academic outcomes and psychological outcomes (Jeffreys' 2015:426). Therefore, various combinations of these factors may provide researchers with significant evidence to identify variables that have the greatest predictive power on the academic performance and success of nursing students.

2.8.2 NURS model components

The components of Jeffreys' NURS model include student profile characteristics, student affective factors, academic factors, environmental factors, professional integration factors, academic outcomes, and psychological outcomes underpin nursing retention decisions (Jeffreys 2015:428). Figure 2.1 depicts the complete NURS model.

Figure 2.1 Jeffreys' Nursing Undergraduate Retention and Success (NURS) Model, 2015 (Source: Jeffreys 2015)

2.8.3 Using the NURS model in the current study

Using the NURS model as the conceptual framework, this study examined the influence of student profile characteristics, academic factors, environmental factors and psychological outcomes on the respondents' performance in Anatomy and Physiology (A&P). Figure 2.2 shows an adapted model tested in this study.

Figure 2.2 Adapted model for the study

(Adapted from Jeffreys 2015:12)

The researcher only focused on the above components that were relevant to the study. Student profile characteristics describe characteristics prior to beginning a nursing course, including age; ethnicity, race, gender, first language and prior educational experience, and enrolment status. Using this model allowed the researcher to observe or determine the impact of each component on the respondents' academic outcomes in anatomy and physiology. The researcher adapted the figure from Jeffreys' NURS model to reveal the interrelation among the components of the selected model.

The adapted model maintained that student retention and success are grounded in the interaction of student profile characteristics, student affective factors, academic, environmental factors, academic factors and psychological factors. It was, however not in the scope of the study to test the entire model. The student profile characteristics included age, gender, race, language and prior education experience; the student affective factors included attitude towards learning; the academic factors included study hours, teaching strategies, academic services (college counselling and library services); the environmental factors included financial status; the academic outcomes included pass and fail and the psychological outcomes included stress and student perception.

The model shows that, the student profile characteristics integrated with the academic factors determine the student's academic outcomes, which in turn influence the academic factors. The integration of the student profile characteristics, student affective factors and the environmental factors determine the student's psychological outcomes, which in turn influence the environmental factor. The four components combined, namely; student profile characteristics, student affective factors, academic factors and environmental factors, may also determine the student's academic outcomes. Both the academic and psychological outcomes have the influence on each other. The student's academic outcomes determine the student's psychological outcome and vice versa.

The researcher developed the data-collection questionnaire on the basis of the framework, with the focus on what is illustrated in figure 2.2. The researcher based the research objectives, questions, research design and methodology and literature review on the model. The study examined the respondents' profile characteristics to determine their influence on environmental and academic factors, which then led to academic and psychological outcomes.

The model formed a strong frame to determine the main contributory factors in student nurses' failure in BNS. The questionnaire covered the selected components of the model. To cover the component on student profile characteristics, respondents were required to indicate their gender, race, age, the category of school attended in matriculation (Grade 12) and level of education. To cover academic factors, respondents were required to indicate on a Likert scale whether they strongly agree (1) or disagree (2) or neutral (3) or disagree (4) or strongly disagree (5). To answer the study hours, the item on notional hours on average spent studying was ranged on =<4

hours, 5-9 hours and >=10 hours. The respondents had to choose from the category of responses. Under this component, items on quality of summative and formative assessments, educators' teaching strategies, the spacing of examinations, college infrastructure, and contribution of home language to performance in A&P were set for respondents to indicate whether they strongly agree or strongly disagree. An item on employment status was included under environment factors to choose from either employed (bursary) or permanently employed.

The way items were set required respondents to give data that determined the academic factors. Academic outcomes are the products of academic factors, which were influenced by student profile characteristics. Psychological outcomes are the products of environmental factors which were also influenced by student profile characteristics. This model played a major role in determining the impact of the stated NURS model components on the performance of student nurses in BNS.

2.9   GAPS IDENTIFIED IN LITERATURE

The literature reviewed touched more on the factors that contributed to success in BNS. Factors contributing to failure were not well addressed. Most of the studies done on the factors contributing to failure in BNS were mostly conducted abroad. There is no study on factors contributing to failure in BNS that was conducted in the rural province of KwaZulu-Natal. The NURS model that was used in this study reveals that, there are so many factors that may contribute to poor performance of student nurses in BNS. These are a few gaps, that were noted by the researcher, who then discovered a need to conduct a study to determine the factors that may contribute to failure of student nurses in BNS in the KZNCN.

2.10   CONCLUSION

The chapter discussed the literature review undertaken for the study, and the relevance of Jeffreys' (NURS) model (2015) for the study. The model outlined factors that affect student nurses' academic outcomes. Since the model underpinned the study, the researcher based the literature review on these factors.

Chapter 3 discusses the research design and methodology used in the study.

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

3.1   INTRODUCTION

This chapter describes the research design and methodology, including the setting, population and sample, data-collection instrument, and data collection and analysis.

3.2   RESEARCH DESIGN

A research design is "a set of logical steps taken by the researcher to answer the research question" (Brink et al 2018:92). A research design is the overall plan for obtaining answers to research questions (Polit & Beck 2012:58). A quantitative research design is a formal, objective, systematic process in which numerical data are used to obtain information about the world. In quantitative research, deductive reasoning is used to generate predictions that are tested in the real world. Quantitative research is mostly allied with the positivist tradition and is the investigation of a phenomenon that lends itself to precise measurements and justification, often involving a rigorous and controlled design (Polit & Beck 2012:739). Descriptive research explores and describes phenomena in real-life situations (Polit & Beck 2012:725). Quantitative studies use a formal measuring instrument to provide numerical information that is statistically analysed (Polit & Beck 2012:275). In this study, the researcher used post positivism in order to be as realistic and objective as possible and to collect probabilistic evidence relevant to the study thereby allowing generalisation of the findings. Descriptive designs are non-experimental and used when researchers want to describe the variable of interest as it occurs naturally (Botma et al 2015:110).

Descriptive studies provide accuracy in the sense that they describe what exists and the frequency with which it exists; assign new meaning to a phenomenon and put information into categories. Polit and Beck (2012:739) state that the main purpose of descriptive research is to observe, describe and document aspects of a situation as it happens naturally.

The researcher selected a quantitative, non-experimental, descriptive research design in order to quantify the problem, understand, and describe factors that contributed to the failure of students in BNS. Structured procedures and a formal instrument were used to collect data that was then analysed by computer into numerical information through statistical procedures (Brink et al 2018:101). The researcher considered a quantitative approach appropriate for this study as a structured, self-designed questionnaire was used to collect data from the participants.

3.3   RESEARCH METHODOLOGY

Research methodology refers to the steps, procedures and strategies taken to investigate the problem being studied and to analyse the collected data (Polit & Beck 2012:273). The research methodology includes the setting; population; sample and sampling; data collection and analysis, and validity and reliability.

3.3.1 Setting

A research setting is the physical location and condition in which data collection takes place (Polit Beck 2012:273). The study was conducted at the KZNCN, focusing on the six campuses that had second-year student nurses. Four of the chosen campuses are located in the Southern region of Kwa-Zulu Natal, are considered bigger campuses, whereas the two are located in the Northern region, and are smaller than those located in the southern region. One of the Southern region campuses is located within Durban central and the other one in Chatsworth Township in Durban, one in Portshepston central and one in Pietermaritzburg central. The car distance between the campuses in Durban and Pietermaritzburg is approximately 57 minutes (77 km); between Portshepston and Pietermaritzburg is approximately 2h15 minutes (175 km); from Durban central to the RK Khan Township is approximately 28 minutes (23 km) and from Durban to Portshepston is approximately 1h 30 minutes (122 km).

In the Northern region, one campus is located within Ngwelezane Township at Empangeni, and the other one within Nqutu deep rural town. The car distance between the two campuses is approximately 2h15 minutes (181 km). The distance from Nqutu to Pietermaritzburg is approximately 3h30 minutes (219 km); to Durban is approximately 4hours (3045 km) and to Port Shepstone is approximately 5h30 minutes (419 km). The

distance from Empangeni to Pietermaritzburg is approximately 3h15 minutes (197 km) ; to Durban is approximately 1h50 minutes(169 km) and Portshepston is approximately 3h15 hours (286 km).

3.3.2 Population

A population refers to the entire aggregate of cases in which a researcher is interested (Polit & Beck 2012:273). The study population are all the elements that meet the particular criteria to be of relevance to the study (Burns & Grove 2009:42). In this study, the population comprised 170 (N=170) second-year student nurses currently registered with the KZNCN. The population was selected based to the fact that they have recently completed BNS and would recall their experiences easily as opposed to those that are currently doing it or have done it in three to four years ago.

3.3.3 Sample and sampling

Sampling is the process of selecting a part of the population to represent the total population (Polit & Beck 2012:290). A sample is a subset or portion of the accessible population identified for the study while sampling is a process of selecting the subset or portion of the population to represent the accessible population (Botma et al 2015:124).

Sample 1: Sampling of campuses

There are ten campuses in KZN, four of which are located in northern region and six in the southern region. Admission of the first year student nurses is done in an alternative base. The two campuses in the northern region admit students in the same period while the other two, admits in the following intake. The same admission procedure applies in the southern region. The two campuses located in Pietermaritzburg alternate among themselves in the admission of students, and the other four located in Durban and one in Port Shepstone alternate among themselves. Due to larger population in these two cities, three campuses admit in the same period. Therefore, the total number of campuses that admit the first year student nurses within the smear periods is six. There was no sampling approach used to select campuses. Campuses were selected based on the availability of the second student nurses in them. The Six campuses that were selected were then coded A, B, C, D, E, F for identification instead of using their names.

Sample 2: Sampling of respondents

Nursing College Campuses	Total number of 2nd year student nurses
A	26
B	17
C	34
D	33
E	35
F	25
Total campuses: 06	Total students: 170
Accessible campuses: 06	Accessible students: 114

For the respondents' selection, the researcher used non-probability convenience sampling because it allowed the researcher to select the most readily available respondents in a study (Polit and Beck 2017: 724). Convenience sampling places primary emphasis on generalisation, ensuring that the knowledge gained is representative of the population from which the sample was drawn (Etikan, Musa and Alkassium 2015:2). The number of respondents accessible per campus was as follows; campus A=21, campus B=10, campus C=24, campus D=20, campus E=23 and campus F=16. The sample size for this study was 114 (n=114) and was determined by the number of accessible respondents during data collection and the number of returned questionnaires.

3.3.4   Data collection

Data collection is the precise, systematic gathering of information relevant to the research purpose or objectives of the study (Polit & Beck 2012:723).

3.3.4.1   *Data-collection instrument*

In this study, data was collected by means of a self-administered structured questionnaire with closed items. A questionnaire is "a formal, written document in which respondents complete the instrument themselves in a paper-and-pencil format" (Polit & Beck 2012:725).

The researcher developed the questionnaire based on Jeffreys' Nursing Universal Retention and Success (NURS) Model, focusing on the success aspect of the model, and the literature review. The researcher's supervisor and the statistician reviewed the questionnaire.

The questionnaire consisted of four sections:

Section 1 – Respondents' demographic information, including gender, race, year of matriculation, educational level, employment status before commencing training, and whether studying nursing was planned or not.

Section 2 – Respondents' academic performance, comprising three items: range of marks they obtained in Biology or Life Sciences at school; overall performance in Anatomy and Physiology, and notional hours spent studying Anatomy and Physiology in a week.

Section 3 – Respondents' attitudes towards Anatomy and Physiology and their perceptions of the manner in which problems are resolved (comprising two items).

Section 4 – Respondents' general perceptions comprising 20 items, to which they indicated "strongly agree", "agree", "neutral" "disagree" or "strongly disagree" with the provided statements.

The researcher used a Likert scale approach and design in section 4. The questions were closed and the respondents had to choose between fixed responses. In a Likert scale the response categories are typically "strongly agree", "agree", "disagree" and "strongly disagree" (Botma et al 2015:138).

3.3.4.2   Pilot study or pre-test

A pre-test or pilot study is a trial run to determine whether the instrument is clearly worded and free from major biases and whether it solicits the desired information (Brink et al 2018:94). Polit and Beck (2012:387) define a pilot study as "a small-scale version or trial run done in preparation for a major study or to test feasibility".

The researcher pre-tested the questionnaire for validity with five respondents to evaluate the relevance and clarity of the questions. The pilot study was done in one of the campuses in the northern region of KwaZulu-Natal. The participants in the pilot study did not participate in the main study. On the day of the pilot study, the researcher was introduced to the campus principal and referred to one of the nurse educators who accompanied him to the venue. The researcher explained the purpose and significance of the study to the participants; that participation was voluntary and that their privacy, confidentiality and anonymity would be assured. The five respondents signed informed consent forms and completed the questionnaire. Upon completion, they put their consent forms and questionnaires in the two separate boxes provided by the researcher. These boxes were placed on the table in the front area of the venue where data collection was taking place.

After the pilot study, the researcher gave the respondents an opportunity to comment on the questionnaire and the process as the whole. The questionnaire was amended based on the feedback.

3.3.4.3 Data-collection process

The researcher visited the six (6) campuses on separate days over a four-week (from 11 April 2018 to 4 May 2018) because of the distance between them. The distance between the southern region campuses is approximately from 22 km and 122 km, between the northern region campuses is approximately 181 km and from the northern region campuses to the southern region campuses is approximately between 181 km and 286 km. The selected campuses were identified as campus A, B, C, D, E and F. The researcher visited campus B and D on 17 April 2018. Campus D was visited at 7h30 in the morning and campus B at 15h30 of the same day. Campus A was visited on 18 April 2018 at 7h30. Campus C was visited on 20 April 2018 at 8h00. Campus C was the only campus where the researcher had to leave the questionnaires and two boxes for consent forms and questionnaires because the students had already been allocated for clinical practice. The researcher visited campus E at 12:00 on 26 April 2018, and campus F at 15:00 on 30 April 2018.

The researcher was given permission to conduct the study by the six campus principals. Letters for permission were emailed to the researcher. The researcher's arrival had been expected by the campus principals and arrangements made with the class educators. The researcher reported at the principals' offices on arrival, was introduced to the class educators and taken to the arranged venue for data collection. Data collection took place in the classrooms.

The class educators introduced the researcher to the students and then left. The researcher explained the purpose, nature and significance of the study to the students; informed them that participation was voluntary and that they had the right to withdraw from the study at any time should they wish to do so. The researcher informed the students that all respondents' privacy, confidentiality and anonymity would be protected and that no information would be shared with anyone other than the researcher's supervisor, the statistician and the college. The students were allowed to ask any questions before consenting to participate and signing informed consent forms. Two sealed boxes were placed at the front of the classroom for respondents to deposit their informed consent forms and completed questionnaires. At the end of data collection, the researcher thanked the respondents for their participation.

The same procedure was followed in all campuses, except in campus C. On arrival to campus C on the 20th April 2019, the researcher discovered that respondents were sent for clinical practice, and would return after three months. The researcher was then referred to the class teacher was assisted to appoint two research assistants to assist with data collection. Data collection process was fully explained to the research assistants. The researcher left the questionnaires (see Annexure 6), letter of information (see Annexure 4), consent forms (see Annexure 5) and two sealed boxes to dispatch questionnaires and consents with the research assistants. During clinical visits, the research assistants informed the respondents that on a specific day they would be requested to go to the campus. On arrival, the respondents were placed in a classroom and the research assistants explained the purpose of the meeting. Two boxes were placed on the front desk, for the respondents to dispatch their questionnaires and consents separately. On completion of data collection, the research assistants contacted the researcher to collect the two boxes. The two boxes were collected on 4 May 2018.

3.3.5 Data management and analysis

Data analysis entails categorising, ordering, manipulating and summarising the data and describing them in meaningful terms (Brink et al 2018:170).

The researcher stored the raw data from the questionnaires on his private laptop with a personal secure password. On completion of data capture and analysis the questionnaire was scanned to a USB and the hard copies of the questionnaires were destroyed by shredding. The USB Will be kept safe and secure for a period of five years to prevent any leakage of information (Brink et al 2018:170).

The data was analysed using statistical analysis. Statistical factor analysis was used to explore dimensionality of the research instrument based on the function specified below:

$$
\begin{bmatrix} X_1 \\ \dots \\ X_n \end{bmatrix}_{nx1} = \begin{bmatrix} \theta_{11} \dots \theta_{1m} \\ \dots \dots \dots \\ \theta_{n1} \dots \theta_{nm} \end{bmatrix}_{nxm} \begin{bmatrix} f_1 \\ \dots \\ f_m \end{bmatrix}_{mx1} + \begin{bmatrix} e_1 \\ \dots \\ e_n \end{bmatrix}_{nx1}
$$

Where X1 … Xn denotes dimensions of m subjects, θ11 ... θmn represents factor loadings, f1 … fm symbolises factor items, and e1 .… en denotes measurement errors. A statistician analysed the data using the Statistical Package for Social Sciences (SPSS) version 24.

3.4 RELIABILITY AND VALIDITY

The quality of research and research instruments is determined by their reliability and validity. The reliability of the data-collection instrument refers to the consistency with which it measures the target attributes (Polit & Beck 2012:331). An ideal data-collection instrument should capture a construct in an accurate, truthful and sensitive manner (Polit & Beck 2012:331).

The validity of the research instrument refers to the extent to which it measures what it is actually intended to measure. Validity indicates whether the conclusions of the study are justified based on the design and interpretation (Botma et al 2015:174). In this

study, the questionnaire was assessed for internal, content, and structural or statistical validity.

3.4.1 Internal validity

Internal validity measures the comprehensibility of operational definitions used in a study. Internal validity examined the pilot study responses to the questionnaire for clarity and comprehensibility.

3.4.2 Content validity

Content validity measures scores of the research instrument and enables examination of the operationalisation of the items under each construct. In this study, content validity systematically analysed the questionnaire items to determine their adequacy. The statistician and research experts reviewed the contents of the questionnaire.

3.4.3 Statistical validity

The statistical validity of the questionnaire was examined based on the Keiser-Meyer-Olkin criterion (Kayisoglu 2015:62).Operationally, the Keiser-Meyer-Olkin Measure of Sampling Adequacy (KMO-MSA) analysis was conducted to determine adequacy of the sampling size.

The KMO-MSA value, to be computed using the SPSS statistical program, was based on the function below:

$$\text{KMO}=\left(\sum\sum r_{ij}^2\right)\Big/\left(\sum\sum r_{ij}^2 + \left(\sum\sum a_{ij}^2\right)\right); \text{where}\, a_{ij} = \left(r_{ij} \bullet 1,2,3,...,k\right)$$

Where aij ≈ 0.0, the variables are measuring a common factor and the KMO value ≈ 1.0. Conversely, where aij ≈ 0.0, the variables are not measuring a common factor and the KMO value ≈ 0.0. Bartlett's test of sphericity was conducted to determine whether factor analysis could be sufficiently performed on the data. Computation of the KMO-MSA and Bartlett's test of sphericity values were based on the function of exploratory factor analysis. Exploratory factor analysis is a multivariate statistical method that examines

the dimensionality of a set of variables for which latent variables are unobserved constructs referred to as factors (Kayisoglu 2015:62).

The statistician was used to perform the following test. If the determinants of the correlation matrices become equal to zero, that suggests that matrices are explained by linear combinations. To provide more complex measures for evaluating the strength of the relationships and suggesting factorability of the items, the results of Barlett's test of sphericity and Keiser-Meyer-Olkin (KMO) measure of sampling adequacy (MSA) were used. The null hypothesis of the Bartlett's test at 5 percent significance level states that the observed correlation matrix is equal to the identity matrix, suggesting that the observed matrix is not factorable (Kayisoglu 2015:63). Results to be discussed in chapter four

3.4.4 Reliability

The reliability of the instrument was ensured by scale reliability. The Cronbach's alpha coefficients were computed to determine the scale reliability (internal consistency) of questionnaire items under each dimension (Cronbach 1951). A Cronbach's alpha coefficient is a statistical measure used to assess the extent to which if the same questions are asked to the same group of respondents under several conditions, similar responses can be obtained. The higher the coefficient value, the higher the reliability of the responses. The Cronbach alpha coefficient was used to indicate how well various items were positively correlated to one another (Tavakol & Dennick 2011:54). Since the Cronbach alpha is based on inter-item correlations, strongly correlated items revealed a normal value which was 0.70 (Tavakol & Dennick 2011:54).

3.5   ETHICAL CONSIDERATIONS

Ethics deals with matters of right and wrong. When humans are used as study participants, care must be taken in ensuring that their rights are protected (Polit & Beck 2012:748). Accordingly, the researcher obtained permission to conduct the study (see Annexure 3), obtained informed consent from the participants (see Annexure 5), and observed the ethical principles of beneficence, respect for persons, autonomy and justice (Polit & Beck 2012:748).

- **Approval and permission**

The researcher obtained ethical clearance from Higher Degrees Committee of the Department of Health Studies, University of South Africa (Ref No.HSHDC/786/2017) (see Annexure 1). Permission to conduct the study was obtained from the KwaZulu-Natal Research Database Board (Ref. No. KZ_201803_012) (see Annexure 3). The researcher also obtained permission from the College Principal and from the principals of the six campuses (see Annexure 3)

- **Right to full disclosure and self-determination**

The principle of autonomy includes the right to self-determination and the right to full disclosure. The right to self-determination is based on the ethical principle of respect for persons and indicates that people are capable of controlling their own destiny. The respondents' right to self-determination was ensured by explaining the purpose and significance of the study to them; obtaining their informed consent (see Annexure 5), and emphasising that participation was free and voluntary, and that they had the right to withdraw from the study at any time should they wish to do so (Polit & Beck 2012:171). The researcher informed the respondents that there were no risks or benefits associated with participation and that the findings would be made available to them upon request.

Informed consent

Informed consent means that participants have adequate information about the research, comprehend that information, and have the ability to consent or decline participation voluntarily (Polit & Beck 2012:173). The researcher gave the respondents full information about the study and allowed them to ask any questions they might have. Having done that, the respondents gave informed consent to participate in the study by signing the consent forms (see Annexure 5).

- **Confidentiality, anonymity and privacy**

The participants were assured of privacy, confidentiality and anonymity. Privacy was assured by completing the questionnaire in a quiet classroom with no interruptions.

Anonymity was assured as no names were written on the questionnaires. The data was treated in strictest confidence and kept under lock and key. No one had access to the data. In addition, the researcher provided two boxes for the respondents to place their informed consent forms and completed questionnaires separately after data collection.

- **Beneficence and non-maleficence**

It is important that the research does not harm, but also potentially contributes to the wellbeing of others (Bless et al 2013:29). The participants must not be harmed by participating in the research project. The researcher must be aware of any intentional and unintentional harm that may occur during the research project (Bless et al 2013:29). The research study posed did not pose any physical, psychological, social or financial risks. There was no coercion to participate.

- **Justice**

This principle is based on the belief that all people should be treated equally. Thus, people should not be discriminated against in research on the basis of race, gender, disability, income level or any other characteristic (Bless et al 2013:29). The researcher used convenience sampling to ensure that everyone available in the selected setting participated in the study. No preference was given to respondents

- **Fidelity**

This implies faithfulness and keeping promises or agreements, specifically between researcher and participant (Bless et al 2013:31). The researcher made sure that all the information or data obtained from the respondents was only used for research purposes and no respondents' data was discussed with anyone other than the supervisor.

3.6   CONCLUSION

This chapter discussed the research design and methodology, including the research setting, population and sample, data-collection instrument, data collection and analysis, and the ethical considerations upheld in the study.

Chapter 4 discusses the data analysis and interpretation, and results.

CHAPTER 4

DATA ANALYSIS AND INTERPRETATION AND FINDINGS

4.1   INTRODUCTION

This chapter discusses the data analysis and interpretation, and the findings of the study. The purpose of the study was to identify factors that contributed to failure among student nurses doing a four-year comprehensive nursing diploma programme (R425) at the KZN College of Nursing (KZNCN) and to make recommendations to improve the pass rate in BNS.

4.2   DATA MANAGEMENT AND ANALYSIS

"Data analysis is the systematic organisation and synthesis of research data and in quantitative studies, the testing of hypothesis using those data" (Polit & Beck 2017: 725). In the study, the researcher captured the data, using Excel and creating a spreadsheet.

The raw data from the questionnaires was stored in the researcher's private laptop with a personal secure password. On completion of data capture and analysis the questionnaire was scanned to a USB and the hard copies of the questionnaires were destroyed by shredding. The USB will be kept safe and secure for a period of five years to prevent any leakage of information (Brink et al 2018:170). A statistician analysed the data using the Statistical Package for Social Sciences (SPSS) and Stata statistical programs for windows. Statistical factor analysis was used to explore the dimensionality of the questionnaire based on the function specified below:

$$
\begin{bmatrix} X_1 \\ \dots \\ X_n \end{bmatrix}_{n \times 1}
=
\begin{bmatrix} \theta_{11} & \dots & \theta_{1m} \\ \dots & \dots & \dots \\ \theta_{n1} & \dots & \theta_{nm} \end{bmatrix}_{n \times m}
\begin{bmatrix} f_1 \\ \dots \\ f_m \end{bmatrix}_{m \times 1}
+
\begin{bmatrix} e_1 \\ \dots \\ e_n \end{bmatrix}_{n \times 1}
$$

Where X1 … Xn denotes dimensions of m subjects, θ11 ... θmn represents factor loadings, f1 … fm symbolises factor items, and e1 …. en denotes measurement errors.

4.3 FINDINGS

The findings are presented and discussed according to the sections of the questionnaire.

4.3.1 Respondents' demographic profile: Sections 1-3

This section presents the respondents' demographic profile according to frequency statistics. Frequencies refer "to the number of times that a result occurs" (Brink et al 2018:180-186). Table 4.1 presents the respondents' demographic profile.

Table 4.1   Respondents' demographic profile

Demographic profile	Frequency (n)	Proportion (%)
Gender		
Male	34	30%
Female	80	70%
Race		
White	2	2%
Indian	22	19%
Coloured	6	5%
Black/African	84	74%
Age category		
15-19 years	10	9%
20-24 years	53	46%
25-29 years	31	27%
30-34 years	17	15%
35 years and above	3	3%
Period during which Matric was completed		
Before the year 2008	48	42%
After the year 2008	66	58%
School category attended in Matric (Gr 12)		
Rural school	46	40%
Township	33	29%
Multiracial	34	30%
Finishing/bridging school	1	1%
Employment status before nursing		
Not employed	64	56%
Self employed	24	21%
Temporarily employed	18	16%
Permanently employed	8	7%

Demographic profile	Frequency (n)	Proportion (%)
Intention to study nursing after matric (Gr 12)		
No	65	57%
Yes	49	43%
Reason for studying nursing if did not intend to study nursing after matric (Gr 12)		
Financial challenges	40	62%
Parent forced me	5	8%
I had no other option	20	30%
Range of notional hours on average spent studying Anatomy and Physiology in a week		
= <4 hours	33	29%
5-9 hours	55	48%
>=10 hours	26	23%

4.3.1.1 Gender

Of the respondents, 70% (n=80) were females and 30% (n=34) were males. Nursing is largely a female profession. In their study in, Langtree et al (2018:132) found that of the participants, 70.2% were females.

4.3.1.2 Race

Of the respondents, 74% (n=84) were Black/African; 19% (n=22) were Indian; 5% (n=6) were Coloured, and 2% (n=2) were White. In a study among first-year students in the KZNCN nursing programme, Langtree (2014:49) found that 86.7% of the respondents were Black African.

4.3.1.3 Age

Of the respondents, 46% (n=53) were aged 20-24 years; 27% (n=31) were aged 25-29 years; 15% (n=17) were 30-34; 9% (n=10) were 18-19, and 3% (n=3) were 35 years and above. The SANC statistics reveal that the average age for student nurses in the four-year nursing education and training in the year 2014-2015 was 24 years (SANC 2015).

4.3.1.4 Year in which respondents passed matriculation (Grade 12)

Of the respondents, 58% (n=66) completed Matriculation (Grade 12) after 2008 and 42% (n=48) completed Matriculation (Grade 12) before 2008.

4.3.1.5 School category attended in matriculation (Grade 12)

Of the respondents, 40% (n=46) attended rural schools; 30% (n=34) attended multiracial schools; 29% (n=33) attended and township schools, and 1% (n=1) attended a finishing/bridging school. Langtree (2014:54) found that most of the respondents attended rural schools in KwaZulu-Natal and were raised in rural areas speaking English as a second language, which affected negatively on first-year anatomy and physiology. In their study it was found that most of the respondents were raised in rural areas (61.3%; Table 1) where the majority attended a rural government school (Langtree 2014:54).

4.3.1.6 Employment status before nursing

Of the respondents, 56% (n=64) were not employed before studying nursing; 21% (n=24) were self-employed; 16% (n=18) were temporarily employed, and 7% (n=8) were permanently employed. Conroy, Stacey, and Van Rooyen (2017:1888) state that KwaZulu-Natal has a 39% unemployment rate and 30% of households earn less than US$1 200 per year.

4.3.1.7 Intention to study nursing

Of the respondents, 57% (n=65) did not intend to study nursing after matriculation (Grade 12) and 43% (n=49) did intend to study nursing. In a study in, Simelane (2017:57) found that most of the participants chose nursing because they were attracted by the stipend they received during training and did not have any intrinsic motivation to be nurses.

4.3.1.8   Reason for studying nursing if did not intend to

Of the respondents, 62% (n=40) studied nursing due to financial challenges; 30% (n=20) studied nursing because they had no other option other than to do nursing and 8% (n=5) did so because their parents forced them. According to the Department of Labour (2013), student nurses in Gauteng Province are paid a stipend on a level 3 salary, which is currently R6000.00 per month.

4.3.2   Respondents' general perceptions of performance: Section 4

This section presents the respondents' perceptions of factors contributing to the failure rate of students nurses in BNS at KZNCN.

4.3.3   Performance in Anatomy and Physiology negatively affected by what other students said about it

Table 4.2   Performance in Anatomy and Physiology negatively affected by what other students said about it

Performance in Anatomy and Physiology was negatively affected by what other students said about it					
		Frequency	Percent	Valid percent	Cumulative percent
Valid	Strongly disagree	20	17.5	17.5	17.5
	Disagree	37	32.5	32.5	50.0
	Neither disagree nor agree	33	28.9	28.9	78.9
	Agree	22	19.3	19.3	98.2
	Strongly agree	2	1.8	1.8	100.0
	Total	**114**	**100.0**	**100.0**	

Of the respondents, 50% (n=57) strongly disagreed/disagreed that performance in anatomy and physiology was negatively affected by what other students said about it; 28.9% (n=33) neither disagreed nor agreed, and 21% (n=24) agreed/strongly agreed. Brown, White and Power (2017:58) found that performance is improved by active learning in which students become engaged participants in the classroom. It motivates students to engage more meaningfully in the learning process. This in turn contributes to good performance. Simelane (2017:64) found that failure of students was influenced by the fact that nursing was never their choice. They came to already having their

qualifications and due to lack of employment they opt for nursing and they are only interested in the stipend.

4.3.4 Respondents' perception of home language contribution to performance in Anatomy and Physiology

Table 4.3 Respondents' perception of home language contribution to performance in Anatomy and Physiology

Home language contributes to performance in Anatomy and Physiology					
		Frequency	**Percent**	**Valid percent**	**Cumulative percent**
Valid	Strongly disagree	15	13.2	13.2	13.2
	Disagree	40	35.1	35.1	48.2
	Neither disagree nor agree	31	27.2	27.2	75.4
	Agree	28	24.6	24.6	100.0
	Strongly agree	0	0	0	0
	Total	**114**	**100.0**	**100.0**	

Of the respondents, 48.3% (n=55) strongly disagreed/disagreed that home language contributes to performance in Anatomy and Physiology; 27.2% (n=31) neither disagreed nor agreed, and 24.6% (n=28) agreed/strongly agreed. In their study in KwaZulu-Natal, Manson (2014:86) found that participants who obtained higher marks in matriculation in IsiZulu achieved well academically in some nursing subjects. Langtree et al (2018:129) state that in the first semester of study, ESL students experience difficulty with the English language which impacts on their learning, particularly with new and complicated terminology in A&P.

4.3.5 Terminology used contributes to poor performance in Anatomy and Physiology

Table 4.4 Terminology used contributes to poor performance in Anatomy and Physiology

Terminology used contributes to poor performance in Anatomy and Physiology					
		Frequency	**Percent**	**Valid percent**	**Cumulative percent**
Valid	Strongly disagree	9	7.9	7.9	7.9
	Disagree	37	32.5	32.5	40.4
	Neither disagree nor agree	28	24.6	24.6	64.9
	Agree	35	30.7	30.7	95.6
	Strongly agree	5	4.4	4.4	100.0
	Total	**114**	**100.0**	**100.0**	

Of the respondents, 40.3% (n=46) strongly disagreed/disagreed that the terminology used in anatomy and physiology contributes to poor performance; 35.1% (n=40) agreed/strongly agreed, and 24.6% (n=28) neither disagreed nor agreed that the terminology contributed to poor performance in Anatomy and Physiology. In their study in Huddersfield, White and Sykes (2012:2) found that participants experienced difficulty with new and complicated terminology and concepts, and found A&P the most difficult subject in the nursing programme.

4.3.6 Educators do not involve the students fully during learning

Table 4.5 Educators do not involve the students fully during learning

Educators do not involve the students fully during learning					
		Frequency	**Percent**	**Valid percent**	**Cumulative percent**
Valid	Strongly disagree	12	10.5	10.5	10.5
	Disagree	37	32.5	32.5	43.0
	Neither disagree nor agree	45	39.5	39.5	82.5
	Agree	18	15.8	15.8	98.2
	Strongly agree	2	1.8	1.8	100.0
	Total	**114**	**100.0**	**100.0**	

Of the respondents, 43% (n=49) strongly disagreed/disagreed that nurse educators do not involve the students fully during learning; 39.5% (n=45) neither disagreed nor agreed, and 17.6% (n=20) agreed/ strongly agreed that educators do not involve students fully during learning. In a study in the Eastern Cape, Tom et al (2014:105) found that a good teaching strategy to enhance student performance was for nurse educators and learners to sit together, share their expectations, and jointly develop strategies that increased the students' success by focusing on the learners' interests. In Oshana, Namibia, Pinehas et al (2017:67) found that participants felt that poor teaching strategies, lack of student-lecturer relationships, and communication barriers hindered academic performance.

4.3.7 Shorter breaks between lectures

Table 4.6   Shorter breaks between lectures

Shorter breaks between lectures creates more exhaustion thus affecting performance in the subject					
		Frequency	Percent	Valid percent	Cumulative percent
Valid	Strongly disagree	9	7.9	7.9	8.8
	Disagree	50	43.9	43.9	52.6
	Neither disagree nor agree	40	35.1	35.1	87.7
	Agree	14	12.3	12.3	100.0
	Strongly disagree	1	0.9	0.9	0.9
	Total	**114**	**100.0**	**100.0**	

Of the respondents, 51.8% (n=59) strongly disagreed/disagreed that shorter breaks between lectures caused more exhaustion and affected performance in the subject; 35.1% (n=40) neither disagreed nor agreed, and 13.2% (n=15) agreed/strongly agreed that shorter breaks between lectures caused more exhaustion and affected performance in the subject. Pinehas et al (2017:66) found shorter breaks influenced the students' performance.

4.3.8 Anatomy and Physiology educators expect students to function productively without their expected assistance

Table 4.7 Anatomy and Physiology educators expect students to function productively without their expected assistance

Anatomy and Physiology educators expect students to function productively without their expected assistance				
		Frequency	Percent	Valid percent	Cumulative percent
Valid	Strongly disagree	6	5.3	5.3	5.3
	Disagree	40	35.1	35.1	40.4
	Neither disagree nor agree	39	34.2	34.2	74.6
	Agree	28	24.6	24.6	99.1
	Strongly agree	1	0.9	0.9	100.0
	Total	**114**	**100.0**	**100.0**	

Of the respondents, 40.4% (n=46) strongly disagreed/disagreed that anatomy and physiology educators expected students to function productively without expected assistance; 34.2%) (n=39) neither disagreed nor agreed, and 25.5% (n=29) agreed/ strongly agreed. Tom et al (2014:105) found that a good teaching strategy to enhance student performance was for nurse educators and learners to sit together, share their expectations, and jointly develop strategies that focused on the learner's interests. Brown et al (2017:491) maintain that active learning motivates students to engage more meaningfully in their learning process.

4.3.9 Infrastructure has an impact on performance in Anatomy and Physiology

Table 4.8 Infrastructure has an impact on performance in Anatomy and Physiology

Infrastructure has an impact on performance in Anatomy and Physiology				
		Frequency	Percent	Valid percent	Cumulative percent
Valid	Strongly disagree	8	7.0	7.0	7.0
	Disagree	39	34.2	34.2	41.2
	Neither disagree nor agree	28	24.6	24.6	65.8
	Agree	37	32.5	32.5	98.2
	Strongly agree	2	1.8	1.8	100.0
	Total	**114**	**100.0**	**100.0**	

Of the respondents, 41.2% (n=47) strongly disagreed/disagreed; 34.3% (n=39) who agreed/strongly agreed, and 24.6% (n=28) neither disagreed nor agreed that infrastructure has an impact of failure on performance in anatomy and physiology. In a study in the Eastern Cape province. Tom et al (2014:107) stated that the nursing students in Eastern Cape Province wished for a variety of educational resources that could enhance their understanding of biological science. The nursing students wished for a biological science laboratory where they could actually see the biological science structures.

4.3.10 Personal and social problems contribute to poor performance in Anatomy and Physiology

Table 4.9 **Personal and social problems contribute to poor performance in Anatomy and Physiology**

Personal and social problems contribute to poor performance in Anatomy and Physiology					
		Frequency	**Percent**	**Valid percent**	**Cumulative percent**
Valid	Strongly disagree	4	3.5	3.5	3.5
	Disagree	24	21.1	21.1	24.6
	Neither disagree nor agree	27	23.7	23.7	48.2
	Agree	41	36.0	36.0	84.2
	Strongly agree	18	15.8	15.8	100.0
	Total	**114**	**100.0**	**100.0**	

Of the respondents, 51.8% (n=59) agreed/strongly agreed; 24.6% (n=28) strongly disagreed/disagreed, and 23.7% (n=27) neither disagreed nor agreed that personal and social problems contribute to poor performance in anatomy and physiology. Stress has been found to be a major barrier to concentrating, problem-solving, decision making, and learning that frequently leads to failure (Emilsson et al 2014:13). Stress, anxiety, and depression indicate negative emotional symptoms and poor psychological wellbeing which affect learning and limit academic performance (Psychology Foundation of Australia 2014).

4.3.11 Strategy used by campus Anatomy and Physiology educators contributes to students' failure in the subjects

Table 4.10 Strategy used by campus Anatomy and Physiology educators contributes to students' failure in the subjects

Strategy used by campus Anatomy and Physiology educators contributes to failure of students in the subjects		Frequency	Percent	Valid percent	Cumulative percent
Valid	Strongly disagree	8	7.0	7.0	7.0
	Disagree	32	28.1	28.1	35.1
	Neither disagree nor agree	43	37.7	37.7	72.8
	Agree	29	25.4	25.4	98.2
	Strongly agree	2	1.8	1.8	100.0
	Total	**114**	**100.0**	**100.0**	

Of the respondents, 37.7% (n=43) neither disagreed nor agreed; that it contributes to failure of students in the subjects 35.1% (n=40) strongly disagreed/disagreed, and 27.2% (n=31) agreed/strongly agreed that the strategy used by the campus A&P educators contributes to students' failure in the subjects. In contrast, Tom et al (2014:105) found that participants indicated that some nurse educators were dedicated, supportive and passionate, which impacted positively on their biological science performance.

4.3.12 The subject educators teach to complete the syllabus

Table 4.11 The subject educators teach to complete the syllabus

The subject educators teach to complete the syllabus		Frequency	Percent	Valid percent	Cumulative percent
Valid	Strongly disagree	11	9.6	9.6	9.6
	Disagree	42	36.8	36.8	46.5
	Neither disagree nor agree	29	25.4	25.4	71.9
	Agree	30	26.3	26.3	98.2
	Strongly agree	2	1.8	1.8	100.0
	Total	**114**	**100.0**	**100.0**	

Of the respondents, 46.4% (n=53) strongly disagreed/disagreed; 28.1% (n=32) agreed/strongly agreed, and 25.4% (n=29) neither disagreed nor agreed that the subject educators only teach to complete the syllabus. In La Trinidad Benguet, Alos et al (2015:63) found that teachers did not know how to catch students' attention in class. The successful completion of undergraduate science courses is based on a variety of factors; the students' existing skills and knowledge in the course and the pedagogical approaches used by instructors when delivering the content (Hull et al 2016:38).

4.3.13 Time set to complete syllabus is shorter than subject content

Table 4.12   Time set to complete syllabus is shorter than subject content

Time set to complete syllabus is shorter than subject content				
		Frequency	Percent	Valid percent	Cumulative percent
Valid	Strongly disagree	11	9.6	9.6	9.6
	Disagree	32	28.1	28.1	37.7
	Neither disagree nor agree	37	32.5	32.5	70.2
	Agree	32	28.1	28.1	98.2
	Strongly agree	2	1.8	1.8	100.0
	Total	**114**	**100.0**	**100.0**	

Of the respondents, 38% (n=43) strongly disagreed/disagreed; 32.5% (n=37) neither disagreed nor agreed, and 29.9% (n=34) agreed/strongly agreed that the time set to complete the syllabus is shorter that the subject content. Tom et al (2014:104) found that some participants regarded biological science content as straightforward, practical and easy to understand.

4.3.14 The one-day study in between examinations has an impact on poor performance in Anatomy and Physiology

Table 4.13 The one-day study in between examinations has an impact on poor performance in Anatomy and Physiology

The one-day study in between exams has an impact on poor performance in Anatomy and Physiology					
		Frequency	Percent	Valid percent	Cumulative percent
Valid	Strongly disagree	10	8.8	8.8	8.8
	Disagree	32	28.1	28.1	36.8
	Neither disagree nor agree	21	18.4	18.4	55.3
	Agree	42	36.8	36.8	92.1
	Strongly agree	9	7.9	7.9	100.0
	Total	**114**	**100.0**	**100.0**	

Of the respondents, 44.7% (n=51) agreed/strongly agreed; 36.9% (n=42) strongly disagreed/disagreed, and 18.4% (n=21) neither disagreed nor agreed that the one-day study in between the examinations has an impact on poor performance in Anatomy and Physiology. Manson (2014:113) found that extra time is needed for studying since the translation of language is much easier for mother-tongue speakers of English, who have heard the phrases before. Pinehas et al (2017:63) found that a constrained study day system coupled with an overloaded examination timetable with less time to study in-between the papers during examination negatively affects learners' academic performance.

4.3.15 Two hours is not enough for the subject examination

Table 4.14 Two hours is not enough for the subject examination

Two hours is not enough for the subject examination					
		Frequency	Percent	Valid percent	Cumulative percent
Valid	Strongly disagree	10	8.8	8.8	8.8
	Disagree	30	26.3	26.3	35.1
	Neither disagree nor agree	24	21.1	21.1	56.1
	Agree	41	36.0	36.0	92.1
	Strongly agree	9	7.9	7.9	100.0
	Total	**114**	**100.0**	**100.0**	

Of the respondents, 43.9% (n=50) agreed/strongly agreed; 36.1% (n=40) strongly disagreed/disagreed, and 21.1% (n=24) neither disagreed nor agreed that two hours is not enough for the subject examination. Pinehas et al (2017:66) found that an overloaded examination timetable together with a huge scope and a short time allocated for examination negatively affects students' academic performance.

4.3.16   The quality of summative (DP) and formative (class) tests does not match the quality of examination questions

Table 4.15   The quality of summative (DP) and formative (class) tests do not match the quality of examination questions

The quality of summative (DP) and formative (class) tests does not match the quality of examination questions		Frequency	Percent	Valid percent	Cumulative percent
Valid	Strongly disagree	10	8.8	8.8	8.8
	Disagree	36	31.6	31.6	40.4
	Neither disagree nor agree	38	33.3	33.3	73.7
	Agree	28	24.6	24.6	98.2
	Strongly agree	2	1.8	1.8	100.0
	Total	**114**	**100.0**	**100.0**	

Of the respondents, 40.4% (n=46) strongly disagreed/disagreed; 33.3% (n=38) neither disagreed nor agreed, and 26.4% (n=30) agreed/strongly agreed that the quality of summative (DP) and formative (class) tests does not match the quality of the examination questions.

4.3.17 Subject educators do not deliver the subject content in an understandable manner

Table 4.16 Subject educators are not delivering the subject content in an understandable manner

Subject educators do not deliver the subject content in an understandable manner		Frequency	Percent	Valid percent	Cumulative percent
Valid	Strongly disagree	13	11.4	11.4	11.4
	Disagree	35	30.7	30.7	42.1
	Neither disagree nor agree	36	31.6	31.6	73.7
	Agree	29	25.4	25.4	99.1
	Strongly agree	1	.9	.9	100.0
	Total	**114**	**100.0**	**100.0**	

Of the respondents, 42.1% (n=48) strongly disagreed/disagreed; 31.6% (n=36) neither disagreed nor agreed, and 26.3% (n=30) agreed/strongly agreed that subject educators do not deliver the subject content in an understandable manner. Alos et al (2015:65) emphasise that the quality of teacher influences student academic performance.

4.3.18 Educators do not provide after-class sessions to students that need more assistance in understanding the subject

Table 4.17 Educators do not provide after-class sessions to students that need more assistance in understanding the subject

Educators do not provide after-class sessions to students who need more assistance in understanding the subject		Frequency	Percent	Valid percent	Cumulative percent
Valid	Strongly disagree	17	14.9	14.9	14.9
	Disagree	28	24.6	24.6	39.5
	Neither disagree nor agree	31	27.2	27.2	66.7
	Agree	36	31.6	31.6	98.2
	Strongly agree	2	1.8	1.8	100.0
	Total	**114**	**100.0**	**100.0**	

Of the respondents, 39.5% (n=45) strongly disagreed/disagreed; 33.4% (n=38) agreed/strongly agreed, and 27.2% (n=31) neither disagreed nor agreed that educators do not provide after-class sessions to students that need more assistance in understanding the subject. According to Miller and Metz (2014:250), an active learning instructional style is when students are encouraged to be responsible for their own learning in order to increase their desire to learn.

4.3.19 Alcohol consumption in the first year level is high

Table 4.18   Alcohol consumption in the first year level is high

Alcohol consumption in the year first level is high				
		Frequency	**Percent**	**Valid percent**	**Cumulative percent**
Valid	Strongly disagree	8	7.0	7.0	7.0
	Disagree	15	13.2	13.2	20.2
	Neither disagree nor agree	26	22.8	22.8	43.0
	Agree	51	44.7	44.7	87.7
	Strongly agree	14	12.3	12.3	100.0
	Total	**114**	**100.0**	**100.0**	

Of the respondents, 57% (n= 65) agreed/strongly agreed; 22.8% (n=26) neither disagreed nor agreed, and 20.2% (n=23) strongly disagreed/disagreed that alcohol consumption in the first year level is high, which could affect student failure.

4.4   SCALE RELIABILITY

The Cronbach's alpha was used to analyse the internal consistency of the questionnaire items. The reliability test was conducted to statistically determine the level to which the selected set of items measured a single latent construct. Cronbach's alpha coefficient was computed to statistically assess the degree to which similar responses could be obtained from participants should the same set of questions be asked several times under similar settings to the same group of study respondents. The overall scale reliability results of the items of the construct "General perceptions" are presented in Panel A of Table 4.19, and the related item-total statistics results are presented in Panel B of Table 4.19.

Table 4.19   Scale reliability statistics

Panel A: Overall scale reliability of selected items		
Cronbach's alpha	**Cronbach's alpha based on standardised items**	**Number of items**
.700	.701	18

Panel B: Item - Total statistics					
	Scale mean if item deleted	**Scale variance if item deleted**	**Corrected item -total correlation**	**Squared multiple correlation**	**Cronbach's alpha if item deleted**
Range of notional hours on average spent studying Anatomy and Physiology (A & P) in a week	48.68	51.121	.195	.132	.695
Performance in Anatomy and Physiology was negatively affected by what other students said about it	48.10	47.610	.347	.265	.681
Home language contributes to performance in Anatomy and Physiology	48.02	49.433	.236	.170	.693
Terminology used contributes to poor performance in Anatomy and Physiology	47.74	50.089	.168	.171	.700
Educators do not involve students fully during learning	47.99	49.088	.290	.286	.687
Shorter breaks between lectures creates more exhaustion thus affecting performance in the subject	48.15	51.349	.138	.204	.700
Anatomy and Physiology educators expect students to function productively without their expected assistance	47.84	50.223	.211	.210	.694
Infrastructure has an impact on performance in Anatomy and Physiology	47.77	47.647	.366	.253	.679
Personal and social problems contribute to poor performance in Anatomy and Physiology	47.25	49.271	.213	.194	.696
Strategy used by campus Anatomy and Physiology educators contributes to failure of students in the subjects	47.78	48.190	.359	.289	.680
Subject educators teach to complete the syllabus	47.91	47.798	.350	.297	.681

Panel B: Item - Total statistics					
Time set to complete syllabus is shorter than subject content	47.81	47.414	.386	.306	.677
The one-day study in between exams has an impact on poor performance in Anatomy and Physiology	47.58	49.219	.198	.288	.698
Two hours is not enough for the subject examination	47.57	48.707	.235	.220	.694
The quality of summative (DP) and formative (class) tests does not match the quality of examination questions	47.86	47.024	.432	.370	.672
Subject educators do not deliver the subject content in an understandable manner	47.91	47.674	.368	.259	.679
Educators do not provide after-class sessions to students that need more assistance in understanding the subject	47.84	46.913	.374	.308	.677
Alcohol consumption in the first year is high	47.23	49.186	.220	.192	.695

The Cronbach's alpha coefficient value (α=0.700) for the finally selected eighteen items satisfied the minimum acceptable threshold of 0.700 scale reliability score. The result thus reveals that items measured a single dimensional latent construct. The first item labelled "range of notional hours on average spent studying Anatomy and Physiology in a week" in Panel B of Table 4.1 belongs to the construct "Academic performance", while the other 17 items belong to the construct "General perceptions".

4.5   STATISTICAL VALIDITY

The exploratory factor analysis (EFA) data reduction technique assessed the statistical validity of the items of the questionnaire. In concurrence with the assessment of sampling adequacy, exploratory factor analysis was performed to measure the underlying structure, patterns and hidden dimensions within the dataset. Congruently, exploratory factor analysis was conducted to select sets of items grouped under certain factors that accounted for most of the observed variance in the dataset with regard to factors contributing to high failure rate of student nurses in Biological Nursing Sciences at KZNCN.

In conducting statistical data analysis, the sampling adequacy of the questionnaire items was measured based on Keiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy (MSA) criterion. The statistical validity results of the items for the construct "General perceptions" are presented in Table 4.20.

Table 4.20   Statistical validity parameters

Dimension	No. of items	Measure		
		Determinant	Bartlett's Test of Sphericity	Keiser-Meyer-Olkin Test of Sampling Adequacy (KMO-MSA)
General perceptions	17	0.068	χ^2=286.225 $p < 0.05$	0.659

The Keiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy (MSA) criterion was used to assess the questionnaire's sampling adequacy. Given the statistically acceptable minimum KMO-MSA threshold of 0.600, the computed overall KMO-MSA value equal to 0.659 for the seventeen questionnaire items for the construct "General perceptions" confirmed adequacy of the sample of items explored under the respective construct. The determinant (= 0.068) of the correlation matrix for the items under the respective construct indicated that the matrix was singular in nature, therefore the matrix was not explained by a linear combination. To provide more complex measures for evaluating the strength of the relationships and suggesting factorability of the items, Barlett's test of sphericity value was computed Bartlett. The null hypothesis of Barlett's test at 5 percent significance level states that the observed correlation matrix is equal to the identity matrix, suggesting that the observed matrix is not factorable.

The computed result on the Bartlett's test was statistically significant, with p-value for the respective construct "General perceptions" being lower than 5 percent significance level. The null hypothesis was thus rejected, indicating that the observed correlation matrix was statistically different from singular matrix. The Barlett's test result revealed validity and suitability of the questionnaire responses with respect to factors generally perceived to contribute to the high failure rate of student nurses in Biological Nursing Sciences at KZNCN.

4.6   EXPLORATORY FACTOR ANALYSIS (EFA)

After measurement of scale reliability and statistical validity, exploratory factor analysis (EFA) was conducted to retain items with high loadings in exploring factors generally perceived to contribute to the high failure rate of student nurses in Biological Nursing Sciences at KZNCN. The latent root criterion was applied to determine the degree of variance that was consistently distributed across extracted factors prior to final extraction of factors based on alpha factoring Varimax rotation transformation method. Table 4.21 presents the computed results of both the extracted and rotated sums of squared loadings.

Table 4.21   Total variance explained – General perceptions

	Total variance explained								
Factor	**Initial Eigenvalues**			**Extraction sums of squared loadings**			**Rotation sums of squared loadings**		
	Total	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
1	3.070	18.061	18.061	2.450	14.409	14.409	1.418	8.342	8.342
2	1.734	10.199	28.260	1.089	6.406	20.815	1.293	7.603	15.945
3	1.492	8.779	37.040	.874	5.140	25.955	1.186	6.979	22.924
4	1.337	7.864	44.904	.688	4.045	30.000	.841	4.946	27.870
5	1.235	7.265	52.169	.615	3.615	33.615	.801	4.713	32.582
6	1.122	6.602	58.771	.496	2.920	36.535	.672	3.953	36.535
7	.925	5.438	64.210						
8	.911	5.358	69.568						
9	.752	4.426	73.994						
10	.717	4.219	78.213						
11	.683	4.016	82.229						
12	.634	3.728	85.957						
13	.595	3.497	89.454						
14	.507	2.980	92.435						
15	.473	2.781	95.216						
16	.426	2.505	97.721						
17	.387	2.279	100.000						

Extraction Method: Alpha Factoring.

The computed results in Table 4.21 show the presence of six initial Eigenvalues greater than 1, therefore, six factors were extracted from selected items in the dataset for the construct "General perceptions". From the rotated sums of squared loadings; approximately 36.5% of total variance in the entire dataset was accounted for by six factors. From the approximate total 36.5% variance, factor 1 accounted for 8.3%; factor 2 for 7.6%; factor 3 for t 7.0%, while factors 4 and 5 accounted for 5% each, and factor

6 accounted for 4% of total variance. Since more than 1 factor was extracted in the solution of the final iteration, the pattern of factor loadings was examined to detect whether there were retained items that exhibited complex structure in line with the requirement that items that load with a score of 0.5 or higher on more than 1 factor should be removed from the analysis.

4.7   FACTOR ITEMS LOADINGS

This section presents the results on retained items with loadings equal to or greater than 0.5 thresholds statistically deemed to be regarded as significant factors contributing to the high failure rate of student nurses in Biological Nursing Sciences at KwaZulu-Natal (KZN) Nursing College. Table 4.22 presents the retained items measuring the latent construct "General perceptions".

Table 4.22   Rotated factor matrix[a] – General perceptions

Selected items	Factor				
	Teaching strategy	After-class sessions	Study and exam time	Shorter breaks	Home language
Home language contributes to performance in Anatomy and Physiology					.553
Shorter breaks between lectures create more exhaustion; thus affecting performance in the subject				.566	
Strategy used by campus Anatomy and Physiology educators contributes to failure of students in the subjects	.578				
The one day study in between exams has an impact in to poor performance in Anatomy and Physiology			.618		
Two hours are not enough for the subject examination			.522		
Educators do not provide after-class sessions to students that need more assistance in understanding the subject		.691			

Table 4.22 shows that there were six items with loading values equal to or greater than 0.5, which distinctly loaded under five factors. The items that loaded in their different respective factors were statistically proven to be the significant factors generally perceived to contribute to the high failure rate of student nurses in Biological Nursing Sciences at KZNCN. The factor "teaching strategy" indicates that the strategy used by campus Anatomy and Physiology educators contributes to the failure of students in the subjects (loading=0.578), while the factor "after-class session" indicates that educators do not provide after-class sessions to students that need more assistance in understanding the subject (loading=0.691), thus contributing to high failure rates.

Furthermore, the factor "study and exam time" shows that the one-day study in between examinations has an impact on poor performance in Anatomy and Physiology (loading=0.618) and two hours is not enough for the subject examination (loading=0.522). These factors thus contribute to high failure rates. While the factor "home language" shows statistical significance of the general perception that home language contributes to performance in Anatomy and Physiology (loading=0.553), the factor "shorter breaks" shows that shorter breaks between lectures causes more exhaustion thus affecting performance in the subject (loading=0.566).

4.8   NONPARAMETRIC CORRELATIONS

The Kendall's tau-b nonparametric test was used to determine the magnitude and nature of association between overall academic performance and general perceptions items which had high item loadings (Tavakol & Dennick 2011:53). The absolute value of the correlation coefficient shows the strength of association, while the sign shows the direction of association.

Table 4.23   An overall academic performance vs study time and general perceptions items

Nonparametric measure: Kendall's tau_b		Correlation Coefficient	Sig. (2-tailed) p-value
Study time	Average notional hours spent studying Anatomy and Physiology	0.301**	0.000
General perceptions	Home language contributes to performance in A & P	0.083	0.299
	Shorter breaks between lectures cause more exhaustion	-0.028	0.734
	The one-day study in between exams has an impact on o poor performance in Anatomy and Physiology	-0.072	0.367
	Two hours is not enough for the subject examination	-0.035	0.663
	Educators do not provide after-class sessions to students that need more assistance in understanding the subject	-0.023	0.769
**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).			

Table 4.23 shows a statistically significant positive correlation between overall academic performance and average notional hours spent studying Anatomy and Physiology (coefficient=0.301) significant at 1 percent level. Though statistically insignificant and low, there is also evidence of a positive correlation between overall academic performance and home language (coefficient=0.083). The remaining general perception items had negative but insignificant correlations with overall academic performance.

4.9   STRUCTURAL EQUATION MODEL (SEM)

The Structural Equation Model method ((Tavakol & Dennick 2011:53)) was used to assess the nature and magnitude to which students' overall academic performance in Anatomy and Physiology (A&P) was affected by each of the distinct items of the construct "general perception". The SEM conducted serves as Confirmatory Factor Analysis (CFA) that validates hypotheses made that certain factors generally perceived to contribute to high failure rates of student nurses in Biological Nursing Sciences at KZNCN did contribute to the failure rates. The results of the model were estimated using the Stata statistical program. The items that fit the model belonged to the "general perceptions" construct and were only the items that had high loadings of greater than or equal to 0.5 retained in the exploratory factor analysis. The observed variable modelled

in terms of how it fit the retained items data was the overall academic performance (AP202) (see figure 4.1).
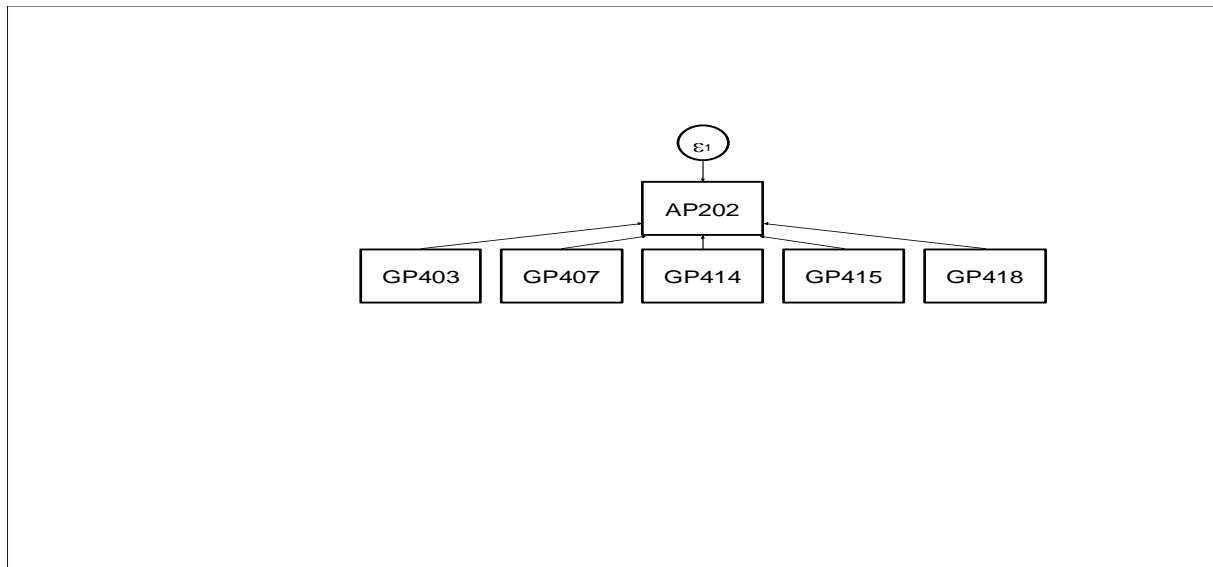
Figure 4.1 Estimated structural equation model

Figure 4.1 of the structural equation model estimated using Maximum Likelihood (ML) estimation method depicts how a set of factors were generally perceived to affect students' overall academic performance in Anatomy and Physiology (AP202). The four factors generally perceived to affect students' overall academic performances are "home language contributes to performance in Anatomy and Physiology" (GP403), "shorter breaks between lectures cause more exhaustion, thus affecting performance in the subject" (GP407), "the one-day study in between exams has an impact on poor performance in Anatomy and Physiology" (GP414), "two hours is not enough for the subject examination" (GP415) and "educators do not provide after-class sessions to students that need more assistance in understanding the subject" (GP418).

Table 4.24   SEM of overall academic performance versus general perceptions items

Structural equation model Estimation method=ml Log likelihood=-487.277					No. of obs=114	
Structural overall academic performance ←	Coeff	Robust Std Err	Z	p>lzl	[95% conf interval]	
Home language	0.096	0.085	1.13	0.257	-0.070	0.264
Shorter breaks between lectures	-0.062	0.108	-0.58	0.564	-0.276	0.150
The one-day study in between exams	-0.068	0.077	-0.89	0.371	-0.219	0.082
Two hours for the subject examination	-0.005	0.081	-0.07	0.942	-0.165	0.153
Educators do not provide after-class sessions	0.020	0.085	-0.24	0.808	-0.187	0.146
_cons	2.347	0.459	5.11	0.000	1.446	3.248
var (e. Overall academic performance	0.818	0.084			0.668	1.000

Table 4.24 shows that only "home language" exhibited a positive, although statistically insignificant, effect on students' overall academic performance (z-statistic=1.13; p-value > 0.05). Although statistically insignificant, all the remaining items generally perceived to contribute to high failure rates of student nurses in Biological Nursing Sciences at KZNCN contributed to failure rates. Thus, the hypotheses that shorter breaks between lectures caused more exhaustion, the one-day study in between exams, two hours for the subject examination, and educators do not provide after-class sessions to students led to poor academic performance could not be rejected.

4.10   CONCLUSION

This chapter discussed the data analysis and interpretation and findings on the factors contributing to high failure rates of student nurses in Biological Nursing Sciences at KwaZulu-Natal (KZN) Nursing College. Scale reliability and statistical validity tests were performed prior to computation of exploratory factor analysis. Based on the Keiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy (MSA), some items of the construct "General perceptions" were retained in the analysis. Furthermore, the same items were retained in the factor analysis performed via the Varimax rotation with Keiser Normalization (Kayisoglu 2015:62)

Chapter 5 briefly discusses the findings and limitations of the study and makes recommendations for practice and for further research.

CHAPTER 5

FINDINGS, LIMITATIONS AND RECOMMENDATIONS

5.1   INTRODUCTION

This chapter concludes the study, by briefly outlining the research design and methodology, summarising the findings, stating the limitations, and making recommendations for practice and further research.

5.2   RESEARCH DESIGN AND METHODOLOGY

The aim of the study was to identify factors that contributed to failure among student nurses doing a four year comprehensive nursing diploma programme (R425) at the KZNCN and to make recommendations to improve the pass rate in BNS. The study therefore wished to answer the following questions:

- What are the factors that contribute to the failure rate in BNS?
- What are the challenges faced by student nurses when studying BNS?
- What strategies should be recommended to overcome the problem?

The researcher used a quantitative, non-experimental, descriptive research design to describe, explain, and predict factors contributing to students' failure in BNS. The study was conducted in the six of the ten campuses of the KZNCN that had the second year student nurses, since the study focused on students who had recently passed BNS.

Inclusion criteria

- All six KZNCN campuses that had the second year student nurses.
- Second year student nurses because they have recently passed BNS.

Exclusion criteria

- All four KZNCN campuses that did not have second year student nurses.

- First year student nurses because they were currently doing BNS.
- Third and fourth year student nurses, because they did their BNS in the first year level and they might have forgotten their experience with BNS.

In this study, the population comprised all 170 second year student nurses at the KZNCN). The researcher used non-probability convenience because it is the selection of most readily available respondents in a study. The sample size for the study was 114 (n=114) second-year student nurses. The number of available respondents during the days of data collection and the number of returned questionnaires determined the sample size. Data was collected by means of a self-administered structured questionnaire developed by the researcher. The researcher distributed the questionnaires to the six campuses. In one of the campuses, the researcher appointed the research assistants who assisted in data collection.

5.3   SUMMARY OF THE FINDINGS

The scale reliability score given by the Cronbach's alpha coefficient revealed that the items of the data-collection questionnaire measured a single dimensional latent construct. The Keiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy (MSA) statistical parameters which assessed the questionnaire's sampling adequacy provided statistical evidence confirming validity and adequacy of the questionnaire items for the construct General perceptions. The overall determinant of the correlation matrix for the items under the respective constructs indicated that the matrix was singular in nature hence the matrix was not explained by a linear combination.

In order to provide more complex measures for evaluating the strength of the relationships and factorability of the items in line with the statistical procedure for statistical analysis of data collected using a structured questionnaire, the computed statistics of Bartlett's test of Sphericity indicated that the observed correlation matrix was equal to the identity matrix, suggesting that the observed matrix was not factorable. The Barlett's test result thus revealed the validity and suitability of the data collected with regard to factors generally perceived to contribute to student nurses' failure in BNS at KZNCN.

The frequencies of the respondents' demographic profiles show that of the respondents, 70% (n=80) were females; 46% (n=53) were 20-24 years old, and 27% (n=31) were 25-29 years old; 74% (n=84) were Black/African and 19% (n=22) were Indian; 58% (n=66) completed Matriculation (Grade 12) after 2008 and 42% (n=48) completed Matriculation (Grade 12) before 2008. Regarding the schools attended in matriculation (Grade 12), 40% (n=46) attended rural schools; 30% (n=34) attended multiracial schools, and 29% (n=33) attended and township schools. Of the respondents, 57% (n=65) did not intend to study nursing after matriculation (Grade 12) and 43% (n=49) did intend to study nursing, and 62% (n=40) studied nursing due to financial challenges (see chapter 4, table 4.1).

Results from the exploratory factor analysis item loadings show that six items that had high loadings, which distinctly loaded under five factors. In line with the first research objective, the items that loaded in their different respective factors were deemed to be the statistically significant factors generally perceived to contribute to a high failure rate of student nurses in BNS at KZNCN. The five factors established from the analysis were teaching strategy, after-class sessions, study and exam time, shorter breaks and home language.

The findings indicate that failure is driven by the strategies used by campus Anatomy and Physiology educators; educators not providing after-class sessions to students that need more assistance in understanding the subject; the one-day study in between examinations leading to poor performance in Anatomy and Physiology; two hours being not enough for the subject examination; home language, and shorter breaks between lectures which cause more exhaustion thereby further affecting performance in A&P subjects.

The nonparametric tests conducted using the Kendall's tau-b technique to determine the degree and nature of association between overall academic performance and general perceptions items which had high item loadings showed statistically significant positive correlations between overall academic performance and average notional hours spent studying A&P significant at 1% significance level. Although statistically insignificant and low, there was evidence of a positive correlation between overall academic performance and home language. However, other remaining general

perception items had negative but insignificant correlations with overall academic performance.

Finally, the results from the Structural Equation Model (SEM) method were used. These results assessed the nature and degree of students' failure in overall academic performance in BNS at KZNCN. Each of the distinct items of the construct "general perceptions on performance" showed that only "home language" exhibited a positive but statistically insignificant effect on students' overall academic performance. Although statistically insignificant, the remaining items were generally perceived to contribute to students' failure in BNS at KZNCN. The respective factors included shorter breaks between lectures that caused more exhaustion, the one-day study between examinations, two hours for the subject examination, and educators not providing after-class sessions to students.

The results from the exploratory factor analysis which show that the significant factors generally perceived to contribute to student nurses' failure in BNS at KZNCN were: teaching strategies used by lecturers, after-class sessions, study and examination time, shorter breaks, and home language were consistent with findings reported from previous research.

5.3.1 Teaching strategies used by lecturers are not so effective

Of the respondents, 43% (n=49) strongly disagreed/disagreed that nurse educators did not involve the students fully during learning; 39.5% (n=45) neither disagreed nor agreed, and 17.6% (n=20) agreed/strongly agreed that educators did not involve students fully during learning.

In Oshana, Namibia, Pinehas, Mulenga and Amadhila (2017:63) found that participants felt that poor teaching strategies, lack of student-lecturer relationships, and communication barriers hindered academic performance. In a study in the Eastern Cape, Tom et al (2014:110) found that as part of the teaching strategy the biological science nurse educators should do accompaniment to their students to make sure that, understanding biological sciences during the delivery of patient care is enhanced. This indicates that good lecturer-student relationships enhance students' performance in learning. Therefore, well established lecturer-student relationships serve as a starting

point in developing a good strategy to enhance student performance. According to Ganyaupfu (2013:60), educators should create an atmosphere conducive to learning in order to enhance students' performance. Brown et al (2017:491) emphasise that active learning motivates students to engage more meaningfully in their learning process. Nursing students tend to learn and understand physiology well when it is related to experiences in their work (Brown et al 2017:492). Relating physiology to nursing students' experiences is part of an active instructional style, which appears effective as students' performance improves. Interactive group work and study groups increased students' academic performance. In Oshana, Namibia, Pinehas et al (2017:63) found that participants felt that poor teaching strategies, lack of student-lecturer relationships, and communication barriers hindered academic performance.

5.3.2 Lack of after-class sessions contributes to failure in students' academic

Students' performance is improved by engaging students in after-class sessions on academic concepts, general academic and subject specific (bioscience) conceptual and writing skills, and providing feedback on assignments (Weaver & Jackson 2011:136-138; Crawford & Candlin 2013:181-185; Tom et al 2014:102-115). The studies reveal that students gave positive feedback describing the individual sessions as one of the most helpful aspects of the programme. The establishment of teaching and learning centres where ESL students were taught language skills such as grammar, vocabulary, and pronunciation were found useful (Tshotsho et al 2015:603). Pinehas et al (2017:63) found that participants felt that students, especially ones considered slow learners, require more support from their nurse educators in order to grasp what is taught.

5.3.3 One-day study between the examinations and shorter breaks

Of the respondents, 51.8% (n=59) strongly disagreed/disagreed that shorter breaks between lectures caused more exhaustion and affected performance in the subject; 35.1% (n=40) neither disagreed nor agreed, and 13.2% (n=15) agreed/strongly agreed that shorter breaks between lectures caused more exhaustion and affected performance in the subject. Hull et al (2016:45) and Alos et al (2015:64) found that, among other factors, shortage of study time and limited time in examinations contributed to students' failure. The studies further reveal that demographic and cognitive factors also affect students' performance differently across a variety of

disciplines (Hull et al 2016). Alos et al (2015) found that five factors mainly contributed to students' failure, namely personal conditions, study habits, shorter study and examination time, shorter breaks and home-related aspects such as the language commonly used. Pinehas et al (2017:63) found that a constrained study day system coupled with an overloaded examination timetable with less time to study in-between the papers set during examination negatively affects learners' academic performance. Nursing students felt that the examination timetable influenced their academic performance poorly especially when there were shorter breaks and more than one module written in one day or consecutively during examination periods (Pinehas et al 2017:63).

5.3.4 Home language influences students' academic performance

Of the respondents, 48.3% (n=55) strongly disagreed/disagreed that home language contributes to performance in Anatomy and Physiology; 27.2% (n=31) neither disagreed nor agreed, and 24.6% (n=28) agreed/strongly agreed.

Langtree et al (2018:130) state that in the first semester of study, ESL students experience difficulty with the English language which impacts on their learning, particularly with new and complicated terminology in A&P. An English as second language (ESL) background, where English is not the home language, has a negative effect on and leads to a high failure rate among students in first-year nursing education (Crawford & Candlin 2013:181; Langtree et al 2018:130). Students' home language has an impact on their performance at first-year level. An evaluation of a blended learning approach in an A&P module for pre-registration health care students found that participants experienced difficulty with new and complicated terminology and concepts (White & Sykes 2012:4). Students thus found A&P the most challenging subject in the nursing programme.

5.4   CONCLUSIONS

The findings indicate that home language positively influenced students' overall academic performance in Biological Nursing Sciences (Anatomy and Physiology) at KZNCN. Conversely, students' overall academic performance in BNS at KZNCN was negatively affected by the shorter breaks between lectures, which caused more

exhaustion, the one-day study in between examinations, two hours for the subject examination, and educators not providing after-class sessions to students.

5.5   LIMITATIONS

The study was only conducted at the six campuses of KZNCN which had second-year nursing students and a sample of 114 respondents. Consequently the findings cannot be generalised to other nursing colleges, NEIs or provinces.

5.6   RECOMMENDATIONS

The study found that students' overall academic performance is negatively affected by shorter breaks between lectures which cause more exhaustion, one-day study between examinations, two hours for the subject examination, and educators not providing after-class sessions to students. Based on the findings the researcher makes the following recommendations for curriculum design, learner support programmes, and study days, and further research.

5.6.1 Curriculum design

Teaching staff should ensure that the curriculum is designed to allow allocation of sufficient notional hours for teaching learners to promote understanding and afford students adequate time to prepare and write the examinations.

5.6.2 Learner support programmes

Learner support is a critical component of student development therefore lecturers should recognise its importance and provide learner support. Management should implement regular and thorough monitoring and evaluation systems that ensure student success and high pass rates. Nurse educators should identify students who require attentive help, and assist them individually.

5.6.3 Study days

The KZNCN principal together with the Examination Board should adopt the higher education system by developing and implementing a strategy to increase the number of study days between examinations to allow students enough time to prepare for each examination.

5.6.4 Further research

The researcher recommends that further research be conducted on the following topics:

- Factors that contribute to university student nurses' failure in BNS
- A comparative study of BNS failure rates at two/three South African nursing colleges
- Lecturers' perceptions of factors contributing to BNS failure rates
- An examination of factors that promote higher pass rates in high school Life Sciences/Biology

5.7 CONCLUDING REMARKS

This chapter concluded the study. Anatomy and Physiology (A&P) as a bioscience is critical for the education and training of professional nurses. Student nurses struggle with and find bioscience in nursing programmes challenging and anxiety provoking. The failure of students in BNS (Anatomy and Physiology) enrolled for the Diploma in Nursing (General, Psychiatry and Community) and Midwifery is of great concern to the nurse educators and campus principals. The researcher hopes that the findings of the study assist BNS nurse educators to develop new learning strategies to assist all students from different backgrounds, and assist and facilitate possible changes in presentation of the content. This, in turn, should help students to study and prepare for examinations. The ultimate purpose of education is change. In this case, the aim is to assist students to overcome failure and improve their performance.

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SANC see South African Nursing Council.

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ANNEXURES

ANNEXURE 1
ETHICAL CLEARANCE CERTIFICATE

UNISA | university of south africa

6 December 2017

Dear Xolani Lawrence Mhlongo

Decision: Ethics Approval

HSHDC/786/2017
Xolani Lawrence Mhlongo

Student No.:5016 734-0
Supervisor: Dr TE Masango
Qualification: PhD
Joint Supervisor: -

Name: Xolani Lawrence Mhlongo

Proposal: Factors contributing to failure of student nurses in biological nursing sciences: Kwa-Zulu Natal College of Nursing

Qualification: MPCHS 94

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 6 December 2017 to 6 December 2019.

The application was reviewed in compliance with the Unisa Policy on Research Ethics by the Research Ethics Committee: Department of Health Studies on, 6 December 2017

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 national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study.

4) [Stipulate any reporting requirements if applicable].

Note:

The reference numbers [top middle and right corner of this communiqué] should be clearly indicated on all forms of communication [e.g. Webmail, E-mail messages, letters] with the intended research participants, as well as with the Research Ethics Committee: Department of Health Studies.

Kind regards,

Prof JE Maritz
CHAIRPERSON
maritje@unisa.ac.za

Prof MM Moleki
ACADEMIC CHAIRPERSON
molekmm@unisa.ac.za

Prof A Phillips
DEAN COLLEGE OF HUMAN SCIENCES

Approval template 2014

ANNEXURE 2
LETTERS REQUESTING PERMISSION TO DO THE STUDY

The Principal

KZN College of Nursing

Private Bag X9089

Pietermaritzburg

3200

05 February 2018

Dear Sir/Madam

I, Xolani Lawrence Mhlongo, studying Masters of Arts in Nursing Science through UNISA, hereby request a permission to conduct a research project in five selected campuses of the College.

The Colleges selected for study as per sampling criteria are: Addington, Grey's, Madadeni, Ngwelezane, R Khan and CJM.

Details of the research project are as follows:

RESEARCH TOPIC:

FACTORS CONTRIBUTING TO FAILURE OF STUDENT NURSES IN BIOLOGICAL NURSING SCIENCES: KWA-ZULU NATAL COLLEGE OF NURSING

Estimated time frame for data collection: 01 March 2018 to 30 June 2018.

This research project will involve the 2nd year nursing students registered for the diploma in nursing (General, Community and Psychiatry) and Midwifery (R425). The researcher will request to use one classroom with desks for the selected learners. Data will only be collected once, within the selected day and maximum time for data collection will be 30 minutes.

Yours faithfully   _____

XL Mhlongo   Researcher's signature

KwaZulu-Natal Department of Health

Private Bag X9051

Willowton

3200

05 February 2018

Dear Sir/Madam

I, Xolani Lawrence Mhlongo, studying Masters of Arts in nursing Science through UNISA, hereby request a permission to conduct a research project in your campus. Details of the research project are as follows:
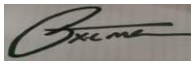
RESEARCH TOPIC:

FACTORS CONTRIBUTING TO FAILURE OF STUDENT NURSES IN BIOLOGICAL NURSING SCIENCES: KWA-ZULU NATAL COLLEGE OF NURSING

Estimated time frame for data collection: 01 March 2018 to 30 June 2018.

This research project will involve the 2nd year nursing students registered for the diploma in nursing (General, Community and Psychiatry) and Midwifery (R425). The researcher will request to use one classroom with desks for the selected learners. Data will only be collected once, within that selected day and maximum time for data collection will be 30 minutes.

Yours faithfully   _____

XL Mhlongo   Researcher's signature

The Campus Principal

Ngwelezane Nursing Campus

Private Bag X20021

Empangeni

3800

05 February 2018

Dear Sir/Madam

I, Xolani Lawrence Mhlongo, studying Masters of Arts in nursing Science through UNISA, hereby request a permission to conduct a research project in your campus.

Details of the research project are as follows:

RESEARCH TOPIC:

FACTORS CONTRIBUTING TO FAILURE OF STUDENT NURSES IN BIOLOGICAL NURSING SCIENCES: KWA-ZULU NATAL COLLEGE OF NURSING

Estimated time frame for data collection: 01 March 2018 to 30 June 2018.

This research project will involve the 2nd year nursing students registered for the diploma in nursing (General, Community and Psychiatry) and Midwifery (R425). The researcher will request to use one classroom with desks for the selected learners. Data will only be collected once, within that selected day and maximum time for data collection will be 30 minutes.

Yours faithfully   _____

XL Mhlongo   Researcher's signature

The Campus Principal

RK Khan Nursing Campus

Private Bag X004

Chatsworth

4030

05 February 2018

Dear Sir/Madam

I, Xolani Lawrence Mhlongo, studying Masters of Arts in nursing Science through UNISA, hereby request a permission to conduct a research project in your campus.

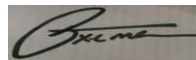Details of the research project are as follows:

RESEARCH TOPIC:

FACTORS CONTRIBUTING TO FAILURE OF STUDENT NURSES IN BIOLOGICAL NURSING SCIENCES: KWA-ZULU NATAL COLLEGE OF NURSING

Estimated time frame for data collection: 01 March 2018 to 30 June 2018.

This research project will involve the 2nd year nursing students registered for the diploma in nursing (General, Community and Psychiatry) and Midwifery (R425). The researcher will request to use one classroom with desks for selected learners. Data will only be collected once, within that selected day and maximum time for data collection will be 30 minutes.

Yours faithfully   _____

XL Mhlongo   Researcher's signature

The Campus Principal

Addington Campus

PO Box 977

Durban

4000

05 February 2018

Dear Sir/Madam

I, Xolani Lawrence Mhlongo, studying Masters of Arts in nursing Science through UNISA, hereby request a permission to conduct a research project in your campus.
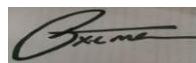
Details of the research project are as follows:

RESEARCH TOPIC:

FACTORS CONTRIBUTING TO FAILURE OF STUDENT NURSES IN BIOLOGICAL NURSING SCIENCES: KWA-ZULU NATAL COLLEGE OF NURSING

Estimated time frame for data collection: 01 March 2018 to 30 June 2018.

This research project will involve the 2nd year nursing students registered for the diploma in nursing (General, Community and Psychiatry) and Midwifery (R425). The researcher will request to use one classroom with desks for the selected learners. Data will only be collected once, within that selected day and maximum time for data collection will be 30 minutes.

Yours faithfully   _____

XL Mhlongo   Researcher's signature

The Campus Principal

Port Shepstone nursing campus

Private Bag X9001

Pietermaritzburg 3200

05 March 2018

Dear Sir/Madam

I, Xolani Lawrence Mhlongo, studying Masters of Arts in nursing Science through UNISA, hereby request a permission to conduct a research project in your campus.
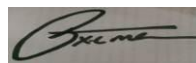
Details of the research project are as follows:

RESEARCH TOPIC:

FACTORS CONTRIBUTING TO FAILURE OF STUDENT NURSES IN BIOLOGICAL NURSING SCIENCES: KWA-ZULU NATAL COLLEGE OF NURSING

Estimated time frame for data collection: 01 March 2018 to 30 June 2018.

This research project will involve the 2nd year nursing students registered for the diploma in nursing (General, Community and Psychiatry) and Midwifery (R425). The researcher will request to use one classroom with desks for the selected learners. Data will only be collected once, within that selected day and maximum time for data collection will be 30 minutes.

Yours faithfully   _____

XL Mhlongo   Researcher's signature

The Campus Principal

Greys' Campus

Private Bag X9001

Pietermaritzburg

3200

05 February 2018

Dear Sir/Madam

I, Xolani Lawrence Mhlongo, studying Masters of Arts in nursing Science through UNISA, hereby request a permission to conduct a research project in your campus.
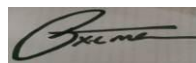
Details of the research project are as follows:

RESEARCH TOPIC:

FACTORS CONTRIBUTING TO FAILURE OF STUDENT NURSES IN BIOLOGICAL NURSING SCIENCES: KWA-ZULU NATAL COLLEGE OF NURSING

Estimated time frame for data collection: 01 March 2018 to 30 June 2018.

This research project will involve the 2nd year nursing students registered for the diploma in nursing (General, Community and Psychiatry) and Midwifery (R425). The researcher will request to use one classroom with desks for the selected learners. Data will only be collected once, within that selected day and maximum time for data collection will be 30 minutes.

Yours faithfully   _____

XL Mhlongo   Researcher's signature

To: The Campus Principal

CJM Campus

Private Bag X5555

Nquthu

3135

05 February 2018

Dear Sir/Madam

I, Xolani Lawrence Mhlongo, studying Masters of Arts in nursing Science through UNISA, hereby request a permission to conduct a research project in your campus.
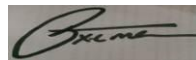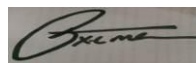
Details of the research project are as follows:

RESEARCH TOPIC:

FACTORS CONTRIBUTING TO FAILURE OF STUDENT NURSES IN BIOLOGICAL NURSING SCIENCES: KWA-ZULU NATAL COLLEGE OF NURSING

Estimated time frame for data collection: 01 March 2018 to 30 June 2018.

This research project will involve the 2nd year nursing students registered for the diploma in nursing (General, Community and Psychiatry) and Midwifery (R425). The researcher will request to use one classroom with desks for the selected learners. Data will only be collected once, within that selected day and maximum time for data collection will be 30 minutes.

Yours faithfully   _____

XL Mhlongo   Researcher's signature

ANNEXURE 3
LETTERS GRANTING PERMISSION DO THE STUDY

health

Department:
Health
PROVINCE OF KWAZULU-NATAL

Private Bag x 5555, Nquthu, 3135
Lot 92, Hlubi Street, Nquthu, 3135
Tel : (034) 271 6528. Fax: (034) 2710094
E-mail.busisiwe.simelane @kznhealth.gov.za

KwaZulu Natal College of Nursing
Charles Johnson Memorial Nursing Campus

01.04.2018

Enquiries: Ms. BS Simelane

Mr XL Mhlongo

CJM Nursing Campus

P/bag X5555

Nqutu

3135

Dear Sir,

Permission to conduct the study

You are hereby granted permission to conduct a study on **Factors contributing to failure of student nurses in biological nursing sciences**: KWAZULU NATAL COLLEGE OF NURSING

You are hereby advised to adhere to the ethical principles whilst conducting the study.

I thank you

B.S Simelane (Principal)

DIRECTORATE:

130 Longa Bolole street.
Private Bag X9051, PMB, 3200
Tel: 033-305-2806/3180/3123 Fax: 033-394-3782
Email: hrkm@kznhealth.gov.za
www.kznhealth.gov.za

Health Research & Knowledge
Management (HRKM)

Reference: HRKM 104/18
KZ_201803_012

23 March 2018

Dear Mr X L Mhlongo
(UNISA)

Subject: Approval of a Research Proposal

1. The research proposal titled 'FACTORS CONTRIBUTING TO FAILURE OF STUDENT NURSES IN BIOLOGICAL NURSING SCIENCES: KWA-ZULU NATAL COLLEGE OF NURSING.' was reviewed by the KwaZulu-Natal Department of Health (KZN-DoH).

   The proposal is hereby **approved** for research to be undertaken at Addington, RK Khan, Greys, Madadeni & Ngwelezana Nursing Campuses.

2. You are requested to take note of the following:
   a. Make the necessary arrangement with the identified facilities before commencing with your research project.
   b. Provide an interim progress report and final report (electronic and hard copies) when your research is complete.

3. Your final report must be posted to **HEALTH RESEARCH AND KNOWLEDGE MANAGEMENT, 10-102, PRIVATE BAG X9051, PIETERMARITZBURG, 3200** and e-mail an electronic copy to hrkm@kznhealth.gov.za

For any additional information please contact Ms G Khumalo on 033-395 3189.

Yours Sincerely

Dr E Lutge
Chairperson, Health Research Committee
Date: 23/03/18

Fighting Disease, Fighting Poverty, Giving Hope

DIRECTORATE:

Physical Address : 211 Pietermaritz Street , Pietermaritzburg 3200
Postal Address: Private Bag X 9089 Pietermaritzburg 3200
Tel: 033 264 7800 Fax: 033 394 7238 Email: sindizama.mthembu@kznhealth.gov.za
www.kznhealth.gov.za

KwaZulu-Natal College of Nursing

Reference: Mrs S Maharaj
Date: 22 October 2018

Principal Investigator: Mr X.L. Mhlongo
Unisa: Student No: 5016-734-0

RE: Gate Keeper Permission to conduct research at the KZN College of Nursing.

TITLE: Factors contributing to failure of student nurses in biological nursing
           sciences: KwaZulu-Natal College of Nursing

Dear Mr Mhlongo

I have the pleasure in informing you that Gate Keeper permission has been granted to you as per
the above request by the Principal of the KZN College of Nursing.

Data Collection site(s):- KZN College of Nursing Campuses

(1) Addington   (2) Grey's
(3) Portshepstone   (4) Ngwelezane
(5) RK Khan   (6) CJM

Please note the following:

1. Please ensure that you adhere to all policies, procedures, protocols and guidelines of the
   Department of Health with regards to this research.
2. This research can only commence once you have received approval from the Provincial
   Health Research Committee in the KZN Department of Health.
3. Gate keeper permission is therefore granted for you to conduct this research at the above
   identified campuses after consultation with the Campus Principals.
4. The KwaZulu-Natal College and its NEI's will not be providing you with any resources for
   this research.
5. You will be expected to provide feedback on your findings to the Principal of the
   KwaZulu-Natal College of Nursing.

Thank You

DR. S.Z MTHEMBU
PRINCIPAL: KZN COLLEGE OF NURSING

Fighting Disease, Fighting Poverty, Giving Hope

health ────────────
Department:
Health
PROVINCE OF KWAZULU-NATAL

107 Manne Drive, Shelly Beach, 4265
Private Bag X719, Port Shepstone, 4240
Tel: 039-3155322 Fax: 039-3155325 Email:Nomantlane.cele @kznhealth .gov.za

KWAZULU-NATAL COLLEGE OF NURSING
PORT SHEPSTONE NURSING CAMPUS

Enquiries :NG Cele
Date: 13/04/2018

Attention: Mr X Mhlongo

**SUBJECT : REQUEST FOR PERMISSION TO CONDUCT RESEARCH AT PORT
SHEPSTONE CAMPUS**

Receipt of letters of approval from the KZN College of Nursing and UNISA for you to conduct a
research on " **Factors contributing to failure of student nurses in Biological Nursing
Sciences in KwaZulu- Natal College of Nursing**" is hereby acknowledged.

Permission is hereby granted for you to conduct your study at Port Shepstone Nursing Campus on
17ᵗʰ April 2018 as requested. Please adhere to the conditions stated by the Kwa-Zulu Natal
College of Nursing.

Best wishes

Mrs Cele
────────────────────────
**Mrs N.G Cele
(ACTING CAMPUS PRINCIPAL)**

Fighting Disease, Fighting Poverty, Giving Hope

DIRECTORATE:
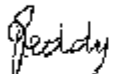
12 April 2018

Attention: XL Mhlongo

CJM Nursing Campus

Re: Permission to Conduct a Study at our Campus

I have received your letter requesting permission to conduct a study at R.K. Khan Campus, would like to inform you that permission is granted for you to collect data on the 18th of April 2018 at 07h00 to 09h15

Thank You.

Mrs. J. Reddy

Campus Principal

health
Department:
Health
PROVINCE OF KWAZULU-NATAL

DIRECTORATE:

16 ERSKINE TERRACE,SOUTH BEACH DURBAN 4001
P O BOX 977 DURBAN, 4000
Tel 031-327 2999 Fax. 031- 327 2076
Email thembi.skakane@kznhealth.gov.za
Web: www.kznhealth.gov.za

TRAINING CAMPUS ADDINGTON

Enquiries TP Skakane-Masango

29 March 2018

PERMISSION TO CONDUCT RESEARCH AT ADDINGTON CAMPUS

Dear Mr X Mhlongo

Permission is hereby granted for you to conduct your research on:

FACTORS CONTRIBUTING TO FAILURE OF STUDENT NURSES IN BIOLOGICAL NURSING SCIENCES: KWA-ZULU NATAL COLLEGE OF NURSING

Please take cognizance of the following:
- You must adhere to all policies, procedures, protocols and guidelines of the Department regarding research
- Please inform our institution before research is commenced
- Please provide a copy of your research report to the Campus, on completion of the study

Wishing you all the best for your studies

Ms. TP Skakane-Masango
Campus Principal

Fighting Disease, Fighting Poverty, Giving Hope

114

DIRECTORATE:

KwaZulu - Natal College of
Nursing:
Grey's Campus

Postal Address: Private Bag X 9001, Pietermaritzburg, 3200
Physical Address: 201 Townbush Road, Northern Park, Pietermaritzburg, 3200
Tel: 033 897 3503 Fax:033 897 3500 Email: bus.shezi@kznhealth.gov.za
www.kznhealth.gov.za

Reference: Mrs B.E. Shezi
Date: 29 March 2018

Principal Investigator: Mr Xolani Lawrence Mhlongo
Student No: 5016 - 734 - 0
University of South Africa

RE: Greys Campus permission to conduct research study.

TITLE: Factors contributing to failure of student nurses in biological nursing sciences:
KwaZulu-Natal College of Nursing.

Dear Sir

I have a pleasure to inform you that permission has been granted to conduct your research study:
Data collection.

We request to forward us a feedback of your research study findings once you have completed.

Thank you

MRS BE SHEZI
CAMPUS PRINCIPAL

Fighting Disease, Fighting Poverty, Giving Hope

115

health
Department:
Health
PROVINCE OF KWAZULU-NATAL

DIRECTORATE:

NGWELEZANE NURSING CAMPUS   KZNCN
Private Bag X 20016, Empangeni 3880
Thanduyise Highway, Nqwelezane T/Ship
Tel.: 035 901 7094,
www.thabi.matsane@kznhealth..gov.za

Enquiry: Dr TE Matsane
Date: 08-03-2018

RE: Gate Keeper Permission to conduct research at Ngwelezane Campus (26/04/2018)

TITLE: FACTORS CONTRIBUTING TO FAILURE OF STUDENT NURSES IN BIOLOGICAL NURSING SCIENCES: KWAZULU NATAL COLLEGE OF NURSING.

Dear Sir

The above research study refers. The permission to conduct this study at Ngwelezane Campus is hereby granted to you. You are therefore advised to adhere to the KZNCN RESEARCH POLICY with regards to this research.

Kindest Regards,

Dr TE Matsane
Campus Principal

ANNEXURE 4
LETTER OF INFORMATION

COLLEGE OF HUMAN SCIENCES
SCHOOL OF SOCIAL SCIENCES
DEPARTMENT OF HEALTH STUDIES

_____

LETTER OF INFORMATION

Dear Research Participant

This structured questionnaire was designed as an instrument to elicit information regarding **factors contributing to failure of student nurses in Biological Nursing Sciences at KZN Nursing College**. Considerable value is highly given to the fact that your input will contribute towards development of recommendations to address the factors contributing to students' failure at the college to enhance student throughput and success.

Kindly note that your participation is entirely voluntary, your identity remains anonymous, no personal information about participants will be disclosed to anyone and all information you provide will remain confidential. Your integrity will in no way be compromised and you are also at liberty to withdraw from this study at any point, should you feel so.

If you do not wish to take part in the study, neither complete nor return the questionnaire. If you decide to participate, the questionnaire should take you about twenty minutes to complete. Please answer the questions in the space provided. Try to honestly complete the questions at the time you are most unlikely to be disturbed, and avoid spending too long on one question. There are no costs associated with completing the questionnaire other than your time.

If you have any queries or would like further information about this research project, please contact me during office hours on +27 790 118 790 or email me on 5016340@mylife.unisa.ac.za. Should you have any questions regarding ethical aspects of the study, you can contact the supervisor of the study at UNISA, Professor. TE

Masango, during office hours at telephone number 012 429 3386 or e-mail: masante@unisa.ac.za.

The researcher appreciates the time taken by the respondents in completing this questionnaire as well as their contribution to the successful completion of the study. A copy of my completed research report can be made available to you upon request.

Mr. Xolani Lawrence Mhlongo   Prof. TE Masango
Researcher   **Supervisor**

CONSENT LETTER

CONSENT TO PARTICIPATE IN THIS STUDY

I, _____ (participant name), confirm that the person asking my consent to take part in this research has told me about the nature, procedure, potential benefits and anticipated inconvenience of participation.

I have read (or had explained to me) and understood the study as explained in the information sheet.

I have had sufficient opportunity to ask questions and am prepared to participate in the study.

I understand that my participation is voluntary and that I am free to withdraw at any time without penalty (if applicable).

I am aware that the findings of this study will be processed into a research report, journal publications and/or conference proceedings, but that my participation will be kept confidential unless otherwise specified.

I have received a signed copy of the informed consent agreement.

Participant Name & Surname.. (please print)
Participant Signature...Date..................

Researcher's Name & Surname.. (please print)
Researcher's signature...Date..................

ANNEXURE 6

QUESTIONNAIRE

Guide to Answering the Questions

- Read each statement or question carefully to ensure understanding
- Put an X in front of your answer for each question in the column labelled "Response"
- Make an explanation on the space provided; where relevant.

#	Question	Response	Code
Section 1: Demographic information			
101	Please indicate your gender	Male Female	1 2
102	Please indicate your race	White Indian Coloured Black/African	1 2 3 4
103	In which age category do you fall under?	15 – 19 years 20 – 24 years 24 – 29 years 30 – 34 years >= 35 years	1 2 3 4 5
104	Indicate the period-interval during which you completed your Matric	Before the Year 2008 After the Year 2008	1 2
105	Which category of school did you attend your matric?	Rural school Township Multiracial Finishing/bridging school	1 2 3 4
106	What was your employment status before nursing?	Not employed Self-employed Temporarily Permanently	1 2 3 4
107	What is your highest level of educational training?	Matric Tertiary	1 2
108	Did you intend studying Nursing Science after your matric?	No Yes	1 2
108a	→ If your answer to Question 108 above was "No", please choose the most closet reason from the options provided why you ended up studying Nursing Science. <u>Other reasons</u>:	Financial reasons Parents forced me I had no other option	1 2 3

#	Question	Response	Code
Section 2: Matric academic performance			
Questions in this section intend to assess your academic performance related indicators			
201	Indicate the range of the mark you obtained in your Grade 12 Life Sciences or Biology subject	50 – 60% 61 – 74% 75 – 89% 90 – 100%	1 2 3 4
202	What was your overall performance in Anatomy and Physiology (A & P)?	50 – 60% 61 – 74% 75 – 89% 90 – 100%	1 2 3 4
203	Indicate the range of notional hours on average you spent studying A & P in a week?	=< 4 hours 5 – 9 hours >= 10 hours	1 2 3

#	Question	Response	Code
Section 3: Attitude towards A & P; and resolution of problems			
Questions in this section intend to determine your attitude towards Anatomy and Physiology, and your perception on the manner in which problems are resolved.			
301	Indicate your attitude towards Anatomy and Physiology subject	Very bad Bad Neither bad nor good Good Very good	1 2 3 4 5
302	Indicate your perception regarding the manner in which personal, social and academic problems are dealt with at the campus	Very bad Bad Neither bad nor good Good Very good	1 2 3 4 5

Section 4: General perceptions

Indicate your opinion based on the 5-point Likert scale for each question provided below:

Example:
Does your Grade 12 mark in English influence your academic performance
(If you consider "Disagree" as your answer, then place an X in the box labelled 2:

Strongly disagree	1	2	3	4	5	Strongly agree

#	Statement	Response/Code				
	Indicate the extent to which you agree or disagree with each of the following statements	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
401	Gender has an influence on academic performance in A&P	1	2	3	4	5
402	Your performance in A&P was negatively affected by what other fellow students spoke about it	1	2	3	4	5
403	Home language contributes to performance in A&P	1	2	3	4	5
404	Bad attitude contributes to poor performance in A&P	1	2	3	4	5
405	Terminology used contributes to poor performance in A&P	1	2	3	4	5
406	Educators do not involve the students fully during learning	1	2	3	4	5
407	Shorter breaks between lectures, creates more exhaustion, thus affecting performance to the subject	1	2	3	4	5
408	A&P educators expect students to function productively without their expected assistance	1	2	3	4	5
409	Infrastructure has an impact to failure in A&P	1	2	3	4	5
410	Personal and social problems contribute to poor performance in A&P	1	2	3	4	5
411	The strategy used by your campus A&P educators has a contribution to failure of students in the subjects	1	2	3	4	5
412	The subject educators teach to complete the syllabus	1	2	3	4	5
413	Time set to complete syllabus is shorter than subject content	1	2	3	4	5
414	The one day study day in between the exams has an impact in to poor performance in A&P subject	1	2	3	4	5
415	Two hours are not enough for the subject examination	1	2	3	4	5
416	The quality of summative (DP) and formative (class) tests do not match the quality of examination questions	1	2	3	4	5
417	Subject educators are not delivering the subject content in an understandable manner	1	2	3	4	5
418	Educators do not provide after-class sessions to students that need more assistance in understanding the subject	1	2	3	4	5
419	Alcohol consumption in the first level is high	1	2	3	4	5

Thank you for your time and participation

ANNEXURE 7
LANGUAGE EDITING CERTIFICATE

Cell/Mobile: 073-782-3923

53 Glover Avenue

Doringkloof

0157 Centurion

21 November 2018

TO WHOM IT MAY CONCERN

I hereby certify that I have edited Xolani Lawrence Mhlongo's master's dissertation, **Factors contributing to failure of student nurses in Biological Nursing Sciences: KwaZulu-Natal College of Nursing**, for language and content.

IM Cooper

IM Cooper

Iauma M Cooper

192-290-4

ANNEXURE 8
TURNITIN ORIGINALITY REPORT

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