PREFERRED LEARNING STYLES OF FIRST AND THIRD YEAR NURSING STUDENTS IN A DIPLOMA PROGRAMME AT A COLLEGE IN KWAZULU-NATAL: A COMPARATIVE STUDY

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Dissertation submitted in fulfilment of the requirements for Master of Health Sciences in Nursing in the Faculty of Health Sciences at the Durban University of Technology

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DECLARATION

This is to certify that the work is entirely my own and not of any other person unless explicitly acknowledged (including citation of published and unpublished sources). The work has not previously been submitted in any form to the Durban University of Technology or to any other institution for assessment or for any other purpose.

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ABSTRACT

BACKGROUND

Learning styles is described by Khanal, Shah and Koirala (2014: 1) as the way in which an individual processes, interprets and organizes information. Obtaining insight into the learning styles of students can benefit the learning and teaching experiences for students and lecturers respectively. The VARK learning style model is based on sensory modes of perception and assesses the “outer instructional preference ring of Curry’s onion ring model” (Mitchell, James and D’Amore 2015: 2). VARK is the acronym that represents the Visual, Aural, Read/Write and Kinaesthetic sensory modalities.

AIM

The aim of this study was to determine and compare the preferred learning styles of first and third year student nurses at Kwazulu-Natal College of Nursing (KZNCN), utilising the VARK sensory based model questionnaire in order to broaden the body of knowledge about learning styles in nursing education.

METHODOLOGY

A quantitative cross-sectional survey design was used to conduct the study. A census sampling survey method was used to collect data from first and third year students in the four year training programme at KZNCN. The sample size consisted of 290 respondents, which comprised of 145 respondents per year of study. Self-administered questionnaires were used to collect the data. The data was analysed using SPSS version 23. Data was described graphically using descriptive statistics and inferential statistics were applied to detect significant trends in the data.

RESULTS

The majority of the respondents were found to be multimodal (77, 6%), preferring two or more sensory modalities, while the remaining 22, 4% were found to have unimodal learning style preferences. The most dominant learning style preference

was Kinaesthetic, with a mean score of 6.54/SD=2.607 and the Visual modality was the least preferred (M=4.36/SD=2.315). The study showed no statistically significant relationship between preferred learning styles and year of study, age or gender respectively. Students that use English as their first language were reported to have a statistically significant Visual score than those that use isiZulu as their first language, with mean scores of 5.33 and 4.00 (p=.005) respectively. Coloured (M=5.43) and Indian (M=5.44) students were found to have a significantly higher Visual score than Blacks (M=4.14), F (2,286) = 6.759, p=.0001. Indians (M=7.08) had a significantly higher Read/Write score than Blacks (M=5.72), F (2, 286) =3.802, p=0.23. Students with previous higher education (M=4.93) have a significantly higher Visual score than those without previous higher education (M=4.17), p=.026.

CONCLUSION

According to the results of the study the majority of first year and third year students preferred multimodal learning styles. Lecturers should take into account various teaching methods when developing lesson plans in order to accommodate different learning styles. A huge gap in the body of knowledge regarding learning styles of individuals in South Africa warrants more research in this area.

KEYWORDS: Learning style preference, Nursing students, VARK questionnaire.

DEDICATION

This dissertation is dedicated to my late parents, Mr Subramoney Pentiah and Mrs Suminthra Pentiah who firmly and lovingly instilled the value of education in their daughters; and to my ‘bonus’ parents, Rev. E. S. Nair and Mrs M. V. Nair for your encouragement, love and support.

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LIST OF ACRONYMS

ACRONYM	FULL WORD/ SENTENCE
A & P	Anatomy and Physiology
GNS	General Nursing Science
FSLSM	Felder-Silverman Learning Style Model
ILS	Felder and Soloman's Index of Learning Styles
KZNCN	KwaZulu-Natal College of Nursing
LSI	Kolb's Learning Style Inventory
LSQ	Honey and Mumford's Learning Style Questionnaire
SANC	South African Nursing Council
MBTI	Myers- Briggs Type Indicator
NEI	Nursing Education Institution
PEPS	Productivity Environmental Preference Survey
R425 Nursing Programme	The South African Nursing Council Regulation 425 for the education and training of an individual in a four year training programme leading to registration as Nurse (General, Community, Psychiatric) and Midwife
VAK	Visual, Aural and Kinaesthetic learning styles
VARK	Visual, Aural, Read/Write and Kinaesthetic sensory modalities

CHAPTER 1: OVERVIEW OF THE STUDY

1.1. Introduction

Nursing students have various learning styles. It is important for a nurse educator to be aware of the learning style that students prefer and to adapt teaching strategies to suit the student's needs. The ultimate goal would be to improve academic performance of the student. Various methods have been used in previous research to identify and explore learning styles used by students. Knowledge of learning styles can be used by educators to modify their teaching styles to suit their learners. Hallin (2014: 1443) assumes that learners at higher education institutions have developed efficient study skills and have acquired relevant learning strategies to conform to the way they learn, however, teaching methods used by lecturers do not apply to all learners. According to Hallin (2014: 1443) nursing students who have been taught with strategies that match their learning style preferences felt motivated, responsible and achieved higher academic performance.

Students' learning style is a major factor to bear in mind when planning for meaningful teaching and learning. Learning styles have also been shown to influence academic performance in previous research studies (Li *et al.* 2014: 229). Understanding, and identifying how one learns and application of this knowledge, increases students' self-confidence and improves their capacity to learn in new situations (Rudman, de Beer and Olorundju 2015: 23).

There are various models of learning styles. Each model has its own questionnaire to assess learning style preferences of an individual. Numerous studies undertaken using different questionnaires have shown that learning styles differ greatly amongst higher education learners in nursing and other fields of study. Examples of studies undertaken in the nursing field include: Purba (2015: 737-740), who conducted a study about learning preferences of nursing and midwifery students; Bangcola (2016: 22-30) who explored learning styles as a predictor of academic performance in the nursing department of an

Asian university and several colleges; Abdollahimohammed and Ja'afar (2014: 1-5) researched learning style preferences of nursing students at two universities in Iran and Malaysia. Examples of research on learning styles conducted in fields other than nursing include Samarakoon *et al.* (2013: 1-6) who undertook a study on learning styles and approaches to learning among medical students; Sharma and Wadhwa (2018: 55-58) researched learning styles of undergraduate dentistry students and the preferred learning styles of medical students was researched by Mashood *et al.* (2017: 36-40). The examples of studies done on preferred learning styles by students learning in the field of nursing and other disciples are only a few to be mentioned and are also listed in Table 2.5 in Chapter 2.

The review of literature undertaken by the researcher revealed that numerous studies have been conducted internationally over the last five years on learning style preferences of learners in the field of health. A list of some of the studies undertaken is outlined in Table 2.5 in Chapter 2. Given the expanse of research conducted on students learning style and its impact on the learning process, it can be deduced that this is a significant topic to be researched. In South Africa, however, studies on this topic have been found to be limited, thus, the interest in investigating the learning style preferences of nursing students in their first and third year of study.

1.2. Background of the study

Carl Jung, a Swiss psychologist, published one of the most well-known ways of defining learning styles. According to Jung, in order for an individual to learn new concepts he or she must use his/her own thoughts, previous experiences and grounded judgement (Jung 1916, cited in McAllister 2015: 17). Jung's work is said to be the initial attempt to explain how a person learns and is thought to be the start of present day learning style models (McAllister 2015:17).

Theories on learning styles assume that we all learn in different ways and on different levels (Hallin 2014: 1443). Researchers and theorists have presented various theories and models concerning learning styles. Some of these theories

and models focus on sensory modalities, talents, cognitive learning, theoretical and applied learning and active and thoughtful learning processes (Aina-Popoola and Hendricks 2014: 2). The concepts learning style and cognitive style are interchangeable in research. Learning styles or preferences are about the manner in which individuals' process and use information to change it into knowledge (Purba 2015: 737).

An aspect of learning styles defines the individuals learning preferences in terms of the sensory approaches in which they process information. Fleming and Mills (1992: 140) introduced four learning styles that involved the senses, i.e. Visual, Auditory, Read/Write, and Kinaesthetic (VARK).

Table 1.1: Characteristics associated with VARK learning styles (Sharma and Wadhwa 2018: 55)

Learning preference sensory modality	Characteristics
Visual	Prefers visual resources e.g. diagrams, pictures, videos. Enjoy seeing people in action
Aural	Prefers to talk about situations and concepts. Enjoy hearing stories from people
Reading/Writing	Prefers taking notes. Uses textbooks, stories and written facts extensively
Kinaesthetic	Prefers hands on experience

The VARK instrument was developed by Fleming and Mills to "empower learners to reflect on their sensory preferences and modify their study methods accordingly" and it is a learning preference tool that is linked to sensory modalities (Sinnerton, Leonard and Rogers 2014: 3). The VARK questionnaire version 7.8 contains 16 questions which learners have to answer by selecting an option that corresponds best with their learning preference. Copyright permission was obtained from the original author to utilise this tool for this study (Annexure 9). An important advantage of the VARK instrument is that the questions are focused on actual scenarios so that the respondents can identify with them easily (Sinnerton, Leonard and Rogers 2014: 3). Furthermore, the questionnaire is readily available online (Fleming 2014).

In the four year nursing programme at KwaZulu-Natal College of Nursing (KZNCN), the first year students', first semester examination comprises of

Anatomy and Physiology I (A & P I) and the third year students', first semester examination is General Nursing Science II (GNSII). KZNCN examination results from May-June 2014 to May-June 2016, as outlined in Table 1.2 below consistently shows a disparity in the percentage pass rate between students that wrote A & P I and GNS II respectively. The number of students that have failed the first year first semester examination is much higher than the students that have failed the first semester of the third year examinations.

Table 1.2: KZNCN Examination Results Statistics (KZNCN 2016; KZNCN 2015a; KZNCN 2015b; KZNCN 2014a; KZNCN2014b)

Examination date	Paper	Total entries	Number failed	Number passed	Percentage passed
May/June 2016	A & P I	151	10	141	82%
	GNS II	193	1	192	99%
November 2015	A & P I	335	16	319	95%
	GNS II	199	0	199	100%
May/June 2015	A & P I	314	81	233	80%
	GNS II	227	12	215	95%
November 2014	A & P I	302	79	223	76%
	GNS II	255	5	250	98%
May/June 2014	A & P I	259	26	233	90%
	GNS II	207	1	206	99.5%

Mohammadi *et al*. (2015: 296) stated that it is possible that various approaches to education prior to entering tertiary institutions may affect the preferred learning style of students therefore influencing the pass rate of students. Khanal, Shah and Koirala (2014: 4) explained that first year student's favour more Auditory and Read/Write learning styles due to the learning styles used at secondary school, where there is an emphasis on didactic lecture teaching methods. Samarakoon *et al*. (2013: 4) agreed with this and adds that students in the later years of their studies are expected to change to multimodal learning styles with an emphasis on more intense learning. This implies that learning style preferences change as an individual progresses during the course of study and could possibly explain the higher pass rates of students at the third year level of study.

1.3. Problem statement

Nursing as a profession requires accuracy and attention to detail. The life of another person depends on the skills and abilities of a nurse (Bangcola 2016: 23). Nurse educators have a special set of responsibilities. They have to provide student nurses with practical and theoretical knowledge, and a skill set in the dynamic field of health sciences. They are required to teach future nurse professionals abstract skills such as problem solving, critical thinking and clinical reasoning (Gore 2014: 2). The South African Nursing Council (SANC) (2005: 35) reiterates this by stating that the micro curriculum of Nursing Education Institutions (NEI's) include "teaching and learning approaches that promote critical thinking and problem solving e.g. problem based learning, role playing, case presentations, reflective learning." Technical knowledge together with critical thinking skills is necessary for students to obtain success in their studies. In order to meet the requirements to teach technical and cognitive skills and the theory of the curriculum, nurse educators must be knowledgeable in both course content and the science of adult education. Nurse educators should understand adult learners and consider the learning process when making decisions on how to teach in order to promote positive student outcomes (Gore 2014: 2).

The SANC (2005: 35) also stipulate that programmes should be facilitated to promote a student-centred approach. Gore (2014: 1) stated that understanding of learning style preferences helps to create a paradigm shift from the lecture model to a model that uses various approaches that focuses on stimulating critical thinking in students. There are numerous studies pertaining to learning styles that have been conducted in other countries, as noted by the researcher when undertaking the literature review, however, current literature indicates that there is insufficient research regarding learning style preferences of nursing students in South Africa. Although this study may not fill that gap completely, it will add to the body of knowledge on the importance of determining learning style preferences when planning teaching methods for student nurses.

Not much is known about the preferred learning styles of nursing students in South Africa. Even less is known about the learning style choices of nursing

students at KZNCN. Identifying their learning styles may assist in promoting optimal learning. Learners have their own learning styles (one or more) and their learning experience may possibly be enhanced if the lecturer incorporated various teaching methods to accommodate their preferred learning styles, however didactic lecturing is the most common method used by present day lecturers. Identifying learning styles and adapting teaching modalities to suit various learning styles will shift the focus to more student–centric teaching.

Information received by students in the classroom needs to be internalised and processed into knowledge in order to correlate theory with practice successfully. Identification and utilisation of preferred learning styles in the planning of teaching can help improve the learning process and thereby academic success (Vinaya, Podder and Pradhan 2015: 206). The SANC (2014: 3) states that a specific competency of a nurse educator is to 'identify individual learning styles and unique learning needs of all students'. According to the SANC (2005: 34) one of the standards for nursing education and training is that NEI's provide learning "based on established competencies and grounded in the latest reliable evidence". Again, the gap in current literature in South Africa indicates a lack of evidence that this competency is being fulfilled.

1.4. Aim of the study

The aim of this cross-sectional, quantitative study is to determine and compare the preferred learning styles of first and third year student nurses at KwaZulu-Natal College of Nursing utilising the VARK sensory based model questionnaire, in order to broaden the body of knowledge about learning styles in nursing education.

1.5. The significance of the study

1.5.1 Nursing Education

Nurse educators strive to ensure that students use their full potential in order to achieve the best academic performance. Different learning styles which a learner brings into the learning environment are fundamental to an educator's instruction approach (Giddings 2014: 6). Knowledge of students learning styles can help improve teaching techniques because the lecturer can adapt or modify teaching strategies to suit the learning styles of each student. Determining student's learning styles will thus empower educators and broaden the body of knowledge in nursing education.

Accurate and efficient assessment of learning styles can allow for faculty to consider learning styles when developing curricula, thus lecturers could possibly boost the efficacy of their instruction, especially with regards to experiential learning which is a fundamental aspect of nursing education (Manolis *et al*. 2013: 51). Giddings (2014: 6) states that by understanding learning styles, educational institutions can design programs based on a combination of learning styles. This also impacts on the longevity of different fields of discipline and the program.

1.5.2 The student nurse

For the learner, knowledge and maintaining awareness of a particular learning style has an impact on learning outcomes. The learner can use their learning styles as tools which give them power to achieve learning and knowledge acquisition (Giddings 2014: 7).

1.5.3 The nursing profession

The student that is empowered in knowledge of his/her learning style will assist in creating a more confident and competent professional. Self-knowledge of ones learning styles and that of others will enhance learning, communication and management of teams with a balanced skill mix for specific tasks (Sreenidhi and Tay 2017: 24).

1.5.4 Research

The study will add to the research spectrum in nursing education. It seeks to help in filling the gap regarding the lack of research in learning styles in the South African context.

1.6. Research objectives

- To determine the preferred learning styles used by first and third year nursing diploma students at a college in KwaZulu-Natal.
- To determine the differences between first and third year student nurses with regard to their learning style preferences.

1.7. Research questions

- What are the preferred learning styles of first and third year nursing diploma students from KwaZulu-Natal College of Nursing?
- What are the differences between first and third year student nurses with regard to their learning style preferences?

1.8. Conceptual framework

Nurse educators need to have insights of students with different learning styles, and it is important to include a variety of instructional methodologies to accommodate different learning styles.

Fleming and Mills (1992: 137-155) developed a sensory-based type of learning styles framework that will be used in this study. The conceptual framework points to a preferred physical sense involved in the process of learning, indicated in the four categories of Visual, Auditory, Read/Write and Kinaesthetic. Fleming and Mills (1992: 141) formed an acronym from the letter of each category or modality, calling their typology VARK. Their model presumes that one modality could be dominant for a learner, or they could have more than one preferred modality.

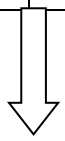
The sensory-based model assesses the outermost layer of Curry's onion ring model (Figure 2.1) which is said to be more flexible, and could more possibly be affected by external factors (Mitchell, James and D'Amore 2015: 2). The assumption can thus be made that learners' preference for the way they receive and process information changes over time according to factors such as age and previous experience. A recommendation by Fleming and Mills (1992: 146) is correlation studies including age, gender and race parameters of the results from the VARK analysis.

Fleming and Mills (1992: 139) argue that determining learning style preferences using VARK serves as a catalyst for reflection. It encourages learners to reflect on the nature, extent and implications of their sensory modalities and as a consequence modify their existing learning activities to assist their learning. Fleming and Mills (1992: 145) further state that, the VARK model provides a simple but effective framework to reflect on how they present information for educators as well. It also serves to increase the sensitivity of educators to the potential for sensory modal diversity in the classroom.

The conceptual framework (Figure1.1) indicates factors that could possibly influence learning style preferences of the student nurse. Depending on the favoured learning style preferences, learning style activities corresponding to those that can be taken into account when a lecturer is preparing lesson plans.

LEARNER

FACTORS THAT COULD INFLUENCE LEARNING STYLE PREFERENCE					
Level of study	Age	Gender	Ethnicity	Language	Previous tertiary education



VARK LEARNING STYLE PREFERENCES AND ASSOCIATED LEARNING ACTIVITIES			
VISUAL	**AURAL**	**READ/WRITE**	**KINAESTHETIC**
"Prefer the use of images, maps, colours, colour coding, handouts, charts, diagrams, illustrations and videos Neat, tidy, excellent spellers, quick readers , like to have a quiet place to study, remember visual details with ease, see and visualize" (Zhang 2016: 75)	"Prefer the use of sounds, music, lectures , presentations, group discussions, oral explanation to learn new content Slow speakers, natural listeners , listen and verbalize" (Zhang 2016: 75)	"Prefer the use of words, written texts, lecture notes to learn new information Tend to be good note takers , readers and are able to translate abstract concepts into words and essays" (Zhang 2016: 75)	"Prefer the use of tactile representations of information , hands-on experiences, to learn new information Learn through trial and error" (Zhang 2016: 75)

Figure 1.1: Framework of VARK learning styles and associated learning styles, and factors that may play a role in learning style preference

1.9 Operational Definitions

Learning style: The manner in which and individual understands, processes, stores and recalls information (Farooque, Mustafa and Mohammad 2014: 1445).

Learning style preference: The learning style that is most favoured by an individual and allows for the most efficient and effective processing of knowledge (Rahman *et al.* 2017: 12).

Sensory modality: Learning style categories that are associated with specific senses, namely: Visual, Aural, Read/Write and Kinaesthetic (Whillier *et al*. 2014: 21).

Student or learner nurse: An individual that is undergoing education and training in nursing and is registered with the South African Nursing Council as a learner nurse (South Africa, Department of Health 2005: 27).

1.10 Conclusion

In this chapter the introduction, background, aims, objectives and the significance of the study was outlined. The problem statement highlighted the need for the study. In Chapter 2 a review of the literature on this topic will be presented. Chapter 3 focuses on the methodology, Chapter 4 the results of the study and Chapter 5 will detail a discussion of the results, recommendations and conclusion of the study.

CHAPTER 2: LITERATURE REVIEW

2.1. Introduction

This chapter outlines the literature review conducted by the researcher. The concept of learning styles is elaborated on, giving various explanations and descriptions from different authors and researchers. There are numerous learning style theories and models. For this review, selected learning style models are expounded. The researcher sought to determine from previous studies how learning styles could have a positive impact on nursing education and if there are factors that may influence learning style preferences. The literature review further contains a critique of learning styles, which are outlined in this chapter.

2.2. Learning styles defined

Research indicates various definitions of learning styles by authors and theorists. Bhat (2014: 14) mentions that the 'learning style' concept was first introduced by Rita Dunn in 1960, and recently this concept has gained a lot of importance in the field of education.

Rahman *et al* (2017: 12) described a learning style as a "complex process of perceiving, processing, storing and retrieving information". Katowa-Mukwato *et al*. (2017: 83) stated that a learning style is a student's unique approach to learning and is based on his/her perception of a situation. Learning styles deal with the approach to learning, the way in which individuals interact in the learning/teaching situation, and the best way in which learning occurs Aina-Popoola and Hendricks (2014: 1). Like Rahman *et al.* (2017: 12), Sarabdeen (2013: 2) states that learning style was developed by researchers to group learners according to the way that they perceive and process information. Sarabdeen (2013: 1) simply defines a learning style as an individuals' approach or way of learning.

Nasiri, Gharekhani and Ghasempour (2016: 2340) described a learning style as a regular and unique behaviour to acquire information, skills and feedback through study and experience; it is the most apt and effective learning method for every learner. Thus, every student has a personal style for obtaining, computing, saving and recalling new information.

Andreou, Papastavrou and Merkouris (2013: 2) definition of learning styles states that they are building blocks within any educational component, characterized by the regular cognitive and affective responses which ascertain how a student interacts in a teaching and learning setting. Abdulghani *et al.* (2016: 2) stated that learning styles is a person's natural, usual and preferred way of assimilating, internalising and retaining acquired information and abilities. AlKasawaneh (2013: 1546) mentions that different definitions point to an agreement that a learning style is an individual's preferred way of learning. Furthermore, that a learning style choice is about the manner in which individuals exchange knowledge and it involves the sensory modalities such as aural (obtaining knowledge by hearing), visual (obtaining knowledge by use of sight), and kinesthetic (obtaining knowledge by active participation).

2.3. Learning style theories and models

Several learning styles models and theories have been used in research. The different models and theories vary in dimensions and characteristics, focusing on different aspects. Some of the aspects that they focus on are cognitive processes, personality traits, sensory modalities, learning processes and thinking styles (Boström and Hallin 2013: 23).

Dziedzic *et al.* (2013: 973) noted that there are up to 70 theoretical models related to learning styles, and more than 50 are grouped into 5 families or categories:

- Learning styles and preferences are biologically determined, including sense modalities and cerebral hemisphere lateralization e.g. Dunn-Dunn, VARK.

- Learning styles reflects characteristics of cognitive structures and includes a sequence of abilities e.g. Riding.
- Learning styles are one component of a fairly stable personality type e.g. Myers-Briggs.
- Learning style preferences of an individual expresses flexibility in learning e.g. Honey and Mumford, Kolb.
- From learning styles, the focus on learning approaches, orientations of learning and conceptions of learning e.g. Entwistle.

The 'onion ring' model was developed by Curry (1983: 1-28) in an effort to determine a framework for many learning style models. The hypothetical onion has various layers: the inner-most layer consisting of a cognitive personality style, followed by outer layers of information processing style, social interaction and instructional preference (outermost layer). The innermost layer is considered the most stable, while the least stable is the outermost layer which is therefore the most easily affected by extrinsic determinants. Figure 2.1 below illustrates Curry's onion ring model.

- A cognitive learning style is the learner's approach to adapting and assimilating information; the Myers-Briggs Type Indicator (MBTI) is an instrument based on this layer
- An information processing style is the learner's manner of understanding information; this is the basis of Kolb's Learning Style Inventory (LSI), the Gregorc Style Delineator, and Honey and Mumford's Learning Styles Questionnaire (LSQ)
- Instructional preference is the learner's choice of environment in which education takes place; The VARK learning style model that uses the VARK (Visual/Aural/Read-Write/Kinaesthetic) questionnaire based on this aspect of Curry's model. The VAK (Visual, Aural, Kinaesthetic) questionnaire and Dunn and Dunn's Productivity Environmental Preference Survey (PEPS) are also based on the instructional preference layer

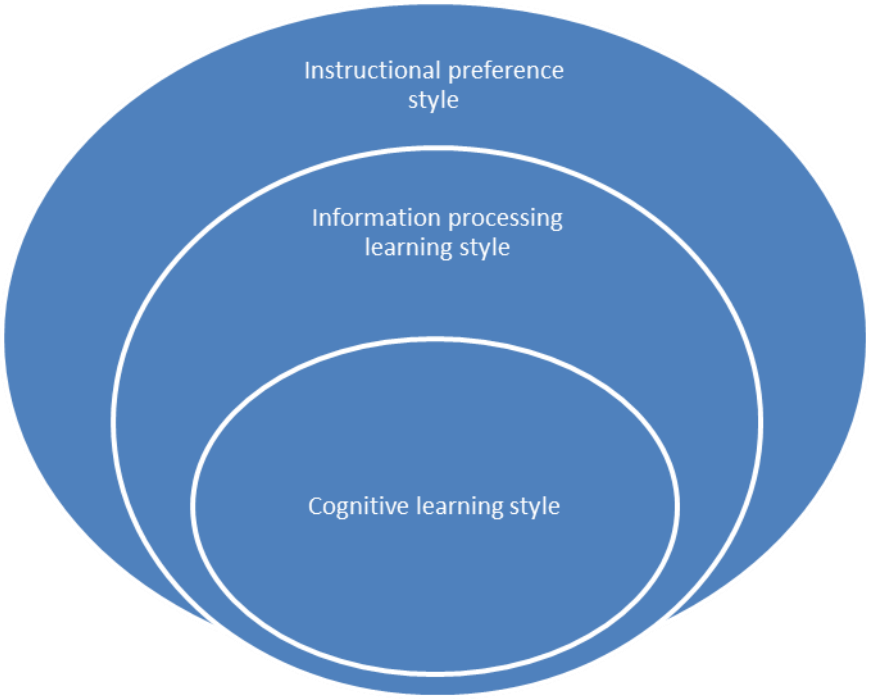


Figure 2.1: Curry's Onion Ring Model

2.3.1 Cognitive or personality type learning styles

2.3.1.1 Myers-Briggs Type Indicator (MBTI)

The Myers-Briggs Type Indicator (MBTI) was developed by Isabel Myers and Katherine Briggs to ascertain how individuals process information, make decisions and relate to others. The MBTI is based on the personality theory of Carl Jung, and has been widely used in education to identify learning styles. It is extensively used in the corporate world mainly to ascertain an individual's personality (Fisher 2015: 11).

According to Li *et al*. (2014: 230), the most stable level of Curry's 'onion' model is the cognitive personality aspect because there is less interaction with the environment, and is more appropriate for predicting behaviour. This aspect of Curry's model can be assessed using the Myers-Briggs Type Indicator (MBTI) personality test. Li *et al*. (2014: 230) state that "cognitive personality models measure pervasive and holistic dimensions of personality, which can be assessed by individual learning styles". The MBTI has four scales of paired

dichotomies, namely: extraversion/introversion (E/I), sensing/intuition (S/N), thinking/feeling (T/F), and judging/perceiving.

This tool consists of 126 items, with information on four sets of preferences, resulting in 16 possible personality types. The instrument identifies preferences according to opposing preferences on four scales (Myers 1962).

Li *et al*. (2014: 229-230) investigated the relationship between learning styles and academic performance among student nurses and found, in-keeping with previous research, that learners with the judging personality types tend to achieve better academically as opposed to perceivers. Judging type learners are more interested in making decisions promptly, structure and closure, which influences commitment to academic goals (Li *et al*. 2014: 235). It was also found that learners with a thinking preference performed better academically. This is attributed to critical thinking skills involving objectivity over personal values. The overall results indicated that although all personality types are evident in nursing students, learners with thinking and judging personality types are more likely to enter the profession, as individuals with similar personality types tend to gravitate towards similar professions.

2.3.2 Information processing learning styles

2.3.2.1 Kolb's Experiential Learning Style Model

David Kolb published his learning style model in 1984 after developing it many years prior. In his work, Kolb recognizes research on experiential learning by others, including Rogers, Jung and Piaget (Kolb and Kolb 2005: 194). The model resulted in related terms e.g. Kolb's experiential learning theory (ELT), Kolb's learning style inventory (LSI) (Kolb 1985).

Kolb's model describes learning as a process. His theory emphasizes the importance of experience in learning. Experiential learning addresses the cognitive, emotional and physical aspects of learners. On the basis of this holistic approach, he created a Learning Style Inventory according to how learners perceive and process information (Kolb 1984: 41). Kolb asserted that

an individual must first encounter a new experience, and then reflect upon the experience. This leads to a new view or concept as a result of the person analyzing and deducing upon their reflection. The individual will then apply the new idea or conclusions to their surrounding world (Haswell 2017: 5-6).

Manolis *et al*. (2013: 45) explained that Kolb's model is based on six propositions or principles, namely that:

- Learning is best conceived as a process, as opposed to outcomes.
- Learning is a continuous process that is grounded in previous experience and knowledge.
- Learning needs the settlement of differences between conflicting methods of adjusting to the world.
- Learning is a comprehensive process that involves adjustment to the environment.
- Learning requires harmonious interactions between the learner and the learning situation.
- Learning is the method of producing understanding that leads to education.

According to Kolb's experiential learning theory (learning styles model) there are four distinct learning styles which are based on a four stage learning cycle. Experiential learning follows a cycle which starts with the acquiring Concrete Experience (CE). Reflective Observation (RO) follows on that experience. From this awareness a theory or Abstract Conceptualisation (AC) is created, which is then applied through Active Experimentation (AE) (Mitchell, James and D'Amore 2015: 3). Learning cycle stages are described by Mitchell, James and D'Amore (2015: 3) as:

- Concrete Experience (CE) – Learners scoring high on CE tend to rely a lot on feeling-based judgement and are sensitive towards people. They are mostly extroverts who are more oriented towards their peers than to authority figures; therefore they benefit more from engaging with fellow learners than with lecturers.
- Reflective Observation (RO) - Learners who score higher on RO tend to have a more impartial and reflective direction towards learning. They are

more cautious when making judgements and view things from different angles, searching for meaning in things.

- Abstract Conceptualization (AC) - Learners who score high on AC on the inventory rely more on logical thinking and analysis of concepts. They tend to plan systematically and engage in rational evaluation. They prefer working more with symbols and things than with people, and they learn best in detached, authority- directed situations.
- Active Experimentation (AE) - A learner scoring high on AE is more hands-on, prefers practical experimentation, is a risk-taker and can influence others through action. Learning occurs best with projects, group discussion, homework and so forth.

With experimentation, new concrete experiences surface, therefore the cycle continues. Different abilities are important for each stage of the cycle. This leads to the notion that individuals have different abilities and learn differently, thus having different learning styles. Bhat (2014: 16) described Kolb's four learning styles, each being a combination of two preferred learning stages:

- Divergers (CE/RO) – they use their imagination well. They are reflective and creative, and see the long term implications of things. They excel at viewing concrete situations from different viewpoints. They enjoy group work, collecting information, the use of imagination for problem solving, and are people oriented. They are able to create new ideas.
- Assimilators (AC/RO) – are more focused on abstract ideas, figurative representations and concepts than people. They prefer theory over the practical value of a lesson. They pay attention to detail, like reading, lectures and exploring analytical models.
- Convergers (AC/AE) – they are good at applying ideas practically. They can problem solve, analyse and apply new ideas. They tend to be less concerned with people and interpersonal situations. They like to work with practical applications, are task oriented and want to get results. They carefully pursue instructions with accuracy
- Accommodators (CE/AE) – they enjoy getting things done and adapt well to changes. They rely on intuition rather than logic. They tend to ask a lot

of questions, enjoy challenges, taking risks and new experiences. These learners are more people oriented, preferring group work- depending on others for knowledge rather that their own capabilities

Sarabdeen (2013: 3) deduced the best possible learning activities and their corresponding characteristics for each learning style in Table 2.1 below.

Table 2.1 Characteristics of learner and best suited learning activities for Kolb's learning styles (Sarabdeen 2013: 3)

Kolb's Learning Styles	Characteristics of learner	Learning Activities
Diverger (Concrete Experience/ Reflective Observation)	Imaginative Provide innovative ideas	Traditional classroom based activity Brainstorming Reflective activities Lectures Rhetorical questions
Assimilators (Abstract Conceptualization/ Reflective Observation)	Uses inductive reasoning "private learners"	Prefer print-based work
Converger (Abstract conceptualization/ Active experimentation)	Practical application of ideas by deductive reasoning Good problem-solvers	Small group discussion Classroom participation Computer- based training
Accommodators (Concrete Experience/ Active experimentation)	Good at actually doing things	Like to experiment- hands on Role-play Games Computer based simulation Computer-based work

The instrument that Kolb uses to assess learning styles is called the Learning Style Inventory (LSI) (Kolb 1985). The LSI is a 12 item questionnaire; each item has four options and each option is ranked by the participant to determine his or her learning style (Yanardöner *et al*. 2014: 594). The Kolb Learning Style Inventory was used by Yanardöner *et al*. (2014: 591-600) to examine the learning styles and personality traits of undergraduate education students at a university in Istanbul. The study revealed that the Assimilator Learning Style was dominant. The study further revealed that there was no association between learning styles and personality traits.

2.3.2.2 Honey and Mumford's learning styles model

Honey and Mumford Learning Style Questionnaire (LSQ) is grounded in Kolb's experiential theory, which emphasises the value of experience in learning (Aziz *et al.* 2013: 820). Like Kolb's learning styles model, depending on the situation, it allows for flexibility (Aina- Popoola and Hendricks 2014: 4). Aina-Popoola and Hendricks: (2014: 4) explained that Honey and Mumford identified four mutually dependent stages in the cycle of learning. Each of the four stages corresponds with a specific learning style. The four learning stages and corresponding learning styles are:

- Having an experience - Activist
- Reviewing the experience - Reflector
- Concluding from the experience - Theorist
- Planning the next steps - Pragmatist

Sarabdeen (2013: 4) described the characteristics and the corresponding best suited learning activities for each of Honey and Mumford's learning styles, as described in Table 2.2.

Table 2.2: Characteristics and best suited learning activities related to Honey and Mumford's cycle of learning and learning styles (Sarabdeen 2013: 4)

Cycle of Learning	Learning Style	Characteristics	Activities
Stage 1: Experiencing	Activists	Learn by doing and participation Hands on experience	Brainstorming problem-solving group discussions/teamwork puzzles role play
Stage 2: Reviewing	Reflectors	Learn by observing and thinking before action Cautious Listen well	Self- analysis questionnaires Paired discussions Interviews feedback coaching
Stage 3: Concluding	Theorists	Prefers to find the logic and theory when approaching problems They like to analyse and synthesise new information.	Analysing, evaluating and generalising information Statistics Models Background information Applying theories
Stage 4: Planning	Pragmatists	Keen to try ideas and techniques to see if they can be applied to practice Link subject matter with reality	Practical decision making Problem solving Case study discussion

Honey and Mumford (2000) developed the Learning Style Questionnaire (LSQ) which consists of 80 tick box questions – each of which has four categories of 20 items. Each category measures each of the four learning styles of activist, reflector, pragmatist and theorist (Bhalli, Khan and Sattar 2015: 838). A study of learning styles of medical students and its correlation with teaching methods and academic achievement was conducted by Bhalli, Khan and Sattar (2015: 837-842), utilizing the Honey and Mumford Learning Styles Questionnaire. The study revealed that the majority of the students had reflector (46, 8%) and pragmatist (37, 3%) learning styles. The study further concluded that there was no significant correlation between learning styles and teaching methodologies and learning styles and academic scores.

2.3.3. Learning styles based on instructional preference

2.3.3.1 Dunn and Dunn Learning Styles Model

This theory focuses on receiving challenging and different knowledge. It is a widely researched learning styles model (Boström and Hallin 2013: 22). The foundation of the theory is that individuals have a peculiar set of biological and developmental traits, a person learns new information and those skills are exclusive to that individual (Bhat 2014: 15). The aims of the Dunn and Dunn Learning Style Model is to improve the performance of learners, and to improve teaching through identification and matching of individuals' learning styles with effective teaching strategies (Dunn and Dunn 1979: 238). Dunn and Griggs (2000: 11) stated that the model is based on the assumptions that:

- Most people can learn.
- A learning environment, resources and approaches respond to diverse learning styles.
- All learners have different strengths.
- learning preferences can be measured,
- If learners are in an empowering environment and have the resources, they can be successful in their learning.
- Lecturers can use learning styles as a basis for instruction.
- Learning style strengths can be used by learners when dealing with difficult or new learning material.

The Dunn and Dunn's Learning Style Model is divided into five learning style stimuli, each of which has specific elements, as described in Table 2.3.

Table 2.3 Dunn and Dunn learning style stimuli and correlating elements (Bhat 2014: 35)

Learning style stimuli	Elements within stimuli
Environmental	Sound - Some learners need complete silence others need sound Light - Some prefer more, whilst others prefer less illumination Temperature - some learners are more comfortable in a warm environment, others prefer a cooler place Room design - furniture and layout of learning space
Emotional	Motivation Persistence - ability to multi-task Responsibility - ability to conform Structure - need for precise instruction
Sociological	Learning alone Learning in pairs Learning with peers Learning with a teacher/ authorities
Physiological	Perceptual - visual (pictures, videos); auditory(music, lectures); kinaesthetic (tactical, hands-on) Intake - food and drink consumption Time of day that learning takes place Mobility - desire to move around during learning
Psychological	Global (focus on overall topic e.g. short stories, illustrations) vs. analytic (learn all parts of the information by bringing little pieces together) Hemispheric (Left side of the brain –more dominant use with analytical learners, or right side of the brain-dominance associated with global learners) Impulsive (make quick decisions) vs. reflective (consider all options or before decision making)

The Dunn and Dunn learning styles in adults are assessed using the Productivity Environmental Preference Survey (PEPS) (Dunn, Dunn and Price: 1984). It is a 104 item self-report questionnaire with a five-point, agree-disagree Likert scale. It is scored using a computer assisted scoring programme (Boström and Hallin 2013: 23).

A comparative study of learning style differences between nursing and teaching students was conducted in Sweden by Boström and Hallin (2013: 22-34). Twenty subscales of the Productivity Environmental Preference Survey (PEPS) were used to identify the learning style preferences on 78 teaching students and 78 nursing students. The findings showed distinct dissimilarity between the two groups. A higher number of teaching students were found to be more persistent, whereas nursing students were more highly motivated, kinaesthetic, and

preferred authorities. The study alluded to the assumption that since motivation stems from interest, nursing students are more likely to select nursing as their initial choice. Teaching modules have low registration rates in Sweden, therefore the profession is not considered to have a high status. The study showed that nursing students preferred the Kinaesthetic learning-practical/doing learning approach. Boström and Hallin (2013: 22) further discovered that more student nurses than student teachers had a greater need for authority, and reported that a likely explanation for this finding was that nursing entails critical situations, and is controlled by legislations and regulations.

2.3.3.2 VARK Learning Style Preferences

Fleming and Mills introduced a learning styles model that was based on the preferred physical senses that are involved in the process of learning and they named their typology 'VARK'. VARK is an acronym for the four sensory based modalities that are utilized by an individual to assimilate knowledge, namely, Visual, Aural, Read/write and Kinaesthetic as discussed above (Fleming and Mills 1992: 137-155). Fleming believed that it was important for learners, instructors and general society to know and understand their unique way of learning. Fleming also believed that understanding and including all learners' instructional preferences in the classroom would create a more equal and successful classroom (Haswell 2017: 5). An important advantage of the VARK instrument is that the questions are focused on actual scenarios so that the respondents can identify with them easily (Sinnerton, Leonard and Rogers 2014: 3). Fleming (1995: 1-2) explained that the options for the answers on the questionnaire are coded into a four part typology, with each part representing the Visual, Aural, Read/Write or Kinaesthetic sensory modality respectively. Peyman *et al.* (2014: 1) outlined the three principles upon which it is based: 1). everyone has the ability to learn, and have their own learning styles, 2). the individual's motivation to learn becomes greater when their learning style is considered and 3). Educational ideas are learned through the use of senses and different insights. The outer 'instructional preference' style layer of Curry's onion ring model is assessed by the VARK Questionnaire (Mitchell, James and D'Amore 2015: 2). Table 2.4 below describes the VARK learning modalities and

the learning materials and activities that an individual would have a preference for as per modality.

Table 2.4: VARK modalities and their associated learning materials and activities

VARK learning style modalities	Associated learning materials and activities
Visual Visual learners process information best from sight. They prefer viewing the learning materials that are presented to them (Katowa-Mukwato *et al*. 2017: 84). Zhang (2016: 74) mentions that some may even have photographic memories. These learners could learn more easily if content was presented to them more photographically. Zhang (2016: 74) also states that lecturers need to show the relationship between concepts using visual forms when teaching these learners.	Demonstrations Videos Graphs Maps Diagrams Charts Chalkboard Presentation slides
Aural Aural learners attain high quality output when information is heard (Zhang 2016: 74). Katowa-Mukwato *et al*. (2017: 84) acknowledges that aural learners, unlike read/write learners prefer listening to lectures before reading lecture notes. They also have excellent listening skills.	Lecture In-class discussion Group presentation Audio recordings
Read/Write Read/write learners are excellent at dealing with written words. They perform well when they are expected to read or write information because they save information as organized in sets of symbols which they can easily remember when required (Katowa-Mukwato *et al*. 2017: 84).	Textbooks Note-taking Lecture handouts
Kinaesthetic Kinaesthetic learners learn best when they can touch or operate learning materials and they enjoy active participation (Katowa-Mukwato *et al*. 2017: 84). They are also referred to as tactile learners, utilizing bodily movements and touch sensations to learn. They learn through movement and doing (Zhang 2016: 74).	Experience Case studies Laboratory activities Modeling Simulation Field trips

The VARK instrument allows for respondents to choose 1 or more options for each question. A respondent may thus prefer only one learning style such as read/write (R), or a combination of 2 or more learning styles. A learner that has a preference for a single learning style is referred to as unimodal and a learner that prefers 2 or more learning styles is referred to as multimodal.

2.4 Factors that may influence a preferred learning style

The SANC (2014: 2) states that facilitation of learning in nursing should recognize and manage multicultural, gender and educational background influences on teaching and learning. A recommendation from a South African study on learning styles indicated that various ethnic groups, language groups, and rural and urban groups can give important data about learning style preferences and their variations amongst students (Rudman, de Beer and Olurundju 2015: 27). Elkalmi *et al*. (2015: 266) support the notion that variables such as age, culture, gender, and experience could influence the learning style preferences of students. In a study conducted in the United States differences in learning styles amongst African American, Asian American, White and Hispanic/Latino nursing students were reported (Fogg *et al*. 2013: 393). The researchers of this study recommended further investigation into the relationship between ethnicity, race and learning styles of nursing students.

Muralidhara, Simbak and Nor (2013: 22-30) stated that the results of their study showed that female medical students had more diverse learning style preferences, having multimodal VARK combinations compared to male students. In a study conducted in Pakistan, Mehta and Rouf (2013: 302) reported no significant statistical differences between learning styles and gender or linguistic background.

In South Africa, our student nursing population is diverse in terms of culture and background as is our general population. A gap in present literature from a South African perspective indicates a need for more investigation into these factors pertaining to learning style preferences of nursing students.

2.5 Critique of learning styles

Some literature indicates that there are opponents of learning styles that claim that there is not enough scientific evidence and research, even to the point that learning styles do not exist! Giddings (2014: 4) states that opponents of learning styles believe it stereotypes students and that it should not be used in educational practices. Willingham, Hughes and Dobolyi (2015: 269) claim that learning styles categorises students implying that it uses a few features to infer that other characteristics can improve the learning experience. They state that psychologically there are very few positive outcomes in categorising students. Cuevas (2015: 23) further notes “Good teachers develop a variety of ways to present their content over the years and treat each student as a unique individual without pigeonholing them into unfounded categories”. Although, the author went on to point out that the learning styles hypothesis is “not completely debunked” and that additional research that “tests the matching hypothesis for interaction effects” is required to add to the body of knowledge (Cuevas 2015: 23).

Newton (2015: 1-5) describes learning styles as a ‘neuromyth’. He conducted a study that analysed literature to determine the research evidence that supported the use of learning styles in education. Despite the overall endorsement of learning styles in the overwhelming literature available, that there was a lack of evidence to support the use of it (Newton 2015: 2). Newton (2015: 5) however admits that a limitation to his analysis as a single researcher is the subjective judgement of whether or not to endorse the utilization of learning styles.

Kirschner (2016: 170) criticised the use of learning styles due to the assumption that individuals have unique learning style preferences; many problems exist with regards to the measurement of learning styles, the theoretical basis for the relationship between learning styles and teaching methods not adequate and there is very little significant empirical evidence for the learning style hypothesis.

Giddings (2014: 5) disputes the opposing arguments for learning styles by arguing that a deficiency of valid and reliable research about the existence of learning styles simply means that there is a need for further research, it does not mean that they do not exist.

2.6 The value of learning styles in nursing education

Different learning styles which a learner brings into the learning environment are fundamental to an educator's instruction approach (Giddings 2014: 6). Knowledge of students learning styles can help improve teaching techniques, because the lecturer can adapt or modify teaching strategies to suit learning styles of the student. Determining student's learning styles will thus empower educators and broaden the body of knowledge in nursing education.

Accurate and efficient assessment of learning styles can allow for faculty to consider learning styles when developing curricula, thus lecturers could possibly expand the efficacy of their teaching, particularly with regards to practical learning which is a fundamental aspect of nursing education (Manolis *et al*. 2013: 51). Giddings (2014: 6) states that by understanding learning styles, educational institutions can design programs based on a combination of learning styles. This also impacts on the longevity of different fields of discipline and the program.

Knowledge and maintaining awareness of a particular learning style has an impact on learning outcomes for the student. The student can use their learning styles as a tool which gives them power to achieve their learning and knowledge acquisition (Giddings 2014: 7).

Nurse educators strive to ensure that students use their full potential in order to achieve the best academic performance. Understanding how students learn and utilising this knowledge in the teaching process can only enhance the learning experience of the student.

2.7 Research on learning styles

Numerous studies have been conducted in various countries using different learning styles instruments. Frantz and Mthembu (2014: 1814-1827) conducted a study with the aim of determining common learning styles of student nurses and the suitable teaching styles needed. Their initial search using the key words 'learning styles' yielded 4835 articles. This number was reduced to 178 when

the key words “undergraduate nursing students” was added. These 178 articles were descriptive studies that aimed to ascertain the learning styles of undergraduate student nurses and included data on the validity and reliability of the instruments used to assess the learning styles. After further screening 11 articles were used in the review representing four continents. Although the research by Frantz and Mthembu (2014: 1814-1827) was conducted in South Africa, the study itself found no articles from South Africa or Africa regarding learning styles. Khanal, Shah and Koirala (2014: 1-8) conducted an analysis of studies on preferred learning styles in medical education where the VARK tool was utilised. Twenty multinational full text research papers were reviewed for the study and they reported that most of the research papers showed that the multimodal learning styles were preferred to unimodal styles. The study further concluded that the Kinaesthetic modality was the most preferred unimodal learning style, with Visual, Aural, and Read/ Write being preferred to a lesser extent. The review of studies using the VARK assessment tool by Khanal, Shah and Koirala (2014: 1-8) was done with the expectation that it would be helpful as verifiable empirical evidence in the medical discipline of higher education.

Literature reviewed for the current study also indicated a gap in the research on learning styles from Africa. The search for current (last five years) literature regarding learning styles only yielded four African studies, including Frantz and Mthembu (2014). Internationally, research on learning styles is extensive, spanning various countries. Table 2.5 below indicates some of the studies completed on learning styles using various learning style models and instruments. The studies listed were conducted from 2013 to 2018 in the health sciences field.

Table 2.5: Previous studies conducted on learning style preferences

Author	Title of study	Year	Country	Learning style Instrument used	Type of study	Summary of findings
Bhatti, Malik and Amjad	"Identifying and comparing the different learning styles of health professional students"	2013	Pakistan	Kolb's Learning Style Inventory (LSI)	Descriptive cross sectional study	Assimilator: 32%, Accommodator: 15.2%, Converger: 15.2%
Aziz *et al.*	"Learning style preferences of pharmacy students"	2013	Malaysia	Honey and Mumford's Learning Style Questionnaire (LSQ)	Cross sectional survey	Reflector: 60.4%, Theorist and Pragmatist: both 8.8% each, Activist: 6.2%
Williams and Brown	"Learning style preferences of undergraduate pharmacy students"	2013	Australia	Kolb's Learning Style Inventory (LSI) Felder and Solomon's Index of Learning Styles(ILS) Success Types Learning Type Indicator(STLSTI)-derived from Myers - Briggs Type Indicator (MBTI)	Cross sectional survey	Assimilator, Active-Reflective and Intuitive, Feeling, Judging (INFJ) and Extroverted, Intuitive, Feeling, Judging (ENFJ) found to be the most frequently preferred learning styles
Abdollahimohammad and Ja'afar	"Learning style preferences of nursing students at two universities in Iran and Malaysia"	2014	Iran and Malaysia	Learning Style Scale (LSS)	Descriptive-comparative study	Malaysian learners: more sociable and analytic Iranian learners: more solitary and perceptive
Hallin	"Nursing students at a university- a study about learning preferences"	2014	Sweden	Dunn and Dunn's Productivity Environment Preference Survey (PEPS)	Descriptive cross sectional study	Majority : flexible, High structure: 75%, Authority figure present: 40%, Auditory, tactile , kinaesthetic: 33.3%, Visual: 8%

						No significant differences between learning styles and age, assistant nurses graduation Females more than males were highly motivated, auditory tactile and kinaesthetic, preferred structure and mobility
Yanardöner *et al*.	"The learning styles and personality traits of undergraduates : a case at a state university in Istanbul"	2014	Turkey	Kolb's Learning Style Inventory (LSI)	Descriptive cross sectional study	Assimilator: 46%, Diverger: 23.2%, Converger: 22.3%, Accommodator: 8.5% No significant relationship between learning styles and gender , department and Grade Point Average (GPA) No significant relationship between learning styles and personality traits
Li *et al.*	"An exploratory study of the relationship between learning styles and academic performance among students in different nursing programmes'	2014	Taiwan	Myers -Briggs Type Indicator (MBTI)	Descriptive and exploratory design	Introversion, Sensing, Thinking, Judging (ISTJ) and Introversion, Sensing, Feeling, Judging(ISFJ) found to be the most frequently preferred learning styles
Elkalmi *et al.*	"Assessment of learning style	2015	Malaysia	VAK (Visual, Aural, Kinaesthetic)	Cross sectional survey	Unimodal: 94.07%, Multimodal: 5.93%

	preferences of pharmacy students : findings from a public university of Malaysia"			Questionnaire		There was no statistical significance between learning styles and Gender, residency, number of siblings and parents income
Fisher	"An investigation of learning style preferences of nurses training at two nursing schools in public health facilities in Cape Town"	2015	South Africa	VARK	Descriptive cross sectional study	Multimodal: 70.2%, Unimodal: 29.8% Kinaesthetic dominant learning style preference
Rudman, de Beer and Olorundju	"Learning styles of first year occupational therapy students studying at a university in South Africa"	2015	South Africa	Felder- Soloman's Index of Learning Styles Index(LSI)	Descriptive study	Sensing, visual , active and sequential most representative with active being the most dominant
Yousef	"The use of the learning styles questionnaire (LSQ) in the UAE"	2016	United Arab Emirates	Honey and Mumford's Learning Style Questionnaire (LSQ)	Descriptive cross sectional study	Reflector: 84%, Theorist: 78%, Activist: 67%, Pragmatist: 60%
Nasiri, Gharekhani and Ghasempour	"Relationship between learning style and academic status of Babul Dental Students"	2016	Iran	VARK	Cross sectional survey	Multimodal: majority of students, Unimodal: one student Significant difference between the mean of final exam scores in students with visual learning style preference than those without No significant differences in preferred

						learning styles between male and female students
Ibrahim and Hussein	"Assessment of visual, auditory and kinaesthetic learning styles among undergraduate nursing students"	2016	Iraq	VAK (Visual, Aural, Kinaesthetic) Questionnaire	Descriptive study	Visual: 40.0%, Aural: 29.5%, Kinaesthetic: 30.5% Females preferred aural learning style (30.3%) more than males (27.3%), and males preferred kinaesthetic learning style (32.3%) more than females (29.8%)
Katowa-Mukwato *et al.*	"Learning styles and intelligence types versus academic performance of nursing students of the University of Zambia"	2017	Zambia	VARK	Descriptive correlation study	Unimodal : 82.6%, Majority kinaesthetic: 35.5% Learning styles had no significant association with academic performance
Alharbi *et al.*	"The learning preferences among nursing students in the King Saud university in Saudi Arabia; a cross sectional study"	2017	Saudi Arabia	Felder-Silverman Learning Style Model (FSLSM) questionnaire	Descriptive cross sectional study	Visual: 67.9%, Active: 50%, Sequential: 37.5%, Verbal: 3.6% No relationship between gender and learning style preference
Rahman *et al.*	"Medical undergraduates preference in learning style; a single institute experience in Bangladesh"	2017	Bangladesh	VARK	Descriptive cross sectional study	Multimodal: 55.6%, Unimodal: 44.4% No significant association between learning style preferences and gender, academic background or

						year of study
Quinn *et al.*	"What type of learner ae your students? Preferred learning style of undergraduate gross anatomy students according to the index of learning styles questionnaire"	2018	USA	Index of Learning Styles (ILS)	Cross sectional survey	Sensing (85.1%), visual(81.2%) , sequential (74.4%) and active(54.9%) and most representative
Sinha *et al.*	Determining the best learning method and gender preference of learning among first year medical students in an island institution: a cross sectional study	2018	India	VARK	Cross sectional survey	Multimodal: 88.42%, Unimodal: 11.58% Males and females preferred different learning style modalities
Almasi, Bavani and Mohammadpour	"Examining the preferred learning styles (PLS) of nursing and midwifery students of Urmia university of medical sciences"	2018	Iran	VARK	Descriptive cross sectional study	Visual most dominant sensory modality, Kinaesthetic least preferred modality No statistically significant relationship between learning style preferences and gender or field of study
Sharma and Wadhwa	"Learning styles of first year students of dentistry and its application in second year microbiology teaching-learning"	2018	India	VARK	Cross sectional survey	Multimodal: 62.8%, Unimodal: 32.6% Kinaesthetic was the most preferred learning style modality

2.8. Conclusion

There are about 70 different models and theories on learning styles, evidenced in literature. Specific instruments were created and are based on respective models. The VARK learning styles model that is based on sensory modalities is very popular in learning styles research. This instrument is easy to understand and contains everyday situations in the questions. Very few studies conducted using the VARK questionnaire compared learning styles of students at different levels in their study. Studies about learning styles indicate that, while this topic has been extensively researched internationally, there is a huge gap on this topic in Africa. Not much is known about the learning style preferences of South African nursing students, and no research were found in KwaZulu–Natal.

CHAPTER 3: METHODOLOGY

3.1 Introduction

A research methodology is the approach that is used to formulate a study, gather, examine and determine data that is pertinent to the research objectives (Polit and Beck 2012: 12). This chapter describes the methodology that was used to determine the learning style preferences of first and third year nursing students and the differences in learning style preferences between these two groups. The research design, paradigm, setting, population and sampling are described. The research instrument and the validity and reliability thereof are discussed. The data collection, data analysis process and ethical considerations pertaining to the study are presented.

3.2 Research design

A research design is a comprehensive arrangement that maps out a plan to answer the research questions. It describes the data collection method, the types of comparisons that will be made and indicates where the study will be conducted (Polit and Beck 2012:58).

In this study a non-experimental descriptive cross-sectional design was utilised. The study can be described as non-experimental because determining the learning style preferences of the target group did not involve manipulation of variables (Polit and Beck 2012: 223). The study was also not controlled. Research took place in a natural setting and it further sought to investigate factors that may have an influence on preferred learning styles (Polit and Beck 2012: 226). The study can further be described as a cross-sectional design as it sought to determine information from a representative sample of the population, namely; the learning styles preferences of first and third year nursing diploma students and data was only be collected once at one point in time (Polit and Beck 2012: 184). Quantitative data was collected in order to

meet the objectives of the study. Quantitative research involves investigating phenomena that involves precise measurements, the collection of numerical data and the use of an established instrument to analyze the information collected (Polit and Beck 2012: 739)

3.3 Research paradigm

Research in nursing is undertaken mainly within two broad paradigms, being positivism and constructivism. The most common paradigm in nursing research is positivism. The positivist paradigm assumes reality exists and evidence is provided through deductive processes and theory verification (Polit and Beck 2012:12-13). Quantitative research is mostly associated with the positivist paradigm because it involves a systematic and orderly process to acquire information, including the use of deductive reasoning.

In this study objective data was obtained by means of a questionnaire. Learning styles is an existing phenomenon and a statistical analysis was carried out to determine the preferred learning styles of the sample population. Also, the findings were not influenced by the researcher. Therefore, a positivist research paradigm is applicable to this study

3.4 Research setting

KwaZulu-Natal College of Nursing (KZNCN) is a college that is accredited by the South African Nursing Council (SANC) and is affiliated with the KwaZulu-Natal Department of Health. KZNCN has 10 campuses which are located in both rural and urban areas of KwaZulu-Natal. These campuses offer various nursing programmes including the four year diploma in nursing (R425). Of the ten campuses, five was used for the study to make up the sample size. The campus at which the researcher is employed was excluded to prevent any bias. The four other campuses were excluded from the study because one campus did not have a third year group at the time of data collection due to there not

being an intake in January 2015, and three campuses did not admit a group for the R425 programme in January 2017.

3.5 Population

A population is defined as the total collection of cases in which a researcher is interested (Polit and Beck 2012: 273). The target population chosen were first and third year students who were registered for the diploma in nursing at KZNCN. The total number of available population per group from the five selected campuses was first year students: n= 165 and those in their third year of study: n= 162. Prior to undertaking the research the total population inclusive of both groups was: n= 327 with a minimum of 262 students, allowing for a 20% attrition or absenteeism on the day of data collection.

Students in their first year of study were chosen because they had presumably not yet adapted to a new learning environment; have to deal with acculturation and with possibly being away from their normal home and support environment. Third year students would have possibly adapted to their learning environment and may have developed different learning styles as the course has progressed to accommodate the use and development of cognitive and technical skills. KZNCN examination results in Table 1.2 in Chapter 1 shows a disparity between examination results of first and third year students respectively.

3.6 Selection criteria

3.6.1 Inclusion criteria

Only first and third year students that were registered for the four year diploma programme at KZNCN were selected for this study. These groups were also more easily accessible for the study. First year students are new to the programme and students at third year level have already had two years of nurse training. The study sought to find any differences or similarities between individual learning styles of students at these two levels of study.

3.6.2 Exclusion criteria

Student nurses in their second and final year of study for the four year diploma programme were excluded because students at those levels of study they are often placed at various institutions for clinical community and psychiatric practica respectively, thus making the groups difficult to access for data collection.

All students that were registered for other nursing programmes, like the two year bridging programme, were excluded from the study.

3.7 Sampling and sample size

Sampling can be defined as the researcher's choice of objects, people or events from which the data needs to be drawn (Brink, van der Walt and van Rensburg 2012: 130).

A census sampling survey method was utilised. Polit and Beck (2012: 264) describes a census survey as one which includes an entire population. This sampling method was used to yield the largest possible sample size for the study. A greater number of respondents used in census sampling would result in a higher degree of statistical confidence in the results of the research. All consenting nursing students that were concurrently in the first semester of their first and third year of study respectively from the 5 campuses were included in the study.

The sample size for first year students in January 2017 was 145, and third year students 145. The total sample population was 290 students. The sample size was made up of all eligible students in the specified years of training and colleges identified in Table 3.1.

Table 3.1: Number of respondents per campus

Name of Campus	Number of first year students	Number of third year students
R. K. Khan	25	26
Benedictine	19	25
Ngwelezane	37	36
Addington	28	25
Greys	36	33
Total of 1st year and 3rd year students respectively:	145	145
Total number of respondents:	290	

3.8 Research instrument

Polit and Beck (2012: 191) describes a research instrument as being one that has been created or borrowed for the use of used structured data collection. It is a formal written document, such as a questionnaire, that is used to collect and record information. A self-administered learning styles questionnaire was utilized for this survey to obtain information to determine first and third year students learning style preferences, and to identify if there was any disparity in learning style preferences between the two groups. The instrument was divided into two sections: Section A which entailed demographic data, linguistic background and schooling history; and Section B which comprised of the VARK version 7.8 questionnaire that assessed learning style preferences. Permission was granted by the author, N.D. Fleming to utilize the instrument in this study (Annexure 9). Polit and Beck (2012: 295) assert that it is advantageous for a study to utilize an instrument that has previously been validated and used in similar research, thus assisting in the interpretation of findings in the study.

The final version of the VARK (Visual, Aural, Read/Write and Kinaesthetic) instrument was reviewed and approved by Fleming and it is now available as VARK version 7.8 (Zhu *et al*. 2018: 3). The instrument comprises of 16 multiple choice questions. A student could choose one or more options for each response. If the student chose all the options, 64 responses could have been obtained. If there was one response per question, a total of 16 responses could have been reported. The total VARK score is calculated by combining the responses of the student. Each question is scored to depict one of the four

learning style preferences respectively. Preferences were arranged by computing the total number of each answer, leading to a unimodal learning style preference (Visual, Aural, Read/Write, or Kinaesthetic), or multimodal learning style preference comprising of two or more learning style preferences (Shousha and Rahman 2014: 238).

3.9 Validity and reliability

Validity refers to the inference made by the use of an instrument that it is an accurate and well-founded measurement. Validity and reliability are dependent qualities of an instrument. The more studies supporting the validity of an instrument the more sound the inference (Polit and Beck 2012: 236, 745, 336). Reliability refers to the instrument's accuracy, dependability and consistency (Polit and Beck 2012: 331).

Leite, Svinicki and Shi (2010: 323-339) established the validity and reliability of VARK as an instrument to find out students preferred learning styles; and their work has been cited extensively in studies where the VARK questionnaire has been utilized. Fitkov-Norris and Yeghiazarian (2015:1-6) assessed the validity of the VARK questionnaire using the Rasch model and the findings supported the instrument's suitability and reliability in determining individuals' learning style preferences for receiving and processing information in Visual, Aural, Read/Write and Kinaesthetic ways. Zhu *et al*. (2018: 3) noted that the VARK instrument is one of the most popular learning style questionnaires with adequate and satisfactory validity and reliability. Several researchers have used VARK in their respective studies. The Cronbach's alpha test measures internal consistency and reliability of an instrument and scores within a range of 0.70 - 0.90 is considered to be acceptable (Fisher 2015: 24). Rahiminia and Rahiminia (2017: 27) reported that validity for their study was investigated by six experts and reliability was established after a pilot study with a Cronbach's alpha = 0.70. The views of faculty members were used to determine validity and reliability was found with a Cronbach's alpha of 0.90 after the questionnaire was completed by 15 participants in a pilot study (Almasi, Bavani and Mohammadpour 2018: 242).

Table 3.2 below provides a list of other studies that tested the VARK tool for reliability.

Table 3.2 Previous studies in which VARK was utilized as a validated and reliable instrument to determine learning style preferences of participants

Researcher/s	Year of Study	Title of study	Cronbach's alpha coefficient score for reliability of the VARK tool
AlKasawaneh	2013	"Using VARK to assess changes in learning preferences of nursing students at a public university in Jordan: implications for teaching"	0.85
Shousha and Rahman	2014	"Learning styles of nursing administration students and their teaching mode efficiency"	0.85
Fisher	2015	"An investigation of learning style preferences of nurses training at two nursing schools in in public health facilities in Cape Town"	0.70
Nasiri, Gharekhani and Ghasempour	2016	"Relationship between learning style and academic status of Babol dental students"	0.86

3.10 Data collection

Data collection is the gathering of facts and figures for research purposes (Polit and Beck 2012: 725). Data was collected after receiving ethical clearance from the different stakeholders. The researcher visited each selected campus whilst the students were on campus for the theory component of the programme to administer the questionnaire personally to the respondents. The potential respondents were handed an information letter regarding the study with an attached consent form and a self-administered questionnaire. The researcher explained the contents of the research using the information guide. The respondents were required to comprehend the information letter before signing the consent form to participate in the research. They were assured of confidentiality, anonymity and that participation in the study was voluntary. The signed consent forms and questionnaires were collected separately and were placed in separate boxes respectively.

3.11 Data analysis

Data analysis involves organizing research data systematically and testing of hypotheses using data collected (Polit and Beck 2012: 725). Data analysis helps to give meaning to the research data that was collected.

After the data was collected from all the participating campuses, assistance was sought from a statistician for analysis. The data was captured electronically by the researcher on a spreadsheet that was provided by the statistician. Charts and tables were used to describe the data obtained. Inferential statistics were used including correlation tests, to determine if demographic factors influence learning style preferences, analysis of variance (ANOVA) and chi-square tests. Numerical analysis that included means, modes and standard deviations was also done. A significance value (p) of 0.05 was used to meaningfully analyze the data. The level of significance is an indication of how probable it is that the findings are reliable. A significance value of 0.05 means that only 5 times out of 100 would the results be invalid and 95 times out of 100 similar results would be reported with a new sample (Polit and Beck 2012: 64-65). The statistician utilized the statistical software package SPSS (Statistical Package for social Sciences) version 23 to analyze the data.

3.12 Ethical considerations

Ethical principles must be adhered to when conducting research. The participant, the institution's research ethics committee and the scientific integrity of the researcher must be borne in mind when applying ethical principles to research (Pera and van Tonder 2012: 331).

3.12.1 Permission to conduct the study

The proposed study, instrument used, the information letter to students and the consent were approved by the DUT Institutional Research Ethics Committee (IREC reference number: REC 9/17), as per Annexure 1. Thereafter, authorization to go ahead with the research was granted by the KwaZulu-Natal Department of Health (Annexure 2b), the Principal of KZNCN (Annexure 3b),

and the Principals of the five selected campuses (Annexures 4b, 5b, 6b, 7b, and 8b). Only after permission was granted in writing by the various stake-holders, was collected. Permission to use the instrument was also obtained by the creator of the VARK questionnaire (Annexure 9) for this study.

3.12.2 Self-determination

Self-determination is defined as the respondents voluntary decision as to whether to take part in the study without the risk of prejudice (Polit and Beck 2012: 154). Respondents voluntarily participated in this research. They were given a letter containing information pertaining to the study. They had the right to question the researcher regarding the study, refuse to participate, or withdraw from the study at any time.

3.12.3 Freedom from coercion

Polit and Beck (2012: 154) describes freedom from coercion as an individual being free from threats of penalty for non-participation or excessive rewards for participation. Participation was voluntary and respondents were made aware prior to signing the consent form that there would be no penalty imposed if the students chose not to participate. They were further informed that they would not be remunerated for participating in the study.

3.12.4 Confidentiality and anonymity

Confidentiality is defined as not divulging information provided by a respondent in any way except for research purposes and this is must be coupled with anonymity in order for it to be possible (Pera and van Tonder 2012: 335). Respondents' names were not required on the questionnaire. Each questionnaire per campus was allocated a number, thus anonymity was maintained throughout the research process.

3.12.5 Full disclosure

Full disclosure includes the researcher's complete description of the study, the individual's right to refuse participation, the researcher's responsibilities and the possible risks and benefits of participation in the study (Polit and Beck 2012: 154). The information letter to the respondent described the purpose of the

study, voluntary participation in the study, the researcher's accountability and the possible risks and advantages.

3.12.6 Informed consent

Informed consent means that the individual that is taking part in the research has enough information about the study and that the information received is well understood, and that the individual has the ability to agree or disagree to participate voluntarily (Polit and Beck 2012: 157). Written informed consent was obtained from each participant. By signing the consent, the participant indicated that he/she had adequate information pertaining to the research and that the information was understood, and that he/she had the right to decline consent which would indicate a refusal to participate in the study.

3.12.7 Management and the storage of data

All information and data linked to the research is stored safely. All paper-based information is stored under lock and key and, electronic information is password protected. Only members of the research team will have access to the information pertaining to the study. The information will be stored for a period of five years, as per institutional policy; thereafter it will be shredded and deleted respectively.

3.13. Conclusion

In this chapter aspects pertaining to the methodology were discussed. The research design and setting was explained. In addition, the research questionnaire and its validity and reliability were discussed. The data collection and the data analysis process were further described. Finally, ethical considerations of the study were described. The next chapter will detail the presentation of results of the study.

CHAPTER 4: PRESENTATION OF RESULTS

4.1 Introduction

In this chapter the results of the study will be presented. The aim of this study was to ascertain and compare the learning styles of first and third year student nurses using the VARK (Visual, Aural, Read/Write, and Kinaesthetic) sensory based model questionnaire. Data related to the variables pertaining to the learning styles of first and third year students in the first semester of their respective years of training in 2017 are presented. These were from groups 1/2017 and 1/2015 respectively.

The first objective of the study was to determine the preferred learning styles used by first and third year nursing diploma students at a college in KwaZulu-Natal. The second objective was to determine the differences in preferred learning styles between first year and third year student nurses. Demographic factors such as age, gender, race, first language, and previous tertiary education as variables that may impact on preferred sensory based learning styles were analysed in descriptive statistics.

4.2. Respondent distribution and level of study

Data was obtained from groups 1/2017 and 1/2015 from the five campuses at KZNCN that had registered both of the groups. Table 3.1 in Chapter 3 illustrates the number of students per campus that participated in the study. A total of 290 respondents met the inclusion criteria for the study. Figure 4.1 below shows the percentage of respondents per level of study. Of the total number of respondents, 50% (n=145) were in their first year of study, while 50% (n=145) of them were in their third year of study.

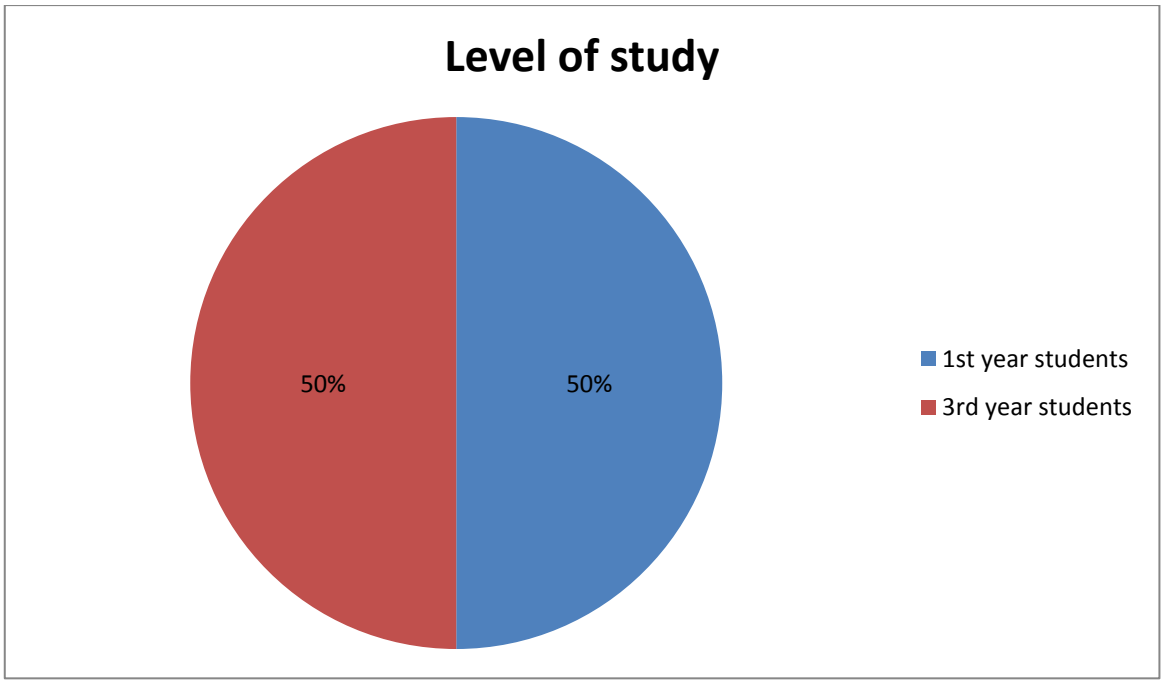


Figure 4.1: Percentage of respondents per level of study

4.3 The data collection instrument

The data collection instrument consisted of items for student nurses in their first and third year of the four year training programme to answer. The instrument was divided into two sections, which were Section A: Demographics and Section B: The VARK Questionnaire.

4.4 Section A: Demographics

The population of this study comprised of 290 student nurses. There were 145 first year students from Group 1/2017 and 145 third year students from Group 1/2015. All the students in the two groups that were present on the day that the data was collected completed the questionnaires.

4.4.1 Age

The mean age of the respondents was 24.5 years (Table 4.1). The majority of respondents were between 21 and 23 years of age: (37.3%, n=108), as indicated by Table 4.2.

Table 4.1: Mean age of respondents

	N	Minimum	Maximum	Mean
Age	288	18	44	24.51
Valid N	288			

Table 4.2: Age distribution of respondents

		Frequency	Percent
Valid	18-20	45	15.6
	21-23	108	37.3
	24-26	68	23.4
	27-29	22	7.6
	>29	45	15.4
	Total	288	99.3
Missing		2	.7
Total		290	100.0

4.4.2 Gender

Figure 4.2 below indicates that the majority of the respondents were female: 72.1% (n=209) and 27.9% (n=81) were males.

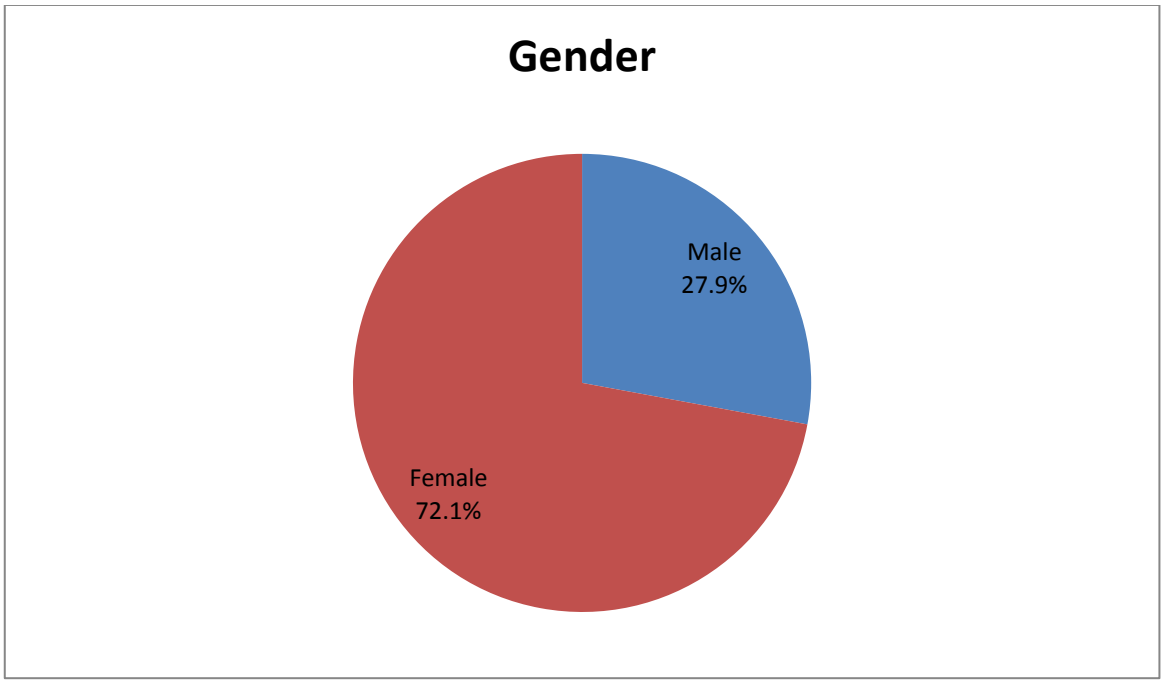


Figure 4.2: Gender of respondents

4.4.3 Race

The racial distribution of the respondents comprised of Blacks 82.4% (n=239), Indians 12.4% (n=36), Coloureds 4.8% (n=14) and Whites 0.3% (n=1).

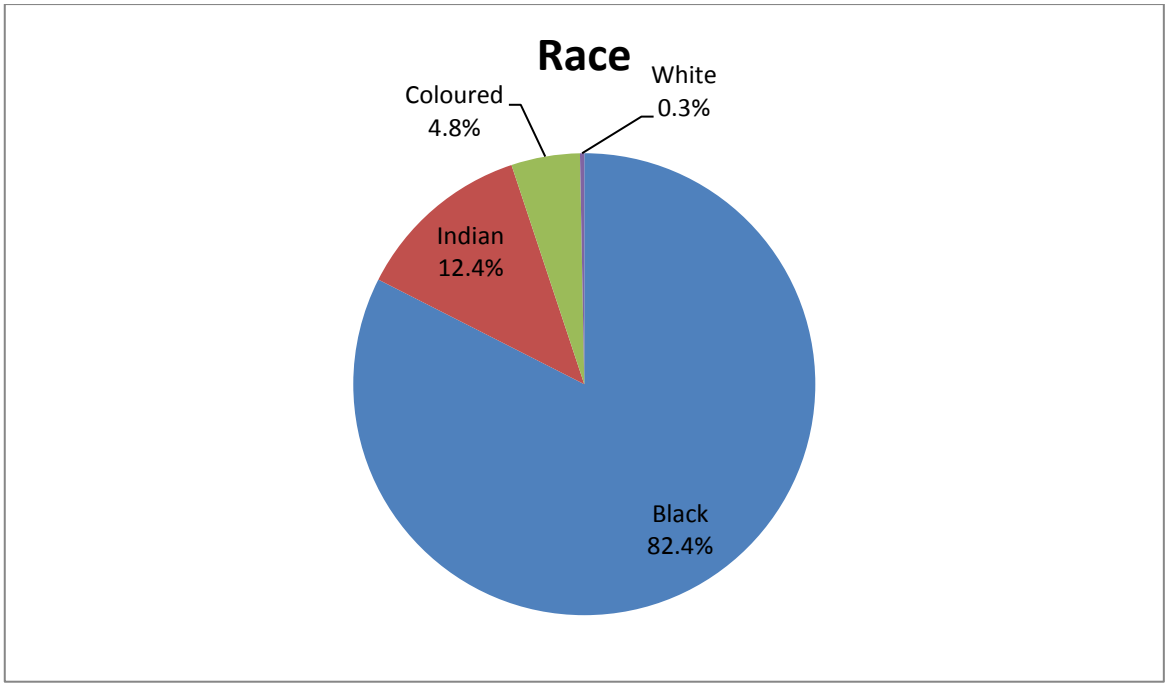


Figure 4.3: Racial distribution of respondents

4.4.4 First Language

The most commonly used first language by the respondents was isiZulu 62.4% (n=181). Respondents using other African languages at home comprised 18.3% (n=53). English was used by 17.9% (n=52) of the respondents, 1.0% (n=3) Xhosa, and 0.3% (n=1) Afrikaans as their mother tongue. Figure 4.4 below illustrates the first language used by the respondents.

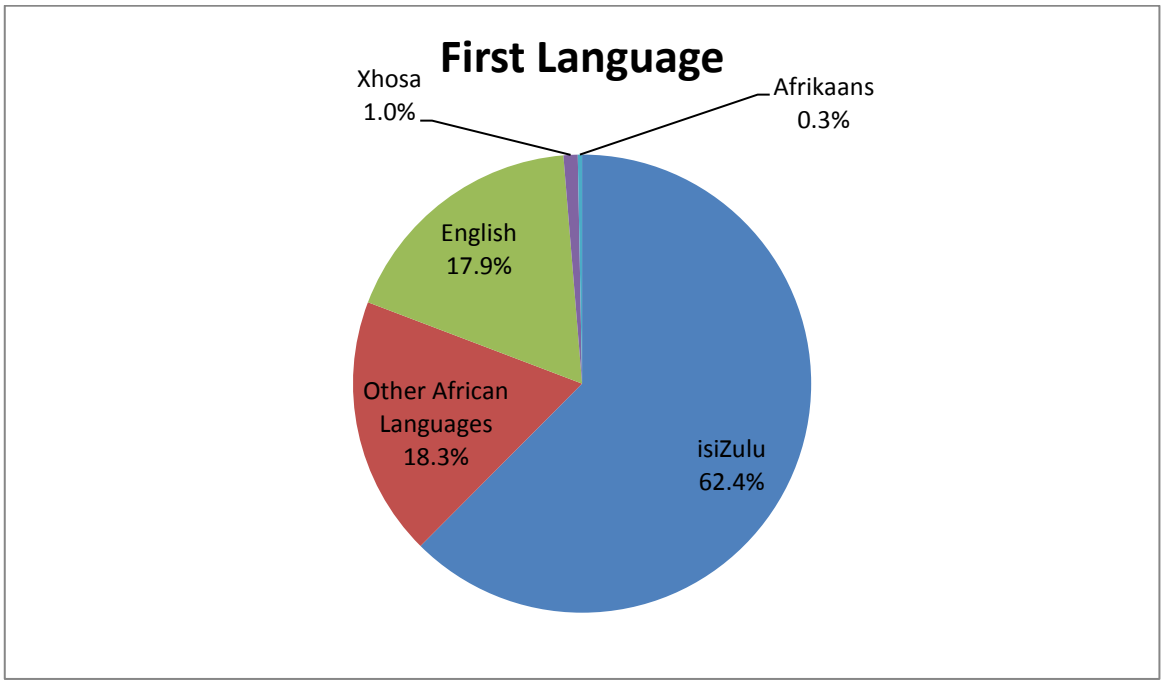


Figure 4.4: Home language of respondents

4.4.5 Previous tertiary education

Of the total respondents, 26.2% (n=76) had some previous tertiary education prior to registering for their current training. Table 4.3 below depicts previous tertiary experience.

Table 4.3: Previous tertiary education of respondents

		Frequency	Percent
Valid	No	212	73.1
	Yes	76	26.2
	Total	288	99.3
Missing		2	.7
Total		290	100.0

4.5 Section B: The VARK Questionnaire

4.5.1 Objective 1: Preferred learning styles used by first year and third year nursing diploma students at a college in KwaZulu-Natal

4.5.1.1 VARK categories for each question as per scoring chart

Tables 4.4 to 4.19 show the percentage of respondents' responses to each of the sixteen questions as per each VARK category respectively. The VARK scoring chart was utilised to determine which multiple choice response corresponded to the appropriate VARK modality**.**

Table 4.4 indicates that 60.3% (n-175) "would tell her directions" which corresponded with the Aural modality, while the lowest score corresponded with the Kinaesthetic modality of 15.9% (n=46).

Table 4.4: VARK modality for each answer to question 1 and the valid percentage response for each modality

Question 1	"You are helping someone who wants to go to your airport, the center of town or railway station. You would:"			
Possible answers	a. "go with her"	b. "tell her the directions"	c. "write down the directions"	d. "draw, or show her a map, or give her a map"
VARK modality-%age (n)	K 15.9(n=46)	A 60.3(n=175)	R 32.2(n=105)	V 21.4(n=62)

For Question 2, the majority of the respondents chose the response that corresponded with the Visual modality (57.6%, n=167). The response least chosen was the Read/Write option (24.1%, n=70).

Table 4.5: VARK modality for each answer to question 2 and the valid percentage response for each modality

Question 2	"A website has a video showing how to make a special graph. There is a person speaking, some lists and words describing what to do and some diagrams. You would learn most from:"			
Possible answers	a. "seeing the diagrams"	b. "listening"	c. "reading the words'	d. 'watching the actions"
VARK modality-%age (n)	V 57.6(n=167)	A 33.8(n=98)	R 24.1(n=70)	K 50.7(147)

Of 388 responses for Question 3, a significant 54.5% (n=158) chose the Kinaesthetic modality and the Visual modality was the least chosen option with 15.9% (n=46).

Table 4.6: VARK modality for each answer to question 3 and the valid percentage response for each modality

Question 3	"You are planning a vacation for a group. You want some feedback from them about the plan. You would:"			
Possible answers	a. "describe some of the highlights they will experience"	b. "use a map to show them the places"	c. "give them a copy of the printed itinerary"	d. "phone, text or email them"
VARK modality-%age (n)	K 54.5(n=158)	V 15.9(n=46)	R 34.5(n=100)	A 29.0(n=84)

Contrary to the previous question, the Visual modality scored the highest for Question 4 as indicated by Table 4.7 below with 43.4% (n=126) and the Aural modality scored 21% (n=61).

Table 4.7: VARK modality for each answer to question 4 and the valid percentage response for each modality

Question 4	"You are going to cook something as a special treat. You would:"			
Possible answers	a. "cook something you know without the need for instructions"	b. "ask friends for suggestions"	c. "look on the Internet or in some cookbooks for ideas from the pictures"	d. "use a good recipe"
VARK modality-%age (n)	K 36.9(n=107)	A 21.0(n=61)	V 43.4(n=126)	R 35.9(n=104)

Table 4.8 below shows that the Kinaesthetic modality scored the highest for question 5 with 59% (n=171) and Visual scored lowest with 16.9% (n=490).

Table 4.8: VARK modality for each answer to question 5 and the valid percentage response for each modality

Question 5	"A group of tourists want to learn about the parks or wildlife reserves in your area. You would:"			
Possible answers	a. "talk about, or arrange a talk for them about parks or wildlife reserves"	b. "show them maps and internet pictures"	c. " take them to a park or wildlife reserve and walk with them"	d. "give them a book or pamphlets about the parks or wildlife reserves"
VARK modality-%age (n)	A 18.6(n=54)	V 16.9(n=49)	K 59.0(n=171)	R 37.9(n=103)

The majority of the respondents chose “reading the details or checking its features online” which was the Read/Write modality for Question 6 with 59.7 % (n=173). The Aural modality scored the least with 14.5% (n=42).

Table 4.9: VARK modality for each answer to question 6 and the valid percentage response for each modality

Question 6	“You are about to purchase a digital camera or mobile phone. Other than price, what would most influence your decision?”			
Possible answers	a. “Trying or testing it”	b. “Reading the details or checking its features online”	c. “It is a modern design and looks good”	d. “The salesperson telling me about its features”
VARK modality-%age (n)	K 35.5(n=103)	R 59.7(n=173)	V 29.7(n=86)	A 14.5(n=42)

For Question 7 in Table 4.10 below, a significant number of respondents chose “watching a demonstration” with 71.7% (n=208), which corresponded with the Kinaesthetic modality. The Visual modality scored the least with 10.3% (n=30).

Table 4.10: VARK modality for each answer to question 7 and the valid percentage response for each modality

Question 7	“Remember a time when you learned how to do something new. Avoid choosing a physical skill, e.g. riding a bike. You learned best by:”			
Possible answers	a.“ watching a demonstration”	b. “listening to somebody explaining it and asking questions”	c. “diagrams, maps, and charts - visual clues”	d. “written instructions – e.g. a manual or book”
VARK modality-%age (n)	K 71.7(n=208)	A 36.2(n=105)	V 10.3(n=30)	R 29.5(n=75)

Table 4.11 below indicates that the Visual modality scored the highest with 46.6% (n=1350) and Read/Write scored the lowest with 25.2% (n=73).

Table 4.11: VARK modality for each answer to question 8 and the valid percentage response for each modality

Question 8	"You have a problem with your heart. You would prefer that the doctor:"			
Possible answers	a. "gave you a something to read to explain what was wrong"	b. "used a plastic model to show what was wrong"	c. "described what was wrong"	d. "showed you a diagram of what was wrong"
VARK modality-%age (n)	R 25.2(n=73)	K 28.3(n=82)	A 42.4(n=123)	V 46.6(n=135)

Question 9 in Table 4.12 below is related to learning a new skill using a computer. The highest scoring modality was Read/Write with 55.5 % (n=161) and Kinaesthetic had the lowest score with 16.2% (n=42).

Table 4.12: VARK modality for each answer to question 9 and the valid percentage response for each modality

Question 9	"You want to learn a new program, skill or game on a computer. You would:"			
Possible answers	a. "read the written instructions that came with the program"	b. "talk with people who know about the program"	c. "use the controls or keyboard"	d. "follow the diagrams in the book that came with it"
VARK modality-%age (n)	R 55.5(n=161)	A 38.6(n=112)	K 16.2(n=47)	V 29.3(n=85)

For question 10 shown in Table 4.13 below, the Read/Write modality scored 38.3 % (n=111) with the highest score and Kinaesthetic scoring the lowest: 19.3 (n=56).

Table 4.13: VARK modality for each answer to question 10 and the valid percentage response for each modality

Question 10	"I like websites that have:"			
Possible answers	a. "things I can click on, shift or try"	b. "interesting design and visual features"	c. "interesting written descriptions, lists and explanations"	d. "audio channels where I can hear music, radio programs or interviews"
VARK modality-%age (n)	K 19.3(n=56)	V 35.5(n=103)	R 38.3(n=111)	A 34.8(n=101)

Table 4.14 below shows that majority of respondents chose the response which correlated with the Kinaesthetic option which was a significant 58.3% (n=169). The modality that scored the least was Visual with 12.4% (n=36).

Table 4.14: VARK modality for each answer to question 11 and the valid percentage response for each modality

Question 11	"Other than price, what would most influence your decision to buy a new non-fiction book?"			
Possible answers	a. "The way it looks is appealing"	b. "Quickly reading parts of it"	c. "A friend talks about it and recommends it"	d. "It has real-life stories, experiences and examples"
VARK modality-%age (n)	V 12.4(n=36)	R 31.4(n=91)	A 32.4(n=94)	K 58.3(n=169)

When respondents answered Question 12, the highest scoring modality was Visual with 52.8 % (n=153) and the lowest score was the Aural modality with 27.9% (n=81), as shown in Table 4.15 below.

Table 4.15: VARK modality for each answer to question 12 and the valid percentage response for each modality

Question 12	"You are using a book, CD or website to learn how to take photos with your new digital camera. You would like to have:"			
Possible answers	a. "a chance to ask questions and talk about the camera and its features"	b. "clear written instructions with lists and bullet points about what to do"	c. "diagrams showing the camera and what each part does"	d. "many examples of good and poor photos and how to improve them"
VARK modality-%age (n)	A 27.9(n=81)	R 35.5(n=103)	V 52.8(n=153)	K 20.0(n=58)

Question 13 in Table 4.16 below was related to classroom teaching or presentation and a highly significant number of respondents indicated that they preferred "demonstrations, models or practical sessions" with 70.3% (n=204), which corresponded with the Kinaesthetic modality. The Visual modality scored the lowest with 11.4% (n=33), indicating that respondents least preferred "diagrams, charts or graphs".

Table 4.16: VARK modality for each answer to question 13 and the valid percentage response for each modality

Question 13	"Do you prefer a teacher or a presenter who uses:"			
Possible answers	a. "demonstrations, models or practical sessions"	b. "question and answer, talk, group discussion, or guest speakers"	c. "handouts, books, or readings"	d. "diagrams, charts or graphs"
VARK modality-%age (n)	K 70.3(n=204)	A 40.7(n=118)	R 24.8(n=72)	V 11.4(n=33)

When answering Question 14, which is related to receiving feedback from a test, respondents mostly preferred receiving feedback "using a written description of you results", which was the Read/Write modality with 45,9% (n=133). The least preferred was the Visual modality 12.8% (n=37%) as shown in Table 4.17 below.

Table 4.17: VARK modality for each answer to question 14 and the valid percentage response for each modality

Question 14	"You have finished a competition or test and would like some feedback. You would like to have feedback:"			
Possible answers	a. "using examples from what you have done"	b. "using a written description of your results"	c. "from somebody who talks it through with you"	d. "using graphs showing what you had achieved"
VARK modality-%age (n)	K 26.9(n=78)	R 45.9(n=133)	A 30.7(n=89)	V 12.8(n=37)

The majority of the respondents chose the option related to the Read/Write modality for Question 15 with 57.6% (n=167). The least favoured modality was Visual with 7.6% (n=22) as shown in Table 4.18 below.

Table 4.18: VARK modality for each answer to question 15 and the valid percentage response for each modality

Question 15	"You are going to choose food at a restaurant or cafe. You would:"			
Possible answers	a. "choose something that you have had there before"	b. "listen to the waiter or ask friends to recommend choices"	c. "choose from the descriptions in the menu"	d. "look at what others are eating or look at pictures of each dish"
VARK modality-%age (n)	K 42.8(n=124)	A 23.4(n=68)	R 57.6(n=167)	V 7.6(n=22)

Question 16 related to presentation of a speech where most respondents chose the option that correlated with the Aural modality 43.1% (n=125), while the Read/write modality was the least preferred with 25.2% (n=73) as indicated in Table 4.19 below.

Table 4.19: VARK modality for each answer to question 16 and the valid percentage response for each modality

Question 16	"You have to make an important speech at a conference or special occasion. You would:"			
Possible answers	a. "make diagrams or get graphs to help explain things"	b. "write a few key words and practice saying your speech over and over"	c. "write out your speech and learn from reading it over several times"	d. "gather many examples and stories to make the talk real and practical"
VARK modality-%age (n)	V 32.4(n=94)	A 43.1(n=125)	R 25.2(n=73)	K 39.7(n=115)

Table 4.20 below shows a summary of the percentages for each chosen modality. Table 4.21 indicates the number of the most favoured VARK modalities. The Kinaesthetic and the Read/Write modalities were the most popular for 5 of the 16 questions. The Visual modality was the least popular having the lowest percentage for 7 of the 16 questions, as indicated in Table 4.22 below.

Table 4.20: Summary of percentage per answer chosen for each modality including multiple modalities

Question	Visual	Aural	Read/Write	Kinaesthetic	Most favoured modality	Least favoured modality
1.	21.4	60.3	36.2	16.9	A	K
2.	57.6	33.8	24.1	50.7	V	R
3.	15.9	29.0	34.5	54.5	K	V
4.	43.4	21.0	35.9	36.9	V	A
5.	16.9	18.6	37.9	59.0	K	V
6.	29.7	14.5	59.7	35.5	R	A
7.	10.3	36.2	25.9	71.7	K	V
8.	46.6	42.4	25.2	28.3	V	R
9.	29.3	38.6	55.5	16.2	R	K
10.	35.5	34.8	38.3	19.3	R	K
11.	12.4	32.4	31.4	58.3	K	V
12.	52.8	27.9	35.5	20.0	V	K
13.	11.4	40.7	24.8	70.3	K	V
14.	12.8	30.7	45.9	26.9	R	V
15.	7.6	23.4	57.6	42.8	R	V
16.	32.4	43.1	25.2	39.7	A	R

Table 4.21: Most favoured modality

Visual	Aural	Read/Write	Kinaesthetic	TOTAL
4	2	5	5	16

Table 4.22: Least favoured modality

Visual	Aural	Read/Write	Kinaesthetic	TOTAL
7	2	3	4	16

4.5.1.2 Descriptive statistics

Means and standard deviations were found by using descriptive statistics. The number of responses for which the V, A, R or K modality respectively was selected was added from the 16 questions. The maximum score is thus 16 and the minimum score is 0.

Table 4.23 and Figure 4.5 below show that on average, respondents ticked 6.46 out of the 16 of the Kinaesthetic responses. Some respondents ticked as many as 15 and some as few as 0. Although the Kinaesthetic and the Read/Write modalities had the highest percentage score for 5 of the 16 questions as per Table 4.2, the statistics clearly indicate that the Kinaesthetic learning style modality was the most selected with a higher mean score as per Table 4.23 below. The Visual modality is the least selected modality with a mean score of 4.36.

Table 4.23: Mean scores for VARK modalities

	N	Minimum	Maximum	Mean	Standard deviation
Total K	290	0	15	6.46	2.607
Total V	290	0	12	4.36	2.315
Total R	290	0	15	5.93	2.851
Total A	290	0	16	5.28	2.786

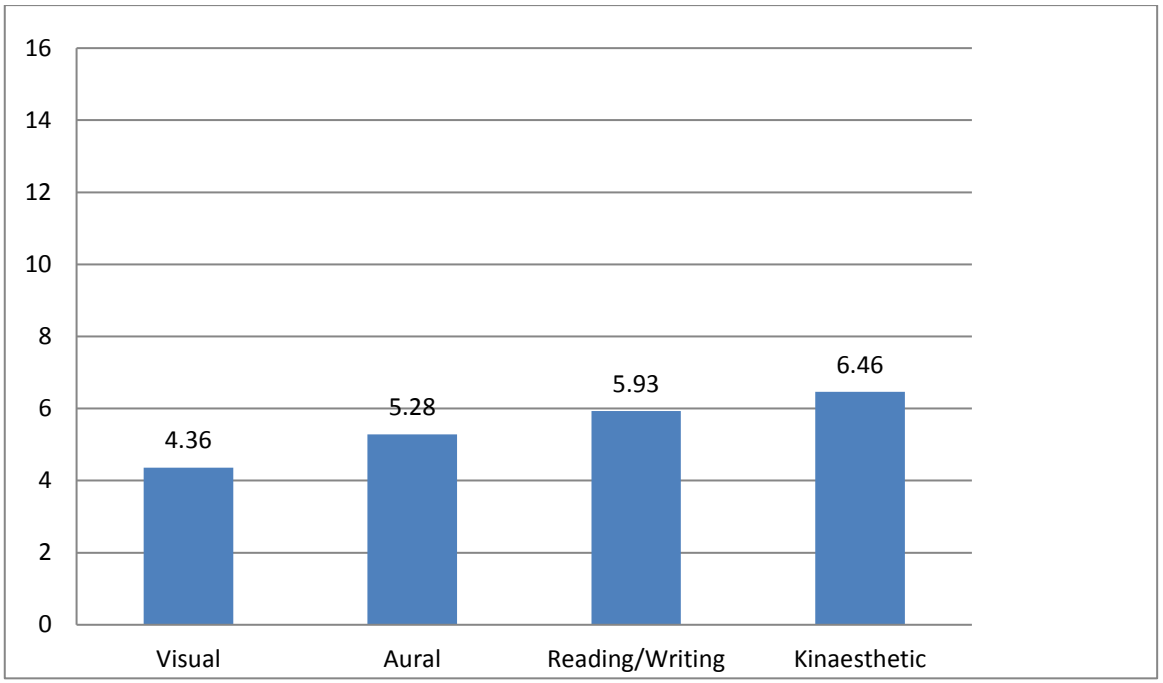


Figure 4.5: Average VARK responses for the 16 questions

4.5.1.3 VARK Unimodal versus multimodal learning style preferences

The questionnaire allowed respondents the choice of one or more items per question. The results indicated that the majority of the respondents were multimodal with 77.6% (n= 225), having two or more VARK modalities, as indicated in Table 4.24 below. The remaining 22.4 % (n=65) were unimodal, having a single VARK modality as their preferred learning style.

Table 4.24: VARK unimodal versus multimodal preferences for the cumulative total of respondents

Valid	Frequency	Percent	Valid Percent
Unimodal	65	22.4	22.4
Multimodal	225	77.6	77.6
Total	290	100.0	100.0

4.5.2 Objective 2: Differences in VARK learning styles between first and third year student nurses

The following tests were applied in the analysis that follows:

Analysis of variance (ANOVA) tests the differences in means between groups. The F-ratio is the statistic computed in ANOVA. Differences between groups are

contrasted with differences within groups to obtain an F- ratio (Polit and Beck 2012: 416).

Pearson's correlation is a coefficient that is computed with variables measured on a ratio scale (Polit and Beck 2012: 392).

t-Tests are used for testing differences in group means. A one sample *t*-test is used to test whether a mean score is significantly different from a scalar value and independent sample *t*-tests compares two independent groups of cases (Polit and Beck 2012: 413).

Levene's test is used to test for equality of variances (Polit and Beck 2012: 427).

Table 4.25 below shows that there were no significant differences for each VARK modality between first year and third year students.

Table 4.25: Differences in VARK learning styles between first year and third year student nurses

Level of study	N	Mean	Standard deviation		t	df (Degrees of freedom)	p value (Level of significance)
Total K: First year Third year	145 145	6.74 6.17	2.568 2.623	Equal variances assumed	1.878	288	.061
				Equal variances not assumed	1.878	287.871	.061
Total V: First year Third year	145 145	4.48 4.23	2.455 2.167	Equal variances assumed	.913	288	.362
				Equal variances not assumed	.913	283.608	.362
Total R: First year Third year	145 145	6.05 5.82	3.005 2.694	Equal variances assumed	.679	288	.498
				Equal variances not assumed	.679	284.629	.498
Total A: First year Third year	145 145	5.51 5.04	2.944 2.608	Equal variances assumed	1.436	288	.152
				Equal variances not assumed	1.436	283.878	.152

A cross tabulation was done and chi square test of independence was applied to determine if there was a relationship between the year of study and the modal preference (Table 4.26). The analysis showed that there was no significant relationship between the year of study and the modal preference with a larger proportion of these students preferring a multimodal learning style in both years.

Table 4.26: Cross tabulation- VARK unimodal versus multimodal preferences for first and third year students respectively

Level of study		Unimodal	Multimodal	Total
First year	Count	32	113	145
	Percentage	22.1	77.9	100.0%
Third year	Count	33	112	145
	Percentage	22.8	77.2	100.0%

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4.5.3 Group Statistics

For this analysis an independent sample t-test and Anova was used to determine if there were significant differences.

4.5.3.1 Age

The analysis showed that there was no significant relationship between age and the modal preferences.

4.5.3.2 Gender

Analysis showed that there was no significant relationship between gender and the modal preferences as indicated by Table 4.27.

Table 4.27: Differences in VARK learning styles related to gender

Gender	N	Mean	Std. Deviation		t	df	p value
Total V				Equal variances assumed	-1.248	288	.213
: Male	81	4.09	2.476				
Female	209	4.46	2.247				
				Equal variances not assumed	-1.195	133.965	.234
Total A				Equal variances assumed	1.301	288	.194
: Male	81	5.62	2.990				
Female	209	5.14	2.699				
				Equal variances not assumed	1.243	133.412	.216
Total R				Equal variances assumed	-.582	288	.561
: Male	81	5.78	2.928				
Female	209	6.00	2.826				
				Equal variances not assumed	-.573	141.099	.568
Total K :				Equal variances assumed	.494	288	.622
Male	81	6.58	2.850				
Female	209	6.41	2.512				
				Equal variances not assumed	.467	130.873	.641

4.5.3.3 Race

Coloureds (M=5.43) and Indians (M=5.44) had a significantly higher Visual score than Blacks (M=4.14), F (2, 286) = 6.759, p=.0001.

Indians (M=7.08) had a significantly higher Read/Write score than do Blacks (M=5.72), F (2, 286) =3.802, p=0.23 as indicated in Table 4.28 below.

Table 4.28: Differences in VARK learning styles related to race groups

Learning style per race group	N	Mean	Standard deviation		df	F	p value
Total V:	239	4.14	2.192	Between	2	6.759	.001
Black	14	5.43	2.533	groups			
Coloured	36	5.44	2.656	Within	286		
Indian				groups			
	289	4.37	2.315	Total	288		
Total							
Total A:	239	5.09	2.637	Between	2	2.782	.064
Black	14	6.00	2.631	groups			
Coloured	36	6.14	3.555	Within	286		
Indian				groups			
	289	5.26	2.783	Total	288		
Total							
Total R:	239	5.72	2.681	Between	2	3.802	.023
Black	14	6.29	3.099	groups			
Coloured	36	7.08	3.500	Within	286		
Indian				groups			
	289	5.92	2.841	Total	288		
Total							
Total K:	239	6.34	2.483	Between	2	1.196	.304
Black	14	7.07	2.645	groups			
Coloured	36	6.92	3.281	Within	286		
Indian				groups			
	289	6.45	2.603	Total	288		
Total							

4.5.3.4 Home Language

The findings revealed that respondents who speak English (M= 5.33) as their home language had a significantly higher Visual score that those that speak isiZulu (M=4.00) as their home language, with F (4, 285) =3.815, p=.005. Table 4.29 shows the differences in VARK learning styles related to the language spoken at home by respondents.

Table 4.29: Differences in VARK learning styles related to home language

Home Language	N	Mean	Standard Deviation		df	F	p value
Total V:				Between	4	3.815	.005
Afrikaans	1	5.00		groups			
English	52	5.33	2.603				
Xhosa	3	3.67	1.155	Within	285		
isiZulu	181	4.00	2.129	groups			
Other	53	4.66	2.425				
Total	290	4.36	2.315	Total	289		
Total A:				Between	4	1.109	.352
Afrikaans	1	5.00		groups			
English	52	5.98	3.334				
Xhosa	3	5.33	4.041	Within	285		
isiZulu	181	5.06	2.513	groups			
Other	53	5.32	3.018				
Total	290	5.28	2.786	Total	289		
Total R:				Between	4	1.656	.160
Afrikaans	1	6.00		groups			
English	52	6.75	3.354				
Xhosa	3	7.67	5.033	Within	285		
isiZulu	181	5.74	2.602	groups			
Other	53	5.70	2.952				
Total	290	5.93	2.851	Total	289		
Total K:				Between	4	1.307	.268
Afrikaans	1	11.00		groups			
English	52	6.73	3.075				
Xhosa	3	7.33	.577	Within	285		
isiZulu	181	6.28	2.528	groups			
Other	53	6.68	2.384				
Total	290	6.46	2.607	Total	289		

4.5.3.5 Previous tertiary education

Students with a previous higher education (M=4.93) have a significantly higher visual score than those without a previous higher education (M=4.17), t (111.768) = -2.262. p=.026 as indicated in Table 4.30 below.

Table 4.30: Relationship between VARK learning styles and previous tertiary education

Previous tertiary education	N	Mean	Standard Deviation		t	df	p value
Total V:				Equal variances assumed	-2.504	286	.013
No	212	4.17	2.150				
Yes	76	4.93	2.670				
				Equal variances not assumed	-2.262	111.768	.026
Total A:				Equal variances assumed	-.687	286	.493
No	212	5.22	2.815				
Yes	76	5.47	2.740				
				Equal variances not assumed	-.696	135.609	.488
Total R:				Equal variances assumed	-.458	286	.647
No	212	5.88	2.892				
Yes	76	6.05	2.776				
				Equal variances not assumed	-.467	137.348	.641
Total K:				Equal variances assumed	-1.326	286	.186
No	212	6.34	2.478				
Yes	76	6.80	2.953				
				Equal variances not assumed	-1.221	115.035	.224

4.6 Conclusion

In this chapter, the findings of the data were presented. The data analysis included a comparison between the preferred learning styles of first and third year nursing students. A discussion of the results will follow in Chapter 5.

CHAPTER 5: DISCUSSION OF RESULTS

5.1 Introduction

This chapter provides a discussion of the results that were presented in the Chapter 4. The discussion is based on the objectives of the study, which were to determine:

- The preferred learning styles used by first and third year nursing diploma students at a college in KwaZulu-Natal
- The differences between first and third year student nurses with regard to their learning style preferences

The findings, limitations, recommendations and conclusions of the study will be presented in this chapter.

5.2 Discussion of findings

5.2.1 The relationship between learning style preference and demographic variables, and level of study

The conceptual framework of the study outlined possible factors that could play a role in influencing the sensory learning style modality preferences, namely; Visual, Aural, Read/Write and Kinaesthetic. This study sought to determine any possible association between preferred learning styles and level of study, age, gender, race/ethnicity, home language and previous tertiary education, as per the assumption of the conceptual framework.

5.2.1.1 Age

The analysis of the data did not find any statistical significance between the age and the preferred learning styles of student nurses. Fisher (2015: 55) also reported no statistical significance between the ages and preferred learning styles of student nurses. Hallin (2014: 1443) reported no statistical significance between learning style preference and age of nursing students. In a study

conducted in Pakistan, no statistically significant association between learning style preferences and age (p=0.120) were found (Mashood *et al*. 2017: 38). Moreover, Whillier *et al.* (2014: 24) also reported no statistically significant difference between unimodal and multimodal learning styles from first to fifth year chiropractic students, however, the analysis did reveal changes in learning style preference for the Visual and Read/Write learning styles as age progressed. Samarakoon *et al.* (2013: 4) concluded that the change from multimodal to unimodal between undergraduate and post graduate students was due to an age difference of about seven years. Daud, Kashif and Chaudry (2014: 43) conducted a study in Pakistan of learning styles of first to fourth year medical students and found that multimodal learning style preferences of respondents increased with age.

5.2.1.2 Gender

Although the sample population in this study was mostly female (72.1%), the results yielded no significant statistical difference in learning style preference between male and females. The association between preferred learning styles and gender has been widely investigated as this aspect has been reported on in numerous research articles. Urval *et al.* (2014: 216) reported no statistical association between VARK learning style preferences and gender amongst undergraduate medical students in India. Mon *et al.* (2014: 24-25) found that although the majority of both male and female students had multimodal learning style preferences, those that were unimodal were more diverse compared between the two groups e.g. 18.2% male versus 6.2% female respectively for Kinaesthetic learning style modality. Pritishkumar and Michael (2014: 185) found no significant association between preferred learning styles of first year medical students in India and their respective gender. Sousha and Rahman (2014: 236) also found no statistical significance between learning style preference and the gender of nursing administration students in Egypt. Similarly, Farooque, Mustafa and Mohammad (2014: 1445) showed no relationship between learning style preference and gender amongst first year undergraduate medical students in India nor did gender did not influence learning style preferences of first year pharmacy students in Malaysia (Elkalmi *et al*. 2015: 266). Saga, Qamar and Trali (2015: 706) found no significant

differences related to unimodal and multimodal preferred learning styles between of male and female undergraduate medical students in Pakistan. However, more females than male students were found to prefer the Aural modality with mean scores of 5.32 versus 5.21, and the Kinaesthetic modality with mean scores of 6.10 versus 6.05 for males.

A Saudi Arabian study by Abdulghani *et al*. (2016: 2) found that 92.47% of male and 50.09% of female first year medical students are unimodal and 40.14% females showed more preference than the males (28.04%) for the kinaesthetic modality. In a study conducted in Iran determining the learning style preferences of nursing and midwifery students, Almasi, Bavani and Mohammadpour (2018: 243) noted no statistically meaningful association between students' preferred learning styles and their gender. Razzaq, Waseem and Khan (2018: 1352) found that in a study among medical students in Pakistan, 67.56% (n=50) of females had multimodal learning style preferences, while only 37.39% (n=11) male students were multimodal. For the unimodal learning styles, it was reported that males accounted for 15.62% (n=5). For the Visual modality females accounted for 8.10% (n=6), in the Aural modality, males accounted for 12.50% (n=4) and females 4.05% (n=3). In the Read/Write modality males accounted for 21.87% (n=7) and females 10.81% (n=8). In the Kinaesthetic modality males accounted for 15.62% (n=5) and females 9.48% (n=7).

Sinha *et al*. (2018: 15) also conducted a study on first year medical students and reported that a greater number of respondents of both sexes favoured multimodal learning styles. Kinaesthetic was the most preferred learning style by females, while Aural was the dominant unimodal style amongst male students. Similarly, Vinaya, Podder and Pradhan (2015: 203) found that female second year medical undergraduates from India mostly preferred the Kinaesthetic learning styles, as opposed to their male counterparts whose dominant preference was Aural. However, Rahman *et al.* (2017: 12) reported a negligible correlation between the preferred learning styles and gender of undergraduate medical students in Bangladesh. No significant association between learning styles and gender (p=0.195) of first year medical students was also concluded by Mashood *et al.* (2017: 36).

5.2.1.3 Race

In this study, it was found that Coloureds and Indians had significantly higher mean Visual scores (M=5.43), (M=5.44) respectively, than Blacks (M=4.14). Also, Indians (M=7.08) have a significantly higher Read/Write score than Blacks (M=5.72). No literature pertaining to this aspect of demographics was found. More research in this area needs to be conducted.

5.2.1.4 Home language

In this study, it was found that students that used English as their first language had a significantly higher Visual mean score than those that used isiZulu as their home language. The mean score for the Visual modality for those that spoke English as their first language was 5.33 and those that spoke isiZulu was 4.0 p=.005. As opposed to this study, Fisher (2015: 55) found a negligible correlation between languages and preferred learning styles. Research done in Australia by Mehta and Rouf (2013: 305) reported that students from both an English-speaking background and a non-English speaking background almost equally preferred multimodal learning styles.

5.2.1.5 Previous tertiary education

The results of this study indicated that students with previous tertiary education (M=4.93) have a significantly higher Visual score than those without previous higher education (M=4.17). Fisher (2015: 50) included previous nursing experience in the analysis of the study and reported no statistical association between preferred learning style and previous nursing experience. Research conducted in Sri Lanka by Karalliyadda (2016: 38) found that preferred learning styles of first year agricultural students were not related to previous academic backgrounds. Additionally, Rahman *et al.* (2017: 12) reported no significant relationship between learning style preferences and previous academic background of medical students in Bangladesh.

5.2.2 Individual preferred VARK learning style modalities of first and third year nursing students

The results of this study revealed that according to the VARK learning style instrument, the multimodal learning styles preference was the most dominant. 77.6% of the respondents indicated a preference for two or more VARK modalities, while the proportion of respondents that preferred a single leaning style modality was reported as 22.4%. This study also revealed that the Kinaesthetic learning style modality was the most prominent choice with the highest mean scores reported, followed by Read/Write, Aural and then Visual learning style with the lowest mean score. With the Kinaesthetic learning style being most dominant, the implication is that learners prefer to acquire and process information through experience, practice and real life hands on situations (Khanal, Shah and Koirala 2014: 3).

The distribution of responses for multimodal responses and Kinaesthetic learning style preference using the VARK appeared to be similar to other studies. In a study done in India by Kharb *et al.* (2013: 1) 61% of respondents had multimodal VARK preferences and 39% were unimodal; Kinaesthetic was reported as the dominant preference. Staying in India, Pritishkumar and Michael (2014: 184) found that 86.8% of their respondents were multimodal; with Kinaesthetic being the prominent learning style preference. Similarly in research conducted in Malaysia by Mon *et al.* (2014: 25) 62.2% of respondents were found to have multimodal learning styles with the Kinaesthetic learning style preferences being dominant. Alkhasawaneh (2013: 1548) found that the learning style preferences of nursing students in a Jordanian study were 55% multimodal and 45% unimodal. The Kinaesthetic modality was also found to be the most dominant learning style preference with a mean score of 4.5, as indicated in Table 5.1 below. In a study in India, Kulkarni, Patil and Javali (2015: 80) reported 100% of first year medical students to be multimodal and the kinaesthetic options on the questionnaire was chosen most frequently with a score of 99%. Purba (2015: 737) found, in a study conducted in Indonesia, that 61.7% and 67.8% of first year, and 70.8% and 63.3% of second year nursing and midwifery students' preferred multimodal learning styles respectively. Whillier *et al.* (2014: 21) reported in a study that 56.0% of chiropractic students

preferred multimodal learning style modalities and Kinaesthetic was found to be the most preferred VARK modality at 65.4%, p<.001 and a significantly higher mean score of 5.66 compared to the other three modalities. The multimodal learning style preferences were the most dominant in first year medical students (98.5%), with Kinaesthetic being the most preferred unimodal learning style with a mean score of 6.51, as reported by Mashood *et al.* (2017: 36). Sinha *et al*. (2018: 16) found 88.4% of first year medical students to have multimodal learning style preferences and 11.57% unimodal, with the most preferred modality being Kinaesthetic. Sharma and Wadhwa (2018: 55) reported that 62.8% of first year dentistry students had multimodal learning style preferences, with the most prominent learning style modality being Kinaesthetic (mean score : 7.02).

However, even though most studies where the majority of the respondents were multimodal; some differed in the dominant learning style preference. Mehta and Rouf (2013: 304) conducted a study in Australia and found 73.7% of respondents to be multimodal and 26, 3% unimodal; here the most dominant learning style preference was Read/Write. A South African study by Fisher (2015: 52) also resulted in consistent findings of 70.2% of respondents having a multimodal preference, while the remaining 29.8% having a unimodal learning preference. Table 5.1 shows the dominant learning style preference being Read/Write, with a 6.99 mean score. Rahman *et al.* (2017: 12) reported 55.6% of medical undergraduates to have multimodal learning style preferences, with the Aural (44.6%) being the most dominant unimodal preference.

The results of a study conducted by Shousha and Rahman (2014: 240-241), reported different results. The majority of third and fourth year nursing administration students were found to be unimodal (54.1%), while 45.9% had a multimodal learning style preference. The dominant single learning style preference in the study was Kinaesthetic. Saga, Qamar and Trali (2015: 706) reported 52% of respondents to be unimodal and the dominant learning style preference was Kinaesthetic. In a study conducted in Iran, 52.1% of all students at university were found to be unimodal, with the dominant learning style preference being Aural, while 48.8% preferred multimodal learning styles (Rahiminia and Rahminia 2017: 260).

The above studies show that mixed modalities of information presentation are needed in order to effectively cater to student learning preferences. Khanal, Shah and Koirala (2014: 3) stated that the trend amongst tertiary lecturers is to teach all learners in a similar way using the traditional lecture format. Khanal, Shah and Koirala (2014: 3) continued to assert that the traditional didactic format is used due to the lack of difficulty of disseminating knowledge, the urgency and obligation to complete the subject matter and possibly due to the lecturers own learning style preference. A multimodal learning style preference of the VARK questionnaire requires lecturers to utilise a variety of teaching methods in order to positively affect learning.

5.2.3 Differences in learning styles between different years of study

The results of this study revealed no statistical significance between the learning style preferences of first and third year nursing students. The multimodal and unimodal learning style preferences were proportionately similar between first and third year students, with respondents being predominantly multimodal. The Kinaesthetic learning style was reported to be the dominant preferred learning style.

Fisher (2015: 54-55) conducted a similar study comparing the learning style preferences between students in the two year training programme and students in the one year training programme. This study yielded similar results between the two categories of students, with Read/Write being the dominant learning style preference. Significantly, the study showed that the Visual learning style preference had the lowest mean score of 4.07, similar to the present study with the Visual learning style having the lowest mean score of 4.36. Pritishkumar and Michael (2014: 184) reported no Visual unimodal learners.

Samarakoon *et al.* (2013: 3-4) conducted a study on learning styles of medical students in their initial year of study, final year, and postgraduate level in Sri Lanka. The study reported that 69.9% of students had multimodal learning styles and 30.1% unimodal with Aural being the predominant learning style preference. Similarly with final year students, 67.5% preferred multimodal learning styles, 38.5% unimodal and Kinaesthetic being the dominant learning style preference. Among post graduate students, the majority were unimodal at

52.9% having Kinaesthetic the dominant learning style preference. The results from the undergraduates showed that although the multimodal learning style preferences remains predominant over the years of study, there is a shift from Aural to Kinaesthetic from first to final year. The Kinaesthetic learning style preference is dominant among post graduates, but there is a dramatic shift to unimodal learning. Samarakoon *et al.* (2013: 4) suggest that the reason for the shift is possibly because the focus changes from classroom learning to greater practical learning and the development of self-learning skills. Shousha and Rahman (2014: 236) found that there was a statistical association in the learning styles of third and fourth year nursing administration students: ($p = 0.032$). Rahman *et al.* (2017: 12) reported no statistical significant relationship between first year and second year undergraduate medical students. Daud, Kashif and Chaudry (2014: 43) reported the preference for multiple modalities of medical students increased as they moved from first and second to third and fourth year of study. Of the first year students, 68% were reported to be multimodal, second year 55% multimodal, third year 80% multimodal and fourth year 74% multimodal. This increasing preference for multiple modalities was in keeping with the transition from pre-clinical in first and second years to clinical in third and fourth years ($p=0.006$).

Mitchell, James and D'Amore (2015: 5) conducted a study in Australia that investigated how learning style preferences of undergraduate nursing and midwifery students vary using a questionnaire that included the VARK learning style and the Kolb LSI (Learning Style Inventory) questionnaires. The questionnaires were administered at the beginning of the students second semester of study and again at the end of the same semester. The study reported that in the pre-survey, 78% of students were multimodal and 23% were unimodal. The post survey revealed that 45% did not change their learning mode, 30% changed to a multimodal learning style, while 25% moved from a multimodal to a unimodal learning style. Mitchell, James and D'Amore (2015: 7) suggested that the increase in multimodality as the course progressed was expected due to the use of diverse teaching strategies in the formal classroom and practical classes. Shousha and Rahman (2014: 240) also reported a slight change in learning style modalities from unimodal to multimodal between third

and fourth year nursing administration students by 2.3%. Purba (2015: 737) reported a negligible correlation between first and second year nursing and midwifery students (p> 0.05).

5.3 The study in relation to the conceptual framework

Though this study reported no significant association between preferred learning style and levels of study age and gender respectively, there has been research undertaken in other countries where these variables yielded a relationship between learning styles. It was also reported that there was a statistical significance between students' preferred learning styles and race, language and previous tertiary education respectively. The conceptual framework listed the various learning activities that are associated with each VARK learning style modality. The Kinaesthetic modality which was the most dominant in this study indicates that the learner will prefer to use tactile representations of information and trial and error as a means of learning (Zhang 2016: 75). This is significant for students in a nursing programme because of the practical component of the course and the intended occupation of nursing that follows completion of the course. The implication is that lecturers should include teaching strategies that would enhance the Kinaesthetic learning modality, e.g. demonstrations, simulation techniques and trial and error. Zhu *et al.* (2018: 11) stated that during learning, the brain is the information processor that integrates multiple sensory inputs, and students who prefer the Kinaesthetic modality access data utilising all their senses, including hearing, touch, smell, taste and sight. Nursing is a practical discipline and continuous learning should motivate student nurses to become Kinaesthetic learners (Zhu *et al.* 2018: 11). Thus, a diverse range of learning activities like role playing, field trips and learning materials would benefit the individual that prefers the Kinaesthetic modality, inclusive of the 'hands on activities' approach to learning. This will also be beneficial for multimodal learners, which was found to be the dominant overall group preference. Multimodal learners get the maximum benefit from their learning experience when a wide variety of learning activities and teaching methods that encompass all four sensory learning style modalities is utilised.

The Read/Write modality had a mean score of 5.93 in this study. It was the second highest mean score, as similarly reported by AlKhasawneh (2013: 1548) with a mean score of 3.8, and Gebru *et al.* (2016: 18) having a mean score of 5.39. Fisher (2015: 54) reported this as the highest mean score. Learners favouring this modality prefer reading of books related to content, assignments and writing notes.

The Aural modality in this study scored a mean of 5.28, similar to that of Gebru *et al.* (2016: 18). However, Urval *et al.* (2014: 218) reported the Aural modality as having the highest mean score of 7.11. Students were in their second year of study, after finishing physiology, biochemistry and anatomy in their first year of medical studies (Urval *et al.* 2014: 216). A possible reason for the Aural modality being dominant in the study is the strong theoretical component that the students were exposed to prior to the study (Urval *et al.* 2014: 216-220). Urval *et al.* (2014: 218) stated that teaching at their institution consisted mainly of lectures utilising PowerPoint presentations and some use of the chalkboard. The Aural modality indicates that students are good listeners' and prefer oral explanations, group discussions, and lecture presentations (Zhang 2016: 75), and the use of didactic lectures can enhance this modality.

The Visual learning style modality scored the lowest mean in this study with 4.36. Similarly, the Visual modality scored the lowest mean scores for the other four studies mentioned in Table 5.1 below. Students that prefer the Visual modality, favour the use of charts, diagrams and videos to enhance their learning experience. Even though this is the lowest scoring modality it is important to remember that a large number of students are multimodal and therefore, teaching should also include strategies that also enhance the Visual modality.

Table 5.1: Comparison of mean scores for the VARK modalities

VARK modalities	Mean scores/standard deviation for various studies					
	AlKhasawneh (2013: 1548)	Urval *et al.* (2014: 218)	Fisher (2015: 54)	Gebru *et al.* (2016: 18)	Sharma and Wadwa (2018: 56)	Current study (2018)
Visual	2.5/ 1.4	4.64/ 2.48	4.07/ 2.60	4.03/ 2.80	4.74/ 3.02	4.36/ 2.315
Aural	3.6/ 2.0	7.11/ 2.72	6.51/ 2.55	5.30/ 5.23	5.84/ 2.59	5.28/ 2.786
Read/Write	3.8/ 1.8	5.59/ 3.18	6.99/ 2.89	5.39/ 2.69	5.14/ 2.40	5.93/ 2.851
Kinaesthetic	4.5/ 1.8	6.94/ 4.15	6.85/ 2.64	5.23/ 2.39	7.02/ 2.14	6.46/ 2.607

5.4 Limitations of the study

The research conducted was a cross-sectional survey of two groups of students in their first and third year of the four year nursing programme. A longitudinal study of the same students during different levels of their study would have added more value in determining if preferred learning styles of individual students alter over their years of study. However, limited time for this study could not accommodate a longitudinal study.

The data was only collected at campuses of the KZNCN which represents state run campuses, limiting its generalisability. Students from private nursing colleges and universities were not included in the sample population.

The study was also limited to student nurses from only one nursing programme. A research design including students from other nursing programmes, e.g. the two year bridging diploma and post-graduate nursing courses, would have strengthened the results.

5.5 Recommendations

The results of this study form the basis for the following recommendations pertaining to nursing education and future research:

5.5.1 Nursing Education

The SANC (2014: 2-3) states that in order to facilitate learning a variety of teaching strategies appropriate to student needs should be implemented. It is further stated that in order to “facilitate student development and socialization”,

each students' own learning styles and individual learning requirements should be identified (SANC 2014: 2-3). The VARK tool was a simple and accessible real-life type questionnaire that was used to profile perceptual learning styles of student nurses. This tool is readily available online and can be utilised to assess students learning style preferences. Learning style preferences tools are available from various authors to assess other aspect of learning styles as described by Curry's onion ring model that was discussed in Chapter 2. The development of new learning style preference tools is also recommended in order to accommodate the dynamics of nursing education.

It is recommended that awareness of student learning styles should be taken into account by nurse educators. The research conducted provided a scope of data to guide the teaching and learning of student nurses. Assessment and awareness of learning styles may provide nurse educators with information that will assist them in creating teaching strategies to enhance the different sensory modes of student nurses.

When planning lessons and curricula, knowledge of student learning styles is important. Fisher (2015: 56-57) states that when designing curriculum, teaching methods should include clinical practical work in the clinical teaching unit and the actual clinical settings to stimulate the use of the Kinaesthetic modality. Nurse educators should be made aware that each student is unique and therefore, awareness of different learning styles other than the predominant style is important. Other various teaching methods should be utilised to engage students actively and to help them enhance their learning capabilities and reach their potentials.

Students themselves should be aware of their learning style preferences. To create awareness amongst students from the beginning of their studies would benefit them in knowing their own preferred learning styles and their learning capabilities. Self-understanding of their own learning process would likely lead to confidence, security and enhance learning (Nielsen, Pedersen and Helms 2015: 61).

Nurse educators should be aware of their own teaching method preferences and learning style preferences with the objective of being aware of their

inadvertent partiality for certain learning styles and some teaching methods (Alharbi *et al*. (2017: 5). Knowing one's self will equip nursing lecturers to diversify their own teaching and their own learning methods.

5.5.2 Future research

Future research may provide more information on learning styles and their value in a South African context such as:

- An exploration of the learning styles of students in various institutions, i.e. private nursing schools and universities.
- Longitudinal studies of student nurses learning styles over various levels of their training.
- Examining the association between learning styles and academic success amongst student nurses.
- Nurse educators' perceptions of the value of learning styles in nursing education.
- Further investigation into the relationship between ethnic background, age, gender and learning style preferences, as recommended by Fleming and Mills (1992: 146), of student nurses in different nursing programmes

5.6 Conclusion

This study concluded that the learning style preferences of student nurses revealed predominantly multimodal learning style preference, favouring two or more learning style modalities. The dominant unimodal learning style preference was reported to be Kinaesthetic. There was no statistical significance between first and third year student nurses.

With the new curriculum changes in Nursing Education in South Africa, the SANC (2005: 35) emphasises that nursing courses should promote student-focused methods of instruction. Awareness of students learning style is instrumental in achieving this.

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ANNEXURES

ANNEXURE 1: Ethical approval from Durban University of Technology

Institutional Research Ethics Committee
Research and Postgraduate Support Directorate
2nd Floor, Berwyn Court
Gate 1, Steve Biko Campus
Durban University of Technology

P O Box 1334, Durban, South Africa, 4001

Tel: 031 373 2375
Email: lavishad@dut.ac.za
http://www.dut.ac.za/research/institutional_research_ethics

www.dut.ac.za

18 July 2017

IREC Reference Number: **REC 9/17**

Ms L Subramoney
P O Box 39561
Uvongo
4270

Dear Ms Subramoney

Preferred learning styles of first and third year nursing students in a diploma programme at a college in KwaZulu-Natal: A comparative study

The Institutional Research Ethics Committee acknowledges receipt of your gatekeeper permission letters.

Please note that Full Approval is granted to your research proposal. You may proceed with data collection.

Yours Sincerely,

Professor J K Adam
Chairperson: IREC

ANNEXURE 2a: Letter to KwaZulu-Natal Health Research Committee

Port Shepstone Nursing Campus
Private Bag X719, Port Shepstone 4240
Lot 107 Marine Drive, Shelly Beach, 4265
Tel.:039 315 5322 Fax: 039 3155325
Email: linda.subramoney@kznhealth.gov.za
Or: lindakzn@hotmail.com

Enquiries: Ms. L. Subramoney
Date: 03/06/2016

The Health Research Manager
Department of Health
Private Bag X 9051
Pietermaritzburg
3200

Dear Sir / Manager

RE: PERMISSION REQUIRED TO CONDUCT RESEARCH AT THE KWAZULU NATAL COLLEGE OF NURSING

I, Ms. L. Subramoney, a lecturer at Port Shepstone Nursing Campus, am currently studying for a Master of Health Sciences (Nursing) degree at Durban University of Technology- Student Number: 21552866. I would appreciate permission to conduct my study at 6 randomly selected campuses of KwaZulu-Natal College of Nursing.

Title: Preferred learning styles of first and third year nursing students in the four year diploma in nursing at a college in KwaZulu-Natal: a comparative study

The participants for this study will include first year and third year students that are currently in the 4 year R425 programme. All student nurses participating in the study will be given an information letter about the research study and a consent form to sign before participating in the study. Students' names will not appear in the study. I will personally go to the different campuses to disseminate the questionnaires and I will collect them back on the same day. All data will be kept in a safe and secure place and electronic information will be password protected. The questionnaires will be analyzed by the researcher together with a statistician.

Written confirmation of permission granted is kindly requested.

Yours faithfully

_____

Researcher: Ms. L. Subramoney
Lecturer- Port Shepstone Nursing Campus

_____ _____

Supervisor: Mrs. P. Pillay
Lecturer- DUT

Co- Supervisor: Dr A. Razak
Part-time Lecturer- DUT

ANNEXURE 2b: Permission letter from KwaZulu-Natal Department of Health

health
Department:
Health
PROVINCE OF KWAZULU-NATAL

330 Langalibalele street,
Private Bag X9051 PMB, 3200
Tel: 033 395 2805/3189/3123 Fax: 033 394 3782
Email: hrkm@kznhealth.gov.za
www.kznhealth.gov.za

DIRECTORATE:
Health Research & Knowledge Management (HKRM)

Reference: HRKM155/17
KZ_2017RP4_816

08 May 2017

Dear Ms L Subramoney
(Durban University of Technology)

Subject: Approval of a Research Proposal

1. The research proposal titled **'Preferred learning styles of first and third year nursing students in a diploma programme at a college in KwaZulu-Natal: A comparative study'** was reviewed by the KwaZulu-Natal Department of Health (KZN-DoH).

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

2. You are requested to take note of the following:
   a. Make the necessary arrangement with the identified facility 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 Lutgé
Chairperson, Health Research Committee
Date: 09/05/17.

Fighting Disease, Fighting Poverty, Giving Hope

ANNEXURE 3a: Letter to the Principal of KwaZulu-Natal College of Nursing

Port Shepstone Nursing Campus
Private Bag X719, Port Shepstone 4240
Lot 107 Marine Drive, Shelly Beach, 4265
Tel.:039 315 5322 Fax: 039 3155325
Email: linda.subramoney@kznhealth.gov.za
Or: lindakzn@hotmail.com

Enquiries: Ms. L. Subramoney
Date: 04/04/2017

The Principal
KwaZulu Natal College of Nursing
Private Bag X 9089
Pietermaritzburg
3200

Dear Madam

RE: PERMISSION REQUIRED TO CONDUCT RESEARCH AT THE KWAZULU NATAL COLLEGE OF NURSING

I, Ms. L. Subramoney, a lecturer at Port Shepstone Nursing Campus, am currently studying for a Master of Health Sciences (Nursing) degree at Durban University of Technology- Student Number: 21552866. I would appreciate permission to collect data at 5 campuses of KwaZulu-Natal College of Nursing: Addington, Benedictine, Greys, RK Khan, and Ngwelezana.

Title: Preferred learning styles of first and third year nursing students in the four year diploma in nursing at a college in KwaZulu-Natal: a comparative study

The participants for this study will include first year and third year students that are currently in the 4 year R425 programme. All student nurses participating in the study will be given an information letter about the research study and a consent form to sign before participating in the study. Students' names will not appear in the study. I will personally go to the different campuses to disseminate the questionnaires and I will collect them back on the same day. All data will be kept in a safe and secure place and electronic information will be password protected. The questionnaires will be analyzed by the researcher together with a statistician.

Written confirmation of permission granted is kindly requested.

Yours faithfully

_____

Researcher: Ms. L. Subramoney
Lecturer- Port Shepstone Nursing Campus

_____ _____

Supervisor: Mrs. P. Pillay
Lecturer- DUT

Co- Supervisor: Dr A. Razak
Part-time Lecturer- DUT

ANNEXURE 3b: Permission letter from the Principal of KwaZulu-Natal College of Nursing

health
Department:
Health
PROVINCE OF KWAZULU-NATAL

DIRECTORATE:
KwaZulu-Natal College of Nursing

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

Reference: Dr. S.Z. Mthembu
Date: 05 May 2017

Principal Investigator: Ms. Subramoney
Student No: 21552866
Durban University of Technology

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

TITLE: **PREFERRED LEARNING STYLES OF FIRST AND THIRD YEAR NURSING STUDENTS IN A DIPLOMA PROGRAMME AT A COLLEGE IN KWAZULU-NATL: A COMPARATIVE STUDY**

Dear Madam

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

Data Collection site(s): Addington, Benedictine, Greys, RK Khan and Ngwelezana campuses

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 and the University Ethics Committee (Please refer to the website).
3. Permission is therefore granted for you to conduct this research at the above identified campuses after consultation with the Campus Principal.
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

ANNEXURE 4a: Letter to Addington Campus

Port Shepstone Nursing Campus
Private Bag X719, Port Shepstone 4240
Lot 107 Marine Drive, Shelly Beach, 4265
Tel.:039 315 5322 Fax: 039 3155325
Email: linda.subramoney@kznhealth.gov.za
Or: lindakzn@hotmail.com

Enquiries: Ms. L. Subramoney
Date: 23/05/2017

The Principal
Addington Nursing Campus
P. O. Box 977
Durban
4000

Dear Madam

RE: PERMISSION REQUIRED TO CONDUCT RESEARCH

I, Ms. L. Subramoney, a lecturer at Port Shepstone Nursing Campus, am currently studying for a Master of Health Sciences (Nursing) degree at Durban University of Technology- Student Number: 21552866. I would appreciate permission to collect data at Addington Nursing Campus.

Title: Preferred learning styles of first and third year nursing students in the four year diploma in nursing at a college in KwaZulu-Natal: a comparative study.

The participants for this study will include first year and third year students that are currently in the 4 year R425 programme; specifically groups 1/2017 and 1/2015. All student nurses participating in the study will be given an information letter about the research study and a consent form to sign before participating in the study. Students' names will not appear in the study. I will personally go to

the different campuses to disseminate the questionnaires and I will collect them back on the same day. All data will be kept in a safe and secure place and electronic information will be password protected. The questionnaires will be analyzed by the researcher together with a statistician.

Written confirmation of permission granted is kindly requested.

Yours faithfully

_____

Researcher: Ms. L. Subramoney
Lecturer- Port Shepstone Nursing Campus

_____ _____

Supervisor: Mrs. P. Pillay
Lecturer- DUT

Co- Supervisor: Dr A. Razak
Part-time Lecturer- DUT

ANNEXURE 4b: Permission letter from Addington Campus

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 Email:Thembi.masango@kznhealth.gov.za
Web: www.kznhealth.gov.za
Fax

TRAINING CAMPUS ADDINGTON

09/06/
2017

Subramoney Linda

LETTER OF SUPPORT TO CONDUCT RESEARCH AT ADDINGTON CAMPUS

Dear student

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

'Preferred learning styles of first and third year nursing students in a diploma programme at a college in KwaZulu-Natal: A comparative study' in our campus.

Please take cognizance of the following:

- You must adhere to all policies, procedures, protocols and guidelines of the Department of Health regarding research
- Your research will only commence once permission is granted by KZN Health Research Committee.
- Please inform our institution before research is commenced
- Please provide a copy of your research report to the Campus, on completion of the study

Please note that both groups are in college in July, and may be available between 15h00 and 16h00, unless otherwise negotiated.

Wishing you all the best for your studies

Ms.T.P. Skakane-Masango
Campus Principal

ANNEXURE 5a: Letter to Greys Campus

Port Shepstone Nursing Campus
Private Bag X719, Port Shepstone 4240
Lot 107 Marine Drive, Shelly Beach, 4265
Tel.:039 315 5322 Fax: 039 3155325
Email: linda.subramoney@kznhealth.gov.za
Or: lindakzn@hotmail.com

Enquiries: Ms. L. Subramoney
Date: 23/05/2017

The Principal
Grey's Nursing Campus
P/Bag X9001
Pietermaritzburg
3200

Dear Madam

RE: PERMISSION REQUIRED TO CONDUCT RESEARCH

I, Ms. L. Subramoney, a lecturer at Port Shepstone Nursing Campus, am currently studying for a Master of Health Sciences (Nursing) degree at Durban University of Technology- Student Number: 21552866. I would appreciate permission to collect data at Grey's Nursing Campus.

Title: Preferred learning styles of first and third year nursing students in the four year diploma in nursing at a college in KwaZulu-Natal: a comparative study.

The participants for this study will include first year and third year students that are currently in the 4 year R425 programme; specifically groups 1/2017 and 1/2015. All student nurses participating in the study will be given an information letter about the research study and a consent form to sign before participating in the study. Students' names will not appear in the study. I will personally go to

the different campuses to disseminate the questionnaires and I will collect them back on the same day. All data will be kept in a safe and secure place and electronic information will be password protected. The questionnaires will be analyzed by the researcher together with a statistician.

Written confirmation of permission granted is kindly requested.

Yours faithfully

_____

Researcher: Ms. L. Subramoney
Lecturer- Port Shepstone Nursing Campus

_____ _____

Supervisor: Mrs. P. Pillay
Lecturer- DUT

Co- Supervisor: Dr A. Razak
Part-time Lecturer- DUT

ANNEXURE 5b: Permission letter from Greys Campus

health
Department:
Health
PROVINCE OF KWAZULU-NATAL

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: busi.shezi@kznhealth.gov.za
www.kznhealth.gov.za

DIRECTORATE:
KwaZulu - Natal College of Nursing:
Grey's Campus

Reference: Mrs BE. Shezi
Date: 21 June 2017

Principal Investigator: Mrs Subramoney Linda
Student number: 21552866
Durban University of Technology

RE: Greys Campus permission to conduct research study.

TITLE: Preferred learning styles of first and third year nursing students in a four year Diploma programme at a college in KwaZulu-Natal: A comparative study.

Dear Madam

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

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

Thank you

21. 06. 2017

DATE

MRS BE SHEZI
CAMPUS PRINCIPAL

ANNEXURE 6a: Letter to Ngwelezane Campus

Port Shepstone Nursing Campus
Private Bag X719, Port Shepstone 4240
Lot 107 Marine Drive, Shelly Beach, 4265
Tel.:039 315 5322 Fax: 039 3155325
Email: linda.subramoney@kznhealth.gov.za
Or: lindakzn@hotmail.com

Enquiries: Ms. L. Subramoney
Date: 23/05/2017

The Principal
Ngwelezane Nursing Campus
P/Bag X20021
Empangeni
3800

Dear Madam

RE: PERMISSION REQUIRED TO CONDUCT RESEARCH

I, Ms. L. Subramoney, a lecturer at Port Shepstone Nursing Campus, am currently studying for a Master of Health Sciences (Nursing) degree at Durban University of Technology- Student Number: 21552866. I would appreciate permission to collect data at Ngwelezane Nursing Campus.

Title: Preferred learning styles of first and third year nursing students in the four year diploma in nursing at a college in KwaZulu-Natal: a comparative study.

The participants for this study will include first year and third year students that are currently in the 4 year R425 programme; specifically groups 1/2017 and 1/2015. All student nurses participating in the study will be given an information letter about the research study and a consent form to sign before participating in the study. Students' names will not appear in the study. I will personally go to

the different campuses to disseminate the questionnaires and I will collect them back on the same day. All data will be kept in a safe and secure place and electronic information will be password protected. The questionnaires will be analyzed by the researcher together with a statistician.

Written confirmation of permission granted is kindly requested.

Yours faithfully

_____

Researcher: Ms. L. Subramoney
Lecturer- Port Shepstone Nursing Campus

_____ _____

Supervisor: Mrs. P. Pillay
Lecturer- DUT

Co- Supervisor: Dr A. Razak
Part-time Lecturer- DUT

ANNEXURE 6b: Permission letter from Ngwelezane Campus

health
Department:
Health
PROVINCE OF KWAZULU-NATAL

DIRECTORATE:

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

Enquiry: Dr TE Matsane
Date: 20-06-2017

RE: Gate Keeper Permission to conduct research at Ngwelezane Campus

TITLE: PREFERRED LEARNING STYLES OF FIRST AND THIRD YEAR NURSING STUDENTS IN A DIPLOMA PROGRAMME AT A COLLEGE IN KWAZULU-NATAL: A COMPARATIVE STUDY

Dear Madam

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 7a: Letter to Benedictine Campus

Port Shepstone Nursing Campus
Private Bag X719, Port Shepstone 4240
Lot 107 Marine Drive, Shelly Beach, 4265
Tel.:039 315 5322 Fax: 039 3155325
Email: linda.subramoney@kznhealth.gov.za
Or: lindakzn@hotmail.com

Enquiries: Ms. L. Subramoney
Date: 23/05/2017

The Principal
Benedictine Campus
Private Bag X5002
Nongoma
3950

Dear Madam

RE: PERMISSION REQUIRED TO CONDUCT RESEARCH

I, Ms. L. Subramoney, a lecturer at Port Shepstone Nursing Campus, am currently studying for a Master of Health Sciences (Nursing) degree at Durban University of Technology- Student Number: 21552866. I would appreciate permission to collect data at Benedictine Campus.

Title: Preferred learning styles of first and third year nursing students in the four year diploma in nursing at a college in KwaZulu-Natal: a comparative study.

The participants for this study will include first year and third year students that are currently in the 4 year R425 programme; specifically groups 1/2017 and 1/2015. All student nurses participating in the study will be given an information letter about the research study and a consent form to sign before participating in the study. Students' names will not appear in the study. I will personally go to

the different campuses to disseminate the questionnaires and I will collect them back on the same day. All data will be kept in a safe and secure place and electronic information will be password protected. The questionnaires will be analyzed by the researcher together with a statistician.

Written confirmation of permission granted is kindly requested.

Yours faithfully

_____

Researcher: Ms. L. Subramoney
Lecturer- Port Shepstone Nursing Campus

_____ _____

Supervisor: Mrs. P. Pillay
Lecturer- DUT

Co- Supervisor: Dr A. Razak
Part-time Lecturer- DUT

ANNEXURE 7b: Approval to conduct research from Benedictine Campus

From: Zibani Monica

Sent: 19 June 2017 02:57 PM

To: Subramoney Linda

Subject:RE: Request for permission to conduct research

Good day
You are given the permission to conduct research at Benedictine Campus on the dates that will be arranged. Group i/2015 is in block till 23.06.2017. When you have arranged the date please inform us so as to assist you regarding the group 1/2017 who is in the clinical setting.

Wishing you success
Kind Regards
M.N Zibani
Principal
Benedictine Campus

ANNEXURE 8a: Letter to R.K. Khan Campus

Port Shepstone Nursing Campus
Private Bag X719, Port Shepstone 4240
Lot 107 Marine Drive, Shelly Beach, 4265
Tel.:039 315 5322 Fax: 039 3155325
Email: linda.subramoney@kznhealth.gov.za
Or: lindakzn@hotmail.com

Enquiries: Ms. L. Subramoney
Date: 23/05/2017

The Principal
RK Khan Nursing Campus
P/Bag X004
Chatsworth
4030

Dear Madam

RE: PERMISSION REQUIRED TO CONDUCT RESEARCH

I, Ms. L. Subramoney, a lecturer at Port Shepstone Nursing Campus, am currently studying for a Master of Health Sciences (Nursing) degree at Durban University of Technology- Student Number: 21552866. I would appreciate permission to collect data at RK Khan Nursing Campus.

Title: Preferred learning styles of first and third year nursing students in the four year diploma in nursing at a college in KwaZulu-Natal: a comparative study.

The participants for this study will include first year and third year students that are currently in the 4 year R425 programme; specifically groups 1/2017 and 1/2015. All student nurses participating in the study will be given an information letter about the research study and a consent form to sign before participating in

the study. Students' names will not appear in the study. I will personally go to the different campuses to disseminate the questionnaires and I will collect them back on the same day. All data will be kept in a safe and secure place and electronic information will be password protected. The questionnaires will be analyzed by the researcher together with a statistician.

Written confirmation of permission granted is kindly requested.

Yours faithfully

_____

Researcher: Ms. L. Subramoney
Lecturer- Port Shepstone Nursing Campus

_____ _____

Supervisor: Mrs. P. Pillay
Lecturer- DUT

Co- Supervisor: Dr A. Razak
Part-time Lecturer- DUT

ANNEXURE 8b: Approval to conduct research from R.K. Khan Campus

From: Reddy Jaya

Sent: 12 June 2017 10:22 AM

To: Subramoney Linda

Subject: RE: Request for permission to conduct research

Good day
You have been granted permission to conduct research at R. K. Khan Campus.
Currently the first and third year students are in block.
Please make good firm arrangements about the date and time you wish to come.

Mrs. J Reddy
Campus Principal
Telephone: 031 4596069
Fax: 031 4015229
e-mail:jaya.reddy@kznhealth.gov.za
web: www.kznhealth.gov.za

health
Department:
Health
PROVINCE OF KWAZULU-NATAL

ANNEXURE 9: Permission from Neil Fleming to use VARK

Fri 2016/02/19 11:51 AM

From: Neil Donald Fleming neil.fleming@vark-learn.com
To: Subramoney Linda linda.subramoney@kznhealth.gov.za
Subject: Using VARK for Research
Dear Linda

PERMISSION:
If you are a student or a teacher in a high school, college or university you are welcome to use the VARK™ questionnaire by linking to our website, or to use paper copies. We ask that you provide this acknowledgement:
© Copyright Version 7.8 (2014) held by VARK Learn Limited, Christchurch, New Zealand.

THERE ARE SOME RESTRICTIONS
You may not place VARK copyright materials online or on an electronic survey instrument, or any website, intranet or password protected site. This applies to those using VARK for research, and all publications, free resources and resources made for sale, or for which fees are charged.
We can analyse your data into VARK categories using both the VARK Research algorithm and the VARK Standard algorithm for a small fee (approx. $US10).

Best wishes for your learning.

Neil
Neil D Fleming
Designer of the VARK Questionnaire
Director: VARK LEARN Limited
50 Idris Road, Christchurch 8052
New Zealand
www.vark-learn.com
Phone: (64) 3 3517798

ANNEXURE 10a: Letter of information to respondents

LETTER OF INFORMATIO N

Title of the Research Study: Preferred learning styles of first and third year nursing students in a diploma programme at a college in KwaZulu-Natal: A comparative study

Principal Investigator/s/researcher: Ms. Linda Subramoney, BA Cur Nursing

Co-Investigator/s/supervisor/s: Supervisor: Mrs. Padmini Pillay, MHSc
Co Supervisor**:** Dr. Ayisha Razak, PhD

Brief Introduction and Purpose of the Study: Research indicates that there is a gap in knowledge about the learning styles preferences of student nurses in a South African context. Knowing how students prefer to learn will empower lecturers to create more student-centered teaching method and could ultimately result in a better learning experience for students. This study will determine the learning style preferences of first year and third year nursing students at KwaZulu-Natal College of Nursing (KZNCN), compare the learning styles of first year and third year students and determine if demographic factors and linguistic background influence learning style preferences**.**

Outline of the Procedures: The study will be conducted at 8 campuses of KZNCN and the participants will be first year and third year students from Group 1/2017 and Group 1/2015 respectively. Your role as a respondent will be to complete the questionnaire that I will provide. The questionnaire consists of a section on demographics and section on learning style preferences. I will be available at your campus should you have any queries or questions about the study or your participation. You should be able to complete the questionnaire in 10-15 minutes.

Risks or Discomforts to the Participant: there will be no risks or discomfort experienced by participation in this study

Benefits: Participation in this study is voluntary and there will be no remuneration for involvement in this study. Knowledge gained from this study will give students and nurse educators' insight into learning style preferences of students and how this knowledge could possible improve the teaching and learning process.
The researcher will be awarded a Master's degree on successful completion of this study.

Reason/s why the Participant May Be Withdrawn from the Study: Participation is voluntary and by consent only. You may withdraw at any time and you will not be penalized in any way should you wish to withdraw.

Remuneration: None

Costs of the Study: None

Confidentiality: No participants name will be recorded on the questionnaire. The researcher will keep the acquired data for a specified period of time in a secure place and only the research team will have access to the questionnaires.

Research-related Injury: No research related injury is anticipated by participating in this study.

Persons to Contact in the Event of Any Problems or Queries:

Researcher: Ms. L. Subramoney (Lecturer- Port Shepstone Nursing Campus) - 0393155322
Supervisor: Mrs. P. Pillay (Lecturer- Durban University of Technology) - 0313732293
Co-supervisor: Dr. A. Razak (Honorary Research Fellow- Durban University of Technology) - 0313732537
Institutional Research Ethics Administrator: 031 373 2900.

Complaints can be reported to the Director: Research and Postgraduate Support, Prof S Moyo on 031 373 2577 or moyos@dut.ac.za

ANNEXURE 10b: Consent form

CONSENT

Statement of Agreement to Participate in the Research Study:

- I hereby confirm that I have been informed by the researcher, Ms. L. Subramoney about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number: 9/17.
- I have also received, read and understood the above written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

Full Name of Participant	**Date**	**Time**	**Signature / Right Thumbprint**

I, _____ (name of researcher) herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

Full Name of Researcher	**Date**	**Signature**
Full Name of Witness (If applicable)	**Date**	**Signature**
Full Name of Legal Guardian (If applicable)	**Date**	**Signature**

ANNEXURE 11: Student Questionnaire

STUDENT QUESTIONNAIRE

DATE: **QUESTIONNAIRE NUMBER:**

NAME OF CAMPUS:

Section A:

Please place an X in the box that corresponds to the option of your choice. Select only one option unless otherwise stated.

1. Age:

Specify:	

2. Gender:

Male	
Female	
Other: (Specify)	

3. Race:

Black	
Coloured	
Indian	
White	
Other: (Specify)	

4. First language/ home language

Afrikaans	
English	
Xhosa	
Zulu	
Other: (Specify)	

5. Do you have any previous tertiary education or qualification?

No	
Yes	
Specify the field of study if your answer is yes:	

Section B:

The VARK Questionnaire (Version 7.8)

How Do I Learn Best?

Choose the answer which best explains your preference and circle the letter(s) next to it. **Please circle more than one** if a single answer does not match your perception.

Leave blank any question that does not apply

.

1. You are helping someone who wants to go to your airport, the center of town or railway station. You would:
a. go with her.
b. tell her the directions.
c. write down the directions.
d. draw, or show her a map, or give her a map.

2. A website has a video showing how to make a special graph. There is a person speaking, some lists and words describing what to do and some diagrams. You would learn most from:
a. seeing the diagrams.
b. listening.
c. reading the words.
d. watching the actions.

3. You are planning a vacation for a group. You want some feedback from them about the plan. You would:
a. describe some of the highlights they will experience.
b. use a map to show them the places.
c. give them a copy of the printed itinerary.
d. phone, text or email them.

4. You are going to cook something as a special treat. You would:
a. cook something you know without the need for instructions.
b. ask friends for suggestions.
c. look on the Internet or in some cookbooks for ideas from the pictures.
d. use a good recipe.

5. A group of tourists want to learn about the parks or wildlife reserves in your area. You would:
a. talk about, or arrange a talk for them about parks or wildlife reserves.
b. show them maps and internet pictures.
c. take them to a park or wildlife reserve and walk with them.
d. give them a book or pamphlets about the parks or wildlife reserves

6. You are about to purchase a digital camera or mobile phone. Other than price, what would most influence your decision?
a. Trying or testing it.
b. Reading the details or checking its features online.
c. It is a modern design and looks good.
d. The salesperson telling me about its features.

7. Remember a time when you learned how to do something new. Avoid choosing a physical skill, eg. riding a bike. You learned best by:
a. watching a demonstration.
b. listening to somebody explaining it and asking questions.

c. diagrams, maps, and charts - visual clues.
d. written instructions – e.g. a manual or book.

8. You have a problem with your heart. You would prefer that the doctor:
a. gave you a something to read to explain what was wrong.
b. used a plastic model to show what was wrong.
c. described what was wrong.
d. showed you a diagram of what was wrong.

9. You want to learn a new program, skill or game on a computer. You would:
a. read the written instructions that came with the program.
b. talk with people who know about the program.
c. use the controls or keyboard.
d. follow the diagrams in the book that came with it.

10. I like websites that have:
a. things I can click on, shift or try.
b. interesting design and visual features.
c. interesting written descriptions, lists and explanations.
d. audio channels where I can hear music, radio programs or interviews.

11. Other than price, what would most influence your decision to buy a new non-fiction book?
a. The way it looks is appealing.
b. Quickly reading parts of it.
c. A friend talks about it and recommends it.
d. It has real-life stories, experiences and examples.

12. You are using a book, CD or website to learn how to take photos with your new digital camera. You would like to have:
a. a chance to ask questions and talk about the camera and its features.
b. clear written instructions with lists and bullet points about what to do.
c. diagrams showing the camera and what each part does.
d. many examples of good and poor photos and how to improve them.

13. Do you prefer a teacher or a presenter who uses:
a. demonstrations, models or practical sessions.
b. question and answer, talk, group discussion, or guest speakers.
c. handouts, books, or readings.
d. diagrams, charts or graphs

14. You have finished a competition or test and would like some feedback. You would like to have feedback:
a. using examples from what you have done.
b. using a written description of your results.
c. from somebody who talks it through with you.
d. using graphs showing what you had achieved.

15. You are going to choose food at a restaurant or cafe. You would:
a. choose something that you have had there before.
b. listen to the waiter or ask friends to recommend choices.

c. choose from the descriptions in the menu.
d. look at what others are eating or look at pictures of each dish.

16. You have to make an important speech at a conference or special occasion. You would:
a. make diagrams or get graphs to help explain things.
b. write a few key words and practice saying your speech over and over.
c. write out your speech and learn from reading it over several times.
d. gather many examples and stories to make the talk real and practical.

The VARK Questionnaire Scoring Chart
Use the following scoring chart to find the VARK category that each of answer corresponds to. Circle the letters that correspond to each answer

Question	a category	b category	c category	d category
1	K	A	R	V
2	V	A	R	K
3	K	V	R	A
4	K	A	V	R
5	A	V	K	R
6	K	R	V	A
7	K	A	V	R
8	R	K	A	V
9	R	A	K	V
10	K	V	R	A
11	V	R	A	K
12	A	R	V	K
13	K	A	R	V
14	K	R	A	V
15	K	A	R	V
16	V	A	R	K

<u>Calculating the scores</u>
Count the number of each of the VARK letters circled to get a score for each VARK category.
Total number of Vs circled =
Total number of As circled =
Total number of Rs circled =
Total number of Ks circled =

ANNEXURE 12: Letter from the editor

Proofwrite Solutions

WRITE - EDIT - RESEARCH - DESIGN

9th of December 2018

To whom it may concern

EDITING OF DISSERTATION FOR MRS LINDA SUBRAMONEY

I have a master's degree in Social Science, Research Psychology and a TEFL qualification from UKZN. I also have an undergraduate and honour's degree Bachelor of Arts in Health Sciences and Social Services from UNISA.

I have 15 years of teaching experience and have been editing academic theses for students from UKZN, UNISA, the University of Fort Hare, and DUT for the past seven years. I have further done editing, transcribing and other research work for private individuals and businesses.

I hereby confirm that I have edited Linda Subramoney's dissertation titled **"PREFERRED LEARNING STYLES OF FIRST AND THIRD YEAR NURSING STUDENTS IN A DIPLOMA PROGRAMME AT A COLLEGE IN KWAZULU-NATAL: A COMPARATIVE STUDY"** for submission of her master's dissertation in education at Durban University of Technology. Corrections were made in respect of grammar, tenses, spelling and language usage using track changes in MS Word 2010. Once corrections have been attended to, the dissertation should be correct.

Yours sincerely

Terry Shuttleworth (TEFL, UKZN, MSocSc, Res Psych, UKZN).