UNIVERSITY OF KWAZULU-NATAL

ANALYSING COGNITIVE LEVELS OF FINAL EXAMINATION QUESTIONS FOR THE DIPLOMA NURSING PROGRAMME USING THE REVISED BLOOM'S TAXONOMY AT A SELECTED NURSING COLLEGE IN EASTERN CAPE

BY

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2017

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A dissertation submitted to the School of Nursing and Public Health, College of Health Sciences, University of KwaZulu-Natal, in fulfilment of the requirement for the degree of Masters in Nursing Education (Coursework)

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DECLARATION

With this, I declare that the dissertation hereby submitted titled: **'Analysing cognitive levels of final examination questions for the Diploma Nursing Programme using the Revised Bloom's Taxonomy at a selected nursing college in Eastern Cape",** is my own independent work and has never been submitted for degree or examination in any university. All the resources and material that has been used or quoted has been indicated and acknowledged by means of references.

Signed:

Student:…… Date:……

Supervisor:…… Date:……

DEDICATION

This dissertation is dedicated to my family, especially my late father who inspired me to be who I am today, my mother, siblings, and my dearest husband and children who survived my absence.

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ABSTRACT

Background: The main objective of the current reform is the production of graduates capable of facing challenges and adapt to changes that may be encountered post-graduation. According to the ICN (2009), employers perceived that graduates were not prepared for the realities of practice nor did they have the competencies needed for health care services. That necessitates higher education to prepare students to be competent graduates through teaching content and transferable skills. Appraised literature reveals that employing Bloom's Taxonomy in class and integrating learning outcomes and assessment strategies, leads to production of graduates that are competent with skills expected from a professional. Previous literature also indicates that poor alignment of curriculum objectives with assessment strategies deprive students' development of crucial skills as well.

Purpose: The purpose of the study was to analyse the cognitive levels of final examination questions for the Diploma Nursing Programme using the Revised Bloom's Taxonomy at a selected nursing college in Eastern Cape.

Methodology: The quantitative descriptive approach was adopted for the study where content analysis was used to analyse final examination questions. The study population consisted of the selected nursing modules' examination question papers for a four-year Diploma Nursing Programme; selected from first year to fourth year level for the period of 2011-2015, for summative and supplementary examinations. A non-probability, convenience sampling method was adopted for the study and the sample consisted of a total of 1709 questions from 95 examination question papers which were analysed.

Data collection was done using a template incorporating the six cognitive levels of the Revised Bloom's Taxonomy. Questions were examined according to template and coding was done for single word, the action verb used in questioning, coded for frequency. Statistical Package for Social Sciences version 24 was used for data analysis.

Findings: The results revealed that the highest percentage of questions set for the Diploma of Nursing Programme dealt with lower cognitive levels (remember, understand, and apply) of which 'understand' obtained the highest percentage across all levels in all modules, the higher order cognitive levels (analyse, evaluate, and create) were less assessed in the examination questions papers.

Recommendations: The study recommends that the nurse educators who are curriculum developers should revise the assessment strategies and align it to curriculum and learning outcomes as well as to the changing health care systems and complexities of patients' care demands. The development of assessment guide is highly recommended, which will be in line with the current instruction methods. Further, for the college management, staff development is recommended in terms of assessment strategies through in-service trainings, workshops, and seminars conducted by assessment experts, to improve in the construction of examination questions in order to develop student's required crucial skills.

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LIST OF ABBREVIATIONS

CBE: Community-based Education

CINAHL: Cumulative Index for Nursing and Allied Health Literature

CNS: Community Nursing Science

DNP: Diploma Nursing Programme

EC: Eastern Cape

ERIC: Educational Resource Centre

ECDOH: Eastern Cape Department of Health

ELT: English Language Teacher

FNS: Fundamentals of Nursing Science

GNS: General Nursing Science

HOCS: Higher order cognitive skills

HO: Higher Order

ICN: International Council of Nurses

IWF: Item-Writing Flaws

LCoN: Lilitha College of Nursing

LOCS: Lower order cognitive skills

LO: Lower order

MA: Master of Arts

MCQs: Multiple Choice Questions

MNS: Midwifery Nursing Science

NEP: Ethos of Nursing and Professional Practice

NECO: National Examination Council

NQF: National Qualification Framework

OBE: Outcome-based Education

PBL: Problem-based Learning

PNS: Psychiatric Nursing Science

PHD: Doctor of Philosophy

SANC: South African Nursing Council

SAQA: South African Qualifications Authority

SPSS: Statistical Package for Social Science

UKZN: University of Kwa-Zulu Natal

WHO: World Health Organisation

CHAPTER ONE

1.1. INTRODUCTION AND BACKGROUND

The current healthcare environment is depicted by rapid transformation and a fast paced, technologically advanced world, coupled with a constant knowledge explosion. This requires nurse educators to change from using traditional teaching methods and opt for innovative teaching and learning strategies that enable students to think critically, solve problems, and have the ability to practice competently in a variety of situations (Bambini, Washburn and Perkins, 2009). Similarly, in its Nursing Education and Training standards, the South African Nursing Council (SANC) under the provisions of Nursing Act (2005) requires Nursing Education Institutions to prepare graduates who demonstrate critical, analytical, and reflective thinking skills. It then follows that along with these necessary changes in instruction methods from traditional teaching to more innovative methods, there was therefore, a need for redesigning assessment methods to fit with the new teaching and learning strategies.

SANC is the statutory body that sets and maintains quality standards of nursing education and practice. According to the SANC Regulation R425, 22 of 1985 as amended, a nursing student should be assessed, upon which the student is required to pass theory and practical examinations (where applicable) in each prescribed subject or module. In both the general higher education and health professions education communities, it is well known that assessment is one of the most grounded stimulus for learning (Combs, Gibson, Hays, Saly and Wendt, 2008; Larsen, Butler and Roediger, 2008). As such, the SANC, under the provisions of Nursing Act 2005, recommended assessment using a variety of strategies as one of the required competencies for nurse educators in South Africa (SANC 2014a).

Lecturers can improve learners' critical thinking through assessment methods (Narenji, Roozbahani and Farahani, (2010). Assessment methods can therefore influence the learning approaches utilized by nursing students. Saeed, Khan and Ahmed (2012) assert that thinking is not driven by answers but rather, by questions, which, when taken seriously, become the driving force in the process of thinking. According to the South African Qualifications Authority (SAQA), 2015, assessment refers to the process used to identify, gather and interpret information as well as evidence against the required competencies in a qualification, part-qualification or professional designation in order to make a judgement about the learner's achievement.

Written examinations are a generally preferred option for educators to assess their students' knowledge. However, developing examination questions is a considerably demanding exercise particularly when educators are attempting to produce a high quality, yet rational assessment to match the variety of cognitive levels is required (Scott, 2003, Chang and Chung, 2009 and Jones, Harland, Reid and Bartlett, 2009). Bloom's Taxonomy, an extensively recognized hierarchical model for the cognitive domain used for developing questions according to various categories or levels of complexity and specificity, was first described in the 1950s (Bloom et.al, 1956). The categories were ordered from simple to complex and from concrete to abstract. These authors identify the cognitive levels as knowledge, comprehension, application, analyzing, synthesis, and evaluation. The first three were regarded as lower order cognitive levels and the last three regarded as higher order cognitive levels.

Forty years later, it is indicated in Anderson and Krathwohl (2001) that, Anderson and a team of psychologists revisited Bloom's Taxonomy to accommodate progressions in pedagogy. Anderson and Krathwohl (2001) describe the cognitive categories of the revised taxonomy as follows; **remember** is the lowest category where the student is expected to retrieve knowledge from long-term memory, while **understand** is the second lowest order category where the student is required to construct meaning from instructional messages. **Apply** is the first level category of higher order thinking, where the student is expected to use information in a new way, or carry out or use a procedure in a given situation. This is followed by **analyse,** a level that requires a student to break down an issue into its constituent parts and identify information that make up the whole determining the relations among the parts. **Evaluate** is the second highest level of thinking where the student is expected to make judgements based on standards and criteria. **Create** is the highest level where a student is expected to reorganise elements into new structure.

Appraised literature reveals that employing Bloom's Taxonomy of cognitive domain in class facilitates the integration of learning objectives and assessment strategies, which in turn provides learners with competitive skills needed in nursing (Lord and Baviska, 2007; Jayakodi, Bandara, Perera and Meedeniya, 2016). Questions are used to stimulate students' thinking and redirect reasoning, thus focusing student's attention (Swart, 2010). However, poorly designed assessments fail to examine course outcomes thus leading to the decline of quality on program standards and graduates (Jayakodi et al. 2016). Gerekwe (2010) believes

that a combination of questions from various levels of taxonomy may result in effective learning across the higher levels. Therefore, it is vital that examiners set proper questions according to the complexity of the program level. Jones et al. (2009) suggest that a good and reasonable examination question paper should entail various difficulty levels to accommodate student capabilities. Student feedback from a study, conducted by Kim, Patel, Uchizono and Beck (2012), indicated that the acquisition of sufficient knowledge is necessary prior to applying, analyzing, synthesizing information, or evaluating situations using critical thinking skills. Therefore, it is important to assess the student at all cognitive levels according to their level of training. Swart (2010) emphasized that academics should focus on incorporating questions, which test higher order cognitive processes, into their assessments to ensure that students are equipped with necessary problem solving and critical thinking skills and not tested on recall of information only.

Tarman and Kuran (2014) in Turkey, examined the cognitive levels on social studies text books based on Bloom's Taxonomy, they observed that higher cognitive level type questions were not sufficiently present in social science books. Further, Tarman and Kuran (2014) recommended that cognitive domain levels should be balanced in assessments in order to develop a competent learner who will be a lifelong learner beyond the classroom. Baig, Kauser, Ali, and Huda (2014) in Saudi Arabia evaluated questions in Basic Medical Science books, the study results indicated that 83.3% of short essay type questions were on recall and the remaining 16.67% was on interpretation of data. Meaning that assessment of higher order thinking skills was neglected.

Knowledge on its own, as stated by Assaly and Smadi (2015) is arguably no longer considered adequate to afford society the calibre of citizens who will be able to cope with challenges beyond schooling, more transferable skills for 'meaning making' are required from graduates in the current global reform. These authors contend that education should aim at developing students with skills that are not only based on present needs of achievement , but assist them to focus on essential skills for full participation in societies as well as ensure that they are able to face challenges beyond the classroom. According to Tanner and Tanner (2007), traditional philosophers focused education on the behaviourist theory where the emphasis was on students' intellectual development. Learners were expected to conform to natural laws and master information found in ancient books transmitted to them passively, by

expert teachers (Tanner and Tanner, 2007). Clearly, this is contrary to what is required in the present transformation, which is the ability of student to be self-directed in their learning and acquire problem solving and critical thinking skills.

A number of authors have raised concerns about the use of traditional methods of teaching and the effects this has on learners. For example, Pretorius, Bailey and Miles (2013) and Petre (2017) suggested that this didactic teaching and learning practice was known to promote passive learners who rarely participate in the learning process resulting in superficial coverage of material where learners have to note down information for memorising. Mooney and Nolan (2005); Mthembu, Mtshali and Frantz (2014) put forward the view that traditional methods of teaching are teacher-centred, therefore it is most likely that learners from these programmes lack critical thinking and problem solving skills. Gunuseni, Serkerkus and Edeer (2014) add that traditional teaching methods result in limited self-directedness and lack of motivation for lifelong learning, since teachers are always available as primary sources of information for learning. It is also believed that learners are often expected to memorise incontestable facts and standard problems not related to real life situations.

When it comes to assessment of learning, Mooney and Nolan (2005) noted that in traditional assessment methods, learners were largely required to recall knowledge previously conveyed to them, although that practice isolated learning from real experiences and the learner's ability to think. This type of assessment was very structured, with questions that evaluated knowledge and comprehension such as "what", and "when", without assessing higher order cognitive domains (Tanner and Tanner, 2007). These authors believe that traditional teaching methods do not facilitate correlation of theory to practice, resulting in students not being adequately prepared to meet the challenging needs of the health care system.

The changing health care system with complex patient needs led to the redesigning of the nursing education curriculum in the world in order to meet the demands of health reform by producing the competent graduate aligned with the current health care situation (WHO, 1985). The literature review conducted by Worrel and Profetto-McGrath (2007), concluded that due to increasingly complex needs and expanding roles in the delivery of health-care, the system required a professional nurse that is capable of applying clinical reasoning skills as an independent practitioner. Similarly, in the 1980s, SANC identified problems with the nursing education system of that time in the country, as a result mandated that nursing education

institutions implement the new comprehensive 4-year basic nursing programme, with the hope of producing nurses who would be more skilled and competent.

Subsequently, new policies backing up the transformation of the health care system, general and professional education, formed part of the context within which community-based education and problem based learning was implemented in South Africa. Mtshali (2009) state that community-based education was introduced to be the vehicle through which health care students and educators would be equipped with the comprehensive knowledge, competencies and attitudes needed to respond to the health care needs of the South African population, replacing the traditional content-driven education. Community-based education is defined by Mtshali, (2005) as a community-oriented program which is problem centred, thus allowing students to deal with real life problems which are work related, facilitating the easy retrieval of information for future use. According to Uys and Gwele (2005), problem-based learning is a student-centred learning approach that allows students to tackle problems in small groups under the supervision of the teacher in a flexible environment. Through this approach, students draw their reasoning skills and negotiation skills. These methods expose students to real life situations in a context that resembles the one that they will work in after graduation.

Along with those changes in instruction methods from traditional teaching to more innovative methods, there was also a need for redesigning assessment methods to fit with the new teaching and learning strategies. The innovative assessment methods were believed to arouse the use of higher-order thinking skills on learners (Shute, 2008), this would subsequently show whether the students have achieved the expected competency levels. Based on the progressivist view, the change in education and assessment methods is central to knowledge construction rather than acquired knowledge (Dewey, 1938 and Tanner and Tanner, 2007).

Igbaria (2013) reviewed literature on previous studies that dealt with analysis of questions using Bloom's taxonomy in textbooks and examination papers, from studies conducted in several countries over the world at different times, ranging from the 1970s, 1980s, and 1990s with one conducted in 2002. The results of these studies showed that most questions emphasized the knowledge level or the second level of comprehension. Igbaria believed that it was easier for teachers and authors to write knowledge questions than questions on other levels or perhaps, the students for whom the questions were written were unable to cope with questions that demanded a higher level of thinking.

A study conducted by Kim et al. (2012) highlights that the adoption of the Bloom Taxonomy approach, drew interest among faculty members and led to developmental workshops because some faculty members indicated that they did hear about Bloom's Taxonomy but had never conceptualized it enough to apply it to their teaching and assessments. The faculty members further attested that the workshops provided them with adequate information to understand and apply Bloom's concepts in their lectures and examination questions. In support of this revelation, Jayakodi et al. (2016) indicated that instructors set questions at low levels due to their lack of knowledge of taxonomies as well as how questions fit in those taxonomies. Anderson and Krathwohl (2001) commented that it was surprising that most educators were still not aware of the latest update in the taxonomy, as they still based their assessments on the original Bloom's Taxonomy.

It is worth noting that in assessment of learning, quality would be compromised if the content was poorly examined, or applied for memorizing in order to make the student study, pass, and then find a job (Gerekwe, 2010). Saeed, Khan and Ahmed (2012) recommended that educators increase the number of questions requiring application, analysis, synthesis and evaluation in order to activate and facilitate critical thinking. These authors further added that the art of questioning be a learned skill, nurse educators could benefit from structured and regular trainings to keep themselves abreast of this skill.

The researcher of the present study noted, with concern, that ever since the Lilitha College of Nursing was established, there were no studies known by the researcher that had been carried out with regard to analysis of examination questions set by nursing educators for the Diploma Nursing Programme. As the college is in the process of preparing for accreditation with Higher Education as well as the alignment of its programmes with the National Qualification Framework (NQF) levels, as per SANC Circular 14 of 2014, the study might be of importance in identifying the assessment standards of the college.

1.2. STUDY CONTEXT

The selected nursing college for the study is under Eastern Cape Department of health. This college received full accreditation from SANC in 2005 after the amalgamation of the former Transkei College of Nursing with the Ciskei College of nursing. The college has five main campuses and 20 satellite campuses. These campuses are affiliated to three universities in

Eastern Cape, namely: Walter Sisulu University, Fort Hare University, and Nelson Mandela Metropolitan University. In its five main campuses, LCoN offers a unified curriculum for the four year Diploma Course in nursing leading to registration as a Registered Nurse, General, Psychiatric, Community, and Midwifery (SANC, R425 as amended) while some of the campuses also offer Postgraduate Diplomas (SANC, R48). The satellite campuses offer bridging courses from enrolled nurse to professional nurse (SANC, R683) and basic nursing programmes for Auxiliary nursing and enrolled nursing (SANC R2176 and R 2175). Main Campuses are distributed across the Eastern Cape to provide access to all Eastern Cape citizens.

The focus of this study is on the examination questions for the four year, Diploma of Nursing Programme. According to SANC, the graduates of the programme will be registered as professional nurses (General, Community, Psychiatry and Midwifery), after successful completion of the course of study and compliance with the programme objective, as well as other programme requirements (SANC, 1985 R425 as Amended). The intake of this programme is once a year. The prescribed programme objectives, according to SANC, stipulate that the student has to show respect and dignity of man in their socio-cultural and religious context, understand a person as a psychosocial, physical and social wellbeing, and also show skill in the diagnosing of individual, family, group, and community health problems as well as ability to plan and implement the therapeutic action and nursing care for health service consumers at any point along the health/illness continuum in all stages of life, including dying. The student is also expected to develop cognitive, psychomotor, and affective skills, which serve as the basis for effective practice and for continuous education (SANC, 1985, R425).

Various forms of assessment are utilized at the selected nursing college during the course of the year namely tests, assignments, projects, and clinical evaluations, which contribute to the student's year mark. A student is expected to achieve a year mark of 40% or above in formative assessment in order to qualify for final examinations at each level of study (LCoN, 2016). The year mark is then added to the examination mark to obtain the final mark. The Pass mark for each level is 50% or above.

When developing examination questions, nurse educators are guided by specification tables provided by the College to align questions with provided action verbs in order to set questions according to the complexity of the programme, for both formative and summative

assessments. The college also provides guidelines for academics for the distribution of questions in percentages for each level, for example, assessment of recall, interpretation, and problem solving should be asked in each level of study. For Level 1 assessment recall should be 20%, while interpretation and problem solving should be 40% each. For Level 2 recall should be 15%, interpretation 35%, and problem solving 50%. For Level 3 recall should be 10%, interpretation 30%, and problem solving 60%. For Level 4 and Post Basics recall should be 5%, interpretation 25%, and problem solving 70% (LCoN Specification guide n.y.).The study will focus on summative assessments. The target group will be summative examination question papers for the period 2011-2015 (main examinations and supplementary examinations) analysed according to template of Revised Bloom's Taxonomy.

1.3. PROBLEM STATEMENT

Transformation of Health systems in South Africa led to increased demand from government and society that higher education institutions must be responsive to community needs (DOH, 1997). As such this nursing college in EC is one of the institutions offering Community based Learning. Therefore, the assessments used should be aligned to the instruction strategies. As a requirement from SANC, all nursing colleges will be under Institute of Higher education, as a strategy to meet the demand for nurses with high calibre because of the changing health care systems and complexities of patients demands (SADOH, 2012). According to the International Council of Nurses (ICN), (2007) the employers perceived that the graduates were not prepared for realities of practice nor have the competencies needed by the health care service. Further, the ICN suggested that curriculum objectives, instruction, and assessment methods should all be aligned and relevant to employer needs.

Similarly, Lord and Baviska (2007) indicated that the graduates leave college or university without the ability to use information learnt because of traditional instruction and assessment strategies, where students are told what to learn and are assessed to recall and summarise the learnt information. Therefore, examiners should pose questions that evaluate understanding and meaningful learning, not only factual content. Findings from different scholars (Bloom, et al (1956), Mooney and Nolan (2005), Rahmat, Saud, Sembilan (2007), Gerekwe (2010), Lucas, Dippenaair, and Du Toit, (2014), Upahi, Issa, and Oyelekan (2015), and Ashadi and Lubis (2017), identified that, teachers frequently set examination questions at low cognitive levels, that assess the students' knowledge and recall, thus failing to develop learners into critical thinkers who can think and act in any encounter with a problem.

Appraised literature reveals that employing Bloom's Taxonomy of cognitive domain in class assists in the aligning learning objectives and assessment strategies, which in turn leads to production of a learner with competitive skills needed in nursing (Lord and Baviska, 2007; Jayakodi et al., 2016). Questions are used to stimulate students' thinking and redirect reasoning, thus focusing student's attention (Swart, 2010). However, poorly designed assessments fail to examine course outcomes thus leading to the decline of quality on program standards and graduates (Jayakodi et al., 2016). Gerekwe (2010) believes that a combination of questions from various levels of taxonomy may result in effective learning across the higher levels. Therefore, it is vital that examiners set proper questions according to the complexity of the program level. Jones et al. (2009) suggest that a good and reasonable examination question paper should entail various difficulty levels so as to accommodate student capabilities.

Anderson and Krathwohl (2001)'s finding that some assessors did not know about the latest updates of the Taxonomy as their assessments were still focused on original Bloom's Taxonomy indicates how some academics are lagging behind on such crucial developments in teaching, learning and assessment. As highlighted in study by Kim et al. (2012), faculty members expressed their lack of knowledge about the taxonomy. Some lacked knowledge on determining how various questions fit in the taxonomy, as indicated in study by (Jayakodi et al. 2016).

The researcher of the present study noted, with concern, that ever since the Lilitha College of Nursing was established, there are no studies known by the researcher that have been carried out with regard to analysis of examination questions set by nursing educators for the Diploma of Nursing Programme. As the College in question has a specific guide for examiners to set examination questions, it has come to the researcher's interest to analyse examination papers to identify if the questions set for the programme are still in line with the adopted specification guide. Consequently, it is the researcher's assumption that this information will assist the educators in knowing their stand, in terms of the type of students that are being prepared, based on assessment methods. Additionally, information from the study might highlight the educator's needs in meeting the SANC requirement of producing lifelong learners. As the college is in the process of preparing for accreditation with Higher Education as well as the alignment of its programmes with the NQF levels, as per SANC Circular 14 of 2014, the study might be of importance in identifying the assessment standards of the college.

1.4. PURPOSE OF THE STUDY

The purpose of this study is to analyse the cognitive levels of final examination questions for the Diploma Nursing Programme using the Revised Bloom's Taxonomy at a selected nursing college in the Eastern Cape.

1.5. OBJECTIVES OF THE STUDY

To analyse the cognitive levels of final examination questions for the Diploma of Nursing Programme using the Revised Bloom's Taxonomy at a selected nursing college in the Eastern Cape. The research objectives were:

1.5.1. To determine the cognitive levels at which examination questions are set in the Diploma programme according to the Revised Bloom's Taxonomy.

1.5.2. To explore progression in the utilisation of action verbs across various levels of the programme.

1.5.3. To compare the difficulty level of questions across various levels of the programme.

1.6. RESEARCH QUESTIONS

The following questions were intended to answer the research objectives:

1.6.1. What are the cognitive levels in the examination questions set for the Diploma Nursing Programme according to the Revised Bloom's Taxonomy?

1.6.2. Which levels of cognitive domain are frequently used for each programme level?

1.6.3. Which levels of cognitive domain are used less frequently for each programme level?

1.6.4. How do the cognitive levels increase with the increase in difficulty of the program level?

1.6.5. Which cognitive levels are regularly used in most question papers?

1.7. SIGNIFICANCE OF THE STUDY

The study will reveal the standard of examination question papers set by educators for the Diploma of Nursing Programme by analysing the cognitive levels of examination questions. Accordingly, the study will contribute to the body of knowledge on students' assessments of critical thinking skills. Further, as the college of nursing is moving to Higher Education, the

information obtained from this study forms a baseline for the educators' stand in assessment of learning, as this type of study is conducted for the first time at the selected nursing college.

For Nursing Education

The findings will inform various stakeholders engaged in nursing education. Nurse educators might identify their shortcomings and make changes on their approach to assessment of learning. Nursing education institutions and funding agencies might take heed of the results and look into providing in-service training opportunities for nurse educators in curriculum alignment to learning outcomes, teaching, and assessment as well as developing quality questions.

For Nursing and professional practice

The improvement in assessment practices might result in graduation of nurses with desired competencies, who will in turn provide quality care, increase the body of knowledge, and continuing growth of the nursing profession.

For Nursing Research

The results and recommendations from this study will serve as baseline data for further studies related to alignment of learning outcomes, teaching, and assessments in the discipline of nursing.

1.8. CONCEPTUAL FRAMEWORK

Burns and Grove (2011) describe the framework as an abstract, logical structure of meaning that guides the development of the study and enables the researcher to link the findings to nursing's body of knowledge. However, Polit and Beck (2012) further suggest that framework refers to the conceptual underpinnings of a study, which is known as theoretical framework in studies based on theory and known as conceptual framework in studies rooted in a specific conceptual model. For this study, the Revised Bloom's Taxonomy was adopted as a guiding framework for the study, of which the concepts outlined in the taxonomy were used to analyse the examination questions set for the diploma nursing program.

Tutkun, Guzel, Koroglu and IIhan, (2012) highlighted that Bloom's Taxonomy is a framework that was designed to classify objectives of any curriculum in terms of explicit and implicit cognitive skills and abilities that affect 21st Century curriculum. According to Lord

and Baviska (2007), cognitive levels of Bloom Taxonomy are thought of as a hierarchical triangle, allowing the instructor to gauge the level of questions asked for examinations. According to the ICN, the Taxonomy assists in the development of appropriate, equitable, and recognised reward systems, it also identifies the competencies (knowledge, skills, and behaviour) required from the student.

Consequently, Bloom et al. (1956) highlighted that the intention of the Taxonomy was to classify students' behaviour and the way individuals think or feel as a result of participating in some unit of instruction. The conceptual framework for the study was adapted from Anderson and Krathwohl (2001), who revised the Bloom's Taxonomy following their discussions with cognitive psychologists. The revised Taxonomy is still hierarchical, illustrating the categorisation of cognitive levels of Bloom, with all nouns changed to verbs and the last two levels exchanged, evaluate replacing synthesis at level 5 and create at level 6 replacing evaluation.

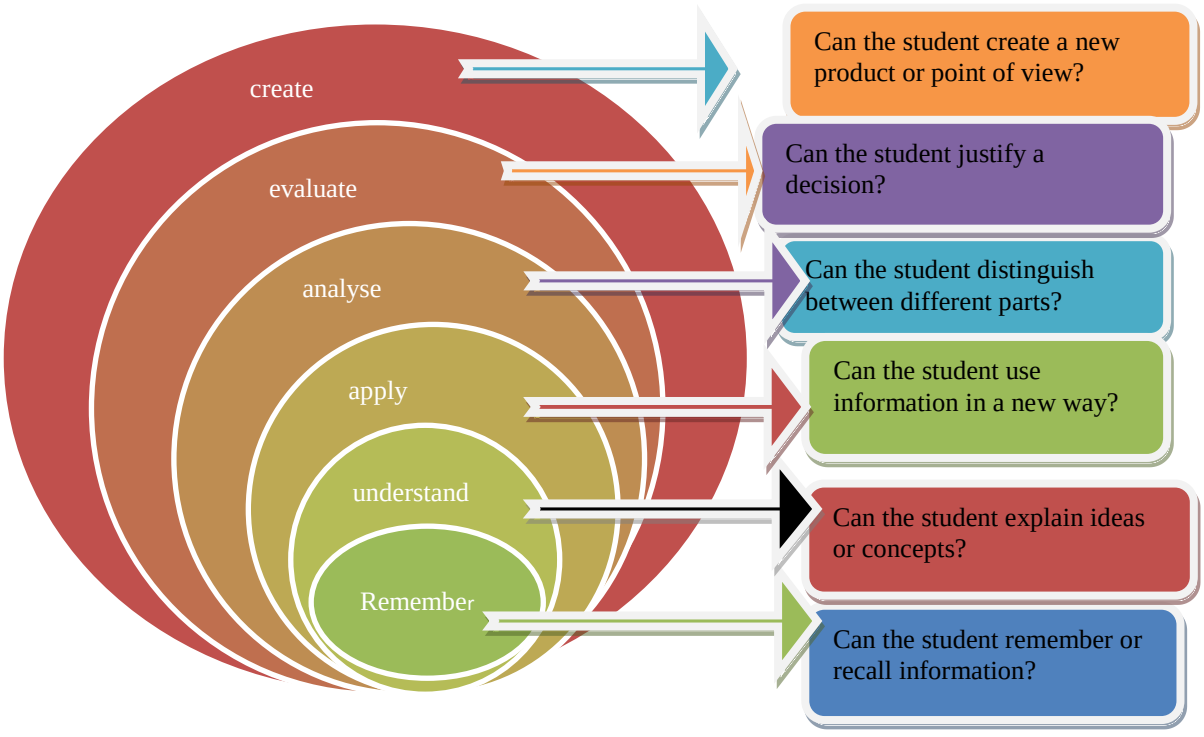

Figure 1.1 Revised Bloom's Taxonomy (Adapted from Anderson and Krathwohl, 2001

Level One- Remember

In this level students are expected to remember by recalling and recognising facts or ideas pertaining to the topic in the exact form the information has been taught (Lord and Baviska. 2007; Rahmat et al. 2007). Students are required to retrieve the learnt information from long-term memory. Common verbs that are used are; select, list, define, label, identify, name, find, state, and tell (Lord and Baviska, 2007, ICN 2007, Kim et al. 2012, Peleeri, 2015).

Level Two- Understand

In this level, Bloom suggested three types of comprehension, which are translation, interpretation and extrapolation (Krathwohl, 2002; Kim et al. 2012). Students are expected to reword and explain information in a meaningful manner based on learnt material. Kim et al. (2012) further suggest that the students who comprehend knowledge will process it in their own language and interpret a given patient case. This requires more thinking than level 1 because new knowledge will be integrated with previous knowledge for interpretation. Verbs related to this level include, summarise, explain, interpret, outline, compare translate, predict, restate, and rewrite (Lord and Baviska, 2007, Okanlawon and Adeoti, 2014, Soleimani and Kheiri, 2016).

Level Three- Apply

Application requires the administration of concepts in a new situation or use abstraction to solve the problem, students have to think about concepts and use them in current situations (Kim et al. 2012). Previously learnt information will be selected, transferred, and used by the student to solve a given task. For example, a student can use learnt knowledge in a presentation or in simulations. Key verbs in this level are: solve, apply compute, show, find, verify, relate, explain how, demonstrate, employ, operate, classify, and construct (Lord and Baviska, 2007; Kim et al. 2012; Okanlawon and Adeoti, 2014; Peleeri, 2015).

Level Four- Analyse

Krathwohl (2002) identifies the three categories of analysis as analysis of elements, analysis of relationships, and analysis of organisational principles. Students are expected to break the ideas into component parts and uncover the unique characteristics of what they have been

taught in order to understand it better (Lord and Baviska, 2007). While students are breaking material into its constituents, they also have to determine how parts are related to each other.

Action verbs that can be used are: investigate, discover, deduce, scrutinise, survey, review, design, analyse, categorise, separate, compare and contrast, outline, highlight, diagnose, elucidate, distinguish between, point out, and determine evidence (Lord and Baviska, 2007; Okanlawon and Adeoti, 2014).

Level Five- Evaluate

Students are expected to argue in support of or against panel discussions, make judgements based on standards, or could be based either on external or internal criteria, by checking, critiquing, and the making of recommendations (Lord and Baviska, 2007). According to Krathwohl (2002), the evaluation level in the revised Bloom Taxonomy has two cognitive processes that are checking and critiquing. Key verbs for evaluation are; assess, decide, grade, recommend, justify, debate, verify, argue, estimate, validate, and criticise (Krathwohl 2002; ICN, 2007; Lord and Baviska, 2007).

Level Six- Create

Krathwohl (2002) highlights the three subcategories of synthesis as production of unique communication, production of plan or proposed set of operations, and derivation of a set of abstract relations. During the synthesis level students put parts together to form a whole, with the emphasis of creating the new meaning or structure, generating solutions to problems, and devising workable plans (Kim et al., 2012). Key verbs of this level are: create, design, invent, plan, propose, establish, produce, devise, compose, modify arrange, and organise (Anderson and Krathwohl 2001; Lord and Baviska, 2007; ICN, 2007).

1.9. OPERATIONAL DEFINITIONS

The following key concepts have been clarified.

1.9.1. Bloom's Taxonomy

Bloom's Taxonomy is a classification of levels of intellectual behaviour, which is composed of three domains, cognitive, affective, and psychomotor. Among the three domains, the widely known for classroom, is the cognitive domain (Luebke and Lorie, 2013). In 2001, Anderson and Krathwohl published the Revised Bloom's Taxonomy version after additional

work that was undertaken with psychologists in which they changed nouns into verbs and exchanged the last two levels on the original Bloom's Taxonomy.

1.9.2. Cognitive domain

The cognitive domain is one of the three major domains developed by Benjamin Bloom, for use in classroom, which is concerned with knowledge and intellectual abilities (Quinn and Hughes, 2007 p115). The cognitive domain consists of six cognitive levels in an ascending order from knowledge, comprehension, application, analyse, synthesis, and evaluation, of which the first three in the order are regarded as lower cognitive skills and the last three regarded as higher order cognitive skills (Rahmat et al., 2007; Bezeidenhout and Alt, 2011; Lucas, et al. 2014).

1.9.3. Examination questions

In this study, examination questions will be referring to questions set at the end of the academic year for each module which assess the student's knowledge of a particular subject in terms of acquired learning after instruction.

1.9.4. Diploma of Nursing Programme

This refers to a course of study for education and training guided by South African Nursing Council Regulation 425, which is offered at a Diploma level, leading to registration as a professional nurse (general, community, psychiatry, and midwifery). The program has to be approved in terms of Section 15(3) of the Nursing Act 50 of 1978 as amended.

1.10. DISSERTATION OUTLINE

CHAPTER ONE: An overview of introduction and background of the study was presented, followed by the study context, problem statement, study purpose, objectives, research questions, significance of the study, conceptual framework, operational definitions, and a dissertation outline.

CHAPTER TWO: The literature applicable in analysing cognitive levels on examination question papers according Bloom's Taxonomy and Revised Bloom's Taxonomy were presented. The reviewed literature addressed teaching and learning, assessment of learning, different methods of assessing learning, outcomes of assessment, preparedness of academics for assessments, and lastly, the challenges in learning assessments was discussed.

CHAPTER THREE: In this chapter, research methodology was summarized entailing the research approach and the design that was adopted, study population and sapling procedures, how data was collected, and the instrument used.

CHAPTER FOUR: Data analysis was done following the SPSS version 24, findings are presented in graphs and tables

CHAPTER FIVE: Research findings were discussed and interpreted, a summary was presented, and limitations and recommendations were discussed.

CHAPTER TWO

LITERATURE REVIEW

2.1. INTRODUCTION

This chapter presents the literature that was reviewed in relation to the study's aims. According to Polit and Beck (2012), literature review assists in various steps of the research project, from problem identification, development of research questions, and the orientation of what is known and not known about the area of enquiry. A search of published and unpublished literature on student assessment was conducted using various data bases at the University of Kwa-Zulu Natal library.

Databases used included EBSCOhost via Medical Literature Online (MEDLINE), Cumulative Index for Nursing and Allied Health Literature (CINAHL), Educational Resource Centre (ERIC), and Google Scholar and Science Direct. Relevant textbooks were also used to supplement electronic material. The search for articles used a combination of the following key terms and phrases: Traditional and alternative assessment methods, Assessment of learning using Bloom's Taxonomy/Revised Taxonomy, and examination questions in Nursing, teaching and learning methods in the development of students' critical thinking skills.

2.2. ASSESSMENT OF LEARNING

2.2.1. Conceptualization of Assessment of Learning

No educational attempt can be understood without an evaluation process that measures it. Assessment is defined by Bruce, Klopper and Mellish (2015, p304) as an, "educator's ability to perceive what learners can do, know, and understand including any further learning assistance that the students may need". While Bezeidenhout and Alt (2011) view the assessment of student learning as an ongoing process, whereby outcomes for student learning are formulated, learning opportunities created to enable the learner to achieve outcomes, and evidence collected, analysed, and interpreted to determine the extent to which the outcomes have been achieved.

The purposes of assessment, as identified by Boud and Falchikov (2007) are two-fold; the first one is to provide certification of achievement in order for the students to graduate with a

validated record of their performance in the program in which they had participated in. The second purpose is to facilitate learning through feedback on previous assessments. These two purposes are related to summative and formative assessments respectively. Baig et al. (2014) suggest that students perceive assessment as a dominant motivator to drive their learning. Therefore, it is crucial that learning be assessed continuously, where an ongoing process of assessing learning is followed by academics using a variety of assessment methods (Bruce et.al. 2015). According to Okanlawon and Adeoti (2014), the two important approaches for assessment are formative and summative assessments.

Formative assessments are carried out during the learning process, with the purpose of identifying gaps in learning, the areas where students need further assistance, and continuously provides feedback to learner and teacher about the learning progress (Bruce et al. 2015). It is associated with criterion-referenced assessment, whereby the learner's performance is compared against pre-determined criteria, focusing on student competency while assessing the learning progress over time (Mkholo, 2010). The aim of the approach is to determine the extent to which the learner has attained certain learning objective so as to plan the next learning step.

Summative assessments are carried out at the end of module or programme as stated by (Okanlawon and Adeoti 2014; SAQA 2015; and Bruce et al. 2015). The purpose of summative assessments is to determine the learner's progression to the next level or to qualify for certification. Summative assessments are associated with norm-referenced assessment as the student's performance is compared with others and suggests how much knowledge the student has gained (Bruce et al. 2015). This means that formative assessments focus on process and summative assessments focus on the end product/end results of learning. However, Boud and Falchikov (2007) criticised summative assessments as not addressing students' future lifetime learning if reliance is on traditional examinations, where students are not actively involved.

According to the SAQA (2015) and Bruce et al. (2015), assessment must be based on sound principles. The main assessment principles that they identified are that the assessment must be clear, be based on relevant assessment criteria, be valid and reliable, be fair and free from bias, and should support the learning process by providing feedback. A study conducted by Memela (2011), investigating assessment practices in grade four mathematics, highlighted the

principles of a good assessment as valid, reliable, fair, transparent, authentic, equitable and it promotes deep learning.

2.2.2. Approach to assessment of learning

The transformation requirements advocated for non-traditional teaching and learning methods which also necessitated the shift from the traditional assessment methods to more effective and comprehensive methods that will address the high standards of practice. A variety of assessment methods ought to be used to accommodate different student capabilities (Jones, 2007; Lucas et al. 2014) because current students are from different social and schooling backgrounds. In the process of the professional development in today's world, transferable skills need to be taught and assessed together with academic content (Pretorius, van Mourick and Barratt, 2017). Questioning is the key to assessment of students' learning process as it stimulates thinking ability. Due to growing demand of lifelong learners, examination questions should address all levels of complexity according to cognitive levels, inorder to stimulate students' cognitive ability (Jones, et al. 2009; Gerekwe, 2010 and Swart, 2010). Therefore the approach to assessment should focus on different assessment methods and questions spread in all cognitive levels.

In their studies, Soleimani and Kheiri, (2016) and Saeed, et al. (2012) indicated that the type of questions asked during assessments will determine the type of skills that students will develop at the end of learning process. Student assessment can result in superficial or deep learning depending on assessment questions asked, in line with the instruction strategy. However, Jideani and Jideani (2012) specify that if classroom activities focus on concepts requiring higher order cognitive skills, but then students are assessed only on factual recall, students will assume that there is no need for them to learn material at higher order levels, thus resulting in superficial learning. However, Hill and Flynn (2008) revealed that many teachers employ assessment at the remembering of facts, which in turn fails to develop students' cognitive skills in reasoning and analysing. Questions, that are poorly constructed, fail to assess higher order cognitive skills that assist students in developing deeper learning competencies (Baig et al. 2014).

Similarly, Crowe, 2008 cited in Jideani and Jideani, (2012), further attests that if students are taught facts and details but tested on higher order cognitive skills, students will perform poorly in exams because they have never had a chance to practice deep a conceptual understanding of material, this validates the importance of aligning assessment to instruction.

In their study, Baas, Castelijns, Vermeulen and Segers (2015) further emphasise that surface learning is associated with memorising learning material and getting a basic understanding of it, while deep-level learning strategies are aimed at understanding, distilling meaning, and applying learning material. Lucas et al. (2014) further suggest that questions set for examination should include a range of Bloom's Taxonomy cognitive levels and be consistent with learning outcomes of the module, students are thus required to have competencies at lower level in order to accomplish competencies and higher levels. However, the quality of questions depends on quality assurance strategies and contextual environment (Johnson, Constantinou and Crisp, 2017).

Variety of assessment methods can be used to assess students, from written examinations, scenario-based questions, projects, multiple-choice questions, true or false questions, matching the column, short answer questions, essay type questions, objective structured clinical evaluation, portfolios, and assignments, (Gwee, 2009; Barnett and Francis, 2012 and Petre, 2017) all of which are common in nursing education.

2.2.3. Traditional assessment methods and their effects on learning

Traditional teaching and assessment methods are teacher-cantered and are considered to deprive students the required workplace skills (Burrell, Finch, Fisher, Rahim, and Dawson, 2011; Mthembu et al. 2014; Ndateba, Mtshali and Mthembu, 2015). The literature reviewed by Boud and Falchikov (2007), also suggested that traditional assessment strategies did not equip students for lifetime learning and for challenges they will face in the future. In their study, Gunuseni et al. (2014), comparing PBL and traditional education in nursing students, concluded that traditional pedagogies limit students' self-directedness and lifelong learning as the teacher is the primary source of the information.

Examples of traditional assessments identified by (Kim, et al. 2012, Petre, 2017 and Pretorius, 2017) are written papers, quizzes, multiple-choice, essays and tests. Abduljabbar and Omar, (2015) identified the written examinations as the mostly used traditional assessment method during formative and summative assessments. The studies carried out by Boud and Falchikov (2007) and Lucas, et al. (2014) highlighted that traditional assessment practices undermine students' capacity to judge their own work as they present inadequate intellectual challenges. According to Stein and Haynes (2009), higher education courses have a tendency to emphasise the rote retention of factual information through traditional methods, which in turn encourages students to dedicate all their time in memorising

information (Haynes, Lisic, Goltz and Harris, 2016), thus depriving learner critical thinking skills.

In Saudi Arabia, Baig, et al (2014) conducted a study evaluating multiple-choice and short essay question items in Basic Medical Science. The results showed that 83.3% of short essay questions were addressing remember which is a lower order cognitive level, and 16.7% of questions were at interpretation level. The assessment using multiple choice questions had 76% of lower order questions with the remaining 24% assessing higher order cognitive skills. Literature from a study conducted by Er, et al. (2014) indicates that multiple choice questions (MCQs) are appropriate to measure knowledge and comprehension because they are more reliable, valid, and easy to score. However, MCQs can be designed to measure application and analysis if well-constructed. Er, Rammurthy and Pock (2014) suggest that the widespread use of multiple choice questions is based on its advantage on grading and its broad coverage of content within a short duration. The multiple-choice questions set to address higher order thinking skills encourage the student's deeper understanding of information.

In another study, Kim et al. (2012), further suggests that well planned multiple-choice questions may be an alternative to essay examinations in order to evaluate students' critical thinking skills in a large class. In order to ensure reliability and validity of the set examinations, instructors have to use Bloom's Taxonomy to ensure that questions assess students' relevant learning processes (Okanlawon and Adeoti 2014). The multiple-choice questions can be effective in assessing higher cognitive levels depending on the crucial construction of MCQs; this is evidenced in the study conducted by Er et al. (2014).

However, Luebke and Lorie (2013) highlighted that, to make an item in MCQs difficult, questions must have more distracters in order to capture complexity. The literature indicates that there are some reasons which make students choose multiple choice questions, of which some could be because of the fact that MCQs help students avoid losing marks due to grammatical errors or poor writing skills and students can guess correct answers in some instances or may lack preparedness to answer short questions, modified essay questions, and essay formats Kennedy, cited in Er et al. (2014). Therefore, this suggests that assessment of lower order and higher order skills can be possible with multiple-choice questions depending on the question construction. This is confirmed by the study conducted by Van der Merwe, (2016) on quality assuring in multiple choice question assessment in Higher Education.

However, instructors can prefer MCQs because they are efficient, objective, and easy to grade as opposed to questions that need subjective interpretation from the different markers, Er et al. (2014). Although, the disadvantage could be student's guessing for answers or misinterpretation of questions. Baig et al. (2014) highlighted that the presence of Item-Writing Flaws (IWF) as the major problem in the quality of MCQs, of which the Item-Writing Flaws can be distracters, unnecessary information in the stem, or negative stem which can affect the student's performance in MCQs. Downing, cited in Baig et al. (2014), suggested the use of a blueprint, which is a table that maps the course objectives and content to be assessed in order to reduce the Item-Writing Flaws.

Kim et al. (2012) suggest that essay type questions can be utilised in examinations as an ideal method of evaluating higher order cognitive skills that require critical thinking. On the other hand, Baig et al. (2014) highlight that essay-type assessment is a sensitive test requiring students not only to recall facts but also to use higher order cognitive skills. Therefore, this means that essay type questions can test higher order reasoning skills if well-constructed. Er et al. (2014) support the notion that short answer questions and essay type questions are useful for testing higher order thinking, including the ability of the student to organise ideas. They further, highlighted that the amount of material assessed using these formats can be restrictive because of time constraints but marking can be subjective without using marking rubrics.

However, Kim et al. (2012) argue that essay questions can be time consuming and labour intensive if used for a large class resulting in delay in students' feedbacks and require the use of multiple graders. Barnett and Francis (2012) conducted a classroom study to determine if using higher order thinking questions foster critical thinking. The results of the study revealed that the section which received higher order thinking quizzes performed significantly better in critical thinking development evaluation, when were measured with Glaser critical thinking Appraisal than the other two sections who received multiple choice and essay tests.

2.2.4. Alternative assessment methods and their effects on learning

Alternative assessment, defined by Georgakis, Wilson, and Evans (2015), as the use of real-life or authentic tasks, contexts, and multiple methods of assessments. Examples of assessments that are authentic to students' future workplaces identified by (Pretorius, et.al. 2017) are internship projects, peer-student evaluation, student's self-assessment, class mini-conferences and podcasts, simulations, and problem-based tasks. Serrano (2016) further

identified other alternative assessments methods as performance based assessments, portfolios, authentic assessments, direct assessments, constructive assessments, and reflection diaries. These methods are believed to develop student's competency skills because of actively involvement in assessments. The instruction and assessment of learning should be constructively aligned to one another, for better outcomes (Biggs, 2003).

The study conducted by Serrano, (2016) identified benefits of alternative assessments as encouragement of students' awareness and reflection, evaluation that is not teacher-centred, integrates different areas of learning, provides prompt meaningful feedback, and it frees students of test anxiety. The negative views identified by Serrano, (2016) are that the alternative methods may be regarded as a weak strategy, not very academic, and peer assessments are considered as not accurate. However alternative methods of assessment are regarded as the best methods for assessing learners to be successful graduates in future because they actively involve students fully throughout learning and assessment process (Litchfield and Dampsey, 2015 and Petre, 2017).

Petre, (2017), analysed the students' preferences for traditional assessment strategies, traditional assessment methods, alternative assessment strategies, and alternative assessment methods. The results show that among the traditional assessment methods written work obtained 42.6% followed by quizzes at 40.1% and students rarely preferred oral assessments. In alternative assessments methods, the portfolio, project, and self-evaluation are mostly preferred by the students and reflective diaries were less preferred by the students. However, Dewey (1938) also emphasised the use of reflective diaries as an alternative assessment method.

Pretorius (2017) argues that universities are still heavily relying on traditional methods of assessment such as essay, tests, and exams. Dewey (1938) further emphasised that reflective learning is important in creating meaning from experience. In the study conducted by (Appel and Mozlin, 2014), investigating the efficacy of critical thinking assessment in predicting clinical success, it is concluded that case-based assessments had no significant predictive value on critical thinking in a clinical environment. Further, it recommended that case-based assessments cannot be used as stand-alone measure to assess the attainment of an outcome. That indicates that variety of assessment methods have to be employed as the students are having different capabilities.

2.3. THE REVISED BLOOM'S TAXONOMY

Bloom et al. (1956) established taxonomy of cognitive levels for sorting questions into different thinking domains. Bezeidenhout and Alt (2011) highlighted that Benjamin Bloom directed his attention to the development of specifications through which educational objectives could be organised according to cognitive complexities. The intention was that such a hierarchy might provide the examiners with more reliable procedures for assessing student learning and the outcomes of educational practice (Bloom et al.1956). Kim et al. (2012) pointed out that although the original Bloom's Taxonomy identified three domains of learning (cognitive domain, based on intellectual capability; affective domain, focusing on aspects of feelings and emotions; and psychomotor domain, focusing on the aspect of manual and physical skills), the cognitive domain is the primary focus of classroom education.

Similarly, Rahmat et al. (2007) and Lucas et al. (2014) identify Bloom's theory on cognitive levels as a core theory for use in classroom learning. Anderson and Krathwohl (2001) revised the original taxonomy, changing nouns into verbs and rearranging the last two levels. Evaluation was placed at level five and synthesis was replaced by create, with metacognitive knowledge added to the former three sub-divisions of knowledge level. The cognitive levels were referred to as cognitive processes on a revised version (Krathwohl, 2002). According to Peleeri, (2015) the cognitive process dimension represents a continuum of increasing complexity from lower to the higher-level thinking skills. Each domain consists of its specific levels, for the cognitive process dimension there are six levels of thinking skills, starting from simplex to complex levels, which are remember, understand, apply, analyse, evaluate, and create (Anderson and Krathwohl, 2001).

In their study, Bezeidenhout and Alt (2011) highlighted that each subsequent level depends on the student's ability to perform at the level or levels that precede it. All cognitive levels should be integrated into curriculum development, instruction, and assessments of student learning, (Jideani and Jideani 2012) so that teaching and assessment are aligned. Bloom's taxonomy is also used for the formulation of learning outcomes, of which the learning outcomes inform the quality of assessment, thus indicated in study conducted by Lucas et al. (2014). Biggs, cited by Jideani and Jideani (2012), further suggest that in aligned teaching, the assessment reinforces learning, meaning that verbs incorporated in learning outcomes act as markers throughout the teaching and learning activities and the same verbs will be used during assessment to keep students on track and familiar with them.

Although most studies suggest that Bloom's Taxonomy is a hierarchy, Paul, cited in Luebke and Lorie (2013), reported that it has been argued by researchers whether or not Bloom's Taxonomy is a true hierarchy since the categories are interdependent. Therefore, Anderson and Krathwohl (2001) indicate that the first three levels are hierarchal but the last three levels are on par with one another and finally developed a revised Bloom's Taxonomy**.** Literature from previous studies conducted by (Lord and Baviska, (2007), Kim, et al. (2012) and Jayakodi et al. (2016), recommended the employment of the Revised Bloom's Taxonomy of cognitive domains in class to integrate learning objectives and assessment strategies, which is believed to further produce learners with competitive skills. Jideani and Jideani (2012) emphasise the use of one broadly accepted Bloom's Taxonomy tool to ensure the alignment of assessment methods to learning outcomes. According to Jones et al. (2009), there are several taxonomies that can be used in class, but the Bloom's Taxonomy is widely recognisable and familiar to many academics, it is generic and easily applied because of its structure.

The structure of the Revised Bloom's Taxonomy ranges from lower to higher cognitive levels in which students' assessments and learning objectives are aligned so as to cover all students' capabilities. The lower cognitive levels provide a pre-requisite knowledge for higher levels. The lower cognitive levels are identified as remember, understand, and apply. Higher cognitive levels are analyse, evaluate, and create (Anderson and Krathwohl 2001; Okanlawon and Adeoti, 2014; Upahi, 2015; Blundell and Berardi, 2016). The findings on the study conducted by Bezeidenhout and Alt (2011) concluded that assessments on lower cognitive levels fail to develop higher cognitive skills that allow students to become deep learners. Further, they suggest that deep learning occurs when students are able to consider information or ideas from different viewpoints to solve problems as well as using decision-making skills to arrive at conclusions or that they can make applications in varying contexts and use initiative to explore new knowledge.

Swart (2010) evaluated final examination question papers in Engineering using Bloom's Taxonomy. The results of the study indicate that the highest percentage of final examination question papers dealt with lower cognitive questions rather than higher order questions. The application category of Bloom's Taxonomy dominated the questions that were set for engineering. Swart (2010) further recommended that there is a need for a paradigm shift in the minds of engineering academics from using lower order questions to higher order

questions. The shift can assist students on how to think and reason so as to be able to apply knowledge later in life.

Okanlawon and Adeoti, (2014) conducted content analysis on the West African School Certificate of Chemistry examination questions. According to Bloom's Taxonomy, the results revealed that most questions focused on lower order cognitive skills and less on higher cognitive skills. Further, it was noted that academics teach only what is tested by national examinations in order to award certificates. Okanlawon and Adeoti (2014) further recommended that teachers should incorporate higher order cognitive skills so as to engage students in intellectually challenging activities rather than activities that need only retrieval of information without the ability to apply it in unfamiliar situations. Hence student involvement in the teaching and learning process, and also in assessment activities, is associated with career success as it encourages them to think deeply about their learning.

Upahi, et al. (2015) conducted research analysing chemistry questions of senior school certificate examinations, conducted by the National Examination Council (NECO), within the framework of Bloom's Revised Taxonomy of cognitive objectives. The results of the study indicated that 80% of questions required lower order thinking skills with only 20% of higher cognitive skill questions. However, results further revealed that there were no questions on the 'evaluate' cognitive category, which is one of higher cognitive levels of the revised Bloom's Taxonomy. It was therefore recommended that examination questions should reflect the Revised Bloom's Taxonomy cognitive process skills, as the analysed examinations were not cognitively demanding.

A survey on the levels of questioning of English Language Teachers in Indonesian Tertiary Education, carried out by Ashadi and Lubis (2017), also showed that most lecturers dominantly use lower order questions, 69%, and only 31% of higher order questions were used in summative test. Further, they recommended teachers set more challenging questions in order to trigger student's thinking skills. However, they still recommend that lower order questions also be there but be less as the semester ascends.

2.4. ASSESSMENT CHALLENGES

2.4.1. Constructive alignment challenges

Biggs (2003) emphasised that the students' approach to learning is determined by the manner in which they are taught and assessed. According to the constructive learning theory, the

learner is the central driver of the learning process and the instructor only guides the process of learning (Biggs, 2003; Uys and Gwele, 2005; Blundell and Berardi, 2016). According to Biggs's theory on constructive alignment, learning is a result of students' activities and experiences as the focus is on transferable learning rather than surface learning. Constructivist learning allows the student the opportunity to engage in meaningful learning experiences, as the instructor is no longer transferring knowledge to student like an expert, but rather facilitates learning.

Therefore, aligning non-traditional teaching and learning process with alternative assessments, allow the student's development through active participation. Dewey (1938), in Experience and Education, emphasised that learning takes place in a meaningful context that allows students to build knowledge upon their experiences. According to Biggs (2003) and Jideani and Jideani (2012), intended learning outcomes, teaching and learning activities, and assessment tasks should be all aligned. This is referred to as constructive alignment whereby a learning activity in the intended outcome is expressed as a verb to be activated in the teaching of the outcome and verified if it is achieved in assessment (Dames. 2012).

Another study, conducted by Lucas et al. (2014), further highlighted that the non-alignment of learning outcomes and assessment criteria is probably a large contributing factor to students' poor performance, therefore learning outcomes should be at relevant cognitive levels for a particular module, corresponding with curriculum objectives and assessment criteria. However, Reyes-Chua (2013), in her study on constructive alignment versus experiential learning in ESL students, concluded that it does not matter which strategy is used in class as long as it fits students' learning styles and preference.

Bruce, et al. (2015) concur that students acquire deep, holistic lifelong-learning when allowed to be the active constructors of knowledge. According to Yilmaz (2011), further suggest that the employment of cognitive learning theory supports the learner-centred approach as opposed to behavioural learning theory. Yilmaz (2011) further suggests that the cognitive learning theory is directed towards development of thinking skills and making knowledge meaningful. It can be assumed then that student's engagement during the learning process and assessments develops them the crucial skills and results in meaningful learning. According to Biggs (2003), student engagement is considered central to effective educational practice in higher education. Therefore, academics have to employ teaching strategies and assessment methods that are learner-centred, which facilitate students' engagement in

classroom activities that are similar to real life. The study conducted by (Ngema, 2012) on the analysis of students' engagement in Post Basic Programmes, identified that the students' active participation in the learning process is the main driver of engagement.

Boud and Falchikov (2007) recommend that the focus of assessment should not only be based on certification but also be focused on the promotion of future learning skills. According to a study conducted by Bezeidenhout and Alt (2011), it is emphasised that examiners must focus assessments on promoting learning, not merely on generating marks. Mazeske, cited in Bezeidenhout and Alt (2011), further suggests that most of the time students are assessed on memory skills, rather than higher cognitive skills, because lecturers do not provide them with opportunities to reflect on their learning, they just train students for examination instead of instilling in them an enthusiasm for making meaning and a curiosity to know more. Academics should focus more on instruction and assessment methods that develop the skills in a learner that will be used in the future as lifelong learning, rather than the simple understanding of facts that can be easily forgotten.

Bezeidenhout and Alt (2011) indicate that cramming does not result in learning that will last, therefore, it is imperative for teachers to use a constructivist approach to teaching and learning whereby the students will make meaning out of information by developing connections between existing knowledge and new knowledge. In that way, students will retain material learnt better because knowledge is constructed rather than acquired from the expert who transmits it to the learner. Lord and Baviska (2007) emphasise that instructors should challenge how students think during class, ensuring that the students actively participate in knowledge discovery.

In order for the student to be able to perform at higher cognitive levels, students need to have the necessary information, understand that information, and be able to apply, analyse, and synthesise it, and eventually evaluate it (Bezeidenhout and Alt, 2011). Hence, it is important to integrate instruction with assessment. Some educators assess students at lower cognitive levels because they want to cover content (Rahmat, 2007 and Okanlawon and Adeoti, 2014), which means that the main aim is to teach students to master content and not to teach them to create knowledge and make meaning out of that information.

Sometimes the examiners assume that preceding the question with a scenario automatically raises the level of the question, yet sometimes students answer questions without any need to first look at the scenario (Gerekwe, 2010). However, Stamovlasis, Papageoogiou, Tsitsipis

(2013) emphasise that remembering pieces of knowledge is no longer the highest priority of learning, what matters is what students can do with knowledge. Hence, employers are also urging the Higher Education institutions to prepare graduates with transferable skills.

Appraised literature revealed that the setting of questions at lower cognitive levels for students by examiners is very common, (Lord and Baviska, 2007; Rahmat, 2007; Hill and Flynn, 2008; Okanlawon and Adeoti, 2014; Ashadi and Lubis, 2017). Furthermore, Jayakodi et al. (2016) emphasised that, assessments that are poorly designed, fail to examine course outcomes leading to low quality graduates who do not fit the employer expectations and thus degrading the standards of the program. Superficial learning is an outcome of traditional instruction methods because the students passively receive information without being allowed to reflect on it, (Lord and Baviska, 2007). Bezeidenhout and Alt (2011) felt that, the integration of learning objectives to assessment methods is often ignored by educators, and students end up being taught and assessed the other way.

The study by Jideani and Jideani (2012) identified that students do acquire information, but the challenge be in the ability to analyse, synthesise, and apply what they have learnt in addressing new problems due to instruction and assessment strategies. Depending on the educator's competencies in setting effective questions, students can be assessed on higher order cognitive skills. The study conducted by Lord and Baviska (2007) attests that graduates, of undergraduate courses, graduate with little understanding of the information learnt during their course of study because of instruction and assessment methods that are not challenging higher cognitive skills; therefore, little knowledge is retained.

2.4.2. Examiners' competency challenges

Preparedness of examiners for competency in setting examination questions is also crucial. Litchfield and Dempsey (2015) point out, the reasons why academics fail to implement authentic assessment methods as lack of knowledge of various assessment methods and learning principles, general resistance to change from olden ways, and comfort and reliance on objective testing methods. Accordingly, the study conducted by Kim et.al. (2012) revealed that the faculty members lacked adequate information with regard to the application of Bloom's Taxonomy in their assessments and during the giving of instructions. Similarly, the study conducted by Jayakodi et al. (2016) also indicated that examiners set questions at low levels due to a lack of knowledge. However, Ashadi and Lubis (2017) concurs that properly designed and implemented assessments can influence the positive attainment of learning

objectives. According to Johnson and Fuller (2006) it is identified that some academics show no agreement on how to use Bloom's Taxonomy. In addition, to that, Yusuf and Chai (2010) indicated that not all academics can identify cognitive levels of questions correctly which lead to failure in meeting the examination standard required for the subject.

Academics need to be prepared more for student assessments and to be referred to the taxonomy in order to construct quality questions. A quantitative study conducted by Soleimani and Kheiri, (2016), examines the quality of Iranian testing classes for Master of Arts (MA) and Doctor of Philosophy (PHD) holders while preparing them to be the test makers in their professional life. The study results revealed that 69.4% of exercises and assignments given to MA students addressed lower order thinking skills, and the 30.6 % were for medium thinking skills (apply) and none of the exercises at higher order thinking skills. The PHD results showed that lower order thinking skills were at 58.3% and medium order thinking skills at 41.7%, higher order skills were not used. According to Revised Bloom's Taxonomy 'apply' is categorised as the highest in lower order cognitive levels (ICN, 2007; Okanlawon and Adeoti, 2014; Peleeri 2015). Therefore, the assessments for test makers in Iran addressed lower cognitive levels.

Furthermore, Ayvaci and Turkdogan (2010) in their study recommended that teachers should ask questions targeting higher order thinking skills more and always align how they teach to assessment. Nasstroon, (2009) recommended that assessment experts should develop assessment standards and these standards should be made known to examiners in order to improve construction of quality examination questions. Okanlawon and Adeoti (2014) highlight that sometimes examination questions are directed at passing the exam rather than developing student learning because examination bodies are competing with each other over pass rates, or they are assessing what is easy for them to set and not what is ought to be examined.

The study conducted by Petre (2017) on students' preferred assessment methods revealed that traditional methods (written paper and quizzes) and the alternative methods (portfolio and project) are evaluation methods that are always preferred by the students as these methods offer them opportunities to apply skills and knowledge acquired. Therefore, Petre (2017) recommended that teachers use many assessment strategies, combining traditional and alternative strategies for better results.

The implications for poor student assessments is that they will produce incompetent graduates who are not prepared for realities of practice (ICN, 2009) and the graduates will leave university without the ability to apply information learnt (Lord and Baviska, 2007). Students in this regard will study to pass what the teacher wants them to master without having to apply that knowledge later in life or in a different context. Academics have to develop the art of asking effective questions in order to develop students' critical thinking and problem solving skills. Consequently, Jones et al. (2009) emphasised that educators need to ensure a balance between lower, intermediate, and higher cognitive questions in examinations for the development of students' critical thinking skills, they should not focus on lower cognitive levels only because this information fades with time (Swart, 2010).

Lack of competency for quality assessments among examiners can be the cause of poor student competencies. Bezeidenhout and Alt (2011) revealed that some educators do try to assess students' higher cognitive levels but only after attending informal or formal educational development courses on a regular basis, short learning programmes on the assessment of student learning. Accordingly, educators face the challenge of fostering higher order skills and lifelong learning to enable the students to easily adapt to current reforms. However, some researchers agree that teachers find themselves confused and indecisive on how to promote higher order thinking skills in their classrooms (Lustick, 2010 and Avargil, Herscovitz and Dori, 2012). According to Volger, cited in Ashadi and Lubis (2017), teachers have a problem with asking questions due to a lack of knowledge and understanding of the importance of higher order cognitive questions. However, Pagliaro (2014) emphasised that the problem is not only for novice lecturers; even experienced ones cannot assess students well. Question writing is a challenging step for most lecturers as they fail to balance questions on higher cognitive levels with ones on lower cognitive levels (Gerekwe, 2010; Swart, 2010 and Abdul-jabbar and Omar, 2015)

Lord and Baviska (2007) argue that teachers following a traditional classroom present large information through a lecture to passive students who, in-turn, will be assessed through questions on recalling and summarisation of information. This instruction method deprives student's deeper learning as students will be expected to retrieve what was said by the teacher without applying the information in new situation Boud and Falchikov (2007) suggests that curriculum and assessments should support deeper learning, not rote learning, as deeper learning will develop students to be lifelong learners with skills for future success. Teachers need continuous development and support when curriculum and teaching methods changes as

their insufficient preparedness affects students' futures (Avargil et al. 2012). In their study, Ayvaci and Turkdogan, (2010) further suggested that to equip students with higher order thinking skills, teachers have to employ suitable teaching and assessment methods.

In order to produce quality graduates, the outcome-based education (OBE) approach has been suggested for higher education as it is an approach driven by exit learning outcomes that the student is expected to display at the end of the course programme (Uys and Gwele 2005). The study conducted by Hasssan, Admodisastro, Kamaruddin, Baharam and Chapa (2016) on developing a learning outcome based examination paper, a tool used in the University of Malaysia, found that the developed tool for assessing OBE assisted lecturers in preparing examination papers according to programme objectives and learning outcomes. Lord and Baviska (2007) highlighted that if instructors can construct examination questions, based on Bloom's Taxonomy of cognitive levels, that it can reverse the trend of producing graduates who have retained very little knowledge when graduating, as less information was taught at higher levels. Further, Jayakodi et al. (2016) supported that developing questions based on the Bloom's Taxonomy cognitive domain categories would be a productive method for ensuring the expected quality of students learning achievement. Nasstrom, (2009) also indicated that the taxonomy for Bloom's is an acceptable and useful tool.

2.5. CONCLUSION

The reviewed literature concludes that assessments, as a strategy of monitoring student-learning progress, should be constructed in a way that can develop students to be lifelong learners. Other studies recommended constructive alignment of curriculum objectives with assessment methods for effective learning to take place. It is also noted that monitoring assessment activities provides the student with information that assists them to understand where they are in their learning process. Therefore, assessments allow students the opportunity to identify their strengths and weaknesses in their learning through feedbacks from assessors. This feedback is believed to provide the student with an understanding of the gap between their current performance and the learning goals that they are aiming to achieve.

The reviewed literature revealed a gap in students' assessments as examiners predominantly set questions focusing on lower order cognitive skills, with little emphasis on higher order cognitive levels, thus leaving students with superficial learning, as deep learning depends on the application of higher cognitive levels to reach solutions. There is a consensus among researchers that assessments should not only be focused on rote learning for the mastering of

facts and concepts, but should focus more on the development of skills for future use in life. Another gap identified is the lack of research studies focusing on assessments in nursing education, most existing studies were from Engineering assessments.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1. INTRODUCTION

According to Babbie (2013), research methodology involves methods, techniques, and procedures that are employed in the process of implementing the research design or research plan, as well as principles and assumptions that underlie their use.

In this chapter, the researcher discusses in detail how the study was conducted. Aspects that are covered include research paradigm, research design and methods. The research setting, population sampling and sampling size, data collection methods, data collection instruments and data collection process, data analysis, will be presented. This will be followed by methods used to ensure reliability and validity. Finally, ethical standards involved, data management, and dissemination of data will be discussed.

The philosophical worldview that guided the study was the positivist worldview, which is a traditional research paradigm underlying a scientific approach (Burns and Grove, 2011). The fundamental assumption of the positivists is that there is a fixed and unbiased reality that can be objectively studied, uncovered, and measured (Polit and Beck, 2012). The researcher used a measurable template to collect data and eliminated subjectivity by utilising a second coder.

3.2. RESEARCH APPROACH

A quantitative research approach was adopted for the study. The approach allowed the researcher to conduct the study under controlled measures minimising researcher bias, and controlling other factors that were not under direct investigation from contaminating the study findings. Burns and Grove (2011) define quantitative research approach as a formal, objective, and systematic process in which numerical data is used to obtain information about the world. This approach is closely aligned to the positivist paradigm. This enabled the researcher to investigate and quantify the results of the analysis of cognitive levels on the set examination papers.

3.3. RESEARCH DESIGN

The research design is an overall plan to address the research questions, including the specifications for enhancing the study's integrity (Polit and Beck, 2012). The design provides

a specific direction for the research process. This study adopted a non-experimental, descriptive design.

According to Burns and Grove (2011), descriptive studies are a means of discovering new meaning, describing what exists, determining the frequency with which something occurs, categorising information, using interviews, as well as integrating unstructured observations or structured observations guided by check lists and questionnaires to describe the phenomenon under study. This method was found suitable for the study because the researcher analysed and described the examination questions set for the Diploma of Nursing Programme, using a template to gather data about the cognitive levels of the Revised Bloom Taxonomy.

3.4. RESEARCH SETTING

Research setting involves a physical location and conditions in which data collection takes place (Polit and Beck, 2012). A setting can be natural (in homes or offices), partially controlled, or controlled depending on the research question. This research was conducted at a selected nursing college in the Eastern Cape Province, at its central office in East London. The Eastern Cape Province is in the South Eastern part of Africa.

This college was chosen by the researcher because, initially, traditional methods of instruction were followed. Following recommendations for transformation (White Paper, 1997), innovative teaching strategies responsive to community needs were introduced, replacing traditional instruction methods. Those innovative teaching strategies were, Community based education (CBE), Problem based learning (PBL), and Competency based education. Non-traditional instruction methods actively involve students during teaching and learning process with the aim of developing their critical thinking skills (Mthembu et al. 2014). According to Biggs (2003) constructive alignment theory, assessment methods have to be aligned to learning objectives.

To the researcher's knowledge, since the college was established, a study of this nature had never been conducted. The College is in the process of preparing for accreditation with Higher education, the researcher believes that the information derived from conducting the study might be of value for the college in respect of assessments.

3.5. STUDY POPULATION

According to Burns and Grove (2011), the target population of the study includes all elements (individuals, objects, events, or substances) that meet the sample criteria for

inclusion in the study. The study population consisted of questions obtained from previous end of the year examination papers (main and supplementary) of the four-year Diploma of Nursing Programme for the period from 2011-2015. A total of 95 examinations question papers for Diploma nursing Programme nursing modules, included: Community Nursing Science (CNS) level 1, 2 and 3; Fundamental of Nursing Science FNS (level 1); General Nursing Science (GNS) level 2 and3; Midwifery Nursing Science (MNS) level 3 and 4; Psychiatric Nursing Science (PNS) level 3 and 4 and one non-nursing module, Ethos of Nursing and Professional Practice (NEP) level 1 and 2 as illustrated in Table: 3.1. The study population was inclusive all available examination papers from first to fourth year level that meet the inclusion criteria. Questions from previous examination papers were used as the units of analysis. Polit and Beck (2012) describe the unit of analysis as the basic unit, or the focus of a researchers' analysis in nursing research that yields data for analysis.

3.6. SAMPLING AND SAMPLING SIZE

Polit and Beck (2012) define sampling as the process of selecting a portion of the population to represent the entire population as well as further referring to a sample as the subset of population elements. Sampling designs are classified into either probability, which involves random selection of elements, or non- probability, where elements are selected by non-random methods (Polit and Beck, 2012).

A non-probability, convenience sampling method was adopted for the study, which entails sampling the most conveniently available study participants (Polit and Beck, 2012). The method was preferred for the study because the researcher was not in position to know which question papers were available from the college archives. Only available examination question papers, which were within the characteristics of the population, were conveniently selected. That is for nursing modules of the Diploma of Nursing Program, from first to fourth year level, for the period from 2011- 2015. Accordingly, question papers for the Diploma of Nursing Programme falling out of the 2011-2015 period, question papers for Basic nursing programmes, and papers for Post graduate programs were excluded from the sample and all examination question papers for ancillary modules falling within or out of this period were also excluded, except Ethos of Nursing and Professional practice modules.

Sample size is the number of respondents needed for the study. Polit and Beck (2012) highlight that to estimate sample size of the study, statistical procedure known as the power analysis can be used. Further, they suggest that since there are no simple formulae to tell the

researchers how big the sample size should be, it is wise that researchers select a bigger sample because the larger the sample number, the higher the power whereas the smaller the sample, the lower the power. This study consisted of a total of 1709 questions from 95 examination question papers which were analysed. This is based on the number of nursing module examination question papers that were offered during the year, for five years, from first to fourth year level of the programme. The examination question paper for each nursing module was made up of five 25 marks questions, each with sub-questions, except for ethos of nursing modules which had four questions of 20 marks each.

Table 3.1: Modules analysed from the examination question papers in 2011-2015

Programme Levels	**Modules per level**	**No. of Examination Question Papers**	
Level 1		***Each year***	***In 5 Years***
	Ethos of Nursing 1	1	5
	Community Nursing Science 1	1	4
	Fundamentals of Nursing Science 1	2	10
Level 2	General Nursing Sciences 1	2	10
	Community Nursing Science 2	2	8
	Ethos of Nursing and Professional Practice 2	1	5
Level 3	Community Nursing Science 3	2	8
	General Nursing Sciences 2	3	15
	Psychiatry Nursing Science 1	1	5
	Midwifery Nursing Science 1	1	5
Level 4	Psychiatry Nursing Science 2	2	10
	Midwifery Nursing Science 2	2	10
TOTAL	**Number of modules =12**	**20**	**95**

As reflected in Table 3.1, CNS modules had examination papers from 2012-2015, all 2011 examination papers for CNS modules were not available from college archives.

3.7. DATA COLLECTION AND INSTRUMENT

Data collection is a systematic method of gathering relevant information for the research purpose, objectives, and questions or the hypothesis of the study (Burns and Grove, 2011), which will have open and closed questions to obtain data. The information was obtained from previous set examination question papers, following an unobtrusive research method. According to Babbie (2013) in unobtrusive research the data is gathered by means that do not involve direct acquisition of information from research subjects, thus implying it to be non-reactive in nature. In this method, the information gathered cannot be contaminated by the

fact that respondents answer in such a manner that they think it is what the researcher wants to hear.

Content analysis, as an unobtrusive research technique, was used to analyse the cognitive levels in final examination questions set for the Diploma of Nursing Programme. The analysis was based on the frequency, order, and intensity of the occurrence of action verbs used in each examination question paper for each level of following the Revised Bloom's Taxonomy. Further, action verbs were categorised according to the cognitive levels of the revised Bloom's Taxonomy.

According to Burns and Grove (2011), content analysis is designed to classify words and text into a few categories chosen because of their theoretical importance. This further highlights that this technique provides a systematic way of measuring frequency, order, or intensity of occurrence of words, phrases, or sentences.

Template one (Appendix 2), incorporating all six cognitive levels of Revised Bloom's Taxonomy, was used as a data collection instrument where each action verb of the question was indicated under the relevant cognitive process dimensions (Adapted from Gerekwe, 2010). The second template (Appendix 1) was utilised for guiding data analysis according to Revised Bloom's Taxonomy, where all cognitive levels were listed with the definition of what is expected at that level and the action verbs that aligned to that cognitive process dimension (adapted from Anderson and Krathwohl, 2001). Both have been used in previous studies but were modified by the researcher to fit the researcher's questions of the study. The researcher modified the scale by aligning its content to the Revised Blooms Taxonomy as they were specifically related to the original Taxonomy. Permission to use the scales was not obtained as the scales were in public domain. Additionally, an instruction (Appendix 3) was provided for the second coder.

3.8. VALIDITY AND RELIABILITY OF THE INSTRUMENT

3.8.1. Validity

Validity refers to the degree to which the instrument measures what it is supposed to measure (Polit and Beck 2012). This is the ability of the instrument to measure all the target attributes of the study and its consistency in doing so (Burns and Grove 2011). For this study, content validity of the instrument was assessed by the researcher comparing constructs of the measuring instrument with the cognitive domains of the Revised Bloom Taxonomy. In

addition, the instrument was subjected to scrutiny by a group of experts in the nursing education department and research committee at the university, as well as the statistician.

3.8.2. Reliability

Reliability is the degree of consistency or dependability with which an instrument measures the attribute that it is designed to measure (Polit and Beck, 2012). For this study, the stability of the instrument was tested to assess the reliability. Stability is the extent to which similar results are obtained when the same measure is administered to a sample twice and the scores are compared (Polit and Beck, 2012). This was done through a test and retest procedure where two coders reviewed the examination questions and coded them into the provided template and then compared findings. Any obtained differences were reconciled.

3.9. DATA CODING AND ANALYSIS

The purpose of the data analysis is to reduce data into an intelligible and interpretable form so that the relations of the research problems can be studied and tested further (De Vos et. al. 2009). Coding is the process of transforming data into symbols compatible with computer analysis (Polit et al. 2004). In content analysis, coding involves the logic of conceptualisation and operationalization. The researcher can code the manifested content by counting the number of times a certain word appears in the text and then code according to the underlying meaning (Babbie, 2013).

In this study, questions were examined according to a template incorporating cognitive process dimensions of the Revised Bloom's Taxonomy. Coding was done for single words, the action verb used in questioning, and then coded for frequency. The concepts were coded as they appear in the question and irrelevant information was not coded but recorded. The cognitive level to which the action verb belongs to was determined by comparing it with the listed verbs per cognitive process dimension, and then placed under the relevant category level.

The data was coded and captured in the provided template, analysed, and subsequently interpreted using the Statistical Package for Social Sciences (SPSS) version 24 with the assistance of the statistician. The cognitive categories were classified into Lower order (remember, understand and apply) and Higher order cognitive levels (analyse, evaluate and create). The frequency of action verbs in each category was counted for each academic year level (first, second, third and fourth) over five years (2011-2015). Since the outcome variable

is a count, a poisson model was used to estimate the change from academic year level 1and 2, 2 and 3, 3 and 4 and 1 and 4 for each year over five year period. The category is binary variable (Lower Order and Higher Order), so the differences between the percentages of LO and HO cognitive levels were compared by comparing percentages of HO cognitive levels. The poisson model reported the incidence rate (IRR) as the change expressed as the ration for comparing the academic year levels. For example in 2011, HO was at 8% and increased to 21% for level 2, then the rate of change was 2.6. Then the "z" test was used to test if the change was significantly different from "0"p values, IRR and 95% confidence levels and reported. The data was analysed in Stata V13.1. Descriptive statistics were used to analyse the data into a readable and summarised form. Data was visually presented in tables, graphs and pie charts.

3.10. ETHICAL CONSIDERATIONS

Ethics of nursing research can be defined as the issues in the research study that have an effect on the complexity of human rights issues, meaning that in research there should be ethical standards that must be taken into consideration in order to protect human being (Burns and Grove, 2011).

In this study, permission to conduct the study was obtained from the selected Nursing College. The research proposal was presented to the University of Kwa-Zulu Natal (UKZN) ethics committee for approval prior to conducting the study. The approval to conduct the study was obtained from the ethics committee. During data collection, the master list of examination question papers was allocated numbers for safe keeping and copies, for use in data collection, were made. Anonymity and confidentiality were respected in the examination question papers as the names of the institution, the examiners, and the external moderators were erased with tippex. Question papers were analysed in a separate room where access was only allowed in the case of two coders.

3.11. DATA MANAGEMENT

The data collected was used exclusively for the purpose of this study. Data collected during the study was stored on the researcher's personal computer with a code known only by the researcher and the study supervisor. Material used was kept in a secure place under lock and key and will be destroyed after five years as per university requirement. The template will be shredded after the five-year period and data stored on the computer will be erased from both the programme files and the recycle bin including the data on statistician computer.

3.12. DISSEMINATION OF FINDINGS

Polit and Beck (2012) asserted that no study is complete until it is shared with others. On completion of this study, the researchers will circulate and share the document with all the stakeholders that were involved. One copy will be kept in the University of Kwa-Zulu Natal (UKZN) Library database so that other researchers can access the information. Another copy will be kept in the research supervisor's office. The article of the study may be published in an accredited Nursing Journal. The study results will be presented in meetings, symposia, and in conferences. Mostly the results and recommendations will be shared with the College managers and personnel through presentations where study will be conducted.

3.13. CONCLUSION

This section has covered the research methodology that was used for the study, research design that guided the study, research setting, population or units of analysis, sampling and sample size, data coding and data analysis, validity and reliability, ethical considerations, data management and dissemination of findings.

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

4.1. INTRODUCTION

This chapter entails the presentation and interpretation of results obtained from the data collected from previous examination question papers of the Diploma of Nursing Programme. The purpose of the study was to analyse the cognitive levels of final examination questions for the Diploma of Nursing Programme using the Revised Bloom's Taxonomy at a selected nursing college in the Eastern Cape. The objectives of the study were to: (a) determine the cognitive levels at which examination questions are set in the Diploma of Nursing Programme according to the Revised Bloom's Taxonomy; (b) explore the progression in the utilisation of action verbs across various levels of the programme; (c) compare the level of difficulty of questions across the various levels of the programme, according to modules.

The examination questions were used as units of analysis to obtain answers to the study questions. A template composed of the categories of the Revised Bloom's Taxonomy from simple to complex (remember, understand, apply, analyse, evaluate, and create) was utilised for data collection. The researcher and the second coder scrutinised and then coded the questions independently according to action verbs used under the categories of the Revised Bloom's Taxonomy. Coding was done for single words which were the action verb used in questioning, coded for frequency. All coded data was then given to the research supervisor for verification.

The collected data was then captured into the SPSS version 24 and analysed for interpretation through the assistance of the statistician and later presented in tables and graphs. This data was summarised through the use of descriptive statistics, frequencies, percentages, a mean, and standard deviation.

4.2. SAMPLE REALISATION

Table 4.1: Composition of examination question papers and examination questions from 2011-2015 for all academic levels

Academic levels	Examination question papers		Examination questions	
	F	%	F	%
Level 1	19	20.0%	330	19.3%
Level 2	23	24.2%	418	24.5%
Level 3	33	34.7%	626	36.6%
Level 4	20	21.1%	335	19.6%
Total	**95**	**100%**	**1709**	**100%**

Across all levels for a period of five years (2011-2015), 95 examination question papers from 12 modules were analysed with 1709 questions. Table 4.1 portrays the number of examination papers and examination questions per academic level across five years. Out of the 95 examination question papers, 20% (n=19) were of the first-year level, composed of 19.3% (n=330) of the questions. The modules for first-year academic levels were; NEP1, FNS1, and CNS 1. The examination question papers that were analysed at a second-year academic level were from three modules GNS1, NEP2, and CNS. The second year level had 24.2% (n=23) of the examination question papers with 24.5% (n=418) examination questions in all.

The third-year academic level had the highest number of 34.7% (n=33) of the examination question papers with 36.6% (n=626) of the examination questions from four modules GNS2, CNS3, MNS1 and PNS1). Lastly was the fourth-year academic level composed of two modules PNS2 and MNS2 with 21.1% (n=20) of the examination question papers and 19.6% (n=335) of the examination questions.

4.3. RESULTS

4.3.1. Questions used in examination question papers

A variety of questions were used, consisting of short answer questions, short essay questions, and multiple choice questions including match the columns, and true or false questions. Short

scenarios preceded most questions, and then students were expected to respond to questions based on the presented scenarios.

4.3.2. Cognitive levels in examination questions across all levels

Table 4.2: Cognitive levels in first-year academic level 2011-2015

Year	**2011**		**2012**		**2013**		**2014**		**2015**		**Mean**		**SD**
Cognitive levels	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	
Remember	12	23,5	13	19.7	18	25.4	24	34.2	22	30.6	17.8	26.8	5.6
Understand	35	68.6	40	60.6	40	56.3	39	55.7	43	59.7	39.4	60.4	5.3
Apply	0	0	5	7.6	5	7.0	3	4.3	3	4.1	3.4	4.6	3.1
Analyse	4	7.8	8	12.1	6	8.5	3	4.3	4	5.6	5	7.6	2.9
Evaluate	0	0	0	0	1	1.4	1	1.4	0	0	0.4	0.4	0.5
Create	0	0	0	0	1	1.4	0	0	0	0	0.2	0.2	0.4
Total	**51**	**100**	**66**	**100**	**71**	**100**	**70**	**100**	**72**	**100**	**66.2**	**100**	**17.8**

4.3.2.1. Cognitive levels in first-year examination question papers 2011-2015

Table 4.2 illustrates the results of cognitive levels for first-year academic level from 2011-2015. The results show that from 330 questions of the first-year modules, in five years, 51 examination questions were asked in 2011. It was found that 23.5% (n=12) were at remember, with the majority of questions, 68.6% (n=35), at second lowest category (understand) and only 7.8% (n=4) questions were set at analyse. The researcher noted that there were no questions set for the other three categories of cognitive levels (apply, evaluate, and create), of which the last two are the highest categories.

In 2012, the results showed that out of 66 questions asked, the majority, 60.6% (n=40), were set at understand cognitive level, followed by 19.7% (n=13) at remember, 12.1% (n=8) at analyse and fewer questions, 7.6% (n=5), were set at the apply level. No questions were set at the last two, highest categories of the Revised Bloom's Taxonomy (evaluate and create).

In 2013, for first year modules, 71 examination questions were set. Out of those 71 questions, 25.4% (n=18) were set at the lowest category, remember. The majority of questions, 56.3% (n=40), were set at understand (the second from the lowest cognitive level), followed by 8.5% (n=6) at analyse, apply at 7.0% (n=5), and the last two highest cognitive levels,

evaluate and create, both at 1.4% (n=1) each. Similarly, in 2013 questions set at understand (a second lowest cognitive level) were highest, whilst those of the highest cognitive level featured the least in the question papers. However, an improvement in representation of all cognitive levels was noted in 2013, as the questions were distributed among all categories in varying percentages.

Further, results showed that there were 70 examination questions at first-year level in 2014, of which the majority of questions, 55.7% (n=39), were set at understand, followed by 34.2% (n=24) questions at remember, and both apply and analyse cognitive levels were set at 4.3% (n=3) each. The least amount of questions, 1.4% (n=1), were set on evaluation and none of the questions were set at the highest cognitive level, create.

The 2015 academic year revealed that there were 72 examination questions for first-year modules. The majority of questions, 59.7% (n=43), were set at understand cognitive level followed by questions set at the remember cognitive level, at 30.6% (n=22), then analyse at 5.6% (n=4), and apply at 4.1% (n=3). None of the questions were set at the evaluate and create cognitive levels. Below is a Figure illustrating the mean values of cognitive levels during a five year period.

In summary of findings, as evidenced in table 4.2, for the first-year academic level, it is noted that in 2011, a majority 68.6% of questions were set at the understand cognitive level with no questions set for the apply, evaluate, and create cognitive levels. In 2012, the understand cognitive level was still the highest at 60.6%, no questions were set at the evaluate and create cognitive levels. It was in 2013 that the results showed that examination questions were distributed among all cognitive levels in varying percentages.

In 2014, understand was still the highest at 55.7% and evaluate was at 1.4%, no questions were set at the create cognitive level. In 2015, the understand cognitive level was still highest at 59.7%, with no questions set at the evaluate and create cognitive levels. In five years the mean score was highest for understand at 60.4%, followed by remember at 26.8%, and the least was create at 0.2%. The extent to which each score deviates from each other (standard deviation) was at 5.6 % for remember followed by understand at 5.3%, as presented in table 4.2.

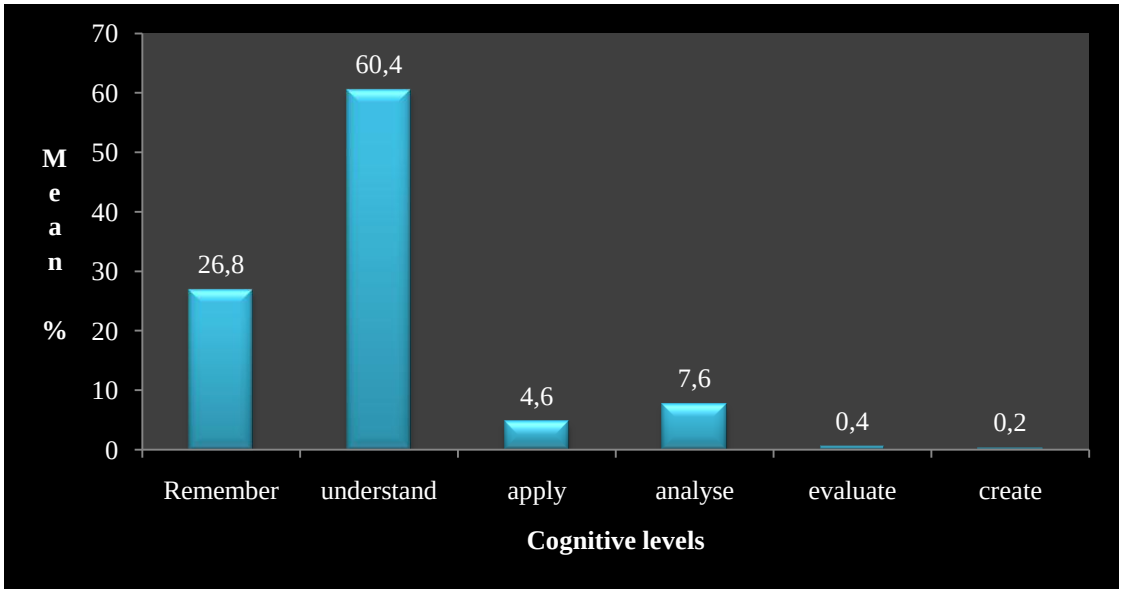

Figure 4.1: Summary of mean values of cognitive levels on first-year examination papers (2011-2015)

The findings depicted in Figure 4.1 revealed that in general, the examination questions across the years were distributed among the six cognitive levels of the Revised Bloom's Taxonomy in varying percentages. Among the cognitive levels, the understand cognitive level remained higher than others in all five years. However, it is noted that the majority of the questions, 91.8%, were set at lower order cognitive levels (remember, understand, and apply). The summary of findings showed that the examination questions on remember were at 26.8%, understand at 60.4%, and apply at 4.6%, of the highest being on the understand cognitive level. The last two highest levels obtained the lowest values. The lower order cognitive levels (remember, understand, and apply) adds up to 91.8% and the higher order cognitive levels (analyse, evaluate, and create) accounted for 8.2%. This is depicted in Figure 4.2.

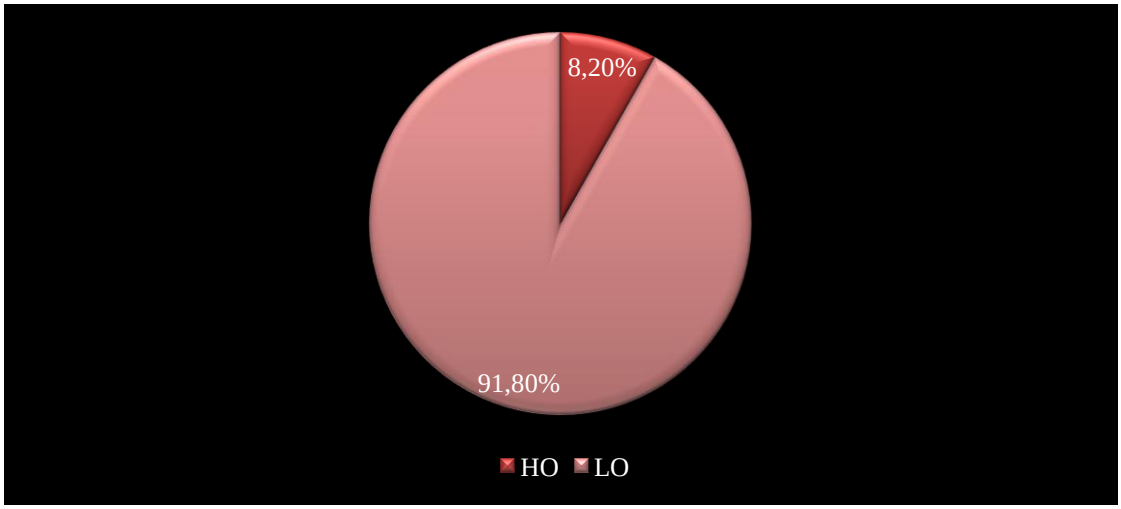

Figure 4.2: First-year academic level's higher order (HO) and lower order (LO) cognitive levels

Most questions, (91.80%) were asked at lower order cognitive levels, meaning that majority of questions required the student to recall and summarise the learnt information with the least amount of questions on application, analysing, evaluation, and create cognitive levels.

4.3.2.2. Cognitive levels in second-year examination question papers 2011-2015

Out of 95 examination question papers that were reviewed, 24.2% (n=23) were for three nursing modules of a second-year academic level during a period of five years with 24.5% (n=418) of the questions. Table 4.3 shows the findings for the cognitive levels in examination question papers for second-year level throughout five years.

Table 4.3: Cognitive levels in second-year academic level 2011-2015

Year	**2011**		**2012**		**2013**		**2014**		**2015**		**mean**		**SD**
Cognitive levels	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**%**
Remember	13	24.5	20	22.0	17	19.8	25	27.5	22	22.7	19.4	23.3	4.6
Understand	29	54.7	49	53.8	54	62.8	48	52.7	58	59.8	47.6	57	11.5
Apply	0	0	7	7.7	4	4.7	8	8.8	8	8.2	5.88	6	3.6
Analyse	7	13.2	10	11.0	7	8.1	7	7.7	6	6.2	9.24	9	2.8
Evaluate	2	3.8	2	2.2	3	3.5	1	1.1	0	0	2.12	2	1.6
Create	2	3.8	3	3.3	1	1.1	2	2.2	3	3.1	2.2	2.7	1.1
Total	**53**	**100**	**91**	**100**	**86**	**100**	**91**	**100**	**97**	**100**	**86.44**	**100**	**25.2**

These findings revealed that in 2011, 53 questions were set from three second-year modules. Out of the 53 questions, the majority, 54.7% (n=29), were set at understand cognitive level, followed by remember at 24.5% (n=13), then analyse at 13.2% (n=7), with both evaluate and create at 3.8% (n=2) each. No questions were set for the apply cognitive level.

In 2012, three second-year academic level modules were reviewed comprising of 91 questions. Out of the 91 questions, the majority, 53.8% (n=49), were set at the second lowest cognitive level, understand, followed by the remember cognitive level at 22% (n=20), then analyse at 11% (n=10), apply at 7.7% (n=7), create at 3.3% (n=3), and the least amount of questions, 2.2% (n=2), were set at evaluate.

In 2013, findings revealed that 23 examination question papers, with 86 questions, were reviewed. A majority of the questions, 62.8% (n=54), were recorded at the understand cognitive level, followed by the lowest cognitive level, remember, at 19.8% (n=17), analyse obtained 8.1% (n=7), followed by the apply level which recorded 4.7% (n=4), evaluation was set at 3.5% (n=3), and lastly, create obtained 1.1% (n=1).

In 2014, the second-year examination question papers consisted of 91 questions, of which 52.7% (n=48) were set at the understand cognitive level, followed by 27.9% (n=25) at remember. Apply accounted for 8.8% (n=8) and analyse cognitive level obtained 7.7% (n=7), followed by create at 2.2% (n=2). The lowest being evaluate at 1.1% (n=1).

In 2015, the 23 examination question papers consisted of 97 questions. Out of those, 59.8% (n=58) were set at the understand level, followed by 22.7% (n=22) at remember. Apply was at 8.2% (n=8) and the analyse level obtained 6.2% (n=6). The highest level, create, obtained 3.1% (n=3) and none of the questions were set at the evaluation level.

In summary, the second-year examination question papers revealed that the understand cognitive level obtained the highest percentage in all the five years of the programme followed by the remember cognitive level. It is also noted that for second-year examination questions, all cognitive levels were utilised, however, lower cognitive levels (remember, understand, and apply) accounted for a higher percentage than higher order cognitive levels (analyse, evaluate, and create).

The average score was higher, 57%, for the understand cognitive level followed by remember at 23.3%. The standard deviation was wider for understand at 11.5%, 4.6% for remember,

and for other cognitive levels ranged from 1.1%, 2.8% to 3.6%. Figure 4.3. illustrates the summary of cognitive levels for second year examination questions.

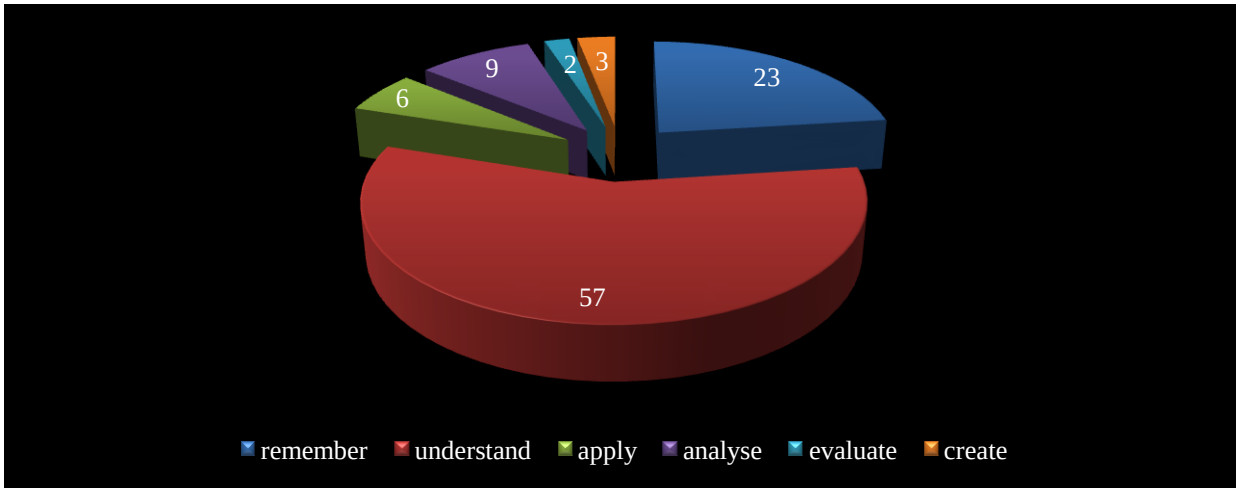

Figure 4.3: Summary of cognitive levels in second-year examination question papers 2011-2015

Figure 4.3, presents the distribution of cognitive levels in second year examination question papers. The understand cognitive level remained the highest at 57% followed by analyse at 23%. The majority of questions were set at lower order cognitive levels which accounted for 86% (remember at 23%, understand at 57%, and apply at 6%) in the space of five years. The higher order cognitive levels, (analyse, evaluate, and create) were at 14%, as portrayed in Figure 4.4. This indicates that more questions were set at lower cognitive levels than at higher cognitive levels.

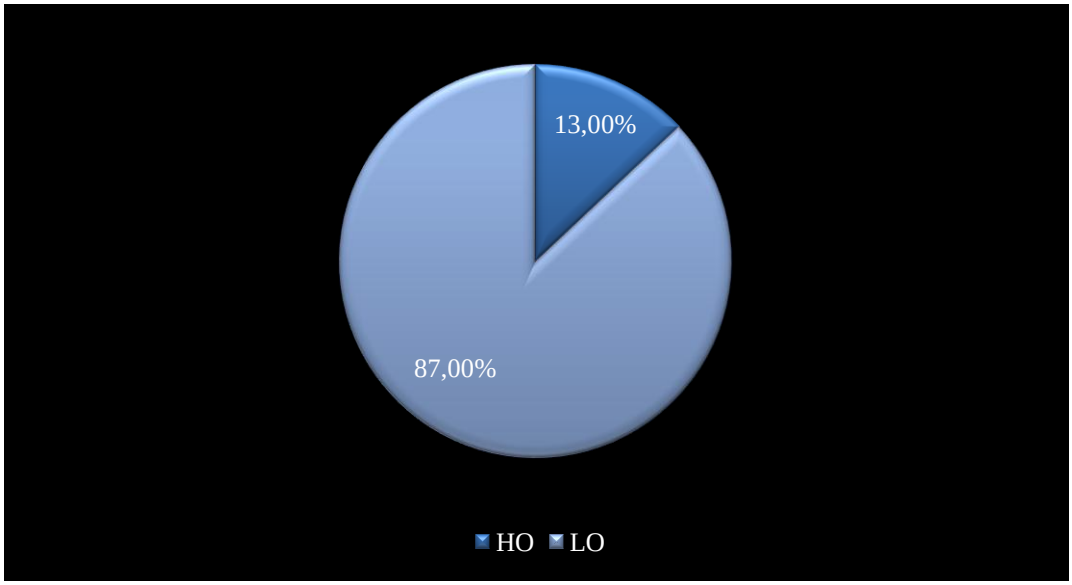

Figure 4.4: Second-year academic level's higher order (HO) and lower order (LO) cognitive levels

The findings reveal that, for second-year academic level, higher order cognitive levels accounted for 13% and lower order cognitive levels accounted for 87%. When first-year is compared to second-year level, from Figure 4.2, it is shown that lower order cognitive levels at first-year academic level were at 91.8% and Figure 4.4, shows that lower order cognitive levels at second-year were at 87% (4.8% less than in first-year). The higher cognitive levels were at 8.2% for first-year level and 13% at second-year level; this means that the questions set at second-year level were 4.8% more complex than those at first year level. Therefore, as the programme increases, the level of questions set also increased. A Poisson model was used to compare lower order and higher order cognitive levels between first-year and second-year; the rate of change that was obtained was 1.6. This means that students at second-year level were more than one and half times more likely to use higher order cognitive levels than at a first-year academic level. This change was statistically significant, "p" =0,048.

4.3.2.3. Cognitive levels in third-year examination question papers 2011-2015

The findings revealed that the examination question papers that were analysed at a third-year academic level were from four modules. Out of 95 examination question papers for all levels, the third-year academic level composed of 34.7% (n=33) of the examination question papers which were analysed, with a total of 36.6% (n= 626) of the questions in five years. Table 4.4 is illustrating the distribution of cognitive levels in third year, from 2011-2015.

Table 4.4: Distribution of cognitive levels at third-year academic level 2011-2015=09

Year	2011		2012		2013		2014		2015		Mean		SD
Cognitive levels	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**%**
Remember	15	17.9	35	24.5	25	17.7	28	21.9	24	18.5	25.4	20.1	2.9
Understand	61	72.6	83	58.0	90	63.8	79	61.7	81	62.3	78.8	63.68	5.4
Apply	2	2.4	5	3.5	5	3.6	2	1.6	3	2.3	3.4	2.68	0.9
Analyse	6	7.1	18	12.6	19	13.5	18	14.0	20	15.3	16.2	12.5	3.2
Evaluate	0	0	1	0.7	0	0	0	0	1	0.8	0.4	0.3	0.4
Create	0	0	1	0.7	2	1.4	1	0.8	1	0.8	1	0.74	0.5
Total	**84**	**100**	**143**	**100**	**141**	**100**	**128**	**100**	**130**	**100**	**125.2**	**100**	**13.3**

In the 2011 academic year, the findings revealed that 84 questions were asked, the majority of 72.6% (n=61) of questions were set at understand, followed by 17.9% (n=15) at remember. Analyse recorded 7.1% (n=6), followed by apply at 2.4% (n=2). There were no questions set at last higher order levels (evaluate and create).

In 2012, four modules' examination question papers were reviewed, comprising of 143 questions across a five year period. Out of 143 questions, the understand level obtained the highest score of 58.0% (n=83), followed by remember cognitive level with a score of 24.5% (n=35). Analyse obtained 12.6% (n=18), followed by apply at 3.5% (n=5). Lastly, the lowest amount of questions were set at the highest cognitive levels (evaluate and create) with a score of 0.7% (n=1) each.

In 2013, for the third-year academic level, 33 examination question papers of four modules were reviewed. A total of 141 questions was obtained, with the majority, 63.8% (n= 90), of questions set at the understand cognitive level, followed by 17.7% (n=25) at remember. The analyse cognitive level obtained 13.5% (n=19), followed by apply at 3.6% (n=5). Lastly, create accounted for only 1.4% (n=2) of total number of questions. No questions were set at the evaluate cognitive level.

In 2014, the findings revealed that there were 128 questions at third-year level. Out of the 128 questions, 61.7% (n=79) of them were set at understand cognitive level, while 21.9% (n=28) was at the lowest cognitive level, remember. The analyse cognitive level was at 14.0% (n=18), followed by apply at 1.6% (n=2), then create at 0.8% (n=1).

The findings showed that for the third-year academic level in 2015, there were 130 questions from 33 examination question papers for four modules throughout five years. Of the 130 questions, the majority, 62.3% (n=81), of questions were set at the understand cognitive level, followed by the 18.5% (n=24) at remember, analyse at 15.3% (n= 20), apply at 2.3% (n=3) and lastly evaluate and create levels obtained 0.8% (n=1) each.

Summing up the results at a third-year academic level, it is evident that in all five years, understand is leading, followed by the remember cognitive level. However, a significant change is noted for a higher order cognitive level, analyse, which has been seen appearing in all the years with a frequency from 7.1% in 2011, to 15.3% in 2015. This indicates that as the programme level increases there was some increase in higher cognitive levels.

The average score for the understand cognitive level was the highest at 63.68% and the extent of deviation among scores throughout five years was at 5.4%. Followed by remember at an average score of 20, 1% and average standard deviation (SD) at 2, 9%, then analyse score was at 12.5% and the SD at 3.2%, followed by apply at 2.68 and 0.9% SD, followed by create at 0.74% and SD of 0.5% then lastly was evaluate at 0.3% and SD of 0.4% with as illustrated in table 4.4. Figure 4.5 is showing the summary of findings from examination question papers for a third-year academic level.

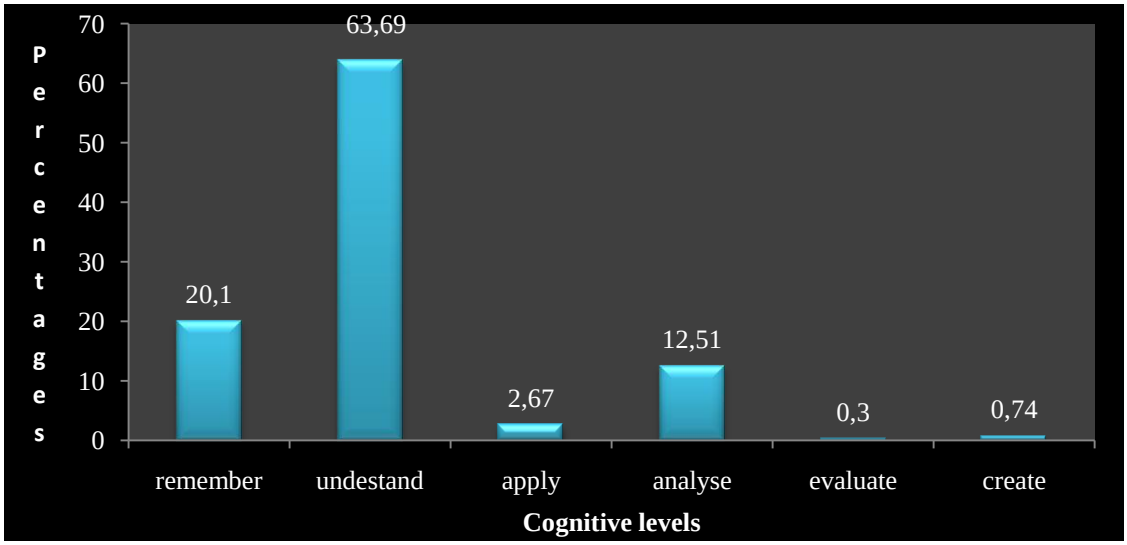

Figure 4.5: Summary of overall cognitive levels for third-year 2011-2015

From the findings illustrated in Figure 4.5, it is clear that remember, understand and apply accounted for the majority, 86.45%, of questions set at a third-year academic level, these are the lower order cognitive levels of the Revised Bloom's Taxonomy, with only 13.55% of questions set at higher order cognitive levels (analyse, evaluate, and create). This is indicated in Figure 4.6. However, questions were not equally distributed among the cognitive levels as the last two highest cognitive levels obtained a total of 0.77% and second lowest cognitive level, understand obtained the highest percentage of 63.69%. When compared to other previous academic levels, third-year academic level questions tried to encompass all cognitive levels, with a higher percentage for analyse.

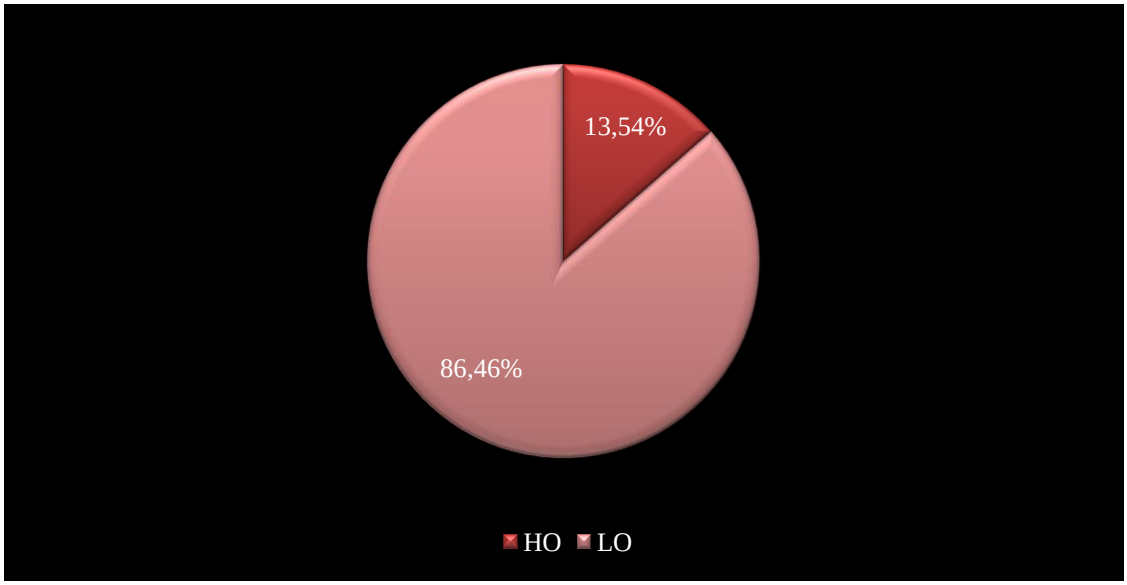

Figure 4.6: Third-year academic level's higher order (HO) and lower order (LO) cognitive levels

Findings displayed in Figure 4.6, revealed that at the third-year academic level, the lower order cognitive levels were 86.46% and the higher order cognitive levels obtained 13%. When comparing second-year and third-year academic levels, HO was 1% higher at third year level than in second year level. The findings indicated that the level of complexity of set questions has increased as the programme level increases. A Poisson model was used to compare lower order and higher order cognitive levels between second-year and third-year academic levels; the rate of change that was obtained was 1.0. This means that students at third-year level were asked higher order cognitive level questions than at second-year academic level. However, this change was not statistical significance, p value 0.8.

4.3.2.4. Cognitive levels in fourth-year examination question papers 2011-2015

The findings revealed that at this academic level, there were 20 examination question papers reviewed for two fourth-year modules. The questions from the examination papers add up to 335 in total. Table 4.6 below presents the cognitive levels of fourth-year level question papers from 2011-2015.

Table 4.5: Cognitive levels in fourth-year academic level 2011-2015

Year	2011		2012		2013		2014		2015		Mean		SD
Cognitive levels	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**%**
Remember	9	13.2	6	8.5	7	10.8	6	8.6	6	9.8	6.8	10.18	1.93
Understand	36	52.9	48	67.6	44	67.7	43	61.4	34	55.7	41	61.06	6.75
Apply	2	3.0	4	5.6	3	4.6	1	1.4	6	9.8	3.2	4.88	3.18
Analyse	21	30.9	13	18.3	11	16.9	20	28.6	14	23.0	15.8	23.54	6.16
Evaluate	0	0	0	0	0	0	0	0	1	1.7	0.2	0.34	0.72
Create	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**68**	**100**	**71**	**100**	**65**	**100**	**70**	**100**	**61**	**100**	**67**	**100**	**18.74**

At this level in 2011, according to the findings, there were 68 questions set for a fourth-year level. Of the 68 questions, 52.9% (n=36) were set at the understand level, followed by 30.9% (n=21) obtained by the analyse cognitive level, and 13.2% (n=9) set at remember. Fewer questions, 3.0% (n=2), were set at the application level. Findings revealed that none of the questions were set at the last two higher cognitive levels, evaluate and create.

In 2012, there were 71 questions set for the fourth-year academic level, of which a majority of the questions, 67.6% (n=48), were set at the understanding level, followed by analyse at 18.3% (n=13), remember at 8.5% (n=6), and apply at 5.6% (n=4). No questions were set at the evaluate and create cognitive levels.

In 2013, four examination question papers were reviewed, comprising of 65 exam questions. The results indicated that out of the 65 questions, a majority of questions, 67.7% (n=44), were asked at the understand cognitive level, followed by analyse at 16.9% (n=11), and remember at 10.8% (n=7), then apply at 4.6% (n=3). There were no questions asked for other cognitive levels.

In 2014, four examination question papers were reviewed comprising of 70 questions in total. The findings showed that a majority, 61.4% (n=43), of questions were asked at understand, followed by analyse at 28.6% (n=20), remember at 8.6% (n=6), and apply at 1.4 % (n=1).

Most of the questions were asked at lower cognitive levels and none at the last two highest cognitive levels.

In 2015, four examination papers were reviewed and the findings indicated that there were 61 questions, of which most, 55.7% (n=34), questions were asked at the understand, followed by the analyse cognitive level which obtained 23.0% (n=14), then apply and remember both at 9.8% (n=6) each. Fewer, 1.6% (n=1), questions were asked at the evaluate cognitive level.

At the fourth-year academic level, like other previous levels, study findings showed that the majority of questions were on the understand cognitive level as it was always the highest during the five-year period. However, a significant change is noted at the analyse cognitive level, which is a higher order cognitive level, with percentages ranging from 16.9% to 30.9%. However, the lowest percentage of analyse was noted in 2013 at 16.9%, and in 2012 at 18.3%. No questions were set for the last two higher order cognitive levels evaluate and create in first four years except in 2015, where evaluate accounted for 1.6% of set questions. Nevertheless, as with the previous academic years, the remember cognitive level was the second highest.

The mean value for the understand cognitive level remained the highest at 61.06 % at fourth year and the extent of deviation was at 6.75%. Followed by Analyse at 23.54 and SD of 6.16%, then remember at 10.18% and SD of 1.93%, followed by apply at 4.88% with SD of 3.18 The total average deviation was 18.74%. The evaluate cognitive level accounted for a lesser average score of 0.34% and standard deviation of 0.72%. Figure 4.7 illustrates the distribution of cognitive levels at a fourth-year academic year level.

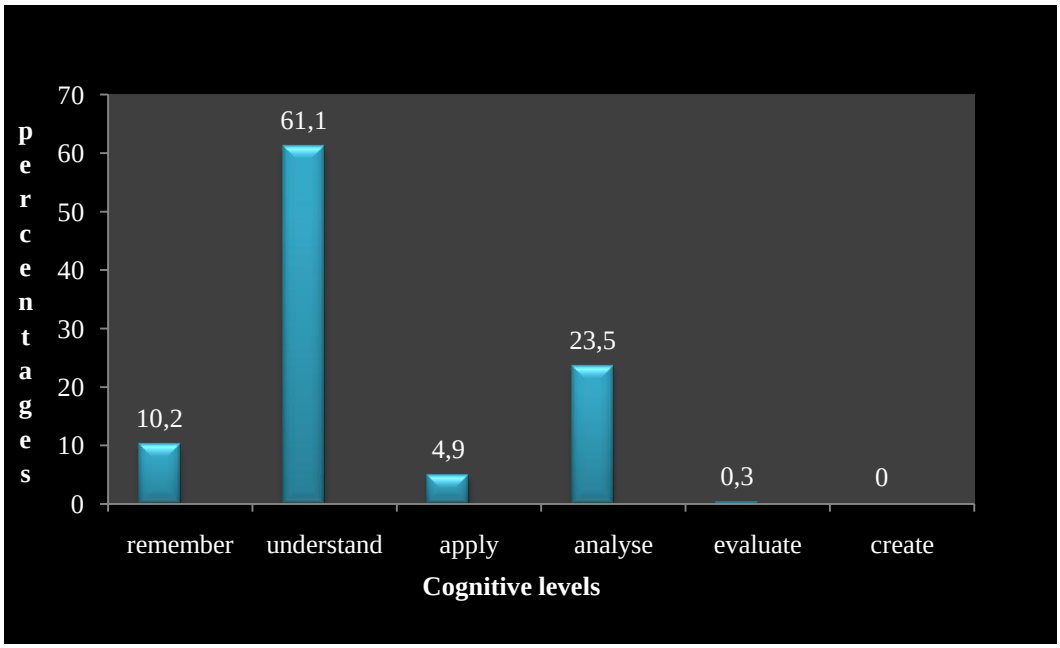

Figure 4.7: Summary of cognitive levels in fourth-year examination question papers

Figure 4.7 portrays the overall results of cognitive levels at a fourth-year level in a period of five years. The understand cognitive level is shown as the highest in the study findings, no questions were set at create cognitive level.

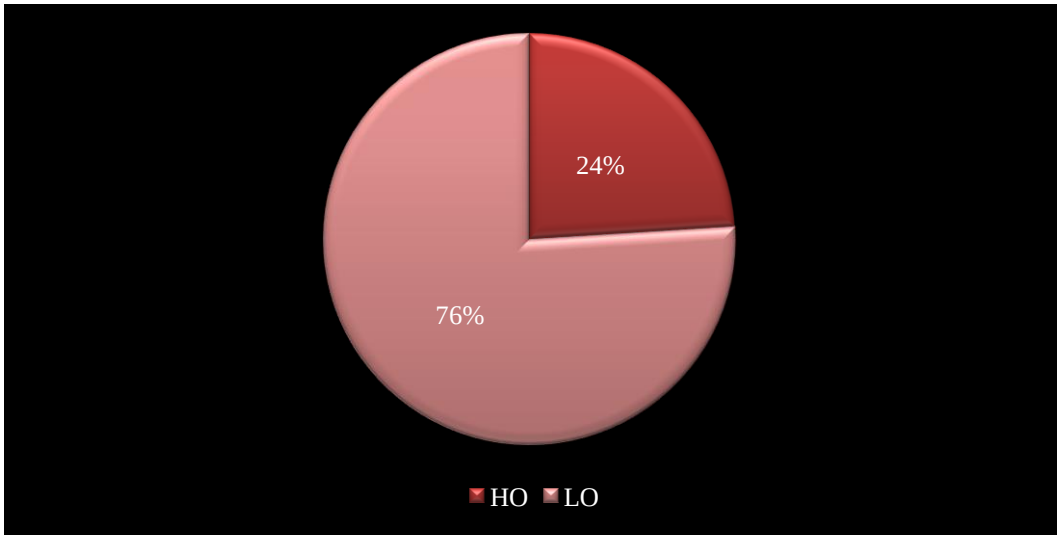

Figure 4.8: Fourth-year academic level's higher order (HO) and lower order (LO) cognitive levels

In Figure 4.8, the findings reveal that lower order cognitive levels were at 76.2% and higher order cognitive levels were at 23.8%. This is indicated in Figure 4.8. When compared to a third-year academic level, lower order cognitive levels at a fourth-year academic level

decreased by 10% and higher cognitive levels increased by 10%, which means that the complexity level of questions increased as the programme level increased. A poison model was used to compare lower order and higher order cognitive levels between third-year and fourth-year; the rate of change that was obtained was 1.7. This means that students at a fourth-year academic level were more than one and half times more likely to use higher order cognitive levels than at a third-year academic level. Statistical significance was "p" = 0.001

4.4. SUMMARY OF COGNITIVE LEVELS ACCORDING TO PROGRAME ACADEMIC LEVELS 2011-2015

Table 4.6: Cognitive levels according to all academic year levels

Academic Levels	First		Second		Third		Fourth		Mean		SD
	N	%	N	%	N	%	N	%	N	%	%
Remember	89	27.0	97	23.2	127	20.3	34	10.2	86.75	20.18	7.19
Understand	197	59.7	238	56.9	394	62.9	205	61.2	258.5	60.18	2.54
Apply	16	4.8	27	6.5	17	2.7	16	5.0	19	4.68	1.55
Analyse	25	7.6	37	8.9	81	13.0	79	23.6	55.5	13.28	7.26
Evaluate	2	0.6	8	1.9	2	0.3	1	0.2	3.25	0.78	0.76
Create	1	0.3	11	2.6	5	0.8	0	0	4	0.93	1.16
Total	**330**	**100%**	**418**	**100%**	**626**	**100%**	**335**	**100%**	**427.25**	**100%**	**20.46**

Findings revealed that remember cognitive level over a period of five years for first-year level was at 27% (n= 89) of 330 questions, followed by the second-year level at 23.2% (n=97) of 418 questions, 20.3% (n=127) of 626 questions, and lastly the fourth-year level at 10.2% (n=34) of 335 questions. A decrease of 3.8% is noted between first and second year levels, then third-year remember level questions are less than second-year level by 2.3%, and fourth-year is 10.1% less than third-year questions. According to the study findings the first-year academic level obtained the highest percentage of 27% with the fourth-year academic level having only 10.2% of questions at the remember cognitive level.

The study's findings revealed that the understand cognitive level for a first-year academic level over five-year period was at 59.7% (n=197) of 330 questions, then the second-year level at 56. 9% (n=238) of 418 questions, then the third-year level at 62.9% (n=394) in 626

questions, and fourth-year level at 61.2% (n=205) of 335 questions. A decrease of 2.8% is noted at second-year level from first year level, third year level increased by 6% more than second-year, while fourth-year is 1.7% less than a third-year level but still 1.5% more than a first-year module. The third-year academic level obtained the highest percentage of questions at the understand cognitive level.

Findings revealed that the apply cognitive level across a five-year period was 4.8% (n=16) for first-year academic level, for second year level was at 6.5% (n=27), for third-year level was at 2.7% (n=17), and for fourth-year level at 5.0% (n=16). From the findings the apply cognitive level was at 2.7% which is the lowest and was the highest at second-year level, 6.5%, followed by fourth-year level at 5%.

The analyse cognitive level at first-year was at 4.6% (n=25), at second-year was at 8.9% (n=37), at third-year was at 13 % (n=81), and at fourth year level at 23.6% (n=79). These findings reveal that the level of complexity increases as the academic year increases as it was at 6% for first-year and increased by 2.9% in second-year, then by 4.1% in third-year and by 10.6% at fourth-year academic level

Study findings show that the evaluate cognitive level as one of the higher order cognitive levels was used less. It was at 0.6% (n=2) in first-year, 1.9% (n=8) in second-year, then 0,3% (n=2) in third-year, and 0.2 % (n=1) at a fourth-year level.

Findings revealed that the create cognitive level was implemented the least out of all cognitive levels, yet it is the highest in the Revised Bloom's Taxonomy. Findings show that first-year level was at 0.3% (n=1), second-year level was at 2.6% (n=11), third-year was at 0.8% (n=5), and it was not used at a fourth-year academic level. An increase of 2.3% for questions at create cognitive level was noted at second-year followed by decrease in third and fourth-year academic levels.

In summary, the study findings revealed that for first-year academic level, the frequency of questions set at lower order cognitive level was at 91.8% and higher cognitive levels were at 8.2%. For the second-year academic year, lower order cognitive levels were at 86% and higher order at 14%. Results showed that for the third-year academic level, the frequency of questions set at lower order cognitive level was 86.46% and the higher order cognitive level was 13.54%. For the fourth-year academic level, frequency of lower order cognitive level questions was 76.2% and the questions set at higher order cognitive level was 23.8%.

Findings revealed that the first-year academic level obtained the highest percentage, 91.8%, of lower cognitive levels, followed by the third-year academic year at 86.46%, then the second-year academic level at 86%, and lastly the fourth-year academic level at 76.2%. Study findings further suggested that questions set for higher order cognitive levels were more, 23.8%, at fourth-year level followed by 14% at second-year level, then third-year level at 13.54%, and the least was from first-year academic level questions at 8.2%. Figure 4.9 is a graph illustrating lower order cognitive levels and higher order cognitive levels per academic level.

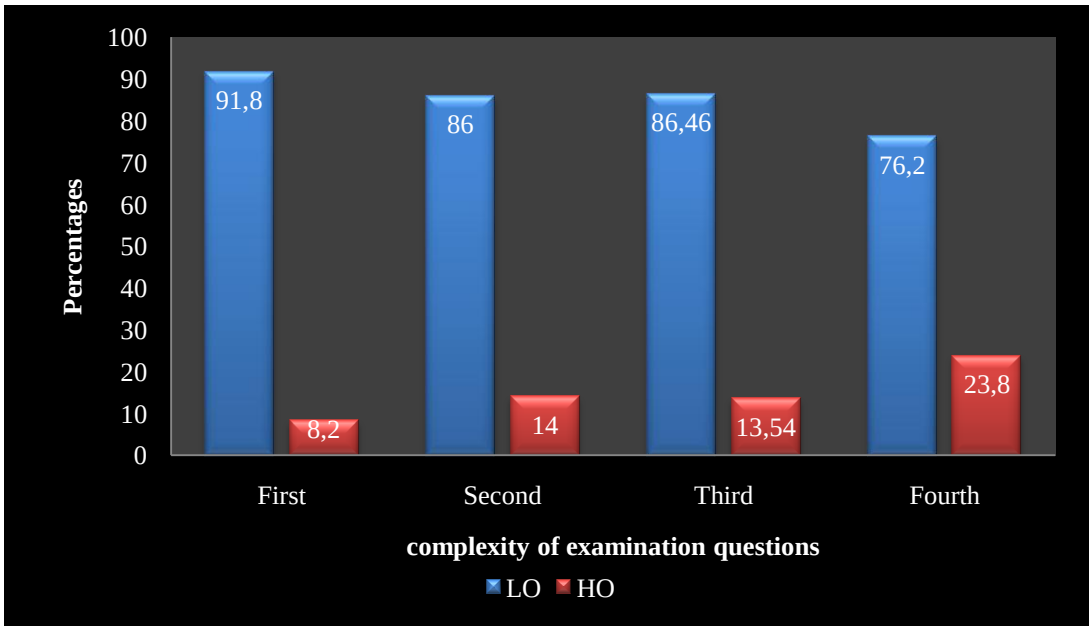

Figure 4.9: Lower order (LO) and higher order (HO) cognitive levels per academic level

The findings revealed that as the programme becomes more complex, the complexity level of questions increases. When comparing a first-year with a fourth-year level, an increase of 15.6% for higher order questions is noted. In contrary third-year level obtained 0.46% less in higher order cognitive level when compared to a second-year level, which means that questions set for a second-year level were more complex than questions set for third-year level.

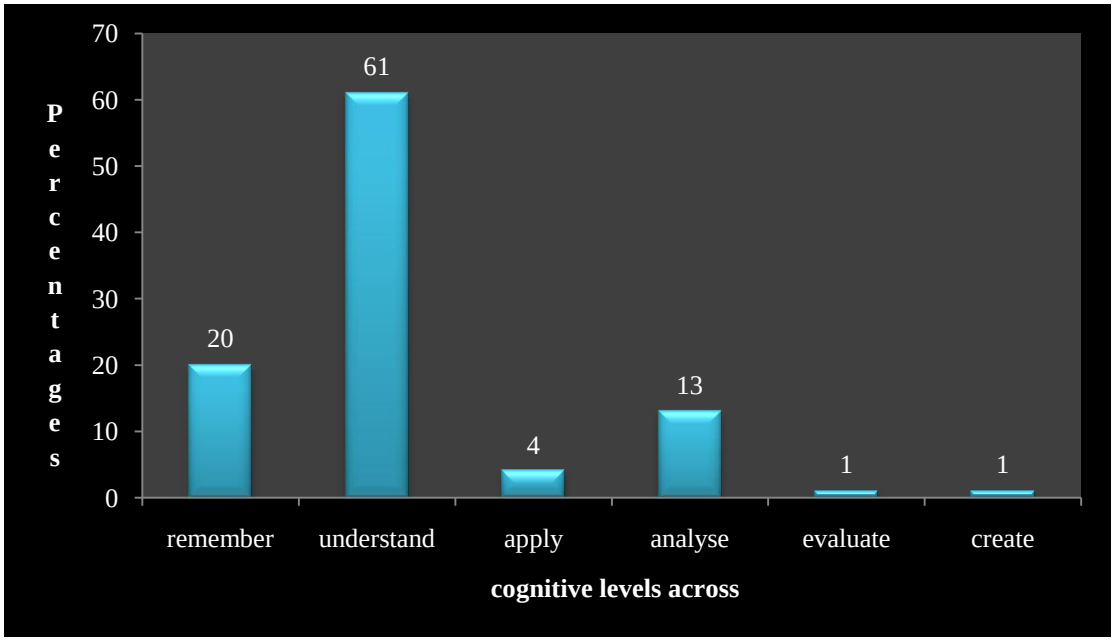

Figure 4.10: Summary of cognitive levels for all the academic year levels 2011-2015

Figure 4.10 shows the distribution of cognitive levels to identify the most commonly used, of which, the frequency of the understand cognitive level remains the highest utilised cognitive level at 61%, followed by remember at 20%, analyse at 13%, apply at 4%, and evaluate and create at 1% each.

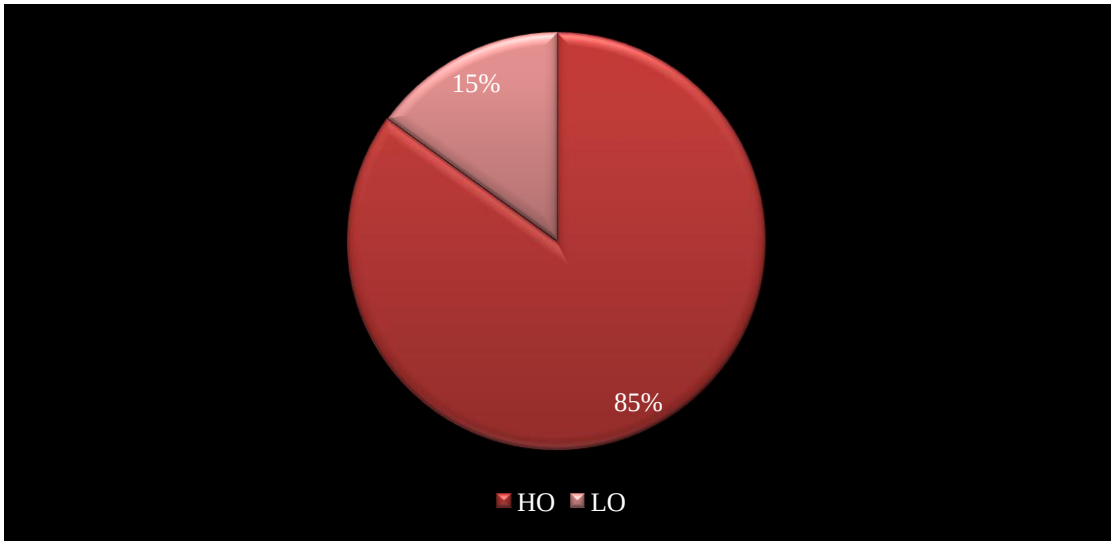

Figure 4.11: Overall percentages of lower order (LO) and higher order (HO) cognitive levels

Lower cognitive levels (remember, understand, and apply) accounted for 85% and higher cognitive levels (analyse, evaluate and create) obtained 15% as indicated in Figure 4.11. This

means that majority of questions set require students to recall and summarise the learnt information rather than requiring them to apply the learn information in new and unfamiliar situations

4.5. SUMMARY OF COGNITIVE LEVELS PER MODULE OVER FIVE YEARS

Table 4.7: Cognitive levels in first-year modules 2011-2015

MODULES	**CNS1**		**FNS1**		**NEP1**		**MEAN**	
Cognitive levels	N	%	N	%	N	%	N	%
Remember	26	37%	53	27%	10	16%	29.6	26.6%
Understand	32	45%	125	63%	40	65%	65.6	57.6%
Apply	12	17%	3	2%	1	2%	5.3	7%
Analyse	1	1%	16	8%	8	13%	8.6	7.3%
Evaluate	0	0	0	0	2	3%	0.6	1%
Create	0	0	0	0	1	2%	0.3	0.6%
Total	**71**	**100%**	**197**	**100%**	**62**	**100%**	**110**	**100%**

Table 4.7 indicates that, out of the 12 nursing modules for the Diploma of Nursing Programme, it is revealed that 25% (n=3) of the modules were for first-year level. Of the three first-year modules, CNS1 accounted for the highest score 37% (n=26) of questions on the remember cognitive level, followed by FNS1 at 27% (n=53), and lastly NEP1 obtained 16% (n=10). For the understand cognitive level, FNS1 obtained the majority of questions, 63% (n=125), followed by NEP1 at 65% (n=40), then CNS1 at 45% (n=32).

For the apply cognitive level, CNS1 was the highest at 17% (n=12), the least being NEP1 at 2% (n=1). The analyse cognitive level was highest at 13% (n=8) for the NEP1 module. The NEP1 module was the only one with questions set at the highest level, evaluate, 3% (n=2), and create at 2% (n=1). FNS obtained 2% (N=3) for apply. Other modules achieved 0% for the last highest cognitive levels.

Findings revealed that for first-year modules in a period of five years, the CNS1 module accounted for majority 99% of lower order cognitive level questions, followed by FNS1 which set 92% of questions at lower order cognitive levels, and lastly NEP1 with 82%. The higher order cognitive levels were higher, 18%, for NEP1, followed by FNS1 at 8%, and CNS1 at 1%. Generally, the majority of questions in all first-year level modules were set at

the lowest cognitive levels of recall and interpretation, with few question set at the higher cognitive levels, analyse, evaluate, and create

Table 4.8: Cognitive levels in second-year modules 2011-2015

Modules	**CNS2**		**GNS1**		**NEP2**		**MEAN**	
Cognitive levels	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Remember	35	23%	53	28%	9	12%	32.3	21%
Understand	74	49%	119	62%	45	60%	79.3	57%
Apply	25	16%	1	1%	1	1%	9	6.%
Analyse	10	7%	15	8%	12	16%	12.3	10.%
Evaluate	3	2%	0	0%	5	7%	2.6	3%
Create	4	3%	4	2%	3	4%	3.6	3%
Total	**151**	**100%**	**192**	**100%**	**75**	**100%**	**139.3**	**100%**

Out of 12 nursing modules, the findings revealed that 25% (n=3) were for second-year level. In a total of 418 questions set in five years, the GNS1 module accounted for the majority, 91%, of questions at the lowest cognitive level, remember at 28% (n=53), understand at 62% (n=119), create at 2% (n=4) and apply at 1% (n=1). In the CNS 2 module 88% of questions were on the lowest cognitive levels (remember 23% (n=35), understand at 49% (n=74) and apply 16% (n=25). Lastly NEP2 had lower order cognitive levels at 73% (remember at 12% (n=9), understand at 60% (n=45) and apply at 1% (n=1).

For the higher order cognitive levels GNS1 obtained 10%, followed by CNS2 with 12% of higher order cognitive level, and NEP2 obtained 27%. From the findings it is deduced that NEP2 at second-year level had more complex questions than the other two modules.

Table 4.9: Cognitive levels in third year modules 2011-2015

Modules	**CNS3**		**GNS2**		**MNS1**		**PNS1**		**MEAN**	
Cognitive levels	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	%
Remember	37	25%	68	23%	4	6%	18	17%	31.75	17.7
Understand	70	47%	204	68%	45	64%	75	69%	98.5	62.
Apply	12	8%	1	0.3%	2	3%	2	2%	4.25	3.3
Analyse	25	17%	25	8.4%	19	27%	12	11%	20.25	15.9
Evaluate	2	1%	0	0%	0	0%	0	0%	0.5	0.25
Create	3	2%	1	0.3%	0	0%	1	1%	1.25	0.8
Total	**149**	**100%**	**299**	**100%**	**70**	**100%**	**108**	**100%**	**156.5**	**100%**

Findings from table 4.9, revealed that out of the 12 modules for the Diploma of Nursing Programme, 33% (n=4) of modules were for third-year. Among third year modules, CNS 3 obtained the highest score, 25% (n=37), of questions set at the recall level, followed by the GNS2 module at 23% (n=68), then PNS 1 at 17% (n=18), and MNS1 at 6% (n=4). In all third-year modules, the understand cognitive level was the highest among all cognitive levels. For the PNS 1 module there was a majority, 69% (n=75), of 108 questions at the understand level, followed by GNS 2 module at 68% (n=204) of 299 questions. The apply level was highest, 8% (n=12), in 149 questions for the CNS3 module when compared to other modules, which ranged between 0.3%- 3%.

Findings showed that for higher order cognitive levels, MNS1 obtained a majority of 27% followed by CNS3 at 20%, then PNS1 at 12%, and lastly GNS2 at 8.7%. This indicates that MNS1 questions were more complex than questions from other modules, with GNS2 module having the lowest percentage of questions at higher level. The lower order cognitive levels were more, 91.3%, in GNS2 questions, followed by PNS1 at 88%, then CNS3 at 80%, and lastly MNS1 at 73%. Table 4.10 illustrates the cognitive levels in fourth year modules.

Table 4.10: Cognitive levels in fourth year modules 2011-2015

Modules	**MNS2**		**PNS2**		**MEAN**	
Cognitive levels	**N**	**%**	**N**	**%**	**N**	**%**
Remember	16	10%	18	10%	17	10%
Understand	88	54%	117	68%	102	61%
Apply	5	3%	11	6%	8	4.5%
Analyse	53	33%	26	15%	39.5	24%
Evaluate	0	0%	1	1%	0.5	0.5%
Create	0	0%	0	0%	0	0
Total	**162**	**100%**	**173**	**100%**	**167.5**	**100%**

Out of 12 nursing modules for the Diploma of Nursing, 17% (n=2) of modules were for fourth-year level. In all, 335 questions were set at fourth-year level, which were distributed among Revised Blooms Taxonomy of cognitive levels except the create cognitive level. For MNS 2, the remember cognitive level accounted for 10% (n=16) of 162 questions, followed by PNS2 module at 10% (n=18) of 173 questions. In both modules the majority of questions were set at the understand cognitive level, with PNS 2 being the highest at 68% (n=117) of 173 questions and MNS 2 the lowest at 54% (n=88) of 162 questions.

The apply cognitive level was highest for the PNS2 module at 6% (n=11) of 173 questions followed by MNS 2 at 3% (n=5) of 162 questions. The MNS 2 module set a majority of questions at the analyse cognitive level at 33% (n=53) of 162 questions, with PNS 2 analyse questions at 15% (n=26) of 172 questions. The PNS2 module set questions at the evaluate level with a score of 1% (n=1) of 172 questions.

Lower orders cognitive levels (remember, understand, and apply) were at 84% for PNS2 and at 67% for the MNS2 module. Higher order Cognitive levels (analyse, evaluate, and create) were at 16% for PNS2 module and 33% for MNS2 module. This means that the MNS2 module set more complex questions than the PNS2 module at fourth-year academic level.

4.6. SUMMARY OF EACH COGNITIVE LEVEL PER MODULE OVER FIVE YEARS

The findings in Figure 4.12, show that from twelve modules reviewed over five years, CNS1 obtained the highest percentage, 37%, for setting questions on recall of information. This was followed by GNS1 at 28%, FNS1 at 27%, CNS3 at 25%, both CNS 2 and GNS 2 at 23%, PNS1 at 17%, NEP1 at 16%, and NEP2 at 12%. PNS2 and MNS 2 both had 10% each, and the lowest being MNS1 at 6%.

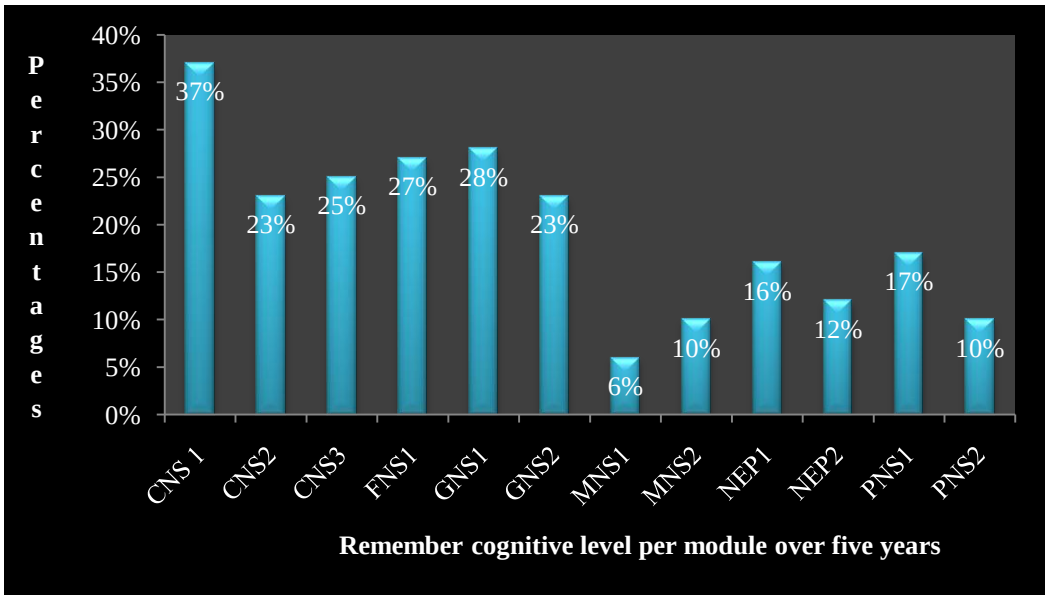

Figure 4.12: Summary of remember cognitive level for each module over five years

The level of complexity among CNS modules is poorly distributed as the results show a decrease of 14% for CNS 2, which indicates that more questions were on other cognitive levels as the programmes become more complex. As well as this, there was a small increase of 2% for CNS 3 when compared to CNS 2. Findings show that NEP 2 was 2% lower than NEP 1. GNS1 obtained 1% more than the FNS1 module, which is the first level module, meaning that more questions were set at recall for the second-year GNS module, with a small difference at third-year as GNS2 is 5% less than GNS1 and 4% less than FNS1.

At third-year academic level for MNS, questions became more complex as recall was only at 6% and the fourth-year MNS 2 module was 4% higher than the third-year module. This means that more questions were set at recall at fourth-year than at a third-year level.

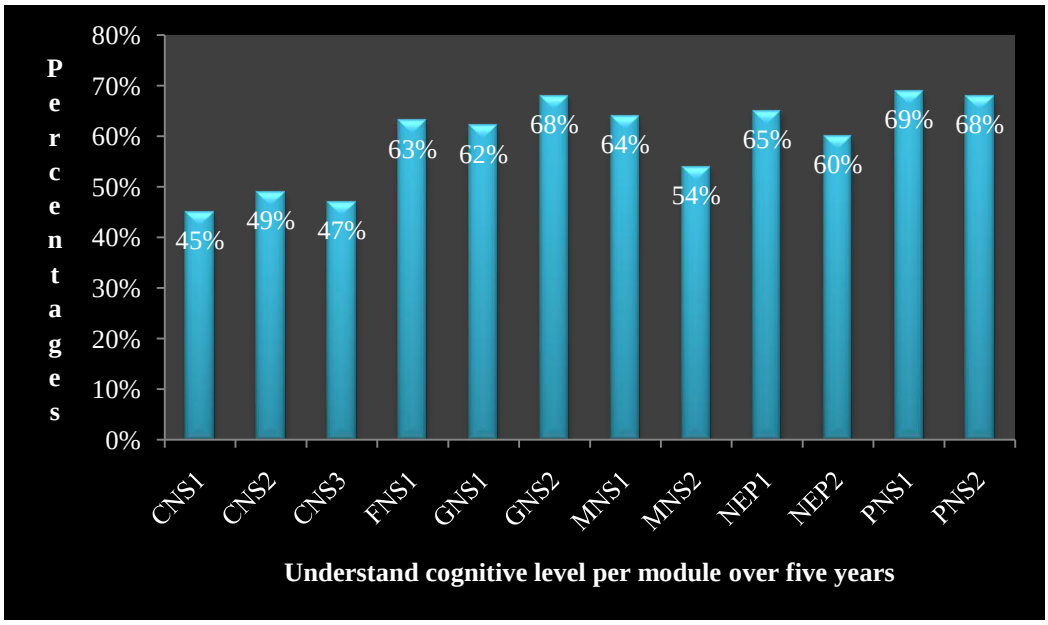

Figure 4.13: Summary of understand cognitive level for each module over five years

Study findings show that the PNS1 module was the highest, at 69%, in setting questions requiring students to reword and explain information in a meaningful manner based on learnt material, a slight difference of 1% is noted for PNS 2 (Fourth-year module) which is at 68%, meaning that more questions are on recalling and understanding information, the lowest cognitive levels. GNS 2 (third-year module) is 6% higher than GNS 1 (second-year module) meaning that in third-year more question were set at the understand cognitive level, thus the complexity of GNS2 questions has increased a bit when compared to GNS1.

The NEP1 module obtained 65%, which is 5% more than the (60%) of NEP2 module. This means that NEP1, a first-year module, set more questions on comprehension than the NEP2 module, thus decreasing the complexity level of NEP 2 questions as NEP 2 is supposed to set more complex questions as the programme difficult increases.

Results show that CNS 1 obtained the lowest percentage of 45%, with CNS 2 at 49% and CNS3 at 47%. Results further suggest that at second year level complexity of questions increased by 4% and decrease by 2% at third year. MNS 1 was at 64% and MNS 2 at 54% with a drop of 10%, meaning that complexity of questions for MNS 2 were lower than complexity of questions for MNS 1 by 10% yet MNS 2 is fourth year module.

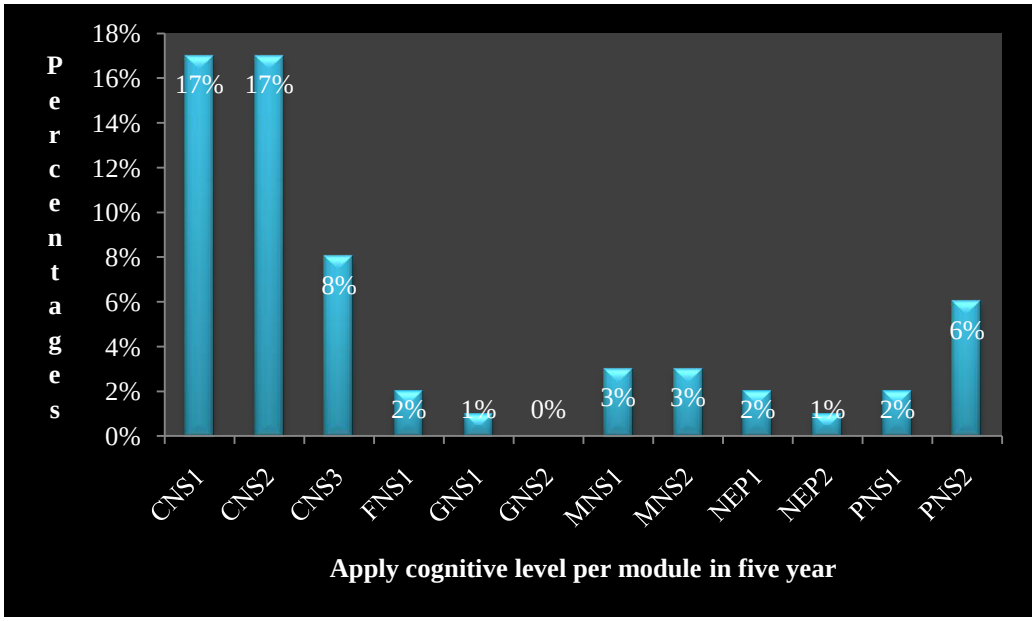

Figure 4.14: Summary of apply cognitive level for each module over five years

Findings in Figure 4.14 above indicate the frequency of apply cognitive level for each nursing module in a period of five years. It is shown that CNS1 and CNS 2 modules both were at 17% respectively, followed by an 8% for CNS3, meaning that for the CNS module there were questions set for students to apply learnt information. Following was PNS 2 at 6% and the MNS modules at 3% each.

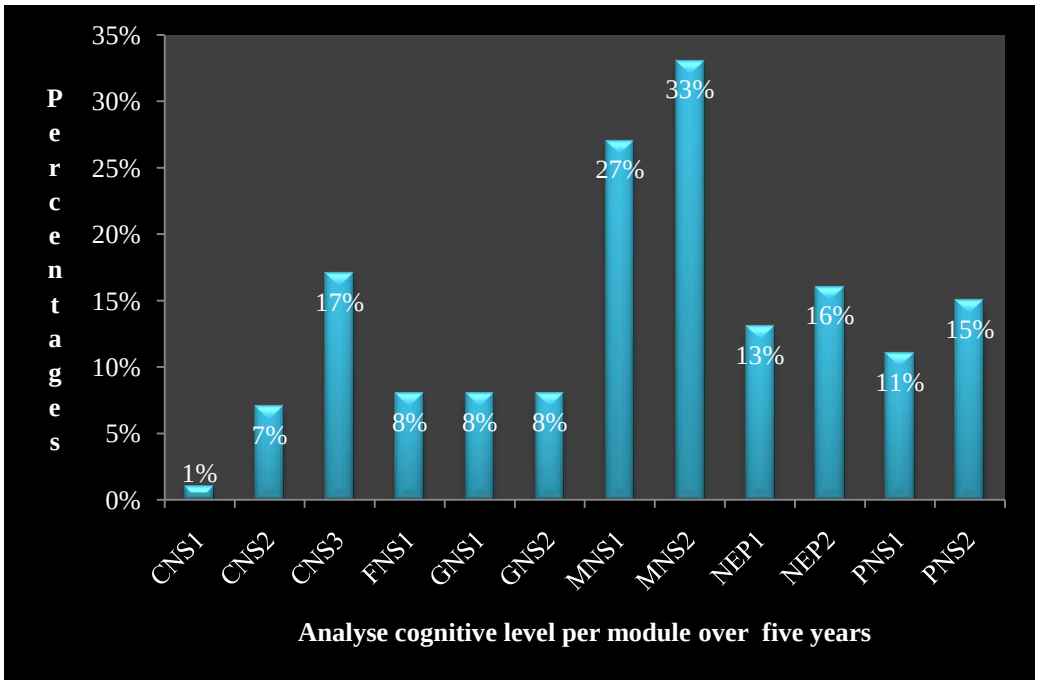

Figure 4.15: Summary of analyse cognitive level for each module over five years

Findings reveal that MNS2, a fourth-year module, was composed of a majority, 33%, of questions at the analyse cognitive level. That indicates that the level of complexity increases as the programme increases, followed by MNS 1 at 27%. Results further indicate that CNS 1 was at 1%, an increase of 6% noted for CNS2 and an increase of 10% for CNS 3, meaning that as the programme went on, questions became more complex in the CNS modules.

Results show that NEP2 is also 3% higher than NEP1, the same applies with PNS 2 as it is 4% higher than PNS 1, meaning that the level of complexity increase as the programme goes on. The FNS1, GNS1, and GNS2 were all the lowest at 8%, meaning that questions for the analyse cognitive level were 8% at first-year (FNS 1) which was the same as in second-year (GNS1) and in third-year for GNS2. The level of complexity remains the same irrespective of programme level increase.

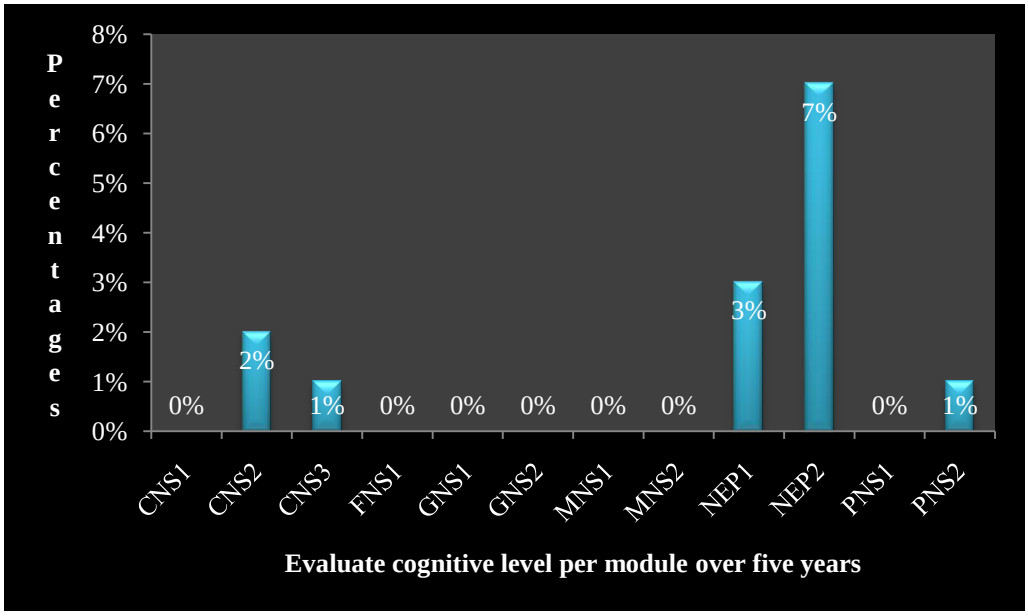

Figure 4.16: Summary of evaluate cognitive level for each module over five years

Findings reveal that NEP2 module set the majority of 7% questions at the higher cognitive level, evaluate, with a noted increase of 4% from NEP1. Results further suggest that following NEP1 was CNS 2 at 2%, and CNS3 and PNS2 at 1% respectively. All other modules never set a question on the evaluate cognitive level.

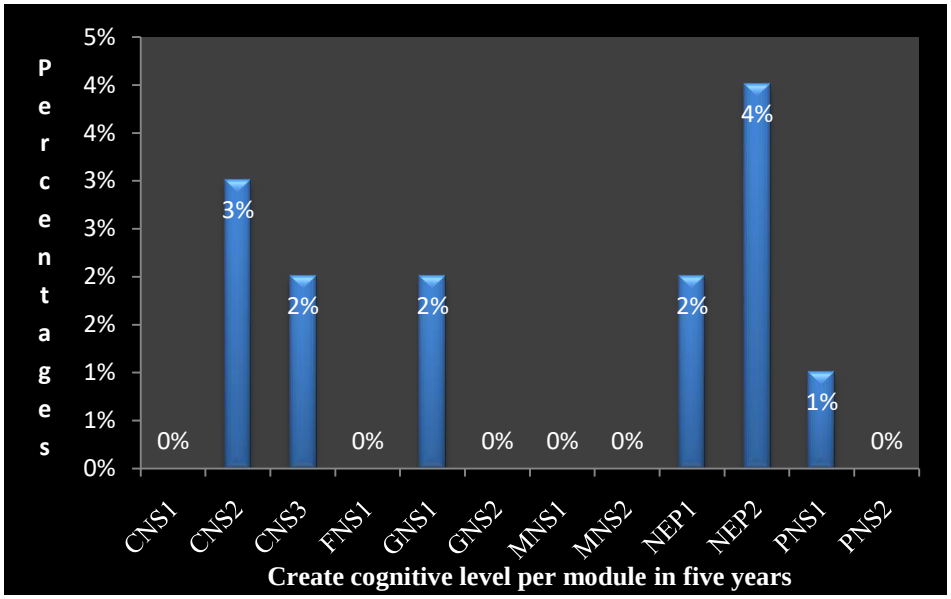

Figure 4.17: Summary of create cognitive level for each module over five years

Study findings reveal that NEP2 obtained the highest percentage (4%) at create cognitive level, followed by CNS2 at 3%; CNS 3, GNS1 and NEP1 at 2%, and lastly PNS1 at 1%, with all others at 0%. MNS modules and GNS 2 and GNS 3 modules set questions only up to the analyse cognitive level.

4.7. SUMMARY OF COMPLEXITY OF QUESTIONS PER MODULE

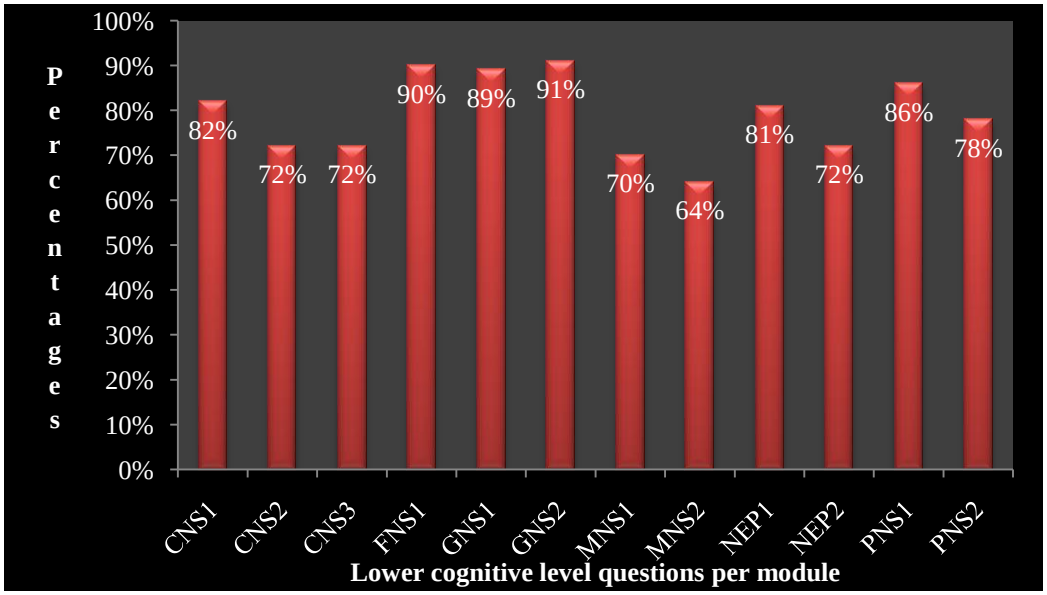

Figure 4.18: Lower order (LO) cognitive levels per module over five years

The study findings revealed that GNS 2, a third-year module, set a majority, 91%, of questions at lower order cognitive levels, meaning that fewer questions were set at higher

order cognitive level. Following on lower order cognitive levels was FNS1 at (90%) and then GNS1 at (89%), PNS1 at 86%, CNS1 at 82%, NEP1 at 81%, PNS2 at 78%; CNS2, CNS3 and NEP2 at 72% respectively, MNS1 at 70%, and finally MNS 2 at 64%.

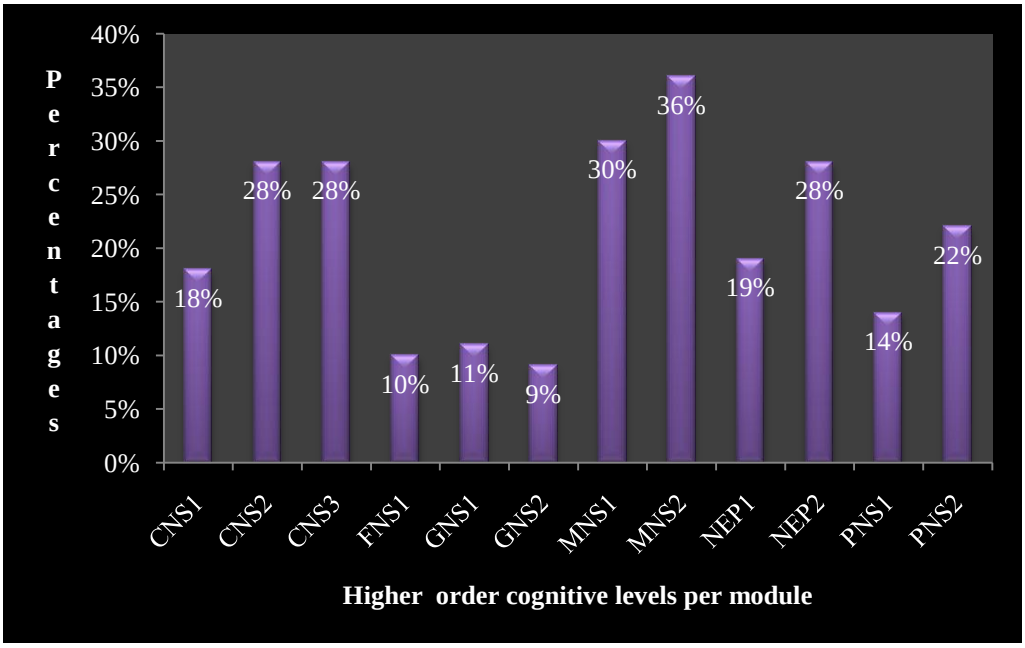

Figure: 4.19. Distribution of higher order (HO) cognitive levels per module over five years

Findings revealed that MNS 2, a fourth-year module, was the highest, at 36%, in setting examination questions that are complex when compared to other modules. MNS1, a third-year module, was at 30%, meaning that as the programme went on, MNS 2 questions were 6% more difficult than third-year ones. Results further showed that CNS 2, CNS3, and NEP2 set 28% of questions at higher order cognitive levels.

The results showed that NEP1, a first-year module, had more complex questions when compared to GNS2 and PNS 2, which are third year modules. The results revealed that the GNS 2 module is the least effective at setting questions requiring students to utilise higher order thinking ability, followed by FNS1 at 10%, GNS1 at 11%, and PNS 1 at 14%.

Table: 4.11. Correlation for HO and LO between academic year levels in five-year period (2011-2015)

Item	Cognitive Domains								
	High Order		Low Order		Total	Academic years compared	Change in IRR	p value (Poisson model)	95%CI
	N	%	N	%					
1st year level	28	8.2%	302	91.8%	330	1 versus 2	1.6	0.048	(1.0-2.5)
2nd year level	56	14%	362	86%	418	2 versus 3	1.0	0.8	(0.8-1.5)
3rd year level	88	13.5%	538	86.5%	626	3 versus 4	1.7	0.001	(1.3-2.3)
4th year level	80	24%	255	76%	335	1 versus 4	2.8	<0.001	(1.8-4.3)
Total	**252**	**59.7**	**1457**	**340.3**	**1709**				

The Poisson model was used to compare different levels on distribution of questions according to Bloom Taxonomy as follows: level one to level two; level two to level three; and level three to level four over a five year period . The category is a binary variable (lower order to upper order cognitive levels). The differences between percentages of HO and LO was simply compared by comparing percentages of HO. When comparing level one with level two, level two were more than one and a half times better in using higher order. In the comparison between level two and level three, the difference was 1.0, which means that third-years were one times higher in utilising higher order cognitive levels than second-years. When comparing third and fourth levels, the results reveal that fourth-year academic level change was 1.7, which means that, at fourth-year level, students used higher order cognitive levels more than one and half times than third-years. When comparing first-year academic levels and fourth-year academic levels, the change is 2.8, which means those students at fourth-year were exposed to higher order cognitive levels more than two and half times more than first-year students. These changes indicate that as the programme level increase the utilisation of higher order cognitive levels increase, however, the percentage of HO remains low.

4.8. SUMMARY OF ACTION VERBS ACROSS ALL LEVELS 2011-2015

The action verbs used in examination question papers were analysed according to the Revised Bloom's Taxonomy. The study findings reveal that most action verbs that were utilised fall

within the lowest categories of the Bloom's Taxonomy. However, verbs of the second lowest cognitive level, understand, were utilised more. The minority of action verbs were from the higher cognitive levels as evidenced by the frequencies in the table below.

Table 4.12: ACTION VERBS COMMONLY USED ACROSS ALL LEVELS 2011-2015

Action verb	N	%
Describe	422	25%
Explain	363	21%
Discuss	184	11%
Outline	158	9%
Define	109	6%
Identify	84	5%
List	60	4%
State	57	3%
Educate	57	3%
Match	45	3%
Highlight	35	2
Indicate	19	1%
Name	12	1%
Manage	11	1%

Table 4.12 above outlines the action verbs that were commonly used across all modules in five years. These action verbs were coded for frequency. In this study 'describe' was the most used action verb in questions set across all levels, from a total of 1709 questions, 'describe' was at 25% (n=422), followed by 'explain' at 21% (n=363), then 'discuss' at 11% (n=184), then 'outline' 9% (n=158), then define at 6% (n=109), then 'identify' at 5% (n=84), then 'list' at 4% (n=60%), 'state' at 3% (n=57), 'educate' at 3% (n=57), 'match' at 3% (n=45), 'highlight' at 2% (n=35), 'indicate' at 1% (n=19), and 'name' at 1% (n=12).

Action verbs used less than 1% have not been included in the table. They were: 'choose', 'mention', 'compare', 'justify', 'write', 'expatiate', 'elaborate', 'determine', 'formulate',

‘interpret’, ‘classify’, ‘analyse’, ‘support’, ‘establish’, ‘compile’, ‘select’, ‘clarify’, ‘apply’, ‘diagnose’, ‘confirm’, ‘develop’, ‘label’, ‘conduct’, ‘examine’, ‘counsel’, ‘explore’, ‘evaluate’, ‘assess’, ‘present’, ‘schedule’, ‘compose’, ‘plan’, ‘prepare’, and ‘provide’.

4.9. CONCLUSION

This chapter presented findings from the data collected from the examination question papers for the Diploma of Nursing Programme, for the period of 2011-2015. Findings that were analysed and interpreted were, cognitive levels and frequencies, percentages, averages, and standard deviation. This information was presented in tables and graphs in relation to the research objectives.

The study findings revealed that most questions were based on preceding scenarios and a variety of question were used. The majority of questions set in examination question papers for all levels reveal that the utilisation of lower order cognitive levels was more prominent than the higher order levels. The first-year academic level accounted for highest percentage of lower cognitive level questions, whereas the fourth-year academic level obtained highest percentage in setting questions at higher order cognitive levels. This means that as the programme went on the complexity of the questions increased. The overall percentage of higher order cognitive levels is 15% whereas lower order cognitive levels accounted for 85% of questions in analysed examination questions.

Among the modules, GNS2, a third-year module, accounted for the highest percentage of lower cognitive level questions. As a result GNS 2 was the lowest in setting questions that address higher order cognitive levels. MNS 2, a fourth-year module, obtained the highest percentage of questions set at a higher order level. Most questions were on a lower cognitive level and ‘understand’ (the second lowest cognitive level according to the Revised Bloom’s Taxonomy) was used in a majority of questions, hence the action verbs that were frequently used in questioning were ‘describe’, ‘discuss’ and ‘explain’. Furthermore, the higher order cognitive domains (create and evaluate) were less frequently used in all programme levels. These findings will be further discussed in the following chapter including recommendations, limitations and a conclusion.

CHAPTER FIVE

DISCUSSION, CONCLUSION, LIMITATIONS AND RECOMMENDATIONS

5.1. INTRODUCTION

This chapter provides a discussion of the most significant findings in line with the objectives, reviewed literature, previous studies in the topic, and in relation to the conceptual framework. Examination questions set for the Diploma of Nursing Programme at a selected nursing college in the Eastern Cape were analysed in light of the Revised Bloom's Taxonomy. The study attempted to provide answers to the study objectives which were: to determine the cognitive levels at which examination questions are set in the Diploma of Nursing programme according to the Revised Bloom's Taxonomy; to explore progression in the utilisation of action verbs across various levels of the programme, and to compare the difficulty level of questions across various levels of the programme.

The examination question papers reviewed were from 12 nursing modules, comprising of 95 examination papers with 1709 questions in total, for a period of five years. Out of the 95 examination question papers, 20% (n=19) were of the first-year level which consisted of 19.3% (n=330) questions. The second-year level had 24.2% (n=23) of the examination question papers with 24.5% (n=418) of the exam questions. The third-year level had the highest number of examination question papers accounting for 34.7% (n=33) with 36.6% (n=626) examination questions. Lastly, the fourth-year level had 21.1% (n=20) of the examination question papers with 19.6% (n=335) of the total examination questions.

5.2. DISCUSSION OF FINDINGS

5.2.1. Variety of questions used across academic levels 2011-2015

Questions are important in assessing the learners' needs and stimulating learner thinking (Swart, 2010). According to Jones et al. (2009), examiners should set examination questions that address different cognitive levels in order to assess the students' capabilities. The present study findings revealed that a variety of questions were used including scenario-based questions, short answer, short essay, multiple choice, match the column, and true or false questions. Short scenarios preceded most of the questions and the students were expected to respond to questions based on the presented scenarios. The significance of the scenarios in most cases is to elevate the cognitive level of the questions. Cormack (2014) implemented complex and rich scenario-based assessments in the form of action research. This according

to Cormack, led to an increase in students' interest in cognitive psychology module, and students reported that it assisted them in applying their knowledge and prompted them to explore literature creatively. However, Gerekwe (2010) suggested that if scenarios used are not of quality, students could respond to questions without referring to the scenarios.

As stated earlier in this study, assessment is the driving force behind learning and as such, the role of formative assessment should not be under estimated. Kadiyala, Gavini, Kumar, Kiranmayi and Rao (2017) suggest administration of continuous formative assessments so that the student is afforded repeated attempts to master the content before being subjected to an endpoint examination. These researchers exposed their medical students to continuous formative assessment using Bloom's Taxonomy to set multiple questions testing at all levels of cognition domain (higher and lower order). They found that students adapted their learning from surface learning to deep learning so that they were able to answer questions at the higher order domain.

Sabzevari, Abbaszade, and Borhani (2013) conclude that applying mixed assessment methods in written tests lead to deep learning approach; however, they contend that taking technical examinations without focusing on reflective thinking, problem solving and critical thinking lead to surface learning approach. In that instance, the aim of students in those circumstances would be only on passing the exams. Swart (2010) insisted that well-constructed multiple-choice questions could measure application and analysis.

Baig, Kauser, Ali, and Huda, (2014) evaluated multiple choice and short essay question items in basic medical sciences. The results from their study showed that short essay questions (83.3%) and multiple-choice questions (76%) assessed recall, which is a lower order cognitive level. In that case, both essay and multiple-choice questions still yielded a majority of lower order level of assessment. Er et al. (2014) were of the opinion that multiple-choice questions were appropriate to measure knowledge and comprehension and believed that they were more reliable, valid, and easy to score. It can be concluded that, although a variety of questions were used in the current study, it did not lead to more coverage of higher order questions in the examination papers.

5.2.2. Cognitive levels of exam question papers in the Diploma Nursing Programme

In the present study, the results showed that most questions used, assessed the lower cognitive levels of the taxonomy. For instance, lower cognitive levels of first-year were set at

91.8%; at second year 82%, at third year 86.5, and 76.2% at the fourth year level of the programme. The findings also revealed that the higher order cognitive levels (analyse, evaluate, and create) were assessed the least in the examination questions, for first year only 8.2% were at higher level, 14% for second year,13.54% for third year and 23.8 % for fourth year. The LCoN specification guide as stated earlier, stipulates that assessment of higher order cognitive skills (HOCS) for first year should be at 40%, while lower order cognitive skills (LOCS) should be at 60%. For second year, both HOCS and LOCS should be at 50%. For third year, HOCS should be at 60% and LOCS at 40%. For the fourth year, HOCS should be at 70% and LOCS at 30%. Therefore, the distribution of the questions did not go according to the stipulated examination guidelines because none of the levels met either specification, assessment of LOCS dominated throughout the levels.

Quite a number of studies reported similar results. To mention a few, Saeed et al. (2013)'s findings from their study conducted in Pakistan for the baccalaureate nursing programme revealed that most educators used lower level questions in their examination papers, for which answers could be predicted as those that required limited thought from the students. However, these authors argued that, although the majority of the questions asked by the teachers were of the low level category, these types of questions were also important in order to reinforce knowledge acquisition at the basic level when used in formative testing. Closer to home, results from Upahi (2015) 's study where Chemistry questions for a period of 5 years were analysed using Bloom's Taxonomy, revealed that 80% of the questions merely measured students' lower order cognitive skills , while 49.4% and 19.5% of the questions measured conceptual and procedural knowledge respectively.

Swart (2010) highlighted that it is critical to assess lower cognitive levels on the basis that it only requires students to recall or remember information leading to surface level learning because that information easily fades with time. Swart believes that surface learning occurs when academics encourage students to remember facts straight from the book through the type of questions they ask, whereas deep learning occurs when academics use higher order questions, which require students to think actively about the solution to a given problem. Along the same line of thought, previous studies such as those of Bezeidenhout and Alt (2011), Jayakodi et al. (2016) and Lucas et.al. (2014) discouraged assessment based on lower cognitive levels, raising concern that it deprives students the opportunity to develop crucial skills, those of critical thinking, problem solving, and clinical judgement.

Barnett and Francis (2012) acknowledged the current calls for reform and emphasis by employers that graduates should possess critical thinking and problem-solving skills in order for them to be in line with rapidly changing global demands on the workforce. Universities and institutions of higher education are confronted with an increasing need to close the perceived gap between what students learn, and what employers seek out. This need is for graduates equipped not only with disciplinary but also with 'soft skills' that allow them to operate effectively across a broad range of contexts (Scully, 2017). Examples of these 'soft skills' include creativity, collaborative problem solving and critical thinking, all of which can be aligned with the upper levels of the various cognitive taxonomies. According to Upahi et.al. (2015), the students' development of higher order cognitive skills is a major objective in the current reforms, therefore, it is of utmost importance to ascertain whether these have been achieved at the end of module or course through assessments.

This means that the questions for the Diploma of Nursing Programme were not as cognitively demanding as expected. According to Swart (2010), higher order questions facilitate deep learning, as students will be required to critically think and solve unfamiliar problems. The SANC through the Nursing Education and Training Standards recommended that graduates possess attributes that allow them to demonstrate critical, analytical, and reflective thinking skills. This would be possible if higher order questions were adequately incorporated, in both formative and summative assessments.

On the other hand, Boud and Falchikov (2006) expressed a general belief that academics assess lower order cognitive levels because the focus of summative assessment is on certification and graduation and not to facilitate learning which will develop students to be lifelong learners. Meanwhile Abduljabbar and Omar (2015) reckon inadequate knowledge of the Bloom's Taxonomy from the lecturers/examiners or challenges in construction of quality questions could be the reason for noncompliance.

5.2.3. Difficulty of examination questions as the levels of the programme increase

High-level questions are helpful for students so that they can think more creatively. Therefore, the complexity of questions has to increase as the programme level increases. According to the results of the present study, the examiners failed to reach the targeted levels of question distribution as tabulated on the institution's guidelines for developing examination questions. According to the LCoN specification guide, lower order questions at first-year should be 60% and higher order questions 40%. In second-year, lower order should

be 40% and higher order 60%. The level of complexity (Higher order) of questions increased from 8.2% (first-year level) to 13% (second-year level), thus as the programme increased the higher order cognitive levels increased by 4.8%. Jones et al. (2009) asserts that first-year students cannot be expected to answer higher order questions as they are still assimilating new information. Although there is some form of increase in the level of complexity for questions for the second year programme in the present study, it is considerably lower than the envisaged 50%.

The results reveal that for lower order questions, first-year examination questions were 31.8% higher than the recommended percentage of 60% at first-year, while second-year examinations had lower order questions of 47%, higher than the expected 40% as per LCoN specification guide for tests and examinations. The higher order questions at first-year were expected to be 40% but disappointingly, only 8.2% were at this level. At the second-year level, higher order questions were supposed to be 50% but were 13% of questions at this level. These results indicate that there is a serious problem in question construction by the academics involved.

In order to assess different students' capabilities, assessments cover all categories of the Revised Bloom's Taxonomy (Anderson and Krathwohl, 2001). When compared to other previous years, third-year academic level questions tried to encompass all cognitive levels. However, the lower order cognitive levels decreased by 1% and the higher order cognitive levels had increased by 1% when compared to second-year level. The findings revealed that the level of complexity of set questions has still increased as the programme level increased. This means that questions at third-year level were set at a higher order cognitive level than at second-year level. These findings are consistent with those of the study conducted by Swart (2010) where it was recommended that the complexity of questions increase as the programme increases. However, even the third-year academic levels fell below the required 60% of higher order questions as it was at only 14%.

From the findings, lower order cognitive levels were at 76% and higher order cognitive levels were at 24%. The studies conducted by Swart, (2010), Gerekwe, (2010) and Abduljabbar, (2015) indicated that there should be a proper balance between higher order and lower order questions in order to determine skill and knowledge transferred to students. When fourth-year academic level is compared to third-year academic level, lower cognitive levels decreased by 10%, and higher cognitive levels increased by 10% which means that the level of complexity

of questions increased as the programme level increased. When compared to the specification guide, at fourth-year level, recall and interpretation should be at 30%, however in this study it was 76%. The higher order questions were supposed to be 70% but were at 24%.

In this study, at the fourth-year level, examiners set more complex questions than at all other academic levels. However, questions did not meet the college requirement. This is supported by the statement made by Swart, (2010) that academics should assess higher order questions in order to cultivate critical thinking skills and creative problem solving skills unto students who are about to leave education for professional service. Similarly, Jones et al (2009) emphasised that academics cannot set simple recall of information questions on final year students, they are expected to assess students' acquired skills at exit level. Heyness et al. (2016), in their study, highlighted that employers put more emphasis on colleges and universities to produce graduates with critical thinking skills. This is only possible with students' assessments of higher order reasoning (Ashadi and Lubis 2017). Assaly and Smadi (2015) asserted that to ensure a country's stability and economic growth, students should master all crucial survival skills..

5.2.4. Summary according to modules

Findings revealed that for first-year modules in a period of five years, FNS1 module accounted for a majority, 90%, of lower order questions, followed by CNS 1 at 82% of lower order cognitive level questions, and lastly NEP1 with 81%. The higher order cognitive levels accounted for more, 19%, for the NEP1 module, followed by FNS1 at 10%, and CNS1 at 18%. Generally, the majority of questions in all first-year level modules were set at the lowest cognitive levels; recall and interpretation, with few questions set at higher cognitive levels, analyse, evaluate, and create. These students were assessed on their ability to recall and interpret information and were deprived the opportunity to develop application and problem solving skills. Jones et al. (2009) encouraged that academics incorporate effective questioning with a balance of higher order and lower order questions, to stimulate student's mental activities and develop problem solving skills and complex thinking skills. This is also in line with the statement made by Bezeidenhout and Alt (2011) that examination questions should be distributed among all cognitive categories, as each cognitive level is a foundation of the next level.

For second-year level, the GNS1 module accounted for the majority 91% of questions at the lowest cognitive level remember 28% (n=53), understand 62% (n=119), and apply 1% (n=1).

Followed by the CNS 2 module with 88% of questions on the lowest cognitive levels (remember 23% (n=35), understand at 49% (n=74), and apply 16% (n=25). Lastly, NEP2's lower order cognitive levels were at 73% (remember at 12% (n=9), understand at 60% (n=45), and apply at 1% (n=1).

For the higher order cognitive levels, GNS1 obtained 9%, followed by CNS2 with 12% of higher order cognitive level, and NEP2 obtained 27%. From the findings it is deduced that NEP2, at second-year level, had more complex questions than the other two second-year modules. In third-year modules, findings showed that for higher order cognitive levels, MNS1 obtained a majority of 27%, followed by CNS3 at 20%, then PNS1 at 12%, and GNS2 at 8.7%. This indicates that MNS1 questions were more complex that questions from other modules, with GNS2 module having the lowest percentage of questions at a higher level. The General Nursing Science (GNS) module has to incorporate higher order questions, as the graduate will have to make independent decisions regarding peoples' lives, however, in this study it was the lowest in setting questions requiring problem solving and critical thinking skills. The lower order cognitive levels were more than 91.3% of GNS2 questions, followed by PNS1 at 88%, then CNS3 at 80%, and lastly MNS1 at 73%. Assessments of lower order skills allow students to recall information without applying; this information fades with time (Swart 2010). It is also suggested that this could be one of the reasons why graduates leave the higher education institutions with poor reasoning ability.

Lower order cognitive levels (remember, understand, and apply) accounted for 84% of PNS2 assessment questions and at 67% of the MNS2 module. Higher order Cognitive levels (analyse, evaluate, and create) accounted for 16% of the PNS2 module and 33% of the MNS2 module. This means that the MNS2 module set more complex questions than the PNS2 module at a fourth-year academic level.

The study findings revealed that GNS 2, a third-year module, set a majority, 91% of questions at lower order cognitive levels (remember and understand), meaning that less questions were set at higher order cognitive level. Following was GNS1 and FNS 1 both at 90%, followed by PNS1 at 86%, CNS1 at 82%, NEP1 at 81%, PNS2 at 78%; CNS2, CNS3 and NEP2 at 72%, MNS1 at 70%, and finally MNS 2 at 64%.

Findings revealed that MNS 2, a fourth-year module, was the highest, at 36%, in setting examination questions that are complex when compared to other modules. MNS1, a third-year module, was at 30% meaning that as the programme increase MNS 2 questions were 6%

more difficult than third year ones. Results further showed that for CNS 2, CNS3, and NEP2 the questions set for higher order cognitive levels were at 28%.

In summary, the results showed that NEP1, a first-year module, had more complex questions than GNS2 and PNS 2, which are third-year modules. The result revealed that the GNS 2 module is the lowest in setting questions requiring students to utilise higher order thinking abilities, followed by FNS1 at 10%, GNS1 at 11%, and PNS 1 at 14%. The instruction of the Diploma of Nursing Program is following the CBE approach; therefore, it is believed that assessments should also foster problem solving and critical thinking skills as CBE and PBL are believed to be effective in developing those skills rather than traditional methods (Tiwari, Lai and Yuen, 2006; Gunuseni et al. 2014). According to Mtshali (2005), cited in Uys and Gwele (2005), CBE is defined as a community-oriented program which is problem centred, thus allowing students to deal with real life problems which are work related, facilitating the easy retrieval of information for future use.

The DOH Higher Education Transformation Programme (1997) emphasised that higher education institutions should produce competent graduates with skills for present and future usage. Consequently, Boud and Falchikov (2007), Jideani, and Jideani (2012) concur in that the alignment of instruction methods with assessment plays an important part in developing students' important skills for future use. It is also highlighted in the (SANC) Nursing Education and Training standards, that across South Africa, all nursing education institutions should respond to the changing needs of nurses' and developing expectations in healthcare systems by training nurses who are equipped with the knowledge, skills, and behaviours required to meet present and future challenges of rendering quality complex care.

5.2.5. Progression of action verbs across all levels

Action verbs are the elements used in stating the learning outcomes that define the student's learning (Jones 2009). Anderson and Krathwohl (2001) revised the original taxonomy, changing nouns into verbs and rearranging the last two levels. The action verbs that were used in the examination question papers for this study were categorised according to the action verbs identified by Anderson and Krathwohl (2001) and were coded for frequency. In this study, 'describe' was the most used action verb in questions set across all levels; in a total of 1709 questions, describe was in 25% (n=422) of questions. This was followed by explain at 21% (n=363), discuss at 11% (n=184), outline at 9% (n=158). Define was used in 6% (n=109) of the questions, identify in 5% (n=84) and list in 4% (n=60%). State at 3%

(n=57), educate at 3% (n=57), match at 3% (n=45), highlight at 2% (n=35), indicate at 1% (n=19), and name at 1% (n=12). The majority of action verbs used fall within the first two lower cognitive levels.

From the preceding discussion of findings from this study, it can be said that the nursing examination papers for the period 2011 to 2015 had very little emphasis on testing the critical thinking skills of analysis, evaluation and creation. There is a disproportionately high number of questions requiring only memorization and regurgitation of learnt material. This coupled with the extremely low number of questions requiring critical thinking skills shows that the papers did not evaluate development critical thinking skills and therefore there is no evidence whether the graduates from that period achieved the expected.

5.3. LIMITATIONS

The focus of the study was only on nursing modules for the Diploma of Nursing Programme (DNP), omitting all other ancillary modules, which form part of the DNP. The study's findings are based on the selected Nursing College and not compared with other Nursing Colleges. Academics' input was not a part of the study. The study focused on summative assessment only, formative assessment and its alignment with curriculum outcomes was excluded. The literature, for assessments in nursing and health care professionals was very scarce, (a few were obtained from medicine), the reviewed literature was mainly from general education and other disciplines, especially engineering.

5.4. CONCLUSION

Effective evaluation and examination is very much dependent on the appropriateness and reliability of the questions (Mehmood, Iqbal & Farooq, 2016). The results of this study conclude that examination questions set for the Diploma of Nursing Programme were not as cognitively demanding as they should be. Questions targeting the lower cognitive level of Bloom's Taxonomy, requiring rote memorisation of facts and information, were used more frequently than higher cognitive level questions. Nursing as a profession requires graduates who can reason and make informed decisions regarding people's health (SANC, Education and Training Standards). Therefore, if students are not equipped with skills to create new thoughts and instead, are taught through the concept of the memorisation of the exact information in their books to regurgitate during exams, they are deprived of opportunities to be decent graduates with higher thinking abilities. The focus of the current study was on

summative assessments, thus, it is important to note that the emphasis for summative evaluation is on the product. Therefore, assessments that are addressing only lower order thinking skills indicate the type of product from the programme. According to Ashadi and Lubis, (2017), questions for preparing students, who are about to enter the real world of work, should employ appropriate questions that trigger their analysis and reasoning ability.

The development of students' higher order cognitive skills is a major objective in current reforms, employers are urging higher education to produce graduates with competitive skills. The variety of questions that were used in the study are short answer questions, essays, match the column, and multiple-choice questions. All these methods are regarded as traditional methods; however, if the distribution of questions were among all the categories of the Revised Bloom's Taxonomy, students' higher reasoning skills would be developed. The results of this study are consistent with the findings of other studies, reviewed in literature, with regard to the dominating lower cognitive questions set by examiners (Lord and Baviska, 2007; Rahmat, et al. 2007; Hill and Flynn, 2008; Edwards, 2010; Gerekwe, 2010; Okanlawon and Adeoti, 2014; Upahi, et. al. 2015; Ashadi and Lubis, 2017)

Generally, in this study, all six cognitive levels of the revised Bloom's Taxonomy were utilised in examination question papers, although the distribution between lower order and higher order cognitive levels was flawed. Higher cognitive levels were less utilised with the 'understand' lower cognitive level being utilized most throughout the five years. There was imbalance between lower order questions and higher order questions. It can be assumed that assessment questions used in this study fail to develop students' intellectual abilities. This is in line with the findings of the study conducted by Bezeidenhout and Alt (2011), which concluded that if problem solving, critical thinking skills, creativity, and the application of knowledge are seldom required from students, there will be no intellectual development in students. To conclude, the study findings indicate a need to provide in-service trainings to academics with regard to the use of the provided specification guide for the college.

Findings across all modules indicate that lower order questions dominated the examination papers.

5.5. RECOMMENDATIONS

For Nursing Education: It is clear from the study findings and reviewed literature that the poor quality of questions is common practice, not only because of novice academics as

experienced teachers still have a problem formulating questions. Therefore, it is recommended that nurse educators who are curriculum developers should revise assessment strategies and align them to the curriculum and learning outcomes. The development of assessment guidelines is highly recommended so as to be in line with the current instruction methods.

For the institution and academics: LCoN has provided a specification guide for tests and examination but, seemingly, this study's findings revealed the incompetence among examiners in constructive questions according to the specification guide. Therefore, now that College staff is aware of its stand on assessments, there is a need for teacher training and support programmes for assessments. Continuous staff development is recommended in terms of assessment strategies', through in-service trainings, workshops, and seminars conducted by assessment experts to improve construction on examination questions for the development of required crucial skills.

In Nursing Research: From the findings of this study, further research on this topic is recommended involving health professionals as more studies were from education and engineering. Research on the alignment of learning outcomes, teaching, and assessments in the nursing curriculum is also recommended. There is a need for more research on graduates' competencies and also for research involving academics in this regard.

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APPENDICES

Appendix 1: Template guiding data analysis

Categories of Cognitive process dimension	Brief explanation	cognitive processes and Alternative names	Verbs commonly used
1.Remember	the student is expected to remember previously learnt material by retrieving the factual information from long-term memory in an exact format as how the information was taught Skill learnt is mastering of subject matter which is rote learning as the student has to go over and over the material memorising without understanding it so as to regurgitate during exam but cannot transfer information to new situation Remember is the lowest level of cognitive domain	Recognising/Identifying Recalling/ Retrieving	Tell List Select Define Identify Name Find State Write Label Collect Quote Who When Where What Which Choose Fill in…

2.Understand	the student is expected to reword and explain information in a meaningful manner Student construct meaning from instructional message This is shown by the students' ability to translate material from one form to another, interpreting material Skills learnt interpreting, meaning making, translation and predicting. This is the second lowest level of cognitive domain	Interpreting/ Clarifying/ Paraphrasing/Representing/Translation Exemplifying/Illustrating/ instantiating Classifying/Categorising / Subsuming Summarising/ Abstracting/ Generalisation Inferring/concluding/ Extrapolating/interpolating/Predicting Comparing/Contrasting/ Mapping/ Matching Explaining/ Constructing models	Interpret Summarize Explain Tabulate Compare Translate Predict Restate Rewrite Contrast Associate Estimate Discuss Extend Clarify Represent Illustrate Describe Categorize Match Conclude Construct Map
3.Apply	This level requires the administration of learnt material in a new and concrete situation This can be achieved by the student's ability to use learnt material through applying rules, concepts, methods, theories, principles and	Execute/ Carry out Using	Solve Apply Compute Demonstrate Calculate Complete

	laws to solve problems Skill acquired is problem solving This is the third lowest level of the cognitive domain levels		Examine Modify Relate Show Change Classify Experiment Discover Execute Implement Conduct Educate Manage
4.Analyse	Student is expected to break down the material into constituent's parts, look in depth at each part and determine how each part relate to one another and to the overall structure or purpose The student will be able to distinguish relevant from irrelevant material or important from unimportant parts of the presented material Also determine how each part fit or function within the structure and recognise the organisational principles involved Requires higher level of thinking than the others	Differentiating/ Focusing/ Discriminating/ Selecting/ Distinguishing Organising/ /Coherence Finding/ Integrating Outlining/Parsing/ Structuring Attributing/ Deconstructing	Analyse Separate Order Investigate Discover Deduce Scrutinize Survey Review Design Outline Categorise Compare and contrast Diagnose Elucidate Distinguish

	Skills learnt is to identification of component parts, how are they organised and recognition of the hidden meaning This is the lowest of the higher cognitive levels		between Differentiate Point out Determine evidence Classify Indicate
5.Evaluate	Students are expected to make judgement based on criteria and standards Students have to argue for or against opinion or statement providing evidence from various sources which agree or contradict argument. Skills learnt checking, critiquing and judging This is the middle higher cognitive level	Checking/Coordinating/ Detecting/Monitoring/ Testing Critiquing/ Judging	Assess Decide Rank Grade Test Measure Recommend Justify Debate Verify Argue Convince Confirm Discriminate Support Conclude Validate Criticise Judge Detect Highlight Justify

6.Create	The student is expected to show the ability to combine parts together to form a new whole Students has to put elements together to form a coherent or functional whole by mentally reorganising the elements into new structure, that was not present before Skills developed production of a unique communication and generation of plan of action This is the highest cognitive level	Generating/ Hypothesising Planning/ Designing Producing/ Constructing	Combine Generate Plan Produce Invent Integrate Modify Rearrange Substitute Create What if Compose Formulate Prepare Generalise Rewrite Come up with Propose Organise Establish Compile

Adapted from various sources, Gerekwe 2010 and Anderson and Krathwohl 2001

Appendix 2: A template for data collection

Academic level: ..... Exam Period: .....

Final/ Supplementary Exam: .....

CATEGORIES OF EXAM QUESTIONS ACCORDING TO REVISED BLOOM'S TAXONOMY COGNITIVE PROCESS DIMENSION

Question No.	Action verb used	Categories of Cognitive Process Dimension					
		Remember	Understand	Apply	Analyse	Evaluate	Create
Total							

Appendix 3: Instruction for coding and analysing data

Please read and follow the following instructions carefully for collecting data and analysing examination questions set for the Diploma Nursing Program according to Revised Bloom's Taxonomy

- Document analysis on which content analysis is used for collecting data, questions are the units of analysis
- Familiarise yourself with template guiding analysis of question according to Revised Bloom's Taxonomy of cognitive domain
- Code action verbs used in each question according to the template
- Data will be coded for a single action verb in the question
- Action verb will be coded as it appears
- Irrelevant material will not be coded but its record has to be kept
- Only action verbs according to the guide will be coded
- Questions that consists of more than one part will be treated as separate questions
- Finally categorise exam questions according to cognitive levels in a provided template
- Return the completed template to the researcher.
- Collect and analyse questions if comfortable with that.

Thank you for your co-operation

Researcher

Appendix: 4 Specification guide for LCoN tests and Examinations

Province of the
EASTERN CAPE
HEALTH

Lilitha College of Nursing in Association with the Consortium of Universities
(WSU, NMMU & FORT HARE)
Lusikisiski • Eastern Cape
Private Bag X1007 • Lusikisiki • 4820 • REPUBLIC OF SOUTH AFRICA
Tel.: (039)253 1981/2 • Fax: (039)253 1642•
Website: www.ecdoh.gov.za
(To change address details double click on the ECDoH logo)

TEST/ EXAMINATION SPECIFICATION TABLE

CONTENT: ....

QUESTION	CONTENT	RECALL	INTERPRETATION	PROBLEM SOLVING	TOTAL MARK ALLOCATION
ꓷTAL ARKS					
ꓷTAL %					100%

LILITHA

United in achieving quality health care for all

Fraud Prevention line: 0800 701 701
24 hour call centre: 0800 0323 64
Website: www.ecdoh.gov.za

PGDP EASTERN CAPE

Ikamva eliqaqambileyo!

Check back page for guidelines :

.....

NB:

- Leave a line in between questions
- Below are guidelines to examiners on constructing test/ examination questions to accommodate problem solving and community based approach

	1st year & ENA	2nd year & EN	3rd year	4th year	Post basic & post reg.
RECALL	20%	15%	10%	5%	5%
INTERPRETATION	40%	35%	30%	25%	25%
PROBLEM SOLVING	40%	50%	60%	70%	70%
TOTAL	100%	100%	100%	100%	100%

Appendix 5: Request at Lilitha College of nursing to conduct the study

Lilitha College of Nursing
Lusikisiki Campus
Private Bag x1007
Lusikisiki
4820
RSA
23/09/2016

The Principal
Lilitha College of Nursing
East London
Eastern Cape
Dear Sir/Madam

Re: REQUEST FOR PERMISSION TO CONDUCT A STUDY

Title of the study: Analysing cognitive levels on final examination questions for Diploma Nursing Programme using the Revised Bloom's Taxonomy at a selected nursing college in Eastern Cape.

I hereby request permission to undertake this research project at Lilitha College of Nursing. The purpose of the study is to analyse the summative and supplementary examination questions set for the Diploma Nursing Programme according to Revised Bloom's cognitive domain levels, for the period 2011-2015, from first level to fourth level.

The study might benefit the college in respect of knowledge base with regards to its assessment practice. There are no risks involved while conducting the study; it is conducted as a requirement for the purpose of Master Degree in Nursing Education at University of Kwa-Zulu Natal.

Researcher : Ms N.I. Fayilane (Student No: 216074033)
Research Supervisor : Ms E.N. Pakkies

Yours sincerely

_____

Ms N.I. Fayilane
Cell: 0824250005
Email: 216074033@stu.ukzn.ac.za

Supervisor: Ms E.N. Pakkies
Phone: 031-268-5888/ 083 270 1177
Email: Pakkies@ ukzn.ac.za

Appendix: 6. Ethical clearance from UKZN ethics Committee

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

14 November 2016

Ms Nontlantla Isabella Fayilane 216074033
School of Nursing and Public Health
Howard College Campus

Dear Ms Fayilane

Protocol reference number: HSS/1769/016M
Project title: Analysing cognitive levels on final examination questions for Diploma Nursing Programme using the Revised Bloom's Taxonomy at a selected nursing college in Eastern Cape

Full Approval – Expedited Application

In response to your application received 18 October 2016, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol has been granted **FULL APPROVAL.**

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment /modification prior to its implementation. In case you have further queries, please quote the above reference number.

Please note: No data collection shall commence before receiving the final gatekeeper permission from Eastern Cape, Department of Health

PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

.....
Dr Shenuka Singh (Chair)
Humanities & Social Sciences Research Ethics Committee

/pm

cc Supervisor: Ms EN Pakkies
cc. Academic Leader Research: Professor B Sartorius
cc. School Administrator: Ms Caroline Dhanraj

Humanities & Social Sciences Research Ethics Committee
Dr Shenuka Singh (Chair)
Westville Campus, Govan Mbeki Building
Postal Address: Private Bag X54001, Durban 4000
Telephone: +27 (0) 31 260 3587/8350/4557 **Facsimile:** +27 (0) 31 260 4609 **Email:** ximbap@ukzn.ac.za / snymanm@ukzn.ac.za / mohunp@ukzn.ac.za
Website: www.ukzn.ac.za

Appendix: 7. Permission from the College management

Province of the
EASTERN CAPE
HEALTH

Room • 1st th Floor • Global Life Building • Independence Avenue • Bhisho • Eastern Cape
Private Bag X0028 • Bhisho • 5605 • REPUBLIC OF SOUTH AFRICA
Tel.: +27 (0)40 608 9509 • Fax: +27 (0)40 608 9689/0866816407
Website: www.ecdoh.gov.za
Email: nomvuyiseko.links@impilo.ecprov.gov.za

Enquiries: Miss V. Delihlazo

MEMORANDUM

TO	**M N.I. FAYILANE**
FROM	**MRS N LINKS: PRINCIPAL: LILITHA COLLEGE OF NURSING**
SUBJECT	**PERMISSION TO CONDUCT RESEARCH IN LILITHA COLLEGE OF NURSING**
DATE	**24 NOVEMBER 2016**

1. The subject matter above refers.
2. This correspondence serves to confirm that permission is hereby granted for you to conduct research in Lilitha College of Nursing (Central Office: East London)
3. The College will be waiting to be forwarded the results/recommendations from your study for implementation purpose by the college campuses.
4. The organization takes this opportunity to wish you success in your studies.

.....

Mrs N Links: Principal Lilitha College of Nursing

LILITHA College of Nursing
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Fraud Prevention line: 0800 701 701
24 hour call centre: 0800 0323 64
Website: www.ecdoh.gov.za

PROVINCIAL GROWTH AND DEVELOPMENT PLAN
PGDP EASTERN CAPE 2004 - 2014

Ikamva eliqaqambileyo!

Appendix: 8. Permission from Eastern Cape Department of Health

Eastern Cape Department of Health

Enquiries:	Madoda Xokwe	Tel No:	040 608 0856
Date:	21 November 2016	Fax No:	043 642 1409
e-mail address:	madoda.xokwe@echealth.gov.za		

Dear Ms. N.I. Fayilane

Re: Analysing Cognitive Levels on Final Examination Questions for the Diploma Nursing Programme Using a Revised Bloom's Taxonomy at a Selected Nursing College in Eastern Cape (EC_2016RP44_498)

The Department of Health would like to inform you that your application for conducting a research on the abovementioned topic has been approved based on the following conditions:

1. During your study, you will follow the submitted protocol with ethical approval and can only deviate from it after having a written approval from the Department of Health in writing.
2. You are advised to ensure, observe and respect the rights and culture of your research participants and maintain confidentiality of their identities and shall remove or not collect any information which can be used to link the participants.
3. The Department of Health expects you to provide a progress on your study every 3 months (from date you received this letter) in writing.
4. At the end of your study, you will be expected to send a full written report with your findings and implementable recommendations to the Epidemiological Research & Surveillance Management. You may be invited to the department to come and present your research findings with your implementable recommendations.
5. Your results on the Eastern Cape will not be presented anywhere unless you have shared them with the Department of Health as indicated above.

Your compliance in this regard will be highly appreciated.

SECRETARIAT: EASTERN CAPE HEALTH RESEARCH COMMITTEE

PGDP EASTERN CAPE 2004 - 2014

Ikamva eliqaqambileyo!

Appendix 9: Letter from editor

Pauline Fogg

54 Grundel Road
Carrington Heights
Durban
4001
074 782 5234

30 November 2017

Letter of Editing

This report serves to state that the dissertation submitted by Nontlantla Isabella Fayilane, in fulfillment of the requirements for the degree Masters in Nursing Education (Coursework) has been edited.

The dissertation was edited for errors in syntax, grammar, punctuation and the referencing system used.

The edit will be regarded as complete once the necessary changes have been effected and all of the comments addressed.

Thank-you for your business.

Pauline Fogg