

## **CHAPTER ONE**

### **1.0 INTRODUCTION**

Bloom's taxonomy is not new in the academic cycles. It has been in use since the 1950s when one of the renowned educational psychologist Benjamin Bloom and other educational psychologists developed a classification of levels of intellectual behavior important in learning (Athanassiou, et al., 2003; Cook, 2013). Bloom's taxonomy continues to enjoy greater and renewed applicability even in the 21<sup>st</sup> century. In nursing education for example, Blooms taxonomy stands unequalled as a helpful guide for students to improve their critical thinking (Kim, et al., 2012; Agbedia and Ogbe 2014). The appreciability of Bloom's taxonomy in learning, teaching and practice has led some Institutions in different countries to develop blue prints (table of specifications) when setting examination questions for students pursuing nursing courses (Cook, 2013; De Young, 2009). This has made nurse educators coordinate test content with instruction content to ensure content validity of the test. It has also helped nurse educators avoid one of the most common mistakes in classroom tests namely writing all the items at the knowledge level (Reichert, 2011).

Nurse educators are responsible for the accurate assessment and evaluation of students' competence. They aspire to learning outcomes that would produce competent practitioners. In the nursing profession, the development of analytical and critical thinking is essential in order to ensure that the nursing student becomes an independent practitioner who is a critical thinker and a problem solver (Sithole, 2011).

In exploring the ideas surrounding the knowledge levels and usage of Bloom's taxonomy in setting examinations, chapter one (1) of this study outlines the introduction to the chapter and the back ground to the research study in which cognitive levels of educational objectives have been described. Conversely, examples of verbs used when testing each objective has been stated. A lengthy discussion has been provided on how examinations were set and the questioning technique pursued in Zambia as well as in other countries. Furthermore, chapter one addressed the rationale of the study, the significance of the study, objectives of the study and ethical issues that were considered during the study.

## **1.1 BACK GROUND**

Learning is the acquisition of knowledge, skills, attitudes, values and norms which result in the change of behavior (Sithole, 2011). According to De Young (2009) learning occurs in various domains such as cognitive, affective and psychomotor. The characteristics of learning within each domain affect the teaching and evaluation methods used. Perry and Potter (2000), observed that an understanding of each learning domain helps the nurse educator/clinical tutor to select suitable teaching and assessment techniques. Furthermore, Ellis (1993) as cited in Garekwe (2010) asserts that teachers use questioning strategies to review, check learning, probe thought processes, seek out alternative solutions and challenge students to think critically and reflect on issues or values. Since the early 1990's questioning techniques for educators have been a major concern to researchers (Blanchette, 2001).

In an attempt to overcome shortcomings associated with the assessment of learning, Bloom (1956) devised taxonomy for educational objectives in order to measure different levels of learning (Ferris and Azizi, 2005). A Taxonomy of educational objectives is a framework for classifying statements of what we expect or intend students to learn as a result of instruction while Bloom's Taxonomy is a tool used to classify learning objectives and to assess students' abilities (Krathwohl, 2002; Ferris and Azizi, 2005).

A study conducted in South Africa revealed that this tool was used extensively by educators in allied health fields, including nursing to structure lesson plans and outcome testing (Garekwe, 2010; Kim, et al. 2012). Though it had not been validated globally, Bloom's Taxonomy was frequently referenced as a teaching and learning tool to explain thought process as well as a measure of appropriate assessment in education. It was valuable in the design of test questions to accommodate objectives (Cimitile, 2008; Clauss and Geedey, 2010; Clifton and Shriner, 2010; Bloom, 1956 as cited in Agbedia and Ogbe, 2014).

The cognitive domain is particularly applicable for classroom test development. The cognitive domain includes those behavioral outcomes which require knowledge of specific information, for example, principles, concepts and generalizations necessary for problem solving (Athanasiou, et al. 2003; Garekwe, 2010; Sithole, 2011).

When planning a lesson and a test, taxonomy of educational objectives (Bloom, 1956) lists six (6) cognitive outcomes (levels) typically sought in college instruction. The cognitive outcomes (levels) include: Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation (Bloom, 1956 as cited in Kim, et al. 2012; Agbedia and Ogbe, 2014). Furthermore, a study conducted in Nigeria states that these levels of thinking recognized as being necessary for learning are classified in order of the complexity of the thought process involved (Agbedia and Ogbe, 2014). This progresses from the relatively simple, low order knowledge and comprehension through application while analysis, synthesis and evaluation are viewed as necessary for higher order thinking. In addition, Kim, et al. (2012) states that the levels build on each other and each level in the hierarchy demands the skills and abilities of the levels that are lower in the hierarchy. For example, an objective written at the application level also requires the abilities of the knowledge and comprehension levels. However, a study conducted by Sithole (2011) in South Africa argued that;

‘If these are desired outcomes of classroom instruction,  
then tests must include assessment of these objectives’.

The cognitive domain of Bloom’s taxonomy had been well explained and widely cited in many articles as well as in Bloom’s original hand book, (Krathwohl, 2012; Kim, et al. 2012). However, it was necessary to clarify the definition of each cognitive domain of Bloom taxonomy in the context of nursing examination questions to determine the usage of the taxonomy in setting examinations in nursing schools.

Studies by Athanassiou, et al. (2003); Garekwe, (2010); Clauss and Geedey, (2010); Sithole, (2011); Kim, et al. (2012); Cook, (2013), revealed that these clarifications help to differentiate test questions into various cognitive levels of Bloom’s Taxonomy classification types as described below;

Knowledge is the lowest level in the cognitive hierarchy. It refers to acquisition, recognition, or recall of nursing knowledge and information. Examples of key words used to classify test questions are: define, list, state, identify, label, name, who? when? where? what?

The next level is comprehension. In the context of nursing, students who comprehend nursing knowledge should be able to take the given information and process it into their own language and interpret a given patient case. Examples of key words used to classify test questions include explain, predict, interpret, infer, summarize, convert, translate, give example, account for, and paraphrase.

Application is the third (3<sup>rd</sup>) level and requires administering a concept or principle in a new situation to solve a problem. In a nursing context, it is interpreted as applying a concept into patient case. Bloom (1956) suggested the need to present a fictional situation to accomplish the application objectives. Key words used to classify test questions include; apply, solve, show, make use of, modify, demonstrate, compute.

The fourth (4<sup>th</sup>) level is Analysis which refers to the ability to break down the materials into its constituent parts and detect the relationships of the parts and of the way they are organized. In the nursing context, students should be able to explore and think critically to come up with the individualized care for each patient basing on patient's presentation. Key words used to classify test questions include; analyze, associate, determine, estimate.

The fifth (5<sup>th</sup>) level is Synthesis which refers to the ability to put parts together to form a whole, with emphasis on creating a new meaning or structure. Synthesis skills in nursing context could be interpreted as applying multiple factors when caring for a patient. Key words used to classify test questions include; design, construct, develop, formulate, imagine, create, change, write the nursing care.

The highest level in the cognitive hierarchy is evaluation which refers to making judgments about the value of ideas, works, and/or solutions. Evaluation skills in a nursing context could be interpreted as evaluating nursing care, which was synthesized based on multiple factors. Key words used to classify test questions include; appraise, evaluate, justify, judge, critique.

The higher order levels of cognitive domain of Bloom's Taxonomy have been described as skills necessary for critical thinking. Thus the use of higher order levels of cognitive domain in classroom teaching and assessment should challenge the thinking ability of students (Agbedia and Ogbe, 2014).

By using questions requiring higher-order thinking, teacher questioning moves beyond an assessment tool and becomes a valuable instructional tool as well (Sithole, 2011). This is so because nurse educators have to prepare nurses under training to be vigilant when caring for clients since at every point of continuum of care, patients with life threatening conditions are found (Garekwe, 2010).

In agreement, a study done in Zambia revealed that nurses caring for patients in any hospital unit or clinical setting should be equipped with knowledge that would enable them recognize deteriorating ill conditions and respond appropriately (Msidi, 2010). Wilkinson (1992:21) as cited in Sithole (2011) is also of the opinion that higher order cognitive levels of Bloom's Taxonomy be used during classroom instruction and examination to promote critical thinking which is not exercised in a vacuum. It is used to apply a basic core of knowledge to each client situation. Nurses need to think critically in order to apply knowledge of general principles to specific areas in the course of delivery of patient care.

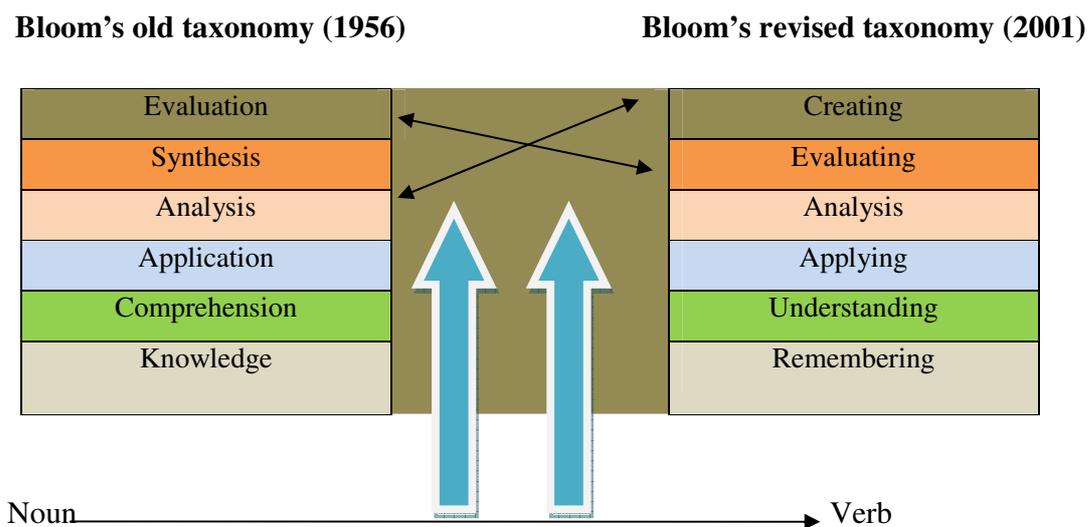
To uphold quality in nursing education in Zambia, all the nurse educators who train from the University of Zambia and Private Universities undergo training in nursing education which covers the usage of Bloom's hierarchy of cognitive levels of educational objectives (Bloom's Taxonomy of 1956) in teaching and assessment of students. Therefore, the General Nursing Council of Zambia (GNC) which is a regulatory body oblige nurse educators to implement teaching strategies that are appropriate to learners' needs based on evidence-based teaching practices and assessment strategies that are timely, appropriate for the learner, and evaluate learning in all domains of Bloom's Taxonomy (GNC, 2001). The nursing schools in Zambia conduct both formative and summative assessments. The methods for classroom evaluation include multiple choice questions, True/False, Matching items, sentence completion, modified essay questions and long essay questions (GNC, 2001). Therefore, nurse educators in these schools carry a large responsibility of implementing the curriculum by teaching and assessing students using Bloom's hierarchy of cognitive levels of educational objectives in classroom setting.

Even if educators are using Bloom's Taxonomy frame work of 1956 to improve quality in assessments, Anderson and Krathwohl (2001) introduced a revision of Bloom's Taxonomy which focuses more closely on 'planning curriculum, instruction, assessment and the alignment of these three' (Anderson and Krathwohl, 2001 as cited in Bumen, 2007; Ayvaci and Turkdogan, 2010; Krau, 2011; Mkandawire, 2013). There has been a change from noun to verbs.

These include: Remembering meaning retrieving, recognizing, and recalling relevant knowledge from long term memory; Understanding meaning constructing meaning from oral, written and graphic messages through interpreting, exemplifying, classifying, summarizing, inferring, comparing and explain; Applying meaning carrying out or using a procedure through executing or implementing; Analyzing meaning breaking material into constituent parts, determining how the parts relate to one another and to an overall structure or purpose through differentiating, organizing and attributing; Evaluation meaning making judgments based on criteria and standards through checking and critiquing; Creating meaning putting elements together to form a coherent or functional whole; reorganizing elements into a new pattern or structure through generating, planning or producing. The six levels are also categorised into lower and higher order thinking skills (Anderson, 2001).

Below is a figure showing changes in Bloom's taxonomy.

**Figure 1: showing changes in Bloom's taxonomy (Anderson, et al. 2001)**



According to Reichert (2011), the American National League of Nursing's (NLC) Core Competencies of Nurse Educators, charge nurse educators with the ethical and legal responsibility to ensure that the methods of evaluation used in their programs are valid. The scholar further stated that the Code of Ethics for Nurses in the American Nurses Association of 2001 requires nurse educators to accurately assess and evaluate student competence following the domains of Bloom's taxonomy. However, as (Reichert, 2011) observed, this was not consistently done as students were subjected to low quality, inadequate assessment measures of their academic performance. This is detrimental to student success as well as institutional integrity.

A study done in United Kingdom by Masters, et al. (2001) stated that evaluation methods should reflect the level of sophistication at which students are expected to practice. The goal of educators using Bloom's taxonomy is to encourage higher - order thought in their students by building up from lower - order to higher order cognitive skills. This will also help graduating nurses to use critical thinking in their nursing care. Most examination test items for both the National Council Licensure Examination for Registered Nurses and the National Council Licensure Examination for licensed practical/vocational nurses are written within each level of Bloom's taxonomy and more questions are at the application and analysis level (Masters, et al. 2001).

According to Sithole (2011), South African nurse educators bear a heavy responsibility, as they are accountable for maintaining quality in assessments and preparing proficient nurses by using the South Africa Nursing Council (SANC) standards which promotes the usage of Bloom's hierarchy of educational objectives for both classroom and practical assessments. They are mandated to advance the profession through the standards and values to which the profession is held.

In order to uphold the nursing standards, Masters, et al. (2001) affirmed that evaluation and assessment of students in nursing education should be effective, efficient, and valid. The quality of assessment and evaluation however, is often hindered due to shortages in nursing faculty, time, or other compromises (Masters, et al., 2001).

On top of the impending shortage of nurse educators, Allen (2008) predicts a need for over 1 million registered nurses by the year 2020 in America due to growth and replacements. This statistic indicated that the shortage of prepared nursing faculty will be challenged by the demand of educating additional nursing students.

This is not different with the Sub - Saharan Africa where shortages in faculty and time, as well as an increase in student numbers per intake lead many faculty to use multiple choice questions (MCQ's) and low cognitive level essay questions to quickly measure knowledge in nursing education (Sithole, 2011). Scholars such as Morrison and Walsh Free (2001), observed that to appropriately evaluate higher-level and critical thinking, higher level questions should be written at a higher cognitive level of Bloom's taxonomy, particularly in upper level courses.

This study therefore, assessed the knowledge levels and usage of Bloom's hierarchy of cognitive levels of educational objectives in setting examinations by nurse educators in Lusaka and Eastern provinces of Zambia.

## **1.2 STATEMENT OF THE PROBLEM**

Nurse educators are expected to produce critical thinking nurses. Critical thinking can only be stimulated from both classroom teaching and assessments using a classification such as Bloom's taxonomy. Assessments are most effective when more test items are written at the application or higher levels of cognition (De young, 2009; Garekwe, 2010). Zambia, being part of the global community, is expected to train critical thinking nurses. Studies done in other parts of the world such as the United States of America and South Africa indicated that nurse educators were concentrating more on setting knowledge/recall questions when evaluating students. Statically, Masters, et al. (2001) found out that in America, 6% of the test items were prepared at the analysis level compared to 46% written at the knowledge level of Bloom's cognitive domain. In a related research done by Garekwe (2010) in South Africa, 57% of the questions were prepared at lower cognitive levels while 43.4% were at higher cognitive levels. This is in direct conflict when it comes to producing a critical thinking nurse for it is important to see to it that assessments match the philosophy of the curriculum and reflect all its educational outcomes (Azer, 2003; Garekwe, 2010 and Mkandawire, 2013).

Questions in the lower order category of Bloom's cognitive domain do not promote critical thinking in a nurse instead; they become fertile manure in the production of a timid, dependent and robot-like nurse (Agbedia and Ogbe, 2014).

The researcher noted that from the inception of post basic nursing education in 1978 in Zambia (GNC, 2002), no research has been conducted on questioning techniques during assessments. Literature has also revealed that there is no information concerning nurse educators' use of Bloom's taxonomy during the preparation of test items for examinations. This is crucial as nurse educators aim at producing critical thinking nurses. The media also carries numerous stories. Some of the stories emerge right from the bowels of the hospital. The stories directly or indirectly link nurse practitioners to their inability to critically judge patients' conditions and take action. In caring for patients, nurse practitioners may have had found themselves with this low mental unsharpness due to many reasons among others poor assessment which did not stimulate critical thinking in them. The route of poor handling in terms of assessments can be traced to the instructors of nurse practitioners. It was therefore the purpose of this study to assess the nurse educators' knowledge on Bloom's taxonomy and whether they use it as an important tool for assessing students in a classroom setting.

### **1.3 FACTORS INFLUENCING KNOWLEDGE AND USAGE OF BLOOM'S HIERARCHY OF COGNITIVE LEVELS OF EDUCATIONAL OBJECTIVES IN SETTING EXAMS IN NURSING SCHOOLS.**

To understand whether nurse educators have the knowledge and use Bloom's hierarchy of cognitive levels of educational objectives in setting examinations in nursing schools, it was useful to look at some of the following factors.

#### **1.3.1 SERVICE RELATED FACTORS**

##### **1.3.1.1 Shortage of nurse educators**

According to the Ministry of Health (2006 to 2011) National Health Strategic Plan, it was estimated that the health sector was operating at 50% of the recommended establishment as most nurses left the country for greener pastures due to poor conditions of service. This did not leave out the nurse educators.

This statistic indicated that the shortage of prepared nursing faculty is challenged by the demand of educating additional nursing students. Sithole (2011) observed that faculty and time as well as an increase in student population lead many faculties to use multiple choice questions (MCQ's) to quickly measure knowledge in nursing education.

Shortage of nurse educators might lead the quality of assessments to be compromised in the nursing fraternity as examinations were not moderated (peer review) before being administered to students.

### **1.3.1.2 Student population /Work over load**

The Ministry of Health (2006 to 2011) National Health strategic Plan ordered schools of nursing to enroll 60 students per intake yet the competence standard 2.2 by General Nursing Council of Zambia set the faculty - student ratio at 1:20. Increased student enrolments not only saturated schools of nursing but also weighed down nurse educators who were diminutive in numbers. This might have contributed to nurse educators using lower level cognitive category of Bloom's taxonomy during classroom assessments.

### **1.3.1.3 Orientation in setting examinations**

The exit of experienced nurse educators from nursing schools in search of greener pastures and retirements left few nurse educators who have formal education in test item construction (Tarrant et al. 2006). Quality test item construction requires exposure, time and drill. These attributes are commonly found in nurse educators with a history of long service or exposure. The push and pull effect of experienced nurse educators who opt to separate, resign, and retire severely cuts on the number of nurse educators well versed in test item construction. This creates an adverse situation where nurse educators who remain with the instructional torch in schools of nursing, maddeningly go on to teach and assess student nurses while being devoid in both knowledge and experience in quality test item preparation. Their test items are not carefully weaved through all the levels of cognitive levels of Bloom's taxonomy. Their assessments are a mirror of their lack of orientation in quality setting of examinations. Clifton and Shriner (2010) agreed that because of lack of orientation in the nursing colleges in setting examinations, many faculties rely on text book derived test questions for their examinations and use MCQ test bank items that assess lower cognitive levels which are often rife with bias.

In the same vein, Downing (2002) observes that poorly constructed MCQs have the tendency to be more difficult, produce lower passing rates and threaten the integrity and quality of nursing education.

#### **1.3.1.4 Standardized guidelines in assessments**

According to Clifton and Shriner (2010), non availability of easy to read guidelines for faculty to use as a reference for test item construction and test item review could have been the reason for non usage of Bloom's hierarchy of educational objectives in setting examinations.

##### **1.3.1.4.1 Lack of peer review (Lack of moderation)**

Nurse educators often have to use their best judgment about what cognitive skill each question is measuring. An examiner might ask a colleague or a committee to read the questions and classify them according to Bloom's hierarchy of cognitive levels of educational objectives. Lack of moderators could have been the feature for non usage of cognitive levels of educational objectives in test item preparation. Tarrant, et al., (2006) described peer review as an examination of test items by a review team composed of members who are adequately trained in writing test items. The review team would be responsible for evaluating and eliminating item writing flaws, for the appropriateness of cognitive levels within the examination and for offering suggestions and guidelines for improvement of underperforming test items (Terrant, et al.,(2006), De young (2009).

##### **1.3.1.4.2 Usage of blue print in test item preparation**

In this research, a blue print is a guide helping nurse educators to standardize the percentage of questions in each cognitive level of Bloom's taxonomy. Test specifications help a nurse educator or instructor avoid one of the most common mistakes in classroom tests, namely preparing all the test items at the knowledge level (De Young, 2009:268). Absence of blue prints in nursing schools could have attributed to non usage of Bloom's hierarchy of cognitive levels of educational objectives when setting examinations.

## **1.3.2 INDIVIDUAL FACTORS**

### **1.3.2.1 Nurse educators' attitude**

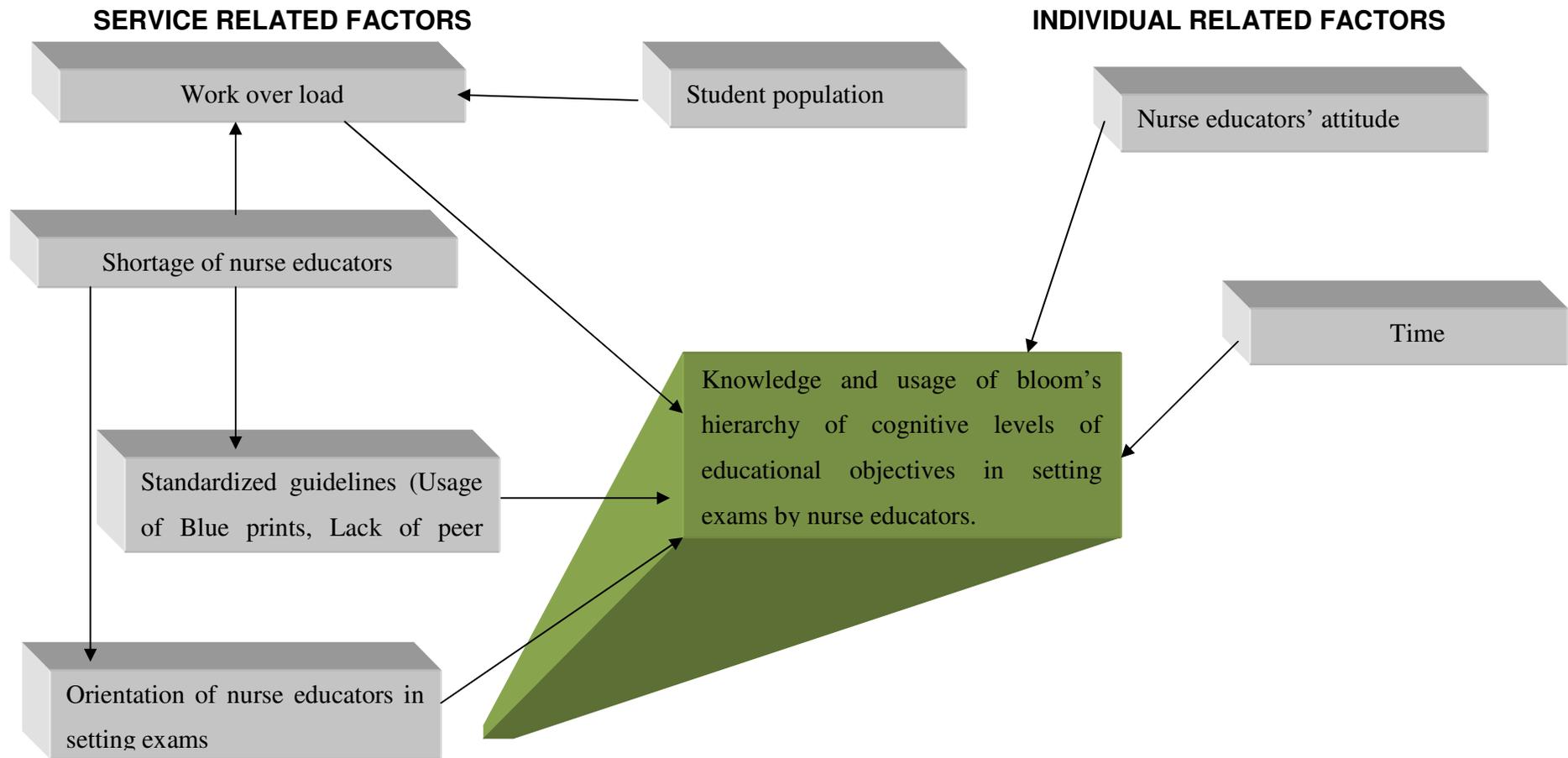
Test items that meet the standard in a classroom assessment ought to be prepared across cognitive levels of Bloom's taxonomy. However, the attitude of nearly all nurse educators included in this study with regard to the distribution of questions according to Bloom's hierarchy of cognitive levels of educational objectives was negative.

Nurse educators indicated that it was both time consuming and difficult to prepare questions according to Bloom's hierarchy of cognitive levels of educational objectives as such they riveted to setting only recall type of questions which do not encourage critical thinking in nursing students (Tarrant, et al. 2006). Adding to this assertion, Mkandawire (2013) stated that the reason that might make some educators fail to move students up the levels of Bloom's hierarchy of cognitive levels of educational objectives is that they might have low expectations concerning the students' abilities.

### **1.3.2.2 Time**

Nurse educators carry out many activities from planning content, lessons and assessments. Time for them is so divided to enable them attend to numerous tasks. It is possible therefore to bias themselves towards a single or more tasks than to the other. As Terrant, et al., (2006) assented that educators spend an immense amount of time preparing lectures, slides and course materials; yet insufficient time is allotted towards test preparation. Therefore, inadequate time allocated in the area of test item preparation by nurse educators caused a rush among them to prepare test items at the lower order of cognitive domain of Bloom's taxonomy.

**FIGURE 2: PROBLEM ANALYSIS DIAGRAM OF FACTORS INFLUENCING KNOWLEDGE AND USAGE OF BLOOM'S HIERARCHY OF COGNITIVE LEVELS OF EDUCATIONAL OBJECTIVES IN SETTING EXAMS BY NURSE EDUCATORS**



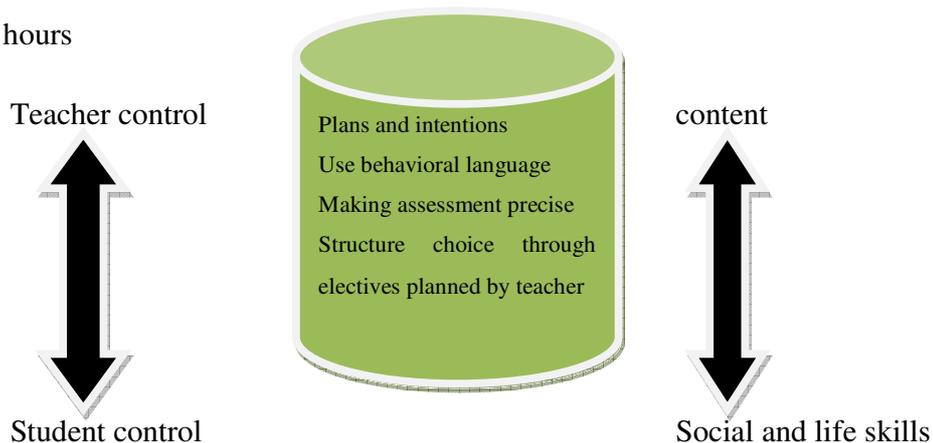
## 1.4 THEORETICAL FRAMEWORK USED FOR THE STUDY

To answer the research question, the product model/objectives also known as behavioural objectives model provided a conceptual framework on which this research is based. According to O'Neill (2010), some key theorists of this model include Tyler (1949) and Bloom (1956). The product model is interested in the product of the curriculum, focuses its major premise on the idea that all learning should be defined in terms of what students should be able to do after studying the program in terms of learning outcomes or learning objectives. It answers the following 4 fundamental questions;

- i. What are the aims and objectives of the curriculum?
- ii. Which learning experiences meet these aims and objectives?
- iii. How can the extent to which these aims and objectives have been met be evaluated?
- iv. How can these learning experiences be organised?

The product model avoids vague general statements of intent, makes assessment more precise, helps to select and structure content, makes teachers aware of different types and levels of learning involved in particular subjects. It also gives guidance to teachers and learners about skills to be mastered. Neary (2003) in O'Neill (2010) describes this model as one which emphasises on 'plans and intentions' (see figure below).

**Figure 3: Product model** retrieved from <http://www.ucd.ie/teaching> accessed on 13/03/14 at 19:50 hours



Based on these assumptions, it could be concluded that the outcome of the training of nurses should reflect the objectives of the curriculum and this can be achieved by designing classroom assessments according to Bloom's hierarchy of cognitive objectives.

According to Azer (2006), assessments need to match the philosophy of the curriculum and reflect its educational outcomes. The approach of assessment requires more complex outcomes, not just the ability of the examinees to recall information. In a practice profession such as nursing, test questions should be heavily weighted at the higher levels of knowing (De Young, 2009:269). According to the product theory, assessments should be able to stimulate student's reasoning skills, critical thinking and decision making for them to achieve the curriculum, course and learning objectives (O'Neill, 2010). In order to prepare nursing students to pursue life – long learning, assessment (tests) may demand a greater deal of analytical thinking, enabling examiners to do test integration of knowledge, problem solving skills, and application of knowledge. Furthermore, Eber and Parker (2007), stated that educators must ensure that what they teach matches what they are assessing. Therefore, if classrooms demand higher-order thinking to occur, assessments to measure the student's knowledge must also reflect critical thinking. The use of Bloom's taxonomy as an assessment framework and the content-by-process matrix as a tool for constructing and analysing instruction and assessment yield significant information for the nurse educator (Reichert, 2011).

### **1.5 RATIONALE OF THE STUDY (JUSTIFICATION)**

The quality of nursing education is discerned after the student nurse has qualified and began practising. The student nurse whose cognitive abilities have developed to optimal levels is more likely to evaluate the patients' conditions and respond appropriately. On the other hand, the student nurse who slither through their studies without a stimulation of their critical thinking manifest the inadequacy through patient abandonment and uncertainty in the face of emergencies. An article by ZANIS, Nkonde (2014) stated that a patient died before being attended to by nurses who insisted on following the queue even after the relatives reported that the patient's condition had changed. Nkonde reported that the relative to the deceased said;

“I do not understand why our nurses have become so careless, heartless and stopped thinking nowadays. People go to the clinic in order to be attended to. We understand that queues are supposed to be followed, but there are situations where you cannot just wait in a queue. Once someone's condition changes it is not a crime to ask other patients to give chance to an emergency”

In some instances, it has been reported that even basic nursing procedures such as temperature reading, Blood Pressure checking and other nursing time-honoured procedures are scarcely done on patients who desperately need them. It may well be argued that it could be a lack of a critical thinking mind that has blossomed from the absence of a deep background understanding and standardized assessments that ‘allows for expert diagnostic and interventions especially when there is no evidence for practice’ (Agbedia and Ogbe, 2014: 14). While the curriculum may be appropriate for nurses, it is likely that along the continuum of nursing education, assessments may be jaded with test items that only curve in at lower cognitive level of Bloom’s Taxonomy. Agbedia and Ogbe (2014) observed that, a nurse, using his or her critical thinking mind, must bring an essential skill to evidence-based practice. The skill is anticipation of risks which helps the nurse to pay attention to early signs of unexpected changes in the patient’s condition. Before the country registers more deaths related to nurses’ lack of mind sharpness, it was essentially time optimal to conduct a research to find out whether nurse educators are knowledgeable on a tool that helps in the promotion of a critical thinking mind - Bloom’s taxonomy and whether they used it when preparing test items for assessment of their students.

## **1.6 SIGNIFICANCE OF THE STUDY**

The study, being the first in the *Zambian nursing fraternity*, will serve as a classic vital baseline for further studies in the nursing education rubric. This research may therefore aid other researchers and academicians to take interest and conduct further researches on the area studied. Consequently, a collection of pieces garnered by this and other researches that are yet to be conducted, a well-rounded body of knowledge and use of Bloom’s hierarchy of cognitive levels of educational objectives in setting examinations will emerge. This will not only act as a sensitizer to nurse educators, the General Nursing Council but also policy makers. When the level of awareness to the pitfalls on the knowledge and use of Bloom’s Taxonomy by nurse educators is raised among various stake holders, a greater likelihood of a collegiate action powerful enough to invoke a myriad of activities such as workshops for nurse educators on Bloom’s Taxonomy and its use will result. Nurse educators will epitomize the use of cognitive levels of Bloom’s taxonomy in test item preparation for classroom assessments.

This positive effect in which nurse educators get empowered with skills on assessing using higher order questions, may not only help increase in the use of Bloom's Taxonomy among nurse educators but may also improve the quality of questions set during assessments. Abundant benefits will be accrued because assessments will match the philosophy of the curriculum and reflect its educational outcomes. Society stands to hugely benefit from this enterprising because schools of nursing will offer graduates with higher order thinking skills. This is in line with the demands of the clinical setting, where highly qualified and critical – analytical skilled nursing practitioners are needed.

## **1.7 RESEARCH QUESTION**

This study addressed the following questions:

1. Do nurse educators have knowledge on Bloom's Taxonomy?
2. Do nurse educators use Bloom's hierarchy of cognitive levels of educational objectives in setting examinations?

## **1.8 OBJECTIVES OF THE STUDY**

### **1.8.1 General objective**

This study determined the knowledge of Bloom's hierarchy of cognitive levels of educational objectives and its usage in setting examinations by nurse educators in Eastern and Lusaka provinces.

### **1.8.2 Specific objectives**

1. To assess nurse educators' knowledge levels on Bloom's Taxonomy of educational objectives.
2. To determine the levels of cognitive domain assessed in examination papers.
3. To determine the relationship between knowledge and use of Bloom's hierarchy of cognitive levels of educational objectives in setting examinations.

## 1.9 HYPOTHESIS

This study addressed the following hypothesis:

**1.9.1 Null hypothesis:** There is no association between nurse educators' knowledge and usage of Bloom's hierarchy of cognitive levels of educational objectives in setting examinations.

## 1.10 DEFINITION OF CONCEPTUAL AND OPERATIONAL TERMS

The following were conceptual and operational definitions of terms used in the study:

### 1.10.1 Knowledge

**Conceptual: Knowledge** is the condition of knowing something with familiarity and understanding of a science gained through experience or association (Krau, 2011).

**Knowledge** is the awareness, consciousness or familiarity gained by experience or learning and is a combination of both practical and theoretical knowledge (De Young, 2009).

**Operational:** In this study, knowledge was defined as the ability to correctly define Blooms' taxonomy and to mention the number of domains of Bloom's taxonomy, levels of cognitive domain as well as to state the words used in the classification of test questions in both lower and higher levels of cognitive domain. In the questionnaire, knowledge awareness test by respondents was dictated by questions between 5 to 10. The researcher graded knowledge levels of respondents into high, moderate and low based on their final score. Respondents who answered correctly all the 5 or 4 questions had high knowledge on Blooms' taxonomy. Respondents who answered correctly 3 questions had moderate knowledge on Bloom's taxonomy while respondents who answered upto 2 questions correctly had low knowledge on Bloom's taxonomy.

### 1.10.2 Use

**Conceptual:** Use means take, hold or deploy (something) as a means of accomplishing or achieving something; employ (Van der Horst and McDonald, 2003).

**Operational:** In this study, **use** was defined as ability to prepare test items across the six (6) cognitive levels of educational objectives of Bloom's taxonomy.

### **1.10.3 Workload**

**Conceptual:** Amount and intensity of work a nurse/nurse educator encounters in a given period of time; affected by technologies, resources, amount of administrative tasks, skills and education of nurses/ nurse tutors (Titler et al., 2007).

**Operational:** In this study, workload is defined as the number of student nurses per each nurse educator (educator to student ratios).

### **1.10.4 Standardized guidelines**

**Conceptual:** Standardized guidelines are policies and protocols formulated by organized health care systems for the performance of standardized procedure functions (Bailey, 2011).

**Operational:** In this study, Standardized guidelines were defined as protocols followed during examination/test item preparation.

### **1.10.5 Nurse educator:**

**Conceptual:** A nurse educator is a nurse who teaches and prepares licensed nurses for entry into practice positions. They can also teach in various patient care settings to provide continuing education to licensed nursing staff. Nurse Educators teach in graduate programs at masters and doctoral level which prepare advanced practical nurses, nurse educators, nurse administrators, nurse researchers, and leaders in complex healthcare and educational organizations (Van der Horst and McDonald, 2003).

**Operational:** In this study a nurse educator is a nurse tutor with a degree, masters or doctoral level of qualification who teaches and prepares licensed nurses for entry into practice positions.

## **OPERATIONAL DEFINITIONS**

**1.10.6 Nursing education:** consists of the theory and practical training provided to nurses with the purpose to prepare them for their duties as nursing care professionals.

This education is provided to nursing students by experienced nurses and other medical professionals who have qualified or experienced for educational tasks.

Nurse education also provides post-qualification courses in specialist subjects within nursing (Van der Horst and McDonald, 2003).

**1.10.7 Taxonomy:** refers to the classification of general principles. Its goal is to ensure that a course of learning will result in the learner acquiring new knowledge, attitudes and skills (Anderson and Krathwohl, 2001; Bradley, 2007; Cook, 2013).

**1.10.8 Bloom's Taxonomy:** is a tool to classify learning objectives and skills for students. It is used extensively by educators in allied health fields, including nursing to structure lesson plans and outcome testing (Anderson and Krathwohl, 2001; Bradley, 2007; Cook, 2013).

Bloom's taxonomy is a system created to improve testing precision by categorizing intellectual behaviour into desired levels (Bloom, 1956).

**1.10.9 Cognitive levels:** In an ascending order of complexity, the cognitive levels of questions are: knowledge, comprehension, application, analysis, synthesis and evaluation.

**1.10.10 Assessment:** According to De Young (2009:263), assessment refers to the process of testing and evaluating students to determine progress towards program goals. It helps teachers to measure students' current level of ability, progress, and their own teaching effectiveness.

**1.10.11 Critical thinking:** According to National Council for Excellence in Critical Thinking (1992:201) as cited in De Young (2009:219), critical thinking is defined as the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action.

**1.10.12 Examination** is a method for determining whether student learning meets criteria established by an external source (Sithole 2011:7).

**1.10.13 Setting examinations:** In this study, setting examinations means preparing test item questions.

## VARIABLES AND INDICATORS

**TABLE 1: VARIABLES CUT OFF POINTS AND INDICATORS**

Variables	Indicators	Type of variable	Cut off points	Question number
<b><u>DEPENDENT</u></b>  Knowledge	High	Ordinal	4 to 5 correct responses.	6 to 10
	Moderate		3 correct responses	
	Low		0 to 2 correct responses	
Use	Adequately utilised	Interval	4 to 5 correct responses	23 to 27
	Not utilised		0 to 2 correct responses	
	inadequately utilised		3 correct responses	
<b><u>INDEPENDENT</u></b>  Work overload	Normal moderate	Interval	2 correct responses	19 to 20
	High		1 correct responses	
			No correct response	
Time	On time	Interval	2 correct responses	21 to 22
	In time		1 correct responses	
	Not done		No correct response	
Standardized guidelines for classroom assessment	Adequately Available	Interval	4 to 6 correct responses	13 to 18
	inadequately Available		1 to 3 correct responses	
	Not available		No response	

## **CHAPTER TWO**

### **2.0 REVIEW OF RELATED LITERATURE**

#### **2.1 INTRODUCTION**

In this chapter, an overview has been given of the literature that the researcher reviewed. This provided the evidence on which the study was based. The review focused on studies conducted on knowledge on Bloom's taxonomy and usage of Bloom's cognitive levels of educational objectives in setting exams. Sources of literature used include books, articles from professional journals and internet. The research used Pub-Med and Google Scholar. The purpose of literature review was to establish what was known about the topic and to identify if there were gaps in the existing literature. The literature review included studies at the global, regional and national levels respectively.

#### **2.2 Use of Bloom's taxonomy**

Knapp (2014) notes that the National Council of State Boards of Nurses (NCSBN) in the United Kingdom, had developed a comprehensive examination entitled National Council Licensure Examination for Registered Nurses (NCLEX – RN). The Board of Nurses assesses the graduate nurses' knowledge on the required skills to practice the nursing profession safely and competently. To maintain quality and promote critical thinking, the cognitive levels of the objectives of Bloom's taxonomy is an integral part of the NCLEX test plan. This tradition fits scholars' observation. Anderson, et al., (2001) observed that the use of Bloom's hierarchy of cognitive levels of educational objectives is the basis for setting and coding test items during assessments.

A study performed within an Australian nursing program revealed that clinical teachers who received lessons on Bloom's cognitive levels of educational objectives asked more low-level questions (91.2%) than high-level questions (4.4%) (Sellappah, et al., 1998). In a related study by Phillips and Duke (2001), three Melbourne universities in Australia, determined the level of questioning used by undergraduate clinical teachers and preceptors basing on Bloom's taxonomy and discovered that both the clinical teachers and preceptors asked a greater number of lower cognitive level questions.

One significant indicator about these findings could be that clinical teachers opted to set lower order questions because of the simplistic nature of such questions. They fiercely avoided setting examinations which demand time and concentration. The other reason could be that the respondents were not oriented in the technique of constructing test items that promote critical thinking. Lacking this crucial in-depth awareness of action verbs to use when setting higher order questions, educators might have decided to settle for lower order questions as the only recourse for classroom assessments.

In a similar study by Profetto-McGrath, et al., (2008) at a Canadian baccalaureate nursing program found that the largest percentages of questions asked by educators were of lower cognitive levels and only 4.1% of questions were framed at high level thus the same scholars affirmed that mainly factual and lower level questioning was being used in classroom setting. Garekwe (2010); Sithole (2011); Reichert (2011) revealed that MCQ examination questions enable educators to test a broad range of topics in the curriculum. However, despite the emphasis on use of Bloom's taxonomy as a framework, the educational goals of MCQs used tested factual knowledge rather than a deeper understanding (Masters, et al., 2001) and (Azer, 2006).

Tarrant, et al., (2006) evaluated test bank questions at a nursing college and discovered that almost half of the MCQ questions contained flaws and bias; over 90% of questions were written at cognitive levels below the application and analysis. Kim, et al., (2012) affirmed that the hierarchical levels of student learning could be used to determine the extent to which educators emphasize both lower and higher order thinking behaviors. In addition, Haladyna, et al., (2002) and Kim, et al., (2012) revealed that curriculum designers and educators have extensively used the Bloom taxonomic model of learning to prepare test items according to cognitive levels of educational objectives.

In contrast, a study by Garekwe (2010) at the University of Kwazulu – Natal in South Africa revealed that nurse educators were not always using Bloom's cognitive levels during classroom assessment; about 57% of the questions were aimed at lower level (knowledge and comprehension) whilst only 43.4% were aimed at higher levels (application, analysis, synthesis and evaluation).

A related study by Rinser (1987) on analysis of cognitive levels of questions also found that 95% of the test questions were devoted to knowledge or comprehension, 5% were used for application and 0.2% for evaluation and analysis whilst synthesis questions were completely neglected.

From the studies conducted by scholars above, it can be assumed that nurse educators did not appreciate the importance and usefulness of incorporating higher order cognitive level questions.

Sithole, (2011) affirmed that fundamental to teaching and assessment in nursing is an explicit recognition that nursing education goes beyond the memorization and recall of facts. The same scholar further stated that nurse educators and assessors need at all times to strive to stimulate these higher order cognitive processes.

In agreement, Garekwe, (2010); De Young, (2009): 268 stated that Bloom's taxonomy is the useful way in which to conceptualize cognitive processes. Bloom's taxonomy of educational objectives can be used to challenge the thinking ability of students during examinations (Anderson and Krathwohl, 2001) and (Fesler – Birch, 2005).

In addition, Phillip and Duke (2002) noted that since questioning is an integral part of teaching that can assist students in applying their knowledge; educators should know how to use questioning strategies effectively. Moreover, Downing (2005); Russell, et al., (2007) affirmed that educators should take advantage of setting higher levels of Bloom's cognitive levels of educational objectives in order to have stimulating questions that help create meaningful active learning instead of just prompting the simple recall of knowledge from students.

Critical thinking is one aspect that every graduating nurse should possess to be prepared to nurse patients holistically. Nurse educators should be cognizant of assessments that stimulate higher order thinking in their nurse students to prepare student nurses for a noble work which demands critical thinking.

Mkandawire (2013) supported the notion when stating that teachers who use Bloom's Taxonomy of the cognitive levels of educational objectives on a regular basis in their lessons and assessments enable pupils to benefit and appreciate the levels of thinking.

### **2.3 Knowledge**

The study conducted by Kim et al., (2012), in America, revealed that university faculty members had heard of Bloom's Taxonomy, but had not conceptualized Bloom's taxonomy enough to apply it to their teaching and assessments. In the same vein, a related study by Boikhutso (2010) on challenges facing University of Botswana on lesson planning revealed that educators had no knowledge on the incorporation of Bloom's taxonomy in lesson plans and in setting examinations.

Had the scholars gone beyond the ordinary survey to examine lesson plans for cognitive levels probably they could have had found that educators incorporated Bloom's taxonomy in their teaching. It can therefore be argued that the scholars' methodology lacked triangulation to provide a complete picture as it were.

Eber and Parker (2007), urged nurse educators to have knowledge on Bloom's taxonomy to enable them plan and develop instruction to ensure both teaching and assessment address each level within the cognitive hierarchy.

### **2.4 Time**

Kelly (1999) and Tarrant, et al., (2006) assumed that the reason for not moving students up the levels of Bloom's taxonomy is both difficult and time consuming for the educator. The scholars added that the quality of assessments and evaluation is often hindered by factors such as shortages of nurse educators and time.

Reichert (2011), stressed that adequate time to assess test bank examination papers according to Bloom's hierarchy of cognitive levels of educational objectives is pertinent because literature shows examination questions to be highly flawed yet still highly utilized. However, Allen (2008), argued that shortages in faculty and time, as well as an increase in student population lead many faculty to use multiple choice questions (MCQ's) to quickly measure knowledge in nursing education or set one (1) or two (2) questions which only measure higher cognitive levels of educational objectives.

A related study by Mkandawire (2013), also revealed that mathematics teachers did not spend enough time to prepare questions according to Bloom's hierarchy of cognitive levels of educational objectives.

Staff shortage and time may not be factual reasons why educators opt for Multiple Choice Questions which only test knowledge. Quality assessments require incorporation of higher order questions even in MCQs. There is a greater likelihood that nurse educators did not have blue prints to guide on the number of questions to be set in the lower or higher order category of Cognitive domain.

## **2.5 Orientation of nurse educators in setting examinations**

A study by Tarrant et al., (2006) stated that few faculties have formal education in neither MCQ test item construction nor the time to create their own MCQs according to Bloom's cognitive levels of educational objectives. Masters, et al., (2001), also revealed that test bank authors in nursing schools have limited formal training in test item construction according to Bloom's cognitive levels of educational objectives; therefore questions taken from test banks are equally susceptible to item writing violations and that they assess lower order cognitive skills.

However, a study done by Boikhutso (2010) in Botswana revealed that nurse educators were taught how to construct test items according to cognitive levels of educational objectives framework. It can be argued that fundamental knowledge alone on test item construction without supportive successive knowledge cannot bear fruits in the classroom. Educators as asserted by Mkandawire (2013), did not undergo Continuing Professional Development meetings or workshops.

## **2.6 Standardized guidelines (Peer Review, usage of blue prints)**

A study by Haladyna, et al., (2002); Moreno, et al., (2006), revealed that standardized guidelines for best practice in MCQ test item construction that test all the cognitive levels of educational objectives had been developed and supported by research. In the last decade, new and ever evolving research involving the format, design, and construction of multiple choice questions had been published in America and the United Kingdom (Considine, et al., 2005).

In addition, an article by Azer (2006) provides 12 practical tips to help question writers in creating MCQs that test cognitive skills. Although there have been several suggestions to improve the quality of test item construction, none of these suggestions have enhanced the power of examination questions to test cognitive skills or assess competence (Azer, 2006). However, a study by Masters, et al., (2001) revealed that there is no sufficient research suggesting guidelines as to the percentage of questions to be written within each level of Bloom's taxonomy and suggests using higher level questions with higher level courses.

On the other hand, Botswana Affiliated Health Training Institutions (2004)'s assessments standards mandate all educators to develop a test specification based on test blue print/ test plan and course objectives. It tabulates what percentage of test items to be set for each cognitive educational objective and requires educators to have test items peer reviewed (moderated) before being administered to the students (Affiliated Health Training Institutions, 2004).

## **2.7 Educators' attitude**

A study by Kelly (1999) revealed that the reason some nurse educators fail to move students up the Blooms' hierarchy of cognitive levels could be that educators might have low expectations concerning the students' abilities which Kelly describes as 'a sad and self fulfilling prophecy'. Similar findings in a related study by Mkandawire (2013) indicated that teachers' views about pupils' abilities affected the teachers' questioning techniques during mathematics lessons. The study further revealed that beliefs about pupils' abilities to learn are one of the essential constraints to classroom questioning.

In support, Kantar (2013) affirms that there is an urgent need for transforming educators' beliefs, knowledge and skills on assessments since teaching to pass a test could impede knowledge transfer and deter the development of learners' higher order thinking skills.

It can be argued that educators' themselves might not have been conversant with the action verbs to use for test item construction across the levels of cognitive domain.

## **2.8 Work overload**

Studies by Agbedia and Ogbe (2014); Allen, (2008) revealed that factors such as large class size and faculty reward structures work against a critical thinking emphasis in nursing students and the setting of examinations according to Bloom's taxonomy of education objectives.

## **2.9 CONCLUSION**

The literature clearly shows that most of the educators worldwide have low knowledge on Bloom's taxonomy and do not use Bloom's hierarchy of cognitive levels of educational objectives when setting examination questions. However, from the literature reviewed some factors influencing knowledge and usage of Bloom's hierarchy of cognitive levels of educational objectives in setting examinations by nurse educators like moderation (peer review) of examination questions, usage of blue print, guidelines for setting examination questions (test construction), orientation of nurse educators in setting examinations have been implemented to some extent. Despite all these efforts put in place to improve quality in setting examination questions and stimulating critical thinking in students by using cognitive levels of educational objectives of Bloom's taxonomy, nurse educators still set either lower level questions only or higher level questions only. According to Anderson, et al., (2001); Bloom (1956); Agbedia and Ogbe (2014) examination questions should follow the six (6) hierarchical cognitive levels of educational objectives progressing from simple (knowledge) to the highly complex (evaluation).

However, no studies have been done on assessment of learning in the nursing fraternity in Zambia. It is from these gaps identified in the literature reviewed that the researcher feels the study to evaluate educators' knowledge and utilization of Bloom's hierarchy of cognitive levels of educational objectives in setting examinations by nurse educators be carried out.

## **CHAPTER 3**

### **3.0 RESEARCH METHODOLOGY**

#### **3.1 INTRODUCTION**

This chapter presents a description of the processes that were followed in conducting this study. It describes the research design, research setting, study population, sample selection, sample size, data collection tools, data collection technique, validity and reliability and the pre-testing of the data collecting tool. .

#### **3.2 RESEARCH APPROACH**

This study employed a quantitative approach. According to Burns and Groove (2009), a quantitative approach is a research that is used to describe variables, examine relationships among variables and determine cause – and – effect interactions between variables. This approach was chosen because the researcher was trying to determine the knowledge of Bloom’s hierarchy of cognitive levels of educational objectives in setting examinations and it’s usage by nurse educators in Lusaka and Eastern provinces of Zambia.

#### **3.3 RESEARCH DESIGN**

In this study, a cross sectional study design was used. This was because the study was thought to be exploratory in nature as little is known about the problem. The purpose of this design in this study was to gain an insight into factors influencing knowledge and usage of Bloom’s hierarchy of cognitive levels of educational objectives in setting examinations by nurse educators.

#### **3.4 RESEARCH SETTING**

The research setting is the physical location and conditions in which data collection takes place (Burns and Groove, 2009). The study was undertaken in government, mission and private nursing training schools. These schools included three (3) government nursing schools in the eastern part of Zambia namely Mwami, Chipata and St Francis nursing schools, one (1) government nursing school in Lusaka province namely Lusaka school of nursing, two (2) private nursing schools based in Lusaka province namely Dovcott College of Nursing and Lusaka Health Institute college of Nursing.

These settings were selected because the schools employ Community Based Education (CBE) and Problem Based Learning (PBL) in the nursing program, with the aim of preparing and producing graduates with higher order thinking skills, who could function well in a rapidly changing health environment.

### **3.5 STUDY POPULATION**

A study population is a well defined set that has certain specific properties (Burns and Groove, 2009). The study units comprised of nurse educators teaching in nursing schools in Eastern and Lusaka provinces.

The study units also comprised of examination papers which students wrote and targeted major examinations which are; end of first (1<sup>st</sup>) year examination, intermediate examination and Hospital mock examination from both the general nursing programs in Enrolled and Registered schools of nursing.

#### **3.5.1 Target Population**

The target population consisted of nurse educators who facilitate teaching and learning in Enrolled, Registered, Theatre, clinical instructors, clinical care, Pediatrics and Midwifery nursing schools. The other targeted data source for this study were past written examination questions in Registered (Diploma) and Enrolled (Certificate) general nursing programs from 2011 to 2013, covering both two (2) and three (3) different levels depending on the program being offered by a particular school.

### **3.6 Inclusion criteria**

The following were included in this study because they met the inclusion criterion which was set by the researcher:

- a) All nurse educators facilitating classroom teaching in the selected study settings
- b) Only those nurse educators who had taught for a year and above
- c) Those who consented to participate in the study.
- d) All nurse educators who were present at the time of data collection.

- e) Only locally set examinations (within the training school) from 2011 to 2013 were included in the study.
- f) All examination papers for re-sit (supplementary) examinations from 2011 to 2013.

### **3.6.1 Exclusion criteria**

- a) All nurse educators who were on leave at the time of data collection
- b) All those who refused to participate in the study.
- c) All past examination papers up to 2010 and 2014.

### **3.7 SAMPLING METHOD**

Sampling is a process of selecting subjects, events, behaviors or elements for participation in a study (Burns and Grove, 2009:35). In order to obtain a representative sample of the population selected for the study, the sample was obtained from the target population.

For this study, two (2) sampling methods were used. A non probability sampling method called convenience sampling was used to select nursing schools. It was also used to select past examination papers from Enrolled (certificate) and Registered (diploma) nursing programs from first year to third year respectively, according to the program being offered. It is important to note that the study used past examination papers from Mwami, Saint Francis and Lusaka Schools of nursing. The study made use of available past examination questions for a period of three (3) years, (2011 to 2013) as long as they met the criteria. In this manner, the sample became representative of the general population. According to Polit and Beck (2008), convenience sampling entails using the most conveniently available sources of data as study participants.

Furthermore, purposive also called judgemental sampling method was used to select nurse educators in Eastern and Lusaka provinces of Zambia to answer the questionnaire. The nurse educators who were given the questionnaires were those who were found within the school and met the criterion.

### **3.8 SAMPLE SIZE DETERMINATION**

The sample size comprised of all the 63 nurse educators since they were few and these were from the following schools:

Lusaka school of nursing ( 40 nurse educators), Chipata school of nursing ( 7 nurse educators), Mwami school of nursing ( 6 nurse educators), St Francis school of nursing ( 6 nurse educators), Lusaka health institute ( 4 nurse educators each) making the total of **63 nurse educators as the sample size.**

The researcher's other study units comprised of past examination papers from 2011 to 2013.

**Table 2: shows the composition of examination question papers for all academic levels from 2011 – 2013 in both Enrolled and Registered general nursing schools.**

<b>Schools of nursing</b>					
<b>Registered Nursing School</b>			<b>Enrolled Nursing Schools</b>		
<b>Year period</b>	<b>Academic level</b>	<b>Lusaka</b>	<b>Mwami</b>	<b>St. Francis</b>	
<b>Total question papers</b>					
	<b>Year 1</b>	<b>36</b> (12 examinations x 3 years) <b>End of year examinations</b>	<b>3</b> (1 examination x 3 years) <b>End of year examinations</b>	<b>3</b> ( 1 examination x 3 yrs) <b>End of year examinations</b>	
<b>2011 to 2013</b>	<b>Year 2</b>	<b>9</b> (3 examinations x 3 years) <b>Intermediate examinations</b>	<b>6</b> (2 examinations x 3 years) <b>Intermediate and hospital examinations</b>	<b>6</b> ( 2 examinations x 3 yrs) <b>Intermediate and hospital examinations</b>	
	<b>Year 3</b>	<b>6</b> ( 2 examinations x 3years) <b>Hospital mock examinations</b>			
<b>Total past examination papers</b>		<b>51</b>	<b>09</b>	<b>09</b>	<b>69 sample population</b>

Based on the interest of determining the knowledge and usage of cognitive levels of Bloom's taxonomy in setting examinations by nurse educators in Lusaka and Eastern provinces of Zambia, sample size was calculated using Krejcie and Morgan formula (1990), used to determine sample size for a limited study population.

The sample size was calculated as follows;

$$S = \frac{X^2 NP (1-P)}{d^2 (N-1) + X^2 P (1-P)}$$

Where;

S = Required sample size

X<sup>2</sup> = Degree of freedom at the desired confidence level (1.96<sup>2</sup> = 3.8416)

N = Accessible study population size (285)

P = Population proportion (assumed at 0.50)

d = Degree of accuracy (assumed at 0.05)

$$\text{Therefore, } S = \frac{X^2 NP (1-P)}{d^2 (N-1) + X^2 P (1-P)}$$

$$S = \frac{3.8416 (69) \times 0.50 (1-0.50)}{0.0025 (69-1) + (3.8416) (0.50) (1 - 0.50)}$$

$$S = 58.62314225$$

$$S = 59$$

**The total sample size for past examination papers was 59.**

### **3.9 DATA COLLECTION TOOLS**

A data collection tool is a measuring device used in gathering of information needed to address a research problem (Polit and Hungler, 2001; Burns and Groove, 2009). In order to achieve the objectives of this study, two (2) data collection tools were used. These included self administered questionnaires and checklists. Questionnaires were used for the collection of data from the respondents. Checklists which were formulated in relation to cognitive levels of Bloom's hierarchy of educational objectives were used to collect data from past examination papers.

### **3.9.1 QUESTIONNAIRES**

The purpose of the questionnaire was to investigate the knowledge nurse educators had concerning Bloom's hierarchy of cognitive levels of educational objectives and whether they used it during the preparation of test items. The questionnaire consisted of the following sections; demographic data, Knowledge on Bloom's taxonomy, attitude towards usage of Bloom's taxonomy, standardized guidelines on setting of examinations, workload, and availability of time when setting examinations (see Appendix V). There was time limit of ten (10) to fifteen (15) minutes for nurse educators to answer the questionnaire. This was done to encourage nurse educators to address all the parts of the questionnaire within the stipulated time. The questionnaire consisted of both open ended questions which allowed respondents to express themselves and closed ended questions which were quick to answer. This was so in order to improve quality of data collected.

### **3.9.2 CHECKLIST**

Furthermore, a checklist based on cognitive levels of Bloom's taxonomy was used (See Appendix VII). The purpose of the checklist was to classify examination questions set by nurse educators according to levels of Bloom's hierarchy of cognitive levels of educational objectives. It was hoped that the checklist would help the researcher gather in depth information about this study's objectives in order to supplement and triangulate the data which was obtained from the questionnaires.

Permission to use the data collection instrument was obtained from the researcher, (Mkandawire 2013), who conducted a similar study. The letter of permission was attached to the appendix (See Appendix VI). The checklist consisted of all the six (6) levels of cognitive domain: knowledge, comprehension, application, analysis, synthesis and evaluation. The checklist was modified and had spaces for indicating the academic levels in the program of study, examination time, action verbs, question stems used and levels of cognitive domain.

### **3.9.3 Validity of the data collecting tools**

Validity of an instrument determines the extent to which it actually reflects the abstract construct being examined (Burns and Grove, 2009:380). To ensure validity of the research tool, the researcher conducted an exhaustive literature search in order to have adequate content coverage. The research instrument was reviewed by the research supervisors.

Important variables of the study were included in the research instrument and the sequencing of the questionnaire was the same for all respondents.

### **3.9.4 Reliability of the data collecting tool**

According to Polit and Beck (2008) the instrument's reliability is the consistency with which it measures the target attribute. In this study, reliability was ensured by conducting a pilot study before the main study to pre-test the research instrument. Reliability was also ensured by the use of different data collecting methods.

Furthermore, Webber (1990) as cited in Garekwe (2010) states that the reliability of a content analysis study refers to its stability or the tendency for coders to consistently re-code the same data in the same way over a period of time, reproducibility, or the tendency for a group of coders to classify categories in the same way; and accuracy, or the extent to which the classification of the text corresponds to a standard or norm statistically. In this study the researcher and the assistant independently reviewed the examination questions and code them into the provided template (checklist with cognitive levels). The coders then compared notes and reconciled differences that showed up in their data. To ensure internal reliability of the research instrument, the researcher tested it using Cronbach alpha test. The level of this test for the modified instrument was 0.863 which made it be sufficiently reliable.

## **3.10 DATA COLLECTION TECHNIQUE**

Data collection technique is the method followed in the gathering of information needed to address a research problem (Polit and Beck, 2008). First and foremost, approval and permission was sought from the Excellence in Research Ethics and Science Converge (ERESC) before carrying out the study.

Permission was also sought from the Permanent Secretary, Ministry of Health, Directors of private nursing schools and Provincial Health Directors requesting permission to use the nursing schools as research sites. Furthermore, permission was sought from the principals of the schools of nursing where the study was conducted from, requesting access to the test banks. The researcher was then referred to the senior tutor – academic, responsible for examinations. Available locally set, major past examination question papers from the year 2011 to 2013 were collected. These papers were collected from each level of the nursing program. The past examination questions which were released were kept safe. They were reviewed strictly under a secured, safe and lockable room and no one was allowed to enter the room/place during the process. Codes and numbers were assigned to examination question papers. Codes represented the test paper and the number represented the level in the undergraduate program.

Content was analyzed to determine the presence of action verbs or question stems in written examination papers. Using a table of key words (See Appendix XI) for classification of test questions (Krathwohl, 2012), the researcher wrote the verbs used in the questions in the suitable cognitive level on a template (checklist).

The questionnaires were distributed to all nurse educators in all nursing schools in Eastern and Lusaka provinces. The researcher visited each office for nurse educators, giving them a brief oral overview of the purpose of the study and asking them to participate in the study. The nurse educators who agreed to participate in the study were given information sheet (See Appendix I) which gave them an explanation on the format of the instrument and what was required of them with regard to completing the instrument. To ensure confidentiality participants signed a consent form (See Appendix II). This form was placed in the envelope not associated with the instrument.

The nurse educators were given the questionnaire to complete. The researcher was available to clarify any queries from the respondents. Upon completion of the instrument, the respondents handed them back to the researcher in the envelope which they were asked to seal in front of the researcher. The questionnaires were then placed in a bag for safe keeping. The researcher was contactable via email or cell phone during and after the data collection period. The envelopes with completed instruments were only opened by the researcher and data collection process was completed.

### **3.11 PRE-TESTING OF THE RESEARCH INSTRUMENT**

Pre-test is the collection of data prior to the experimental intervention or the trial administration of a newly developed instrument to identify flaws or assess time requirements (Polit and Beck, 2008; Burns and Groove, 2009). The pre-test study was conducted among six (6) respondents which is 10% of the actual study population. It was done from Dovcott and Makeni private nursing schools. The exercise was done for the purpose of assessing the feasibility of the study. Additionally, it was done for the purpose of making necessary adjustments to the questionnaire.

After the pre-test, answer option 'D' to question number 22 was modified to read as "not done in the institution". Previously it read as "others, specify". However, the check list with educational objectives was not pre-tested as it was already used in a related research.

### **3.12 ETHICAL CONSIDERATION**

Ethics is defined as a system of moral values that is concerned with degree to which research procedures adhere to professional, legal and social responsibilities to the study participants (Burns and Groove, 2009). Ethical approval and permission was sought from the Excellence in Research Ethics and Science Converge (ERESC).

Permission was also sought from the Permanent Secretary, Ministry of Health and Directors of private nursing schools requesting permission to use the nursing schools as research sites, principals of the schools of nursing where the study was conducted from, requesting access to the examination questions. The past examination questions which were released were kept safe. They were reviewed strictly under a secured, safe and lockable room and no one was allowed to enter the room/place during the process. Codes and numbers were assigned to examination question papers. Codes represented the test paper and the number represented the level in the undergraduate program.

Written informed consent was sought from all participants after the procedures were thoroughly explained to them and confidentiality maintained.

Serial numbers and not names were used on the questionnaires. To ensure further confidentiality, all questionnaires were kept under lock and key.

### **3.13 DATA ANALYSIS AND PRESENTATION**

Data analysis is the systematic organization and synthesis of data (Burns and Groove, 2009). Data from open ended questions on the questionnaire was categorised into similar responses. Closed ended questions were assigned numerical codes for easy entry and analysis using the computer. Thereafter, data was entered and analysed with use of the statistical package for social sciences program software (SSPS).

Furthermore, this study used content analysis in examination papers. According to Burns and Grove (2009:528), content analysis is designed to classify the words in a text into a few categories chosen because of their theoretical importance. This is to identify patterns in text, to quantify and analyze the presence, meanings and relationships of such words and concepts, and then make inferences about messages within the texts. The researcher coded single words, action verbs that were in cognitive levels, example; define, analyse, evaluate. Coding for frequency was done, thus kept a record of the number of times certain words representing cognitive levels were used in question papers across the three (3) years.

Data was then transferred to statistical package for social sciences program (SSPS) version 20 for analysis, computation of correlation and reliability. The statistical methods used to describe the overall characteristics of the data collected included descriptive statistics in which frequency tables, graphs, pie charts and numerical descriptions were used. Inferential statistics such as chi-square test were applied to explore the statistical relationships between variables.

Confidence interval was set at 95%. A 5% level of significance (P-value 0.05 or less) was considered statistically significant.

## **CHAPTER FOUR**

### **4.0 DATA ANALYSIS AND PRESENTATION OF THE RESEARCH FINDINGS**

#### **4.1 INTRODUCTION**

This chapter presents the analysis and key findings of the study on whether nurse educators were knowledgeable about Bloom's hierarchy of cognitive levels of educational objectives and whether they used it when preparing test items for examinations in nursing schools in Lusaka and Eastern provinces of Zambia.

In this study, data was analyzed using SPSS version 20 statistical package and Microsoft Excel software programs. Data analysis was done to reduce, organize and give meaning to the data. Findings were presented in pie charts, frequency tables and graphs. Furthermore, presentation of data was arranged according to the specific objectives of this study. Findings of cognitive levels in question papers from each nursing school were also presented in the same way.

The chi-square test was used to test associations of variables. The cut off point for statistical significance was set at five percent (5%), only p - value less or equal to 0.05 were considered statistical significant thereby rejecting the null hypothesis.

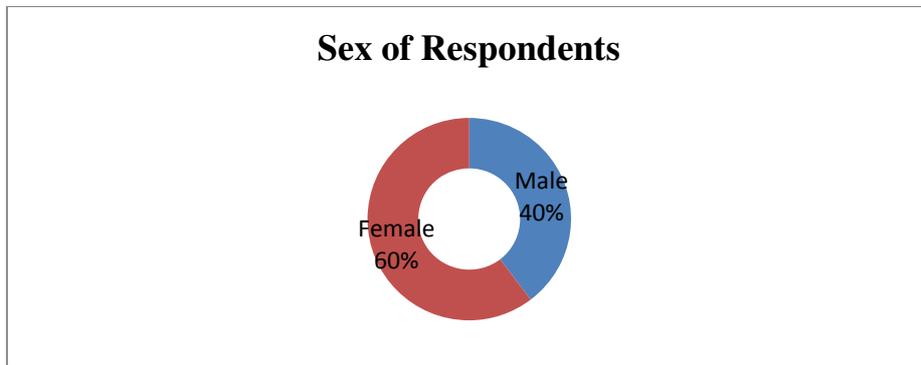
#### **4.2 PRESENTATION OF DATA FROM THE QUESTIONNAIRES**

##### **4.2.1 SECTION A: SOCIO - DEMOGRAPHIC DATA OF THE RESPONDENTS**

This section presents the respondents demographic characteristics. The demographic characteristics included gender, age range, level of professional qualification, years of experience in classroom teaching, highest level of professional qualification.

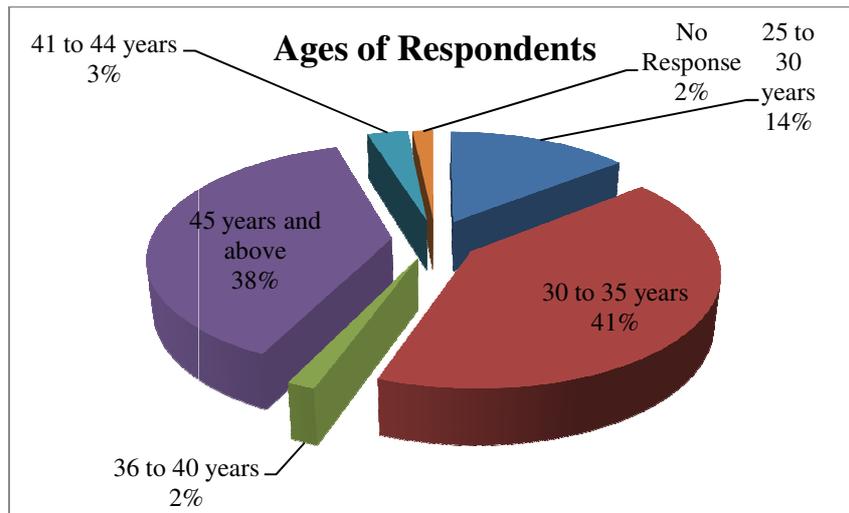
The study sampled a total of 63 nurse educators of which 25 (40%) were male and 38 (60%) were female as shown in Figure 4 on page 41.

**Figure 4: Sex of Respondents (n =63)**



This study also solicited information on the age range of the respondents. Findings are shown in figure 5 below.

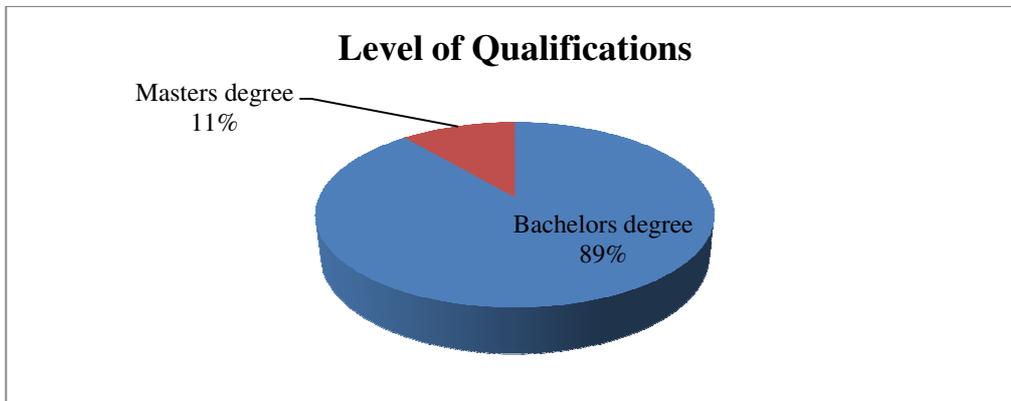
**Figure 5: Ages of Respondents (n =63)**



According to Figure 5 above, a total of 9 (14%) of the respondents ranged from 25-30 years of age, 26 (41%) ranged from 30-35 years, only 1 (2%) of the respondents fell within the age range of 36-40 years, 2 (3%) were aged between 41 and 44 years, 24 (38%) aged 45 years and above. Only 1 (2%) of the respondents did not respond to the question.

Furthermore, the study gathered information on the level of qualifications for nurse educators. The findings are shown in figure 6 on page 42.

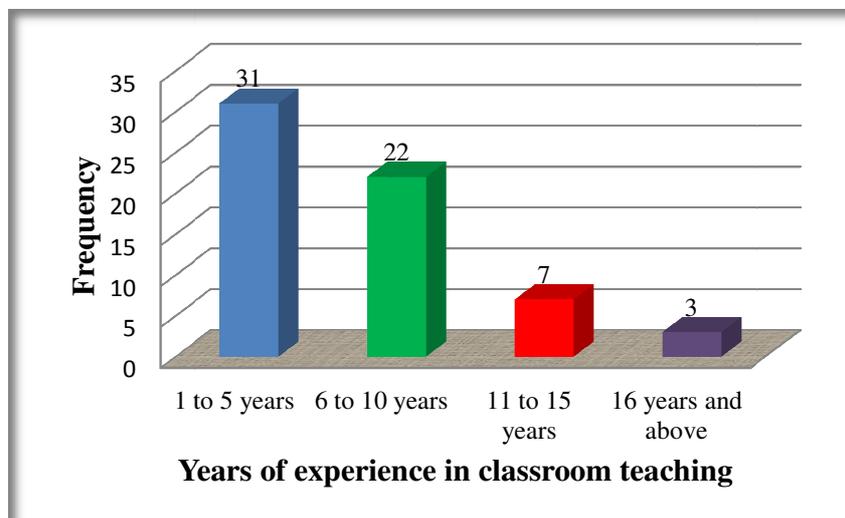
**Figure 6: Level of Qualifications (n =63)**



According to Figure 6 above, 56 (89%) of the respondents had attained a bachelor’s degree level qualification and only 7 (11%) had attained a masters level qualification.

The study further sourced information from nurse educators on years of experience in classroom teaching and assessments. Responses are illustrated in figure 7 below.

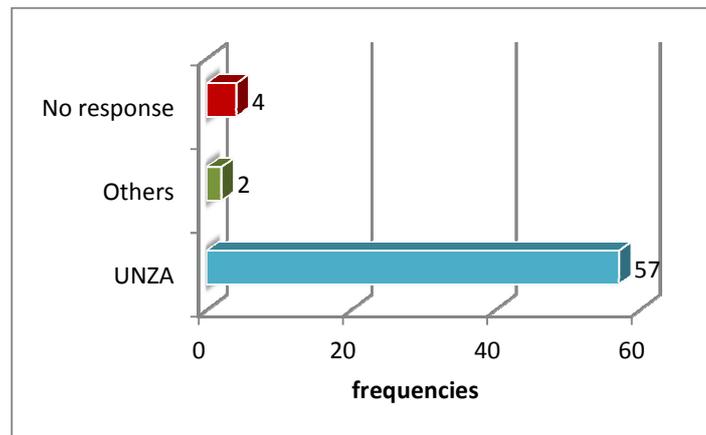
**Figure 7: Years of Experience (n =63)**



Regarding figure 7 above, the majority 31 (49%) of the respondents had years of experience ranging from 1-5 years, 22 (35%) had experience between 6-10 years, 7 (11%) had experience ranging from 11-15 years and only 3 (4%) had experience of about 16 years and above. The mean was 1.7143 and the standard deviation was 0.85059.

In addition, analysis of nurse educators' responses on where they attained their highest qualification indicated that majority, 57 (91%) of the respondents obtained their qualifications from the University of Zambia (UNZA), whereas 2 (3%) obtained their qualifications elsewhere and 4 (6%) did not respond to the question. The results are portrayed in figure 8.

**Figure 8: Institution where highest professional qualification was attained (n =63)**

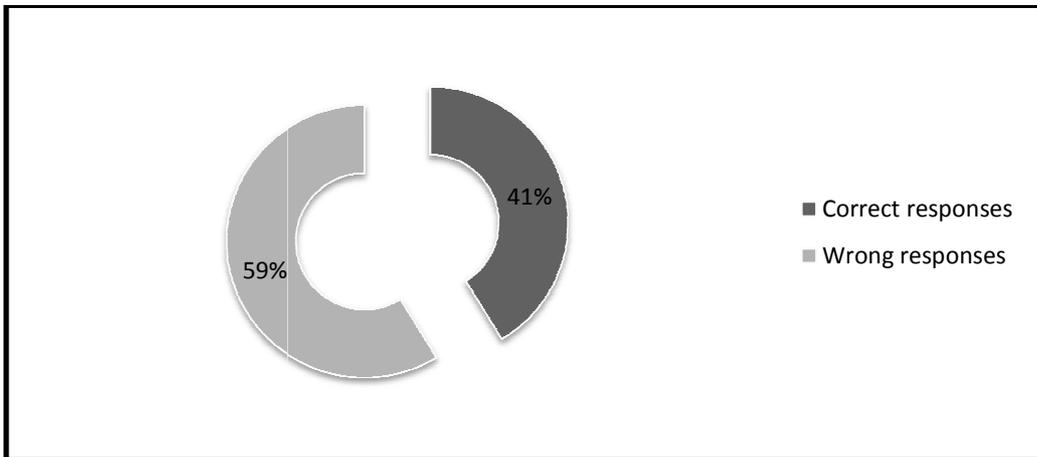


#### **4.2.2 SECTION B: RESPONDENTS' KNOWLEDGE LEVELS ON BLOOM'S TAXONOMY**

To achieve the first specific objective of this study which was to assess nurse educators' knowledge levels on Bloom's taxonomy of educational objectives, Section B presents the respondents' responses. The variables measured were definition of Bloom's taxonomy, number of domains in Bloom's taxonomy, number of levels of educational objectives in cognitive domain, words used to classify test questions in lowest level of cognitive domain, cognitive levels of educational objectives which promote critical thinking.

The study solicited for information from the nurse educators on how they defined Bloom's taxonomy. The results have been shown in the figure that follows on page 44.

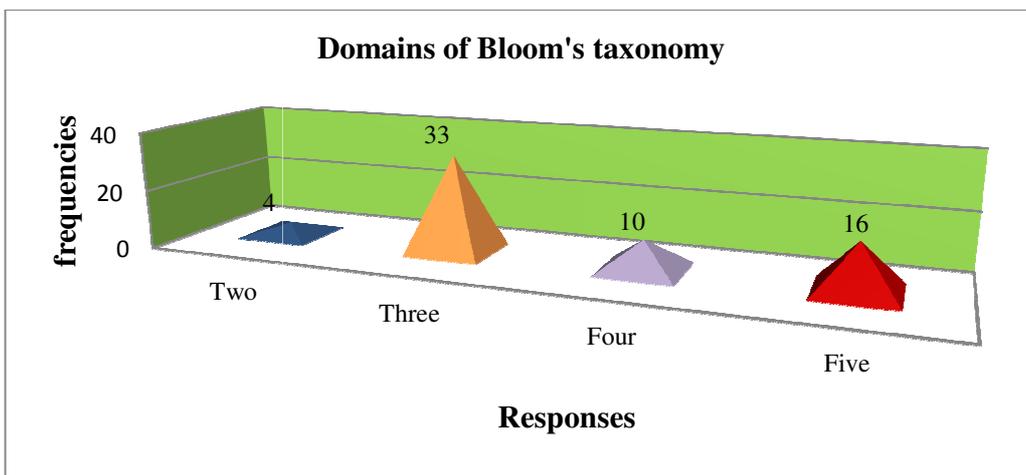
**Figure 9: Definition of Bloom's Taxonomy**



According to Figure 9 above, 26 (41%) of the respondents defined Blooms Taxonomy correctly while 37 (59%) did not define it correctly. Blooms Taxonomy is a tool used to classify learning objectives and to assess students' abilities (Krathwohl, 2002; Ferris and Azizi, 2005).

The study further sourced information on knowledge concerning the number of domains of Bloom's taxonomy from the nurse educators. The responses are illustrated in figure 10 below.

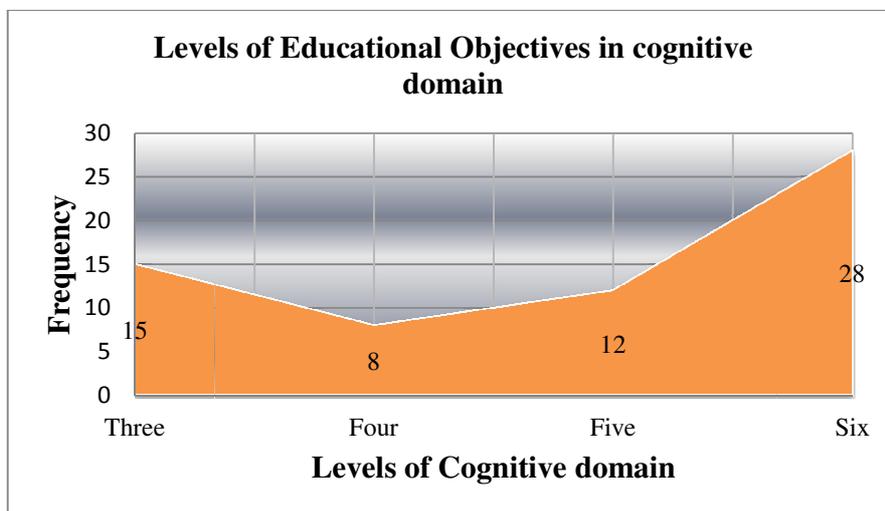
**Figure 10: Domains of Bloom's taxonomy (n =63)**



According to Figure 10 on page 44, 4 (6%) of the respondents mentioned that Bloom's hierarchy of educational objectives had 2 domains, 33 (52%) stated that it had 3 domains, 10 (16%) stated that it had 4 domains and 16 (25%) stated that it had five domains. The mean was 2.6032 and the standard deviation was 0.94254.

Besides soliciting for knowledge on the domains of Bloom's taxonomy, the study further obtained information on the number of levels of educational objectives in cognitive domain. Figure 11 below gives a picture of the responses.

**Figure 11: Levels of cognitive domain (n =63)**



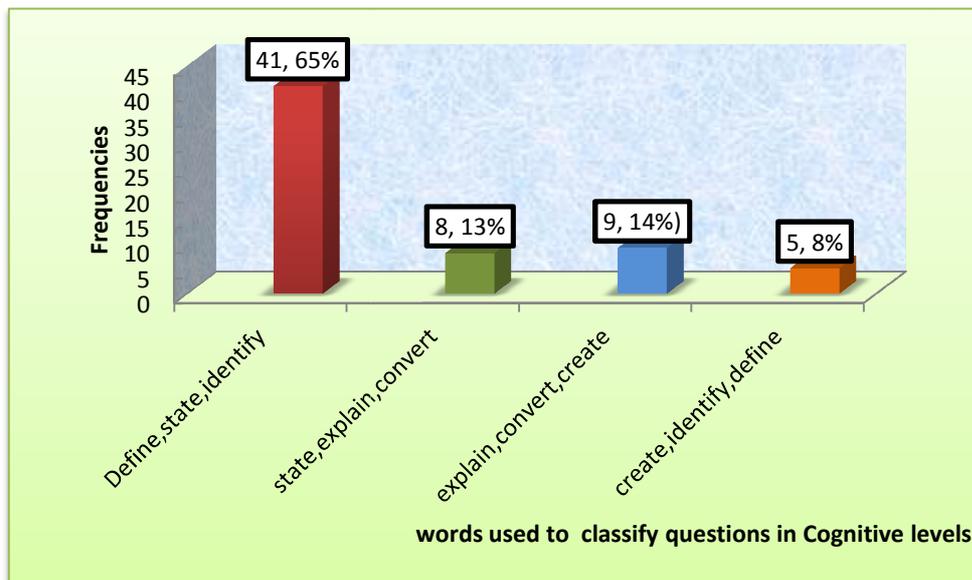
From the figure above, 15 (24%) of the respondents stated that there are three levels of educational objectives in cognitive domain, 8 (13%) stated that there are four levels, 12 (19%) stated that there are five levels and the majority, 28 (44%) of the respondents stated that there are six levels of educational objectives in cognitive domain which is the correct answer.

In addition to investigating the knowledge nurse educators had on the levels of cognitive domain, the study also gathered information on the specific words used to classify test items in the lowest level of cognitive domain.

The majority, 41 (65%) of the respondents correctly stated that the words define, state and identify are the ones used to classify test questions in the lowest levels of cognitive domain.

Only 8 (13%) of the respondents mentioned that the words state, explain, and convert are the ones used to classify test questions in the lowest levels of cognitive domain. 9 (14%) thought the words explain, convert and create are the ones used whereas 5 (8%) of the respondents thought create, identify and define are the words used. The mean was 1.6508 and the standard deviation was 1.00256. The responses are illustrated in figure 12 below.

**Figure 12: Words used to classify test questions in the lowest Level of cognitive domain (n=63)**



The research further analysed the responses nurse educators gave on the cognitive levels of educational objectives which promote critical thinking in students. Results are presented in figure 13 on the next page.

**Figure 13: Cognitive levels of educational objectives promoting critical thinking in students (n =63)**

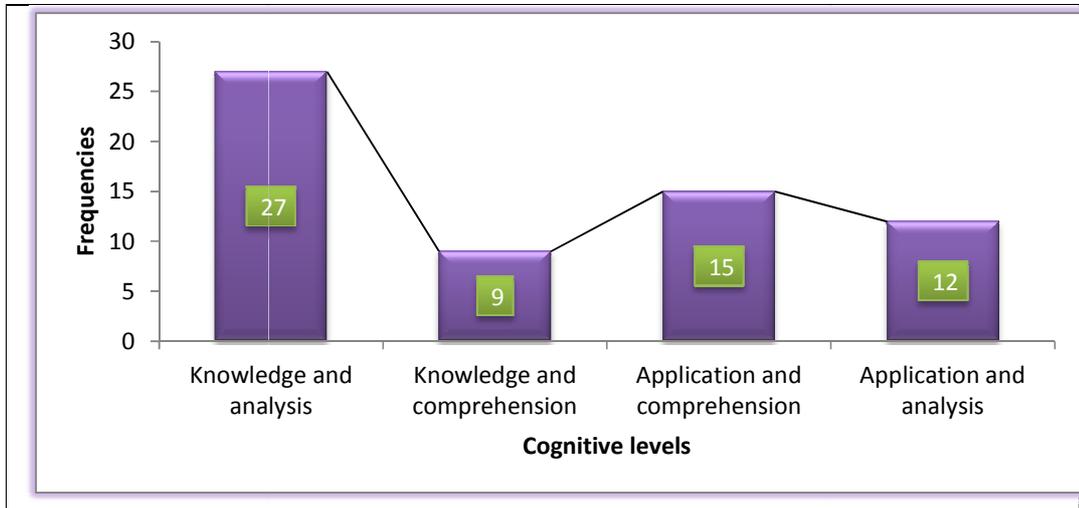
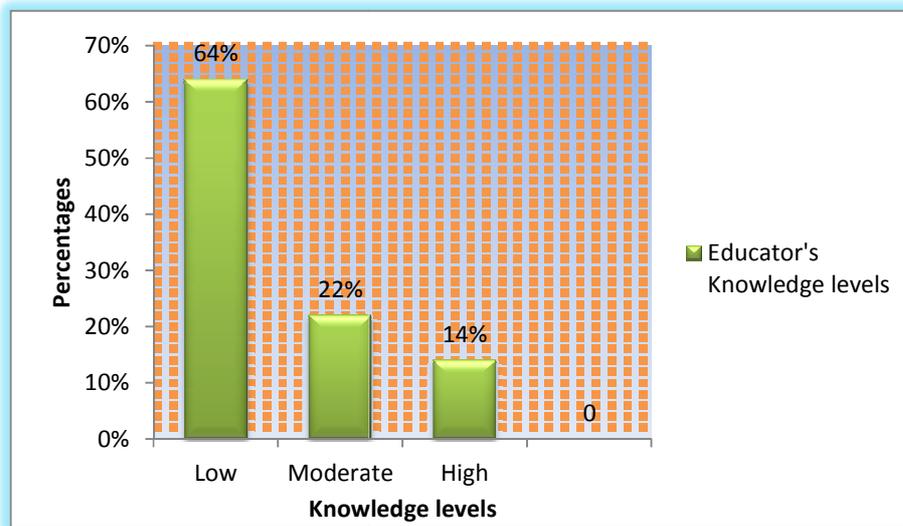


Figure 13 shows that 27 (43%) of the respondents indicated that knowledge and analysis in the Bloom's hierarchy of cognitive levels of educational objectives promote critical thinking, 9 (14%) stated that knowledge and comprehension promote critical thinking in students, 15 (24%) thought application and comprehension promote critical thinking where as 12 (19%) stated correctly that application and analysis promote critical thinking in students.

Using the cut off points set for this study, majority (64%) of the respondents had low knowledge on Bloom's cognitive levels, 22% had moderate knowledge while 14% had high knowledge. Figure 14 on the next page portrays the findings.

**Figure 14: Nurse Educators' knowledge levels on Bloom's cognitive levels (n = 63)**



#### **4.2.3 SECTION C: BLOOM'S HIERARCHY OF COGNITIVE LEVELS OF OBJECTIVES WHEN SETTING EXAMINATIONS**

##### **4.2.3.1 USE OF COGNITIVE LEVELS OF EDUCATIONAL OBJECTIVES WHEN PREPARING TEST ITEMS BY NURSE EDUCATORS.**

The second specific objective of this study was to determine the levels of cognitive domain assessed in examination papers. To achieve this objective, nurse educators were asked a number of questions to find out whether they used cognitive levels of educational objectives when preparing test items for examinations. The responses were recorded as shown in figure 15 on page 49.

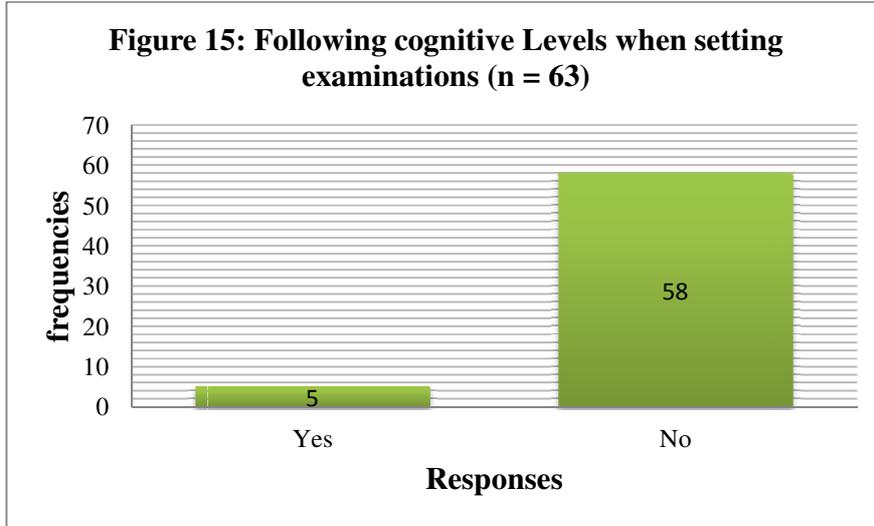
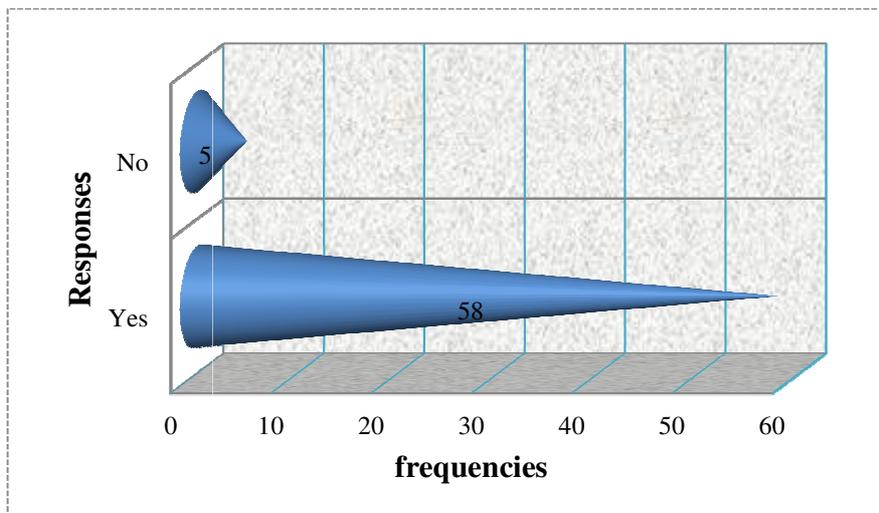


Figure 15 above indicates that 5 (8%) of the respondents mentioned that they always followed the Bloom's hierarchy of cognitive levels of educational objectives when setting examinations whereas majority, 58 (92%) stated that they did not.

Figure 16 below displays the results gathered on what nurse educators thought about the usage of Bloom's hierarchy of cognitive levels of educational objectives when setting/ preparing examination questions/test items.

**Figure 16: Importance of Bloom's Hierarchy of cognitive levels of educational objectives when setting examination questions/test items (n=63)**

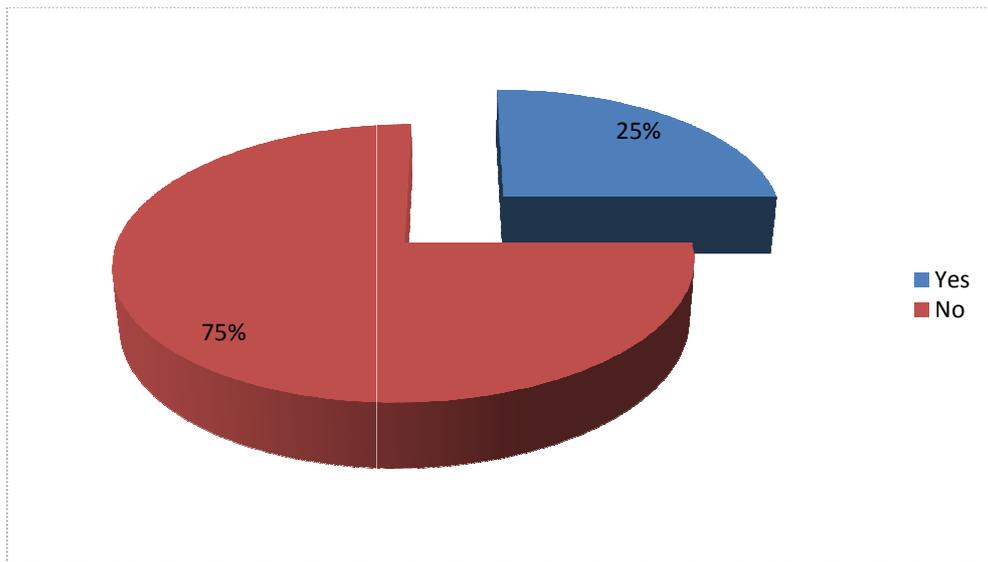


From figure 16 on page 49, a greater percentage, 58 (92%) of the respondents asserted that Bloom's hierarchy of cognitive levels of educational objectives when setting examination questions was important whereas 5 (8%) contended that following the Bloom's hierarchy of cognitive levels of educational objectives when setting examination questions was not important in nursing education.

#### 4.2.3.2 USE OF STANDARDIZED GUIDELINES WHEN PREPARING TEST ITEMS BY NURSE EDUCATORS

The analysis also gleaned information on whether nurse educators followed any standardized assessment guidelines when setting examination questions (preparing test items). The results are indicated in figure 17 below.

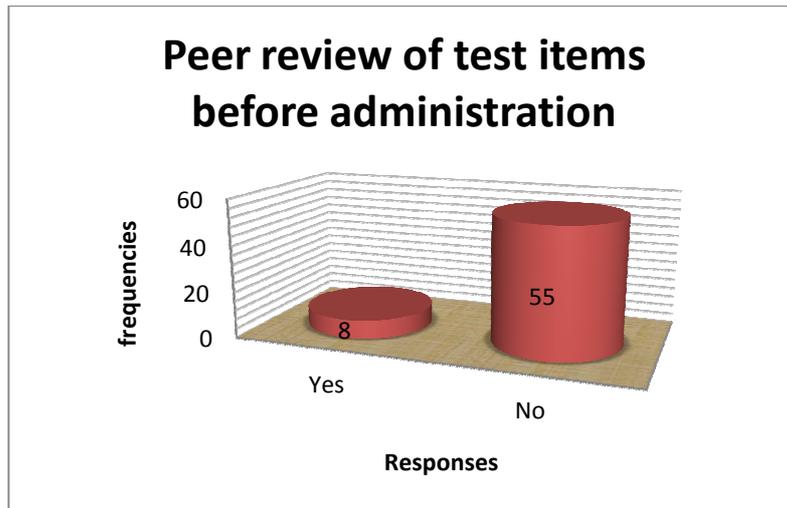
**Figure 17: Following Standardized assessment guidelines when setting examinations (n =63)**



Based on data presented in Figure 17 above, 16 (25%) of the respondents agreed that they used standardised guidelines for classroom assessment when setting examinations while the majority 47 (75%) stated that they did not follow any standardised guidelines when setting examinations.

With regard to standardized guidelines, the study also gathered information on peer reviewing (moderation) of test items before they were administered to students. Nurse educators' responses are presented in the figure below.

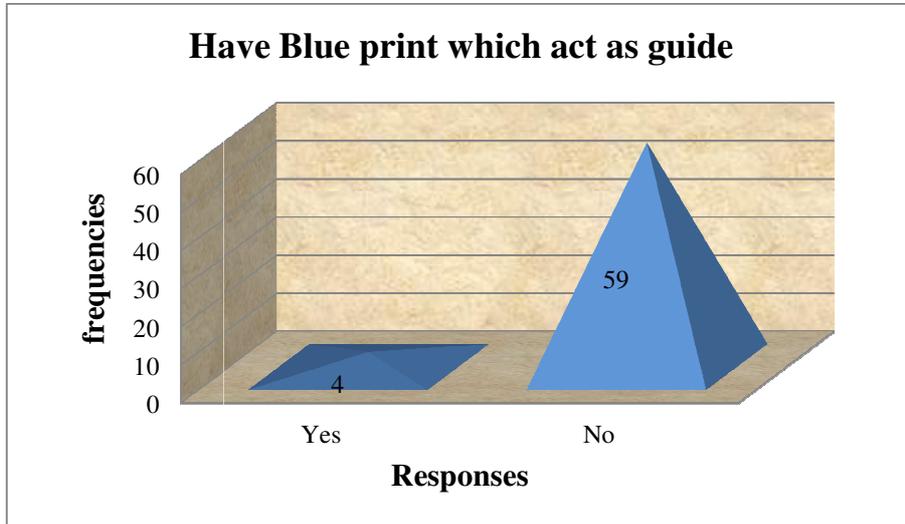
**Figure 18: Peer review of test items before administration to students (n =63)**



According to Figure 18 above, 8 (13%) of the respondents agreed that a team(s)/committee peer reviewed the test items before being administered to the students, whereas majority, 55 (87%) disagreed that they did not have their test papers peer reviewed before being administered to students.

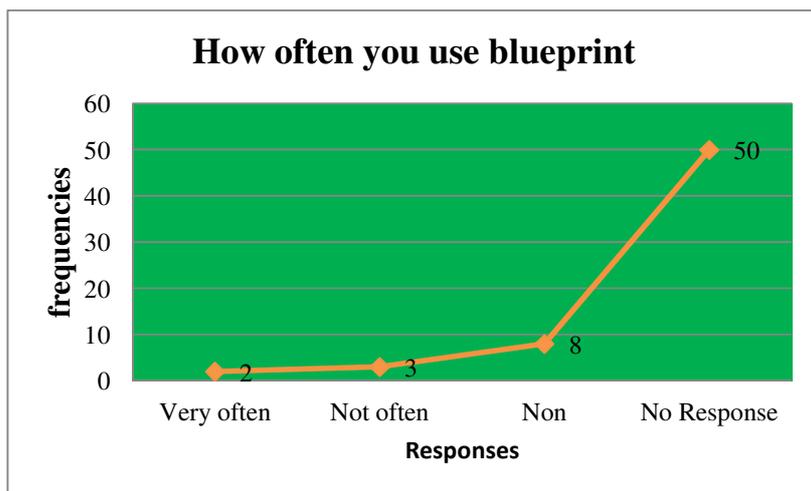
Furthermore, the study acquired the responses nurse educators gave on the availability of a blue print in nursing schools. The findings indicated that only 4 (6%) of the respondents had a blue print (table of specification) which act as a guide on how many questions to set in each cognitive level where as the rest 59 (94%) of the respondents affirmed that they did not have any blueprint. Figure 19 on page 52 gives a picture of the results.

**Figure 19: Have Blue print which acts as a guide on number of questions to set in each cognitive level (n =63)**



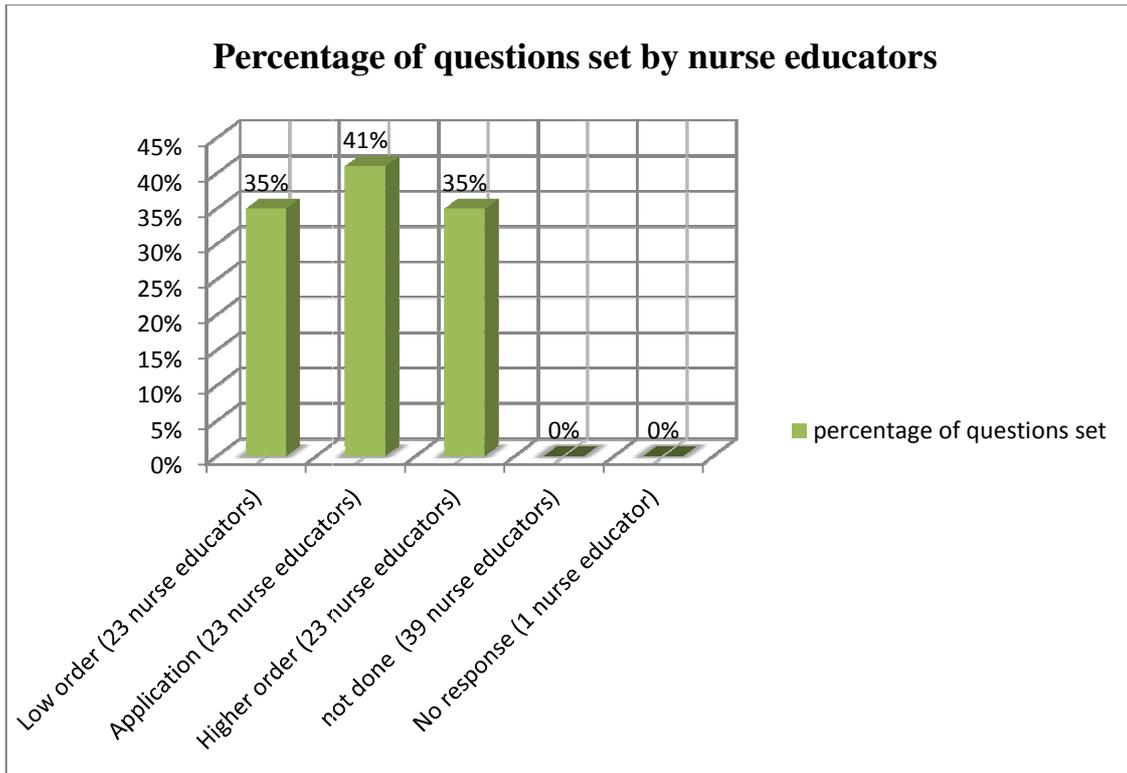
In addition, the study also collected data from nurse educators on how often the blue print was used. 2 (3%) of the respondents used the blueprint often, 3 (5%) used the blueprint but not often, 8 (13%) did not use the blue print at all and majority, 50 (79%) did not respond to the question. Figure 20 below gives a picture of the responses.

**Figure 20: Use of the Blueprint (n =63)**



However, figure 21 below displays data on the percentage of questions nurse educators usually ask for cognitive level classifications.

**Figure 21: Percentage of questions set for low Order, application and higher order levels (n =63)**



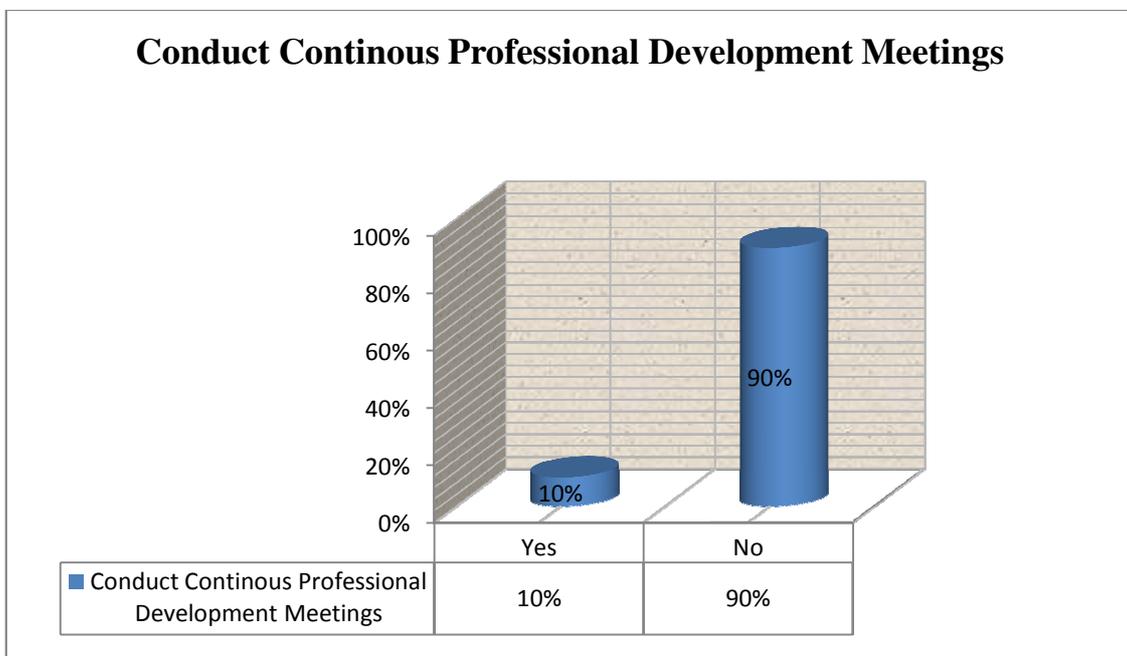
According to Figure 21 above, 62 nurse educators responded to the question of the percentage of questions set for low order level. It is evident that 23 (37%) of the respondents set about 35% of their examination test items for lower order level, 39 (61%) of the respondents mentioned that they did not do this process in their institutions whereas 1 (2%) of the respondents did not respond to the question at all.

On application order level, 23 (37%) of the respondents set 41% of questions for application level, 39 (61%) of the respondents mentioned that this was not done at all and only 1 (2%) did not respond to this question.

Higher order level results indicated that 23 (37%) of the respondents set 35% for higher order questions, 39 (61%) of the respondents mentioned that this was not done at all and only 1 (2%) did not answer this question.

The survey also got information from nurse educators on whether nursing departments conducted Continuing Professional Development meetings on assessment techniques. The responses from the nurse educators are tabulated in Table 22 below.

**Figure 22: Continuous Professional Development Meetings (CPDs) on assessment techniques (n =63)**



Referring to Figure 22 above, 6 (10%) of the respondents affirmed to the fact that there departments conducted continuous professional development meetings on assessment techniques, whereas majority, 57 (90%), of the respondents mentioned that their department did not hold such meetings.

#### 4.2.3.3 NURSE EDUCATOR'S TEACHING WORK LOAD

The analysis shows nurse educators' responses on the number of students they teach (educator – student ratio). Results have been illustrated in figure 23 below.

**Figure 23: Educator - Student Ratio (n =63)**

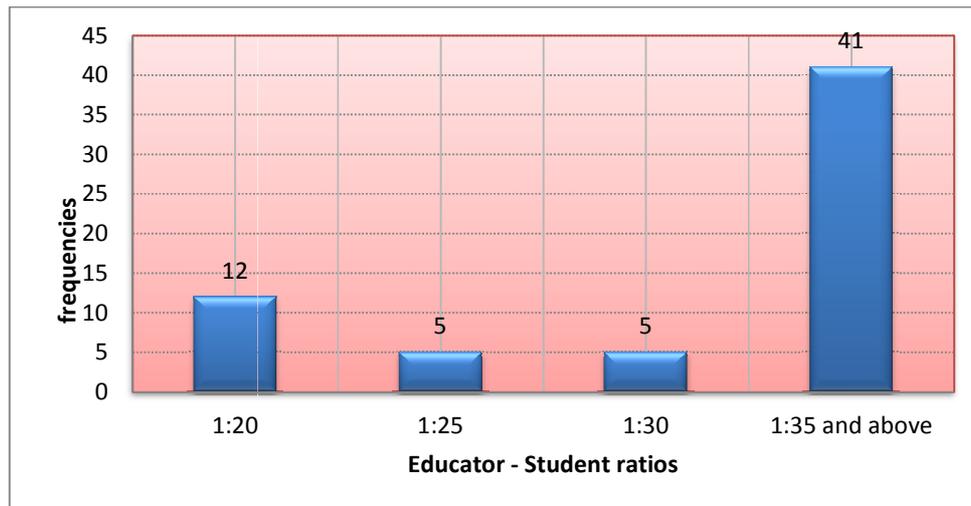
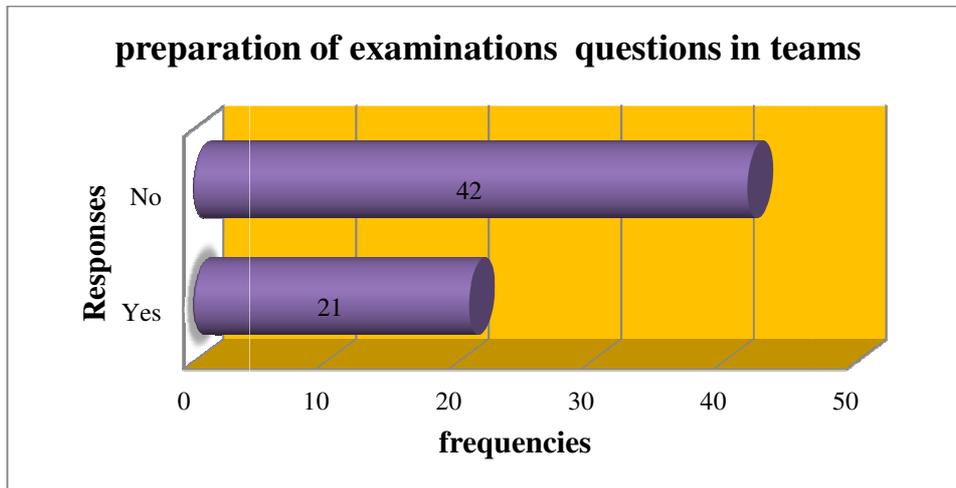


Figure 23 above indicates that the majority of the respondents 41 (65%) said that they had an educator - student ratio of 1:35 and above, 5 (8%) had a ratio of 1:30, 5 (8%) had a ratio of 1:25 and 12 (19%) had a ratio of 1:20. The mean was 3.1905 and the standard deviation was 1.21625.

The respondents were asked on whether examination questions/test items were prepared in teams. Results are recorded in figure 24 below.

**Figure 24: Preparation of examination questions in teams (n =63)**

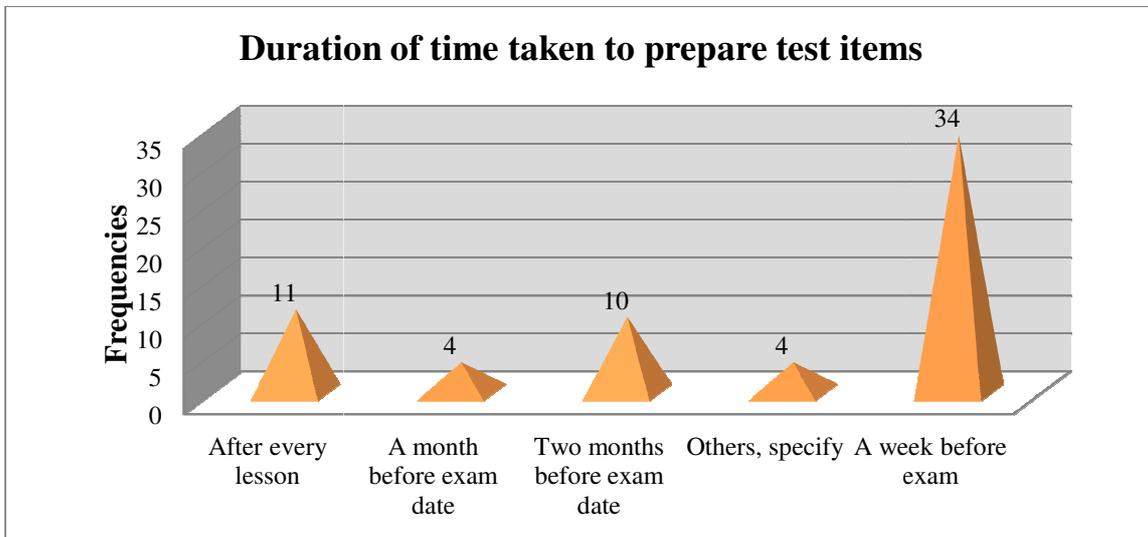


The tabulated data in figure 24 above, indicates that 21 (33%) of the respondents set examination questions in teams, whereas 42 (67%) mentioned that they did not set examinations in teams.

#### **4.2.3.4 TIME TAKEN TO PREPARE TEST ITEMS BY NURSE EDUCATORS**

Further analysis of nurse educators' responses on the duration of time taken to prepare test items indicated that 11 (18%) of the respondents prepared test items after every lesson, 4 (6%) of the respondents prepared test items a month before examinations, 10 (16%) of the respondents prepared tests two months before the examination date, 34 (54%) prepared tests a week before the examinations and only 4 (6%) of the respondents prepared tests on other interval not specified. The mean was 3.7302 and the standard deviation was 1.57814. Figure 25 on the next page gives a picture of the findings.

**Figure 25: Duration of time taken to prepare test items (n =63)**



Besides soliciting for information from nurse educators on the duration of time taken to prepare test items, the study also targeted to obtain information on the time when peer reviewed test papers were compiled. Table 3 below gives a picture of the responses.

**Table 3: Compilation of peer reviewed test papers (n =63)**

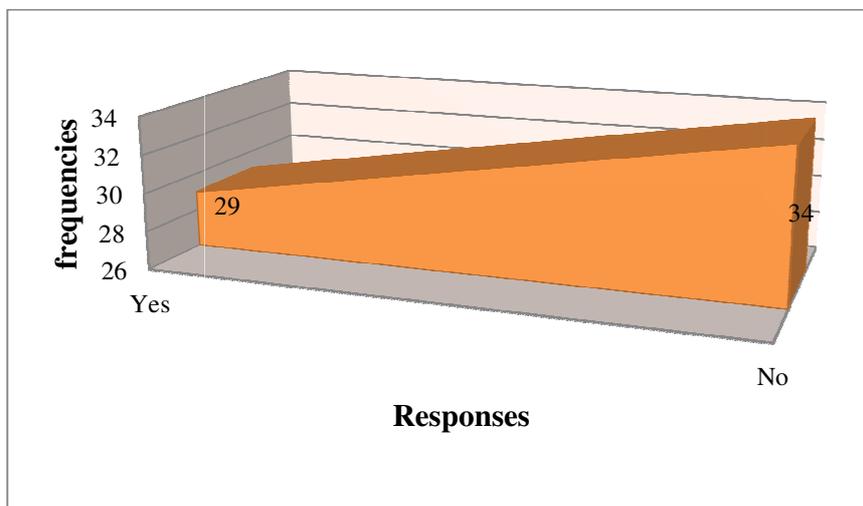
VARIABLE	FREQUENCY	PERCENTAGE
Week before examination date	9	14
Two days before examination date	4	6
Two weeks before examination date	4	6
Not done in the institution	46	74
<b>Total</b>	<b>63</b>	<b>100</b>

Table 3 indicates that 9 (14%) of the respondents compiled their peer reviewed test paper a week before the examination, 4 (6%) compiled 2 days before, 4 (6%) compiled 2 weeks before while the majority, 46 (74%) of the respondents affirmed that moderation or peer reviewing was not done in their institutions.

#### 4.2.3.5 USE OF CERTAIN TAXONOMIES IN ASKING QUESTIONS EITHER THROUGH TESTS OR ASSIGNMENTS BY NURSE EDUCATORS

The study further obtained information from nurse educators on the subject whether they followed other taxonomies other than Bloom's Taxonomy in asking questions either through tests or assignments. The responses are shown in figure 26.

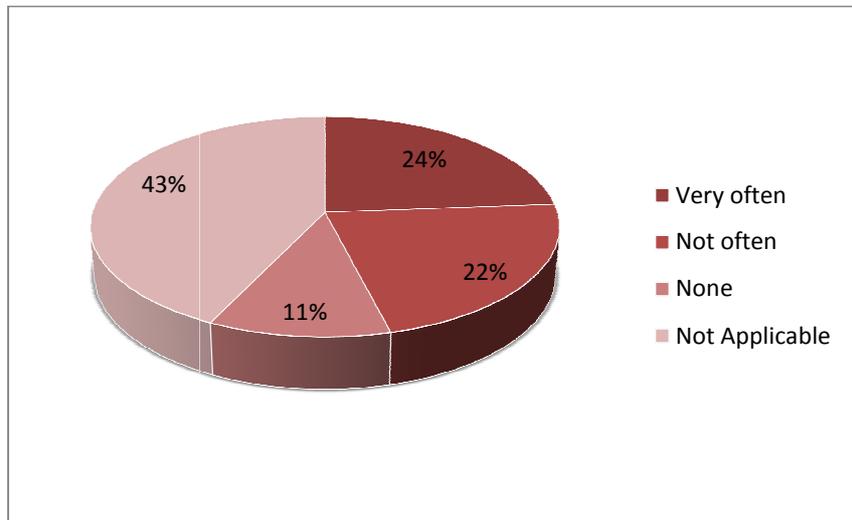
**Figure 26: Follow taxonomies in asking questions (n =63)**



Based on results from Figure 26 above, 29 (46%) of the respondents followed other taxonomies other than Bloom's taxonomy in asking questions either through test, assignments or during lessons and 34 (54%) of the respondents did not.

Following the responses in figure 26, the study also solicited information from nurse educators on how often they said taxonomies were used. Figure 27 below illustrates the responses.

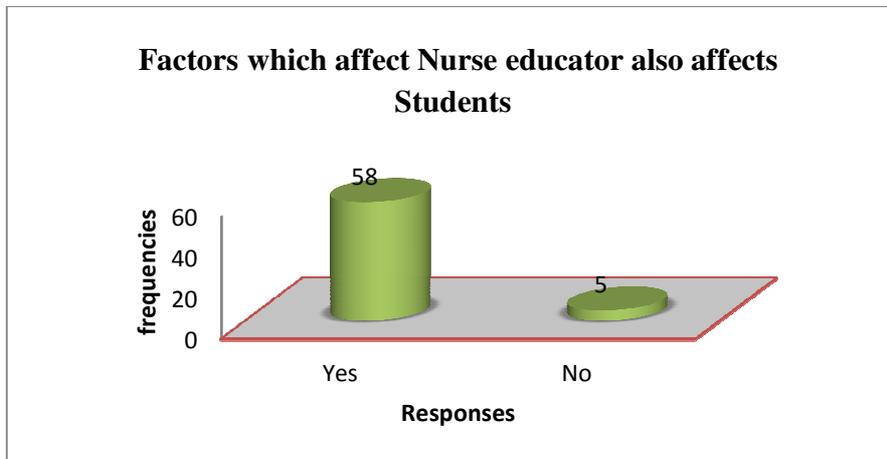
**Figure 27: How often do you use taxonomies (n =63)**



Based on the findings presented in Figure 27 above, 15 (24%) of the respondents used taxonomies very often, 14 (22%) used them but not often, 7 (11%) did not use them at all while 27 (43%) of the respondents did not respond to the question at all. The mean was 35.7460 and the standard deviation was 46.71049.

Furthermore, the investigation obtained information on whether the factors which affected nurse educators' usage of Bloom's taxonomy in questioning also affected the performance of student nurses/learners. The responses are illustrated in figure 28 on the next page.

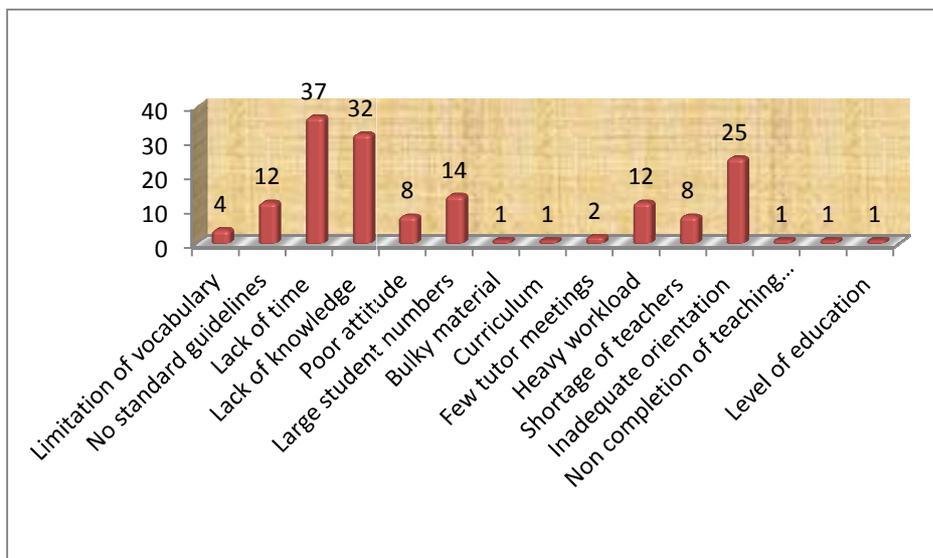
**Figure 28: Factors which affect Nurse Educator (n =63)**



According to Figure 28 above, majority, 58 (92%) of the respondents were aware that factors which affect nurse educators' usage of Bloom's taxonomy in questioning also affected performance of student nurses whereas 5 (8%) were not.

Additional analysis of nurse educators' responses on factors that affect the usage of Bloom's taxonomy in questioning indicated the following as shown in figure 29 below.

**Figure 29: Factors that affect usage of Bloom's Taxonomy in questioning techniques (n=63)**



According to figure 29 on page 60, most of the respondents stated that lack of time (23%) affects use of Bloom's taxonomy as a questioning technique in nursing. Lack of knowledge (20%) was also cited by most respondents, inadequate orientation (16%), large student numbers (9%), poor attitude (5%), no standard guidelines (7%), shortage of teachers (5%) and heavy workload (8%) were the main factors cited.

Further analysis of nurse educators' opinion on whether asking questions at different levels of cognitive domain indicated that all respondents 63 (100%) gave a positive response. They are agreed that asking questions at different levels of cognitive domain helps student nurses to develop critical thinking skills in nursing. The mean was 1.0000 and the standard deviation was 0.0000.

#### **4.3 PRESENTATION OF DATA (LEVELS OF COGNITIVE DOMAIN) FROM THE PAST EXAMINATION QUESTION PAPERS**

Furthermore, to achieve this study's second objective of determining levels of cognitive domain assessed in examination papers, the analysis of data collected from the records (past written examination questions) was done. The analysis was based on cognitive levels of educational objectives (Knowledge, Comprehension, Application, Analysis, Synthesis and Evaluation) found in examination papers. Examination question papers were collected from three (3) selected nursing schools in Eastern and Lusaka provinces of Zambia.

A total of 51 examination papers were collected and reviewed. The examination papers analysed were between 2011 and 2013. They contained 3,358 questions from all the levels of basic nursing programs. The question papers consisted of both objective and subjective questions. The researcher in this study grouped the results according to levels in the program per institution, over a period of 3 years. Out of these question papers, 41, containing 1,570 questions were from institution A. Among the 41 question papers, 26 with 903 questions were from institution A's first years. These were end of year examinations in each course. Second years accounted for nine (9) papers containing 433 questions.

These examination papers comprised of paper 1, 2 and 3 making intermediate examinations. Third years had 6 papers with a total number of 234 questions and these were hospital final examinations comprising of paper 1 and 2.

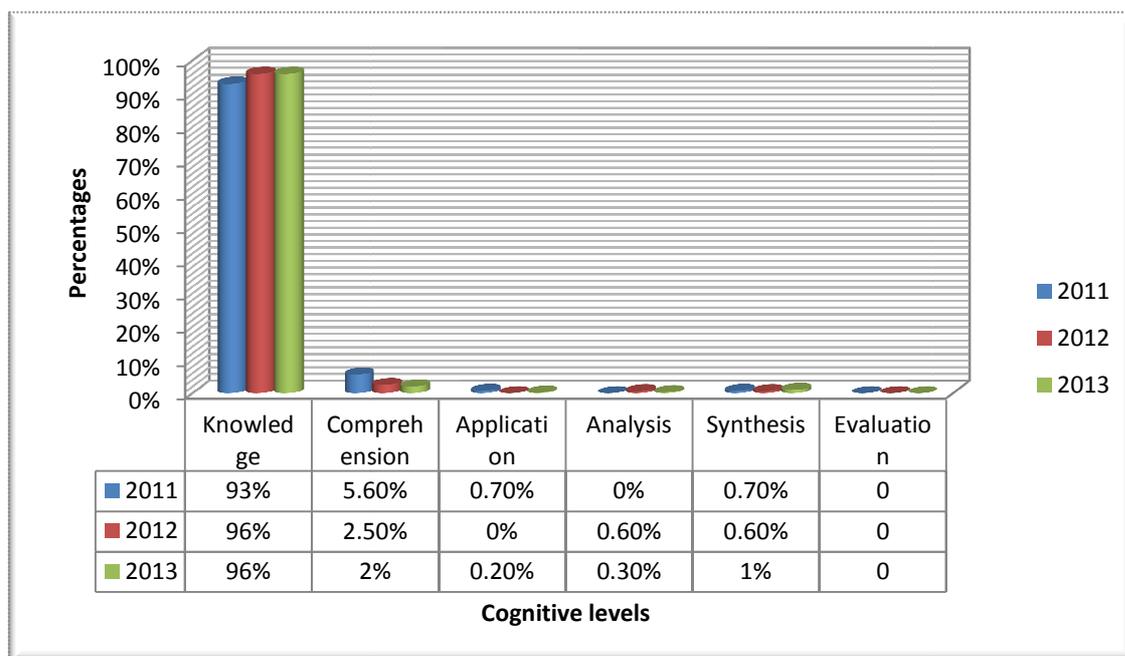
Institution B had a total number of 1082 questions analysed from 9 examination papers. Each year had one (1) paper of end of first year examination totalling to 384 questions. Second year's intermediate examinations, had a total of 336 questions analysed from three (3) question papers. Hospital mock examination had three (3) examination papers as well with 362 questions.

Seven (7) examination papers containing 728 questions were analysed from institution C. End of first year examination had a total number of 115 questions, second year's intermediate examinations had 234 questions while third year's hospital mock examinations consisted of 357 questions. The results are hereby illustrated in texts, tables and figures.

Below are illustrations depicting the analysis of cognitive levels from question papers set in each institution across the three (3) years (2011 to 2013).

#### 4.3.1 EXAMINATION QUESTION PAPERS FROM INSTITUTION A

**Figure 30: Cognitive Levels used in Institution A: Year 1 Papers**



According to the findings presented in figure 30, on page 63, in 2011, the majority of the questions were set at the knowledge/ recall level of cognitive domain with 133 (93%) of the questions asked.

Comprehension level questions accounted for 8 (5.6%). Fewer questions were observed at the application and synthesis levels which accounted for only 1 (0.7%) each. No questions were set at analysis and evaluation levels of cognitive domain of Bloom's taxonomy.

In 2012, the findings indicated that 155 (96%) were positioned at the knowledge/ recall level, followed by comprehension level at 4 (2.5%). Fewer questions were set at the analysis and synthesis levels which accounted for 1 (0.6%) each. No questions were set at application and evaluation levels of cognitive domain of Bloom's taxonomy.

In the year 2013 as illustrated in figure 30, it was evident that majority, 578 (96%), of the questions were drawn from the knowledge\ recall level, while 13 (2%) were from the comprehension and 25 (1%) from the synthesis level. Questions at the analysis level recorded 2 (0.3%) and application level at 1(0.2%). No questions were set at evaluation levels of cognitive domain of Bloom's taxonomy.

**Figure 31: Cognitive Levels used in Institution A: Year 2 Papers**

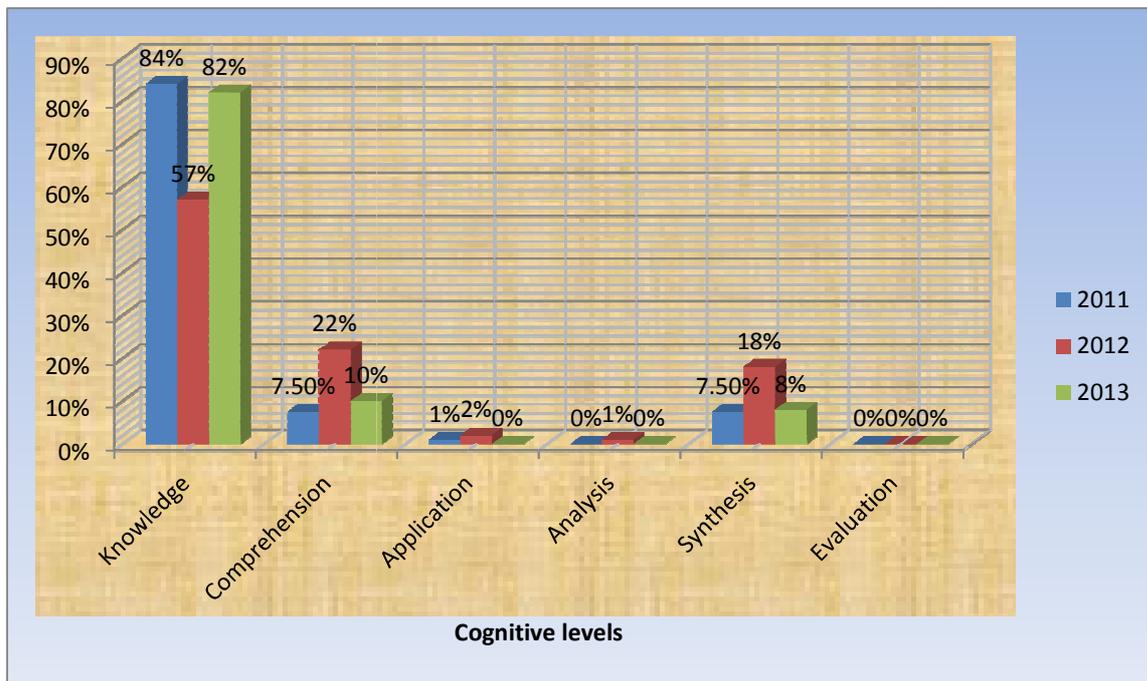
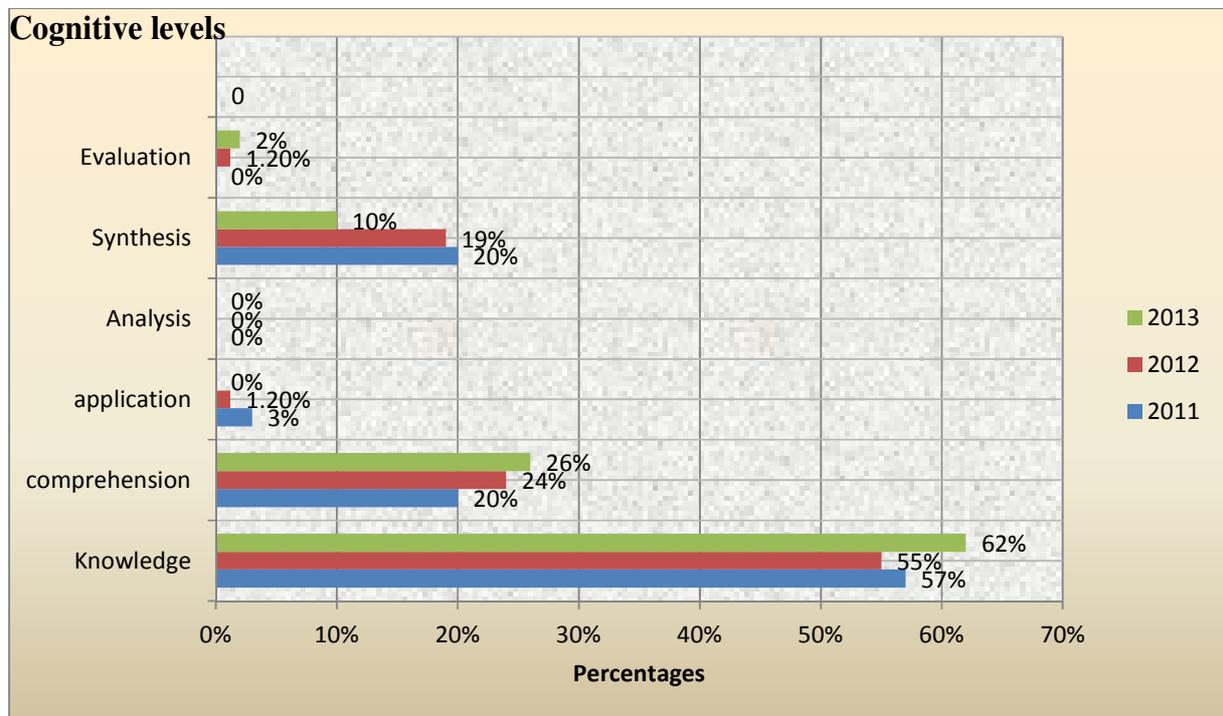


Figure 31 above shows findings of institution A, year 2 papers in 2011. The study revealed that the knowledge level dominated the examination papers by accounting for 134 (84%) of the 160 examination questions, followed by comprehension and synthesis level at 12 (7.5%) each, and application level at 2 (1%), while no questions were set for the analysis and evaluation levels.

In 2012, knowledge/ recall level still dominated the examination papers by 62(57%), followed by comprehension level at 24 (22%), synthesis level had 19 (18%) of the examination questions, while the application and analysis levels had very few questions accounting for 2 (2%) and 1(1%) respectively. Evaluation level had 0%.

2013's findings revealed that, majority 136(82%) were set at knowledge/ recall level. Comprehension level had 16 (10%) while synthesis accounted for 13(8%) of the examination questions. No questions were set at the application, analysis or evaluation level.

**Figure 32: Cognitive Levels used in Institution A: Year 3 Papers**



A review of examination question papers for year 3 (Figure 32), shows that in 2011, majority 44 (57%) out of 76 questions were set at knowledge/ recall level followed by comprehension and synthesis levels which accounted each for 15 (20%). Fewer questions were set from the application level which had 2 (3%) of the examination questions. No questions were set at analysis and evaluation levels in 2011's year 3.

In 2012, it was evident that majority, 44 (55%) out of 80 questions were drawn from the knowledge\ recall level, while 19 (24%) were from the comprehension level. This was followed by 15 (19%) from the synthesis level. Questions at the application and evaluation level recorded 1(1.2%) each. No questions were set at the analysis level of cognitive domain of Bloom's taxonomy in 2012's year 3.

Knowledge/ recall level still dominated the examination questions in 2013's year 3 by 48 (62%), followed by comprehension level at 20 (26%), synthesis level had 8 (10%) of the examination questions, while evaluation level had very few questions accounting for 2 (2%). No questions were set at application and analysis levels in 2013's year 3.

The study further analysed the questions into lower and higher order categories of cognitive domain. Table 4 below describes the findings and depicts the levels of complexity between the levels and years of training.

**Table 4: Summation of cognitive levels used and the levels of complexity**  
**Institution A: 2011 - 2013**

Cognitive levels	2011			2012			2013			Total
	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3	
	Total %	Total %	Total %	Total %	Total %	Total %	Total %	Total %	Total %	
<b>Lower order (Knowledge and Comprehension)</b>	141 (98.6%)	146 (91.3%)	59 (77.6%)	159 (98.7%)	86 (80%)	63 (79%)	591 (98.7%)	152 (92.1%)	68 (87.2%)	1465 93.3%
<b>Higher order (Application, Analysis, Synthesis, Evaluation)</b>	2 (1.4%)	14 (8.7%)	17 (22.4%)	2 (1.2%)	22 (20%)	17 (21%)	8 (1.3%)	13 (7.9%)	10 (12.8%)	105 6.7%
<b>Total questions</b>	143	160	76	161	108	80	599	165	78	1570
<b>Level of complexity between levels of training</b>	1 <sup>st</sup> and 2 <sup>nd</sup>		2 <sup>nd</sup> and 3 <sup>rd</sup>	1 <sup>st</sup> and 2 <sup>nd</sup>		2 <sup>nd</sup> and 3 <sup>rd</sup>	1 <sup>st</sup> and 2 <sup>nd</sup>		2 <sup>nd</sup> and 3 <sup>rd</sup>	
	7.3%		13.7%	18.7%		1%	6.6%		4.9%	
<b>Level of complexity between years of training</b>	<b>Between year 1 and year 2 (2011 – 2013)</b>					<b>Between year 2 and year 3 (2011 – 2013)</b>				
	10%					8%				

From table 4 on page 67, it was evident that a greater percentage of examination questions were dominated by lower order levels which accounted for 1465 (93.3%) for the year 2011 to 2013 in institution A. The smaller percentage of examination questions were set at higher order levels, 105 (6.7%).

However, in 2011, an increase in the level of complexity was noted between year 1 and year 2 by 7.3%. 13.7% was noted between year 2 and year 3 of 2011. In 2012, an increase in the level of complexity of examination questions by 18.7% was noted between year 1 and year 2.

A smaller increase of 1% was observed between year 2 and year 3. Another increase in the level of complexity of examination questions by 6.6% was detected between year 1 and year 2 of 2013 while 4.9% was noted between year 2 and year 3 of the same year.

Concerning the level of complexity between years of training (2011 to 2013), an increase in the level of complexity was noted between year 1 and year 2 for the year 2011 to 2013 by 10% and 8% between year 2 and year 3.

Tables 5, 6 and figure 33 below describe the findings from the analysis of examination question papers in institution B. The findings from the analysis are in relation to Bloom's classification of the cognitive domain.

#### 4.3.2 EXAMINATION QUESTION PAPERS FROM INSTITUTION B

**Table 5: Cognitive Levels used in Institution B: Year 1 Papers**

Cognitive levels	2011		2012		2013		Total	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
<b>Knowledge</b>	111	97	118	91	124	89	353	92
<b>Comprehension</b>	2	1.7	9	7	9	6	20	5
<b>Application</b>	0	0	0	0	1	1	1	0.3
<b>Analysis</b>	1	0.7	0	0	3	2	4	1
<b>Synthesis</b>	1	0.7	2	2	3	2	6	2
<b>Evaluation</b>	0	0	0	0	0	0	0	0
<b>Total</b>	<b>115</b>	<b>100</b>	<b>129</b>	<b>100</b>	<b>140</b>	<b>100</b>	<b>384</b>	<b>100</b>

According to the findings presented in table 5 on page 68, majority 111 (97%) of the questions were set at the knowledge/ recall level of cognitive domain of Bloom's taxonomy. Fewer questions were observed at comprehension level accounting for 2(1.7%) followed by analysis and synthesis levels which accounted for only 1 (0.7%) each. No questions were set at application and evaluation levels of cognitive domain of Bloom's taxonomy in institution B, year 1's examination papers. In 2012, the findings indicated that majority 118 (91%) of the examination questions were set at knowledge/ recall level. Fewer questions 9 (7%) were set at comprehension level, synthesis level accounted for 2 (2%). No questions were set at application, analysis and evaluation levels of cognitive domain of Bloom's taxonomy.

In the year 2013 as illustrated in table 5, it was evident that majority, 124 (89%), of the questions were set at knowledge\ recall level followed by comprehension level which accounted for 9 (6%). Questions at the analysis and synthesis level recorded 3 (2%) while 1(1%) questions were set at the application level. No questions were set at evaluation level of cognitive domain of Bloom's taxonomy.

**Table 6: Cognitive levels used in Institution B: Year 2 Intermediate examination papers**

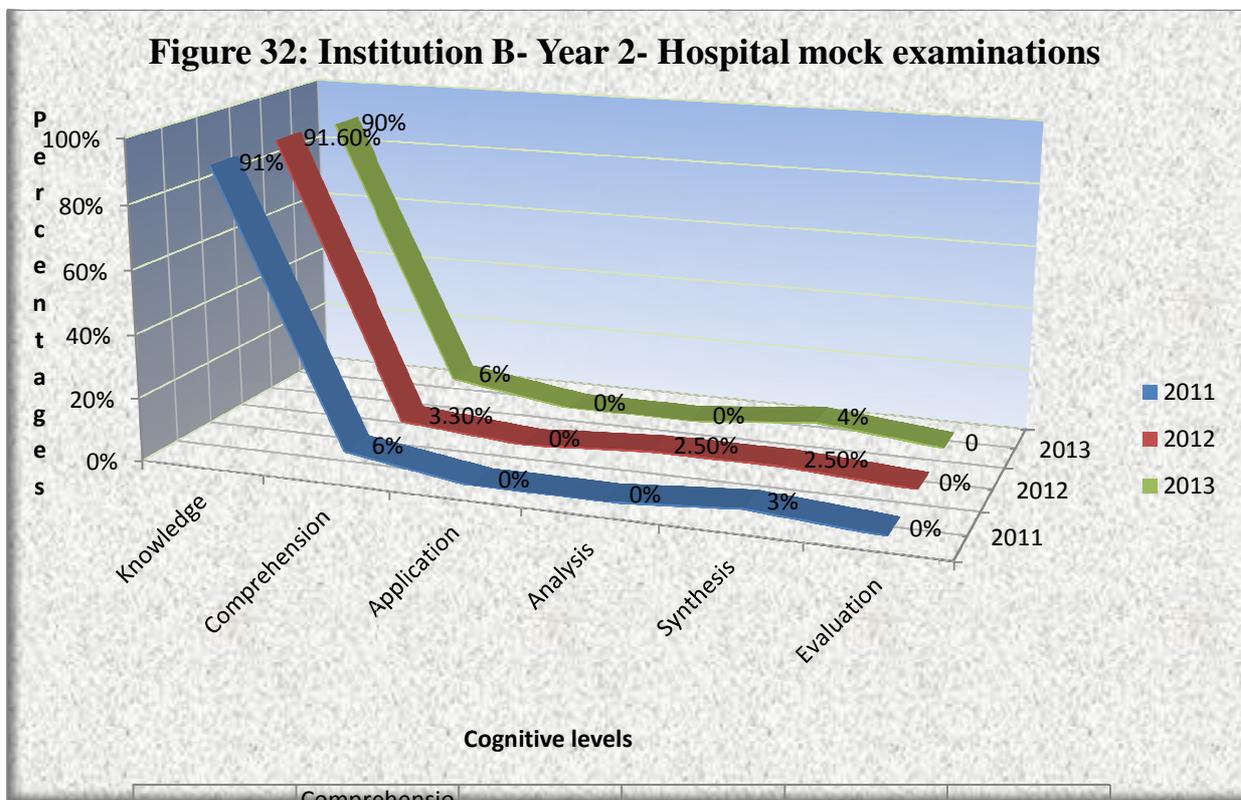
Cognitive levels	2011		2012		2013		Total	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
<b>Knowledge</b>	110	90	100	100	110	96	320	95
<b>Comprehension</b>	6	5	0	0	2	2	8	2.5
<b>Application</b>	0	0	0	0	0	0	0	0
<b>Analysis</b>	1	1	0	0	0	0	1	0.2
<b>Synthesis</b>	5	4	0	0	2	2	7	2.3
<b>Evaluation</b>	0	0	0	0	0	0	0	0
<b>Total</b>	<b>122</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>114</b>	<b>100</b>	<b>336</b>	<b>100</b>

From the table above, the majority 110 (90%) of the examination questions were set at knowledge/ recall level for the year 2011. Fewer questions 6 (5%) were set at comprehension level, synthesis level accounted for 5 (4%) while analysis level accounted for 1(1%).

No questions were set at application and evaluation levels of cognitive domain of Bloom's taxonomy. Surprisingly, in 2012, majority 100 (100%) of the examination questions dominated the knowledge/ recall level while no questions were set for the other levels of cognitive domain.

Furthermore, in 2013, knowledge/ recall level still dominated the examination questions accounting for 110 (96%). Fewer questions 2 (2%) were set at both comprehension and synthesis levels respectively. No questions were set at application, analysis and evaluation levels of cognitive domain in the same year.

**Figure 33: Institution B: Year 2: Hospital Mock Examinations**



According to the findings presented in figure 33 above, majority 107 (91%) of the questions were set at the knowledge/ recall level of cognitive domain of Bloom's taxonomy. Fewer questions were observed at comprehension level accounting for 7 (6%) followed by synthesis level at 3 (3%). No questions were set at application, analysis and evaluation levels of cognitive domain for the year 2011.

In 2012, knowledge/ recall level of cognitive domain still dominated accounting for 110 (91.6%) while fewer questions were set at comprehension level accounting for 4 (3.3%), analysis and synthesis levels for 3(2.5%) each. No questions were set at application and evaluation levels of cognitive domain of Bloom’s taxonomy. Majority, 113 (90%) of the examination questions in 2013 as shown in table 13 above were set at knowledge level. Comprehension level accounted for 7 (6%) while 5 (4%) of the examination questions were set at synthesis level. No questions were set at application, analysis and evaluation levels of cognitive domain of Bloom’s taxonomy.

Table 7 below displays summation of data on the types of questions nurse educators set for student nurses.

**Table 7: Summation of cognitive levels used and levels of complexity Institution B: 2011 - 2013**

Cognitive levels	2011			2012			2013			Total
	Year 1	Year 2 intermediate	Year 2 Mock exam	Year 1	Year 2 intermediate	Year 2 Mock exam	Year 1	Year 2 intermediate	Year 2 Mock exam	
	Total %	Total %	Total %	Total %	Total %	Total %	Total %	Total %	Total %	
<b>Lower order</b> (Knowledge and Comprehension)	113 (98.3%)	116 (95.1%)	114 (97.4%)	127 (98.4%)	100 (100%)	114 (95%)	133 (95%)	112 (98.2%)	120 (96%)	1049 (97%)
<b>Higher order</b> ( Application, Analysis, Synthesis, Evaluation)	2 (1.7%)	6 (4.9%)	3 (2.6%)	2 (1.6%)	0 (0%)	6 (5%)	7 (5%)	2 (1.8%)	5 (4%)	33 (3%)
<b>Total questions</b>	115	122	117	129	100	120	100	114	125	1082
<b>Level of complexity between levels of training</b> 	1 <sup>st</sup> year and intermediate exam		Intermediate and mock exams	1 <sup>st</sup> year and intermediate exam		Intermediate and mock exams	1 <sup>st</sup> year and intermediate exam		Intermediate and mock exams	
	3.2%		-2.3%	-1.6%		5%	-3.2%		2.2%	

Cognitive levels	2011			2012			2013			Total
	Year 1	Year 2	Year 2	Year 1	Year 2	Year 2	Year 1	Year 2	Year 2	
		intermediate	Mock exam		intermediate	Mock exam		intermediate	Mock exam	
	Total %	Total %	Total %	Total %	Total %	Total %	Total %	Total %	Total %	
Level of complexity between years of training.	Between year 1 and year 2, intermediate examinations (2011 – 2013)					Between year 2, intermediate exam and mock examinations (2011 – 2013)				
	-1%					1%				

From the table above, it is evident that a greater percentage of examination questions were dominated by lower order levels of cognitive domain which accounted for 1049 (97%) for the year 2011 to 2013 in institution B. The smaller percentage of examination questions were set at higher order levels, 33 (3%).

An increase in the level of complexity was noted between year 1 and intermediate examinations in year 2 of 2011 by 3.2%. However, in the same year, a negative difference of -2.3% was observed between intermediate and mock examinations. In 2012, a negative difference of -1.6% was noted between year 1 and intermediate examinations regarding the level of complexity of questions.

However, regarding intermediate and mock examinations in the same year, an increase of 5% was noted. In 2013, a negative difference of -3.2% was noted between year 1 and intermediate examinations regarding the level of complexity of questions.

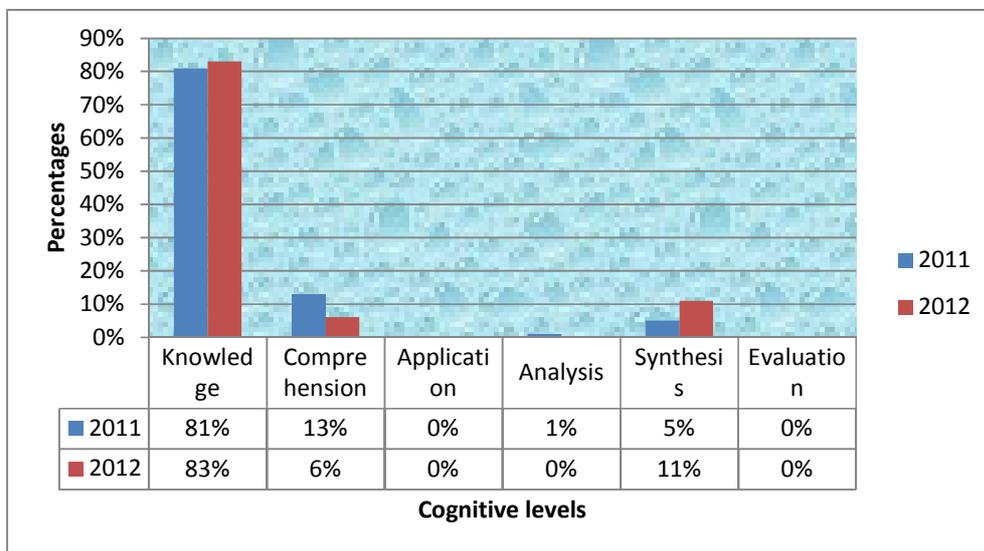
In the same year, an increase in the level of complexity of examination questions by 2.2% was detected between intermediate and hospital examinations.

Concerning the level of complexity between years of training (2011 to 2013), a negative difference of -1% was observed between Year 1 and intermediate while an increase by 1% was noted between intermediate and mock examinations.

### 4.3.3 EXAMINATION QUESTION PAPERS FROM INSTITUTION C

An analysis of cognitive levels in question papers for institution C was done. The purpose was to investigate whether nurse educators used Bloom’s hierarchy of cognitive levels of educational objectives when setting examinations. The researcher analyzed end of year 1 and intermediate examination papers for 2011 and 2012 only. The researcher did not find end of year 1 and intermediate examination papers for the year 2013. Figure 34 and table 8 below display the findings.

**Figure 34: Cognitive Levels used for Institution C: Year 1 Papers**



From figure 34 above, in 2011, most 49 (81%) of the questions from institution C’s year 1 papers were set at knowledge level. Comprehension level followed accounting for 8 (13%), synthesis level recorded 3 (5%) while analysis level accounted for 1 (1%). No application or evaluation level questions were set. Majority 45 (83%) of the examination questions were set at knowledge/recall level in the year 2012. Synthesis level followed accounting for 6 (11%) of the questions while comprehension recorded 3 (6%). No questions were set at application, analysis and evaluation levels.

**Table 8: Cognitive Levels used for Institution C: Year 2 Intermediate Examinations**

Cognitive levels	2011		2012		Total	
	Frequency	%	Frequency	%	Frequency	%
Knowledge	107	91.5	106	90.6	213	91
Comprehension	6	5.1	7	6	13	5.6
Application	0	0	0	0	0	0
Analysis	0	0	1	0.9	1	0.4
Synthesis	4	3.4	3	2.5	7	3
Evaluation	0	0	0	0	0	0
<b>Total</b>	<b>117</b>	<b>100</b>	<b>117</b>	<b>100</b>	<b>234</b>	<b>100</b>

The data presented in table 8 above shows that in the year 2011, a greater percentage, 107 (91.5%) of the examination questions were set at knowledge/recall level. A smaller percentage of questions were set at comprehension level which accounted for 6 (5.1%) and synthesis level 4 (3.4%). No questions were set at application, analysis and evaluation levels.

In 2012, knowledge/recall level questions still dominated accounting for 106 (90.6%), followed by 7 (6%) questions at comprehension level, synthesis level accounted for 3 (2.5%) and analysis level at 1 (0.9%). No questions were set at application and evaluation levels.

Figure 35 on the next page displays Hospital Mock Examination findings from all the three successive (3) years (2011 to 2013).

**Figure 35: Cognitive Levels used in Institution C: Year 2, Hospital Mock Examinations**

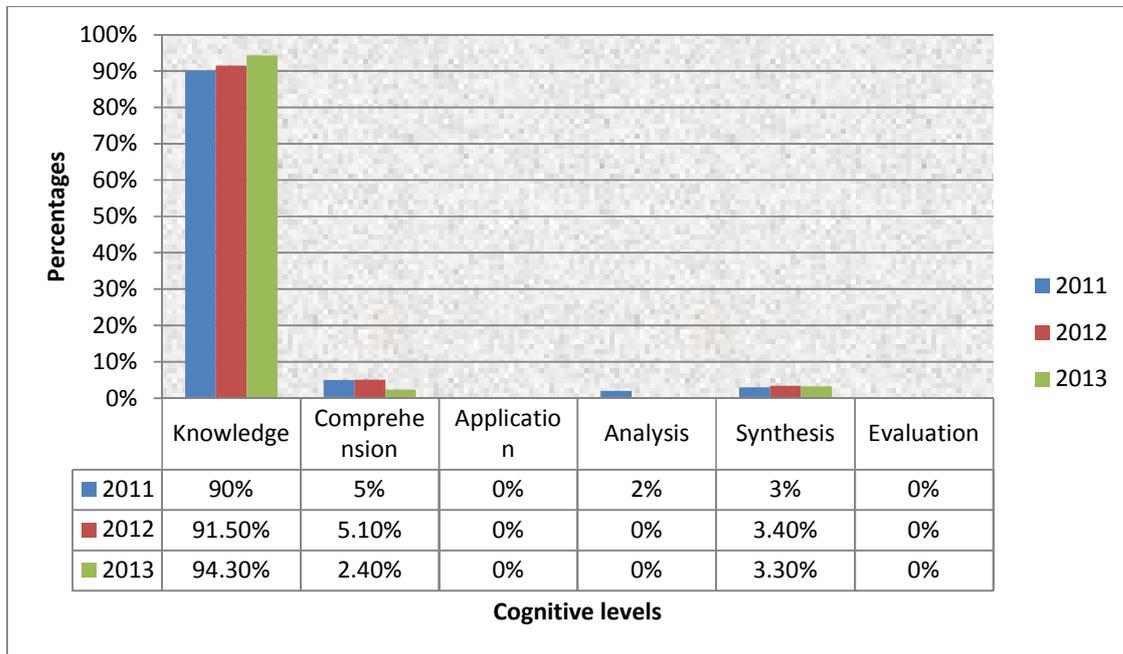


Figure 35 shows that the majority 105 (90%) of the questions of hospital mock examinations in the year 2011 were set at knowledge/recall level. Fewer questions were observed at comprehension level which recorded 6 (5%), followed by synthesis level 4 (3%) and analysis level which accounted for 2 (2%). Application and evaluation level accounted for 0%.

In 2012, questions set at knowledge/recall level still dominated and recorded 108 (91.5%). Fewer questions were set at comprehension level which accounted for 6 (5.1%), synthesis level recorded 4 (3.4%) while application, analysis and evaluation levels accounted for 0%.

In 2013, the greater percentage of examination questions was noted at knowledge/recall level accounting for 115 (94.3%). A smaller percentage of questions were recorded at comprehension level 3(2.4%) and synthesis level 4 (3.3%). No questions were set at application, analysis and evaluation levels.

Table 9 below gives a picture of the distribution of cognitive levels set in examination questions for institution C during the period between 2011 and 2013.

**Table 9: Summation of cognitive levels and levels of complexity:**

**Institution C: 2011 - 2012**

Cognitive levels	2011			2012		
	Year 1	Year 2	Year 2	Year 1	Year 2	Year 2
		intermediate	Mock exam		intermediate	Mock exam
	Total %	Total %	Total %	Total %	Total %	Total %
<b>Lower order</b> (Knowledge and Comprehension)	57 (93.4%)	113 (96.6%)	111 (94.9%)	48 (89%)	113 (96.6%)	114 (96.6%)
<b>Higher order</b> (Application, Analysis, Synthesis, Evaluation)	4 (6.6%)	4 (3.4%)	6 (5.1%)	6 (11%)	4 (3.4%)	4 (3.4%)
<b>Total questions</b>	61	117	117	54	117	118
<b>Level of complexity between levels of training</b>	1 <sup>st</sup> year and intermediate exam		Intermediate and mock exams	1 <sup>st</sup> year and intermediate exam		Intermediate and mock exams
	-3.2		1.7	-7.6		0
<b>Level of complexity between years of training.</b>	Between year 1 and year 2, intermediate examinations (2011 – 2012)			Between year 2, intermediate exam and mock examinations (2011 – 2012)		
	-0.6%			1%		

The summation of level of complexity for cognitive levels for institution C shows a decrease by -3.2% between year 1 and intermediate examinations for 2011. However, in the same year, an increase of 1.7% was noted between intermediate and mock examinations. In 2012, a negative difference of -7.6% was noted between year 1 and intermediate examinations.

Regarding intermediate and mock examinations in the same year, no reduction or increase in the level of complexity was noted and 0% was recorded.

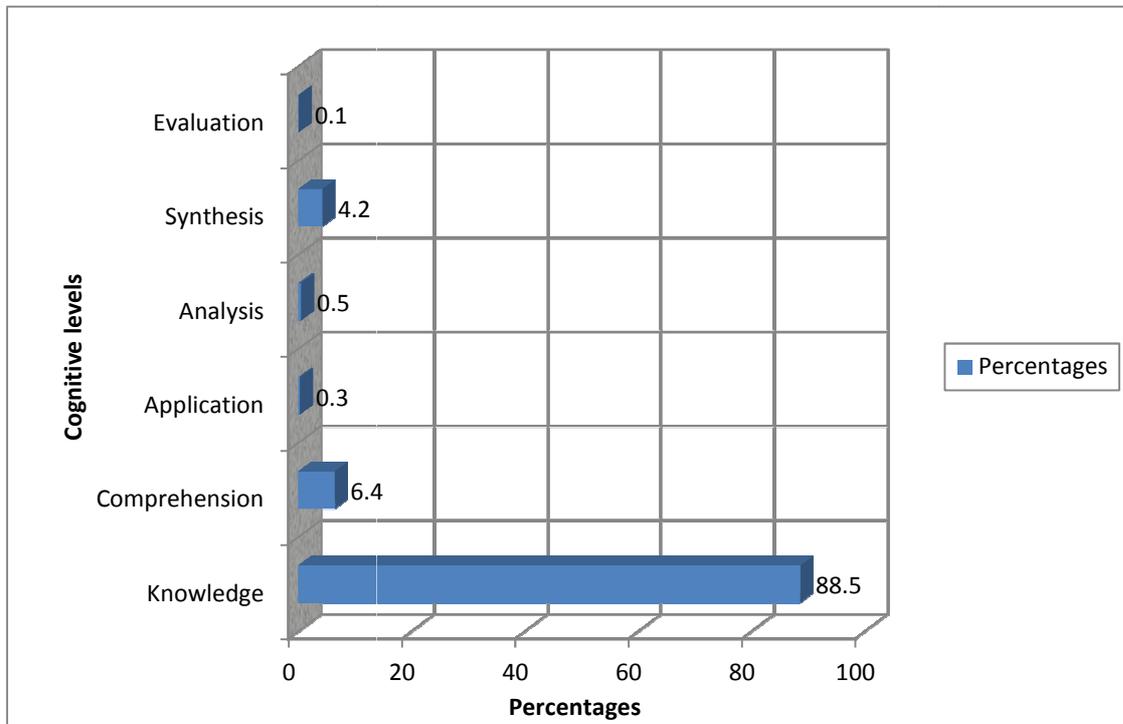
Concerning the level of complexity between years of training (2011 to 2012), a negative difference of -0.6% was observed between Year 1 and intermediate while an increase by 1% was noted between intermediate and mock examinations.

#### **4.3.4 SUMMATION OF COGNITIVE LEVELS OF EXAMINATION QUESTIONS (2011-2013) IN SCHOOLS OF NURSING OF EASTERN AND LUSAKA PROVINCES**

Figure 36 below shows the frequency distribution of cognitive levels in the examination questions set over a period of three (3) years, (2011-2013), in schools of nursing in Eastern and Lusaka provinces of Zambia. This is to establish the commonly and less commonly used domains out of 3,358 examination questions in all the selected schools. The greater percentage goes to knowledge level which accounted for 2,972 (88.5%) of examination questions followed by comprehension, 216 (6.4%). The smaller percentages were observed at synthesis level with 141 (4.2%), Analysis accounting for 16 (0.5%), Application level, 10 (0.3%) and Evaluation level at 3 (0.1%).

Furthermore, lower order questions (knowledge and comprehension) accounted for 3188 (95%) while higher order questions (application, analysis, synthesis and evaluation) were noted at 170 (5%) for the period 2011 to 2013 in all the 3 institutions. This showed that there was no balance in the questions set across the lower order and higher order cognitive categories. Figure 36 on page 77 illustrates the findings.

**Figure 36: Summation of cognitive levels of examination questions (2011-2013) in schools of nursing of Eastern and Lusaka provinces (n=3,358)**



Bloom’s taxonomy arranges action verbs which help differentiate test questions into various cognitive levels. However, table 10 below shows the action verbs which were used by nurse educators in the analysed question papers.

**Table 10: ACTION VERBS USED IN ALL QUESTIONS IN ALL SELECTED NURSING SCHOOLS YEAR 2011 TO 2013**

Action verb or question stems used	FIRST YEAR in both 2 and 3 year programs		SECOND YEAR in a 3 year program		Intermediate Mock exams in a 2 year program		THIRD YEAR		TOTAL	
	Frequency	%	Frequency	%		%	Frequency	%		%
<b>Knowledge level of cognitive domain</b>										
Choose (MCQs)	408	29.1	113	26.1	391	30.3	-	-	912	27.2
Match	274	19.5	20	4.6	254	19.7	-	-	548	16.3

Action verb or question stems used	FIRST YEAR in both 2 and 3 year programs		SECOND YEAR in a 3 year program		Intermediate Mock exams in a 2 year program		THIRD YEAR		TOTAL	
	Frequency	%	Frequency	%		%	Frequency	%		%
<b>Knowledge level of cognitive domain</b>										
True/false	100	7.1	-	-	-	-	-	-	100	3
Knowledge Level										
Complete	230	16.4	60	13.9	229	17.8	-	-	519	15.5
Define	93	6.6	41	9.5	30	2.3	45	19.2	209	6.2
State	22	1.6	45	10.4	40	3.1	42	17.9	149	4.4
Identify	-	-	5	1.2	11	0.9	2	0.9	18	0.5
List	65	4.6	12	2.8	26	2	20	8.5	123	3.7
Outline	64	4.6	13	3	8	0.6	13	5.6	98	2.9
Mention	36	2.6	13	3	11	0.9	12	5.1	72	2.4
Indicate	-	-	-	-	1	0.08	-	-	1	0.02
What	10	0.7	1	0.2	12	0.9	-	-	23	0.7
Which	40	2.9	4	0.9	134	10.4	-	-	178	5.3
Who	5	0.4	-	-	1	0.08	-	-	6	0.2
Name	-	-	1	0.2	-	-	-	-	1	0.02
Where	-		-	-	1	0.08	-	-	1	0.02
Draw	5	0.4	5	1.6	9	0.7	3	1.3	22	0.7
<b>Comprehension level of cognitive domain</b>										
Explain	11	0.8	36	8.3	40	3.1	33	14.1	120	3.6
Describe	10	0.7	10	2.3	18	1.4	15	6.4	53	1.6
Make	1	0.07	-	-	-	-	1	0.4	2	0.06
Discuss	11	0.8	6	1.4	19	1.5	5	2.1	41	1.2
Why	1	0.07	-	-	-	-	-	-	1	0.02
Give	1	0.07	2	0.5	1	0.08	-	-	4	0.1
<b>Application level of cognitive domain</b>										
Illustrate	1	0.07	3	0.7	1	0.08	-	-	5	0.1
Counsel	-	-	-	-	-	-	1	0.4	1	0.02
How	2	0.1	-	-	-	-	-	-	2	0.05

Action verb or question stems used	FIRST YEAR in both 2 and 3 year programs		SECOND YEAR in a 3 year program		Intermediate Mock exams in a 2 year program		THIRD YEAR		TOTAL	
	Frequency	%	Frequency	%		%	Frequency	%		%
<b>Knowledge level of cognitive domain</b>										
Solve	-	-	1	0.2	-	-	-	-	1	0.02
<b>Analysis level of Cognitive Domain</b>										
Differentiate	-	-	-	-	1	0.08	-	-	1	0.02
Calculate	3	0.2	1	0.2	4	0.3	-	-	8	0.2
Compare and Contrast	1	0.07	-	-	1	0.08	-	-	2	0.05
Convert	-		-	-	1	0.08	-	-	1	0.02
<b>Synthesis level of Cognitive Domain</b>										
Discuss the management	1	0.07	17	3.9	19	1.5	19	8.1	56	1.7
Describe the management	2	0.1	24	5.5	23	1.8	21	9	70	2.1
Explain nursing care	1	0.07	-	-	-	-	-	-	1	0.02
Write	4	0.3	-	-	2	0.6	-	-	6	0.2
Manage	-		-	-	-	-	1	0.4	1	0.02
<b>Evaluation level of Cognitive Domain</b>										
Assess & Classify	-	-	-	-	-	-	1	0.4	1	0.02
Justify	-		-	-	1	0.08	-	-	1	0.02
<b>TOTAL</b>	1,402	100%	433	100%	1,289	100%	234	100%	3,358	100%

The findings in table 10 above shows that the most commonly used action verbs for first years were choose at 408 (29.1%) , followed by match accounting for 274 (19.5%), Complete at 230 (16.4%), True/False at 100 (7.1%), Define at 93 (6.6%), Outline and List at 65 (4.6%) respectively.

Furthermore, the data in table 16 shows that the verb “Choose” still dominated, accounting for 113 (26.1%) in the examination questions for second years of the a three (3) year program.

This was followed by complete with 60 (13.9%), state 45 (10.4%), define at 41 (9.5%), explain 36 (8.3%), describe the management at 24 (5.5%)

Intermediate and hospital mock examinations for a two (2) year program recorded “choose” with 391 (30.3%) as the most frequently used action verb.

This was followed by match at 254 (19.7%), complete 229 (17.8%), which 134 (10.4%) while the verb state and explain accounted for 40 (3.1%) respectively.

Third year level indicated that the commonly used verbs in examination questions were define at 45 (19.2%), state at 42 (17.9%), explain at 33 (14.1%), describe the management at 21 (9%), list 20 (8.5%), discuss the management at 19 (8.1%), describe 15 (6.4%), outline 13 (5.6%) and mention at 12 (5.1%).

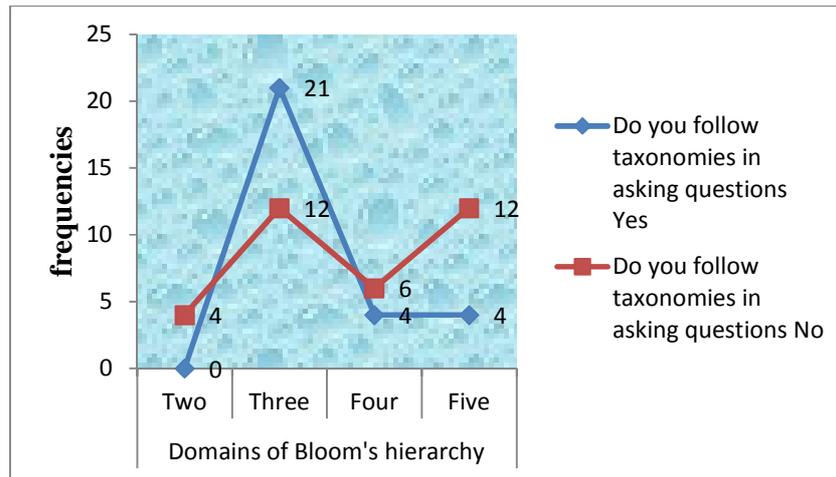
However, in summary, “choose” which accounted for 27.2% of all the questions from all the institutions in the years 2011 to 2013, was the most frequently used action verb. This was followed by match at 16.3%, complete at 15.5%, define at 6.2% and which at 5.3%.

#### **4.4 SECTION C: ASSOCIATIONS AMONG VARIABLES**

The third specific objective of this study was to determine the relationship between respondents’ knowledge levels of Bloom’s taxonomy and use of cognitive levels of educational objectives in setting examinations. To achieve this objective, cross tabulations were used to explore the statistical relationships between variables.

#### 4.4.1 RELATIONSHIP BETWEEN RESPONDENTS KNOWLEDGE LEVELS OF DOMAINS OF BLOOMS TAXONOMY AND USE OF COGNITIVE LEVELS OF EDUCATIONAL OBJECTIVES

**Figure 37: Use of taxonomies when asking questions and knowledge of domains of Bloom's taxonomy.**



A cross tabulation of use of taxonomies and knowledge of the number of domains Bloom's hierarchy of cognitive levels of educational objectives has, is presented in Figure 37 on page 81. The findings indicated that of the total number of 29 respondents who said they used taxonomies when asking questions, none mentioned that the Bloom's taxonomy had two domains, 21 (72%) of the respondents said it had three domains, 4 (14%) said it had four domains and 4 (14%) said it had five domains.

Among the 34 who did not use Bloom's hierarchy of cognitive levels of educational objectives, 4 (12%) said Bloom's taxonomy had two domains, 12 (35%) said it had three domains, 6 (18%) said it had four domains and 12 (35%) said it had five domains. The chi square test was used to test the null hypothesis ( $H_0$ ) that there was no relationship between use of taxonomies when asking questions and knowledge of Bloom's taxonomy domains. The alternative hypothesis ( $H_1$ ) tested was that there was a relationship between use of taxonomies when asking questions and knowledge of domains of Bloom's taxonomy. The p-value used for testing was set at  $\alpha = 0.05$ . The chi square (asymptotic significance 2 sided) was 0.015 with 3 degrees of Freedom (df). P-value = 0.015 which was below the standard  $\alpha = 0.05$ .

Therefore, the null hypothesis was rejected and concluded that there was a significant relationship between use of taxonomies when asking questions and knowledge of domains of Bloom's taxonomy.

**Table 11: Follow Taxonomies and knowing levels of Cognitive Domain**

		Knowing Levels of cognitive domain				Total
		Three	Four	Five	Six	
Do you follow taxonomies in asking questions	Yes	6	6	4	13	29
	No	9	2	8	15	34
Total		15	8	12	28	63

Table 11 shows that of the total of 29 respondents who used/followed taxonomies when asking questions, 6 (21%) mentioned that the levels cognitive domain had were three, 6 (21%) mentioned that the levels were four, 4 (13%) mentioned that the levels were five and 13 (45%) mentioned that the levels were six.

Of the 34 respondents that did not use taxonomies when asking questions, 9 (26%) mentioned that the levels were three, 2 (6%) mentioned that the levels were four, 8 (24%) mentioned that the levels were five and 15 (44%) mentioned that the levels were six. The chi square test was used to test the null hypothesis ( $H_0$ ) that there was no relationship between use of taxonomies when asking questions and knowing levels of Cognitive Domain. The alternative hypothesis ( $H_1$ ) tested was that there was a relationship between use of taxonomies when asking questions and knowing levels of Cognitive Domain. The p-value used for testing was set at  $\alpha = 0.05$ .

The p-value of 0.295 which lied above the standard  $\alpha = 0.05$  was found. It was therefore concluded that there was no significant association between following/using taxonomies when asking questions and knowing the levels of cognitive domain.

**Table 12: Use of taxonomies and knowledge of words used to classify test questions in lowest level of cognitive domain**

		Words used to classify test questions in the lowest level of cognitive domain				Total
		Define, state, identify	State, explain, convert	Explain, convert, create	Create, identify, define	
<b>Do you follow taxonomies in asking questions</b>	Yes	24	2	0	3	29
	No	17	6	9	2	34
<b>Total</b>		41	8	9	5	63

As indicated in table 12 above, 24 (83%) of the respondents among the 29 respondents who said they used taxonomies, also said the words define, state and identify were the ones used to classify test questions in the lowest level of cognitive domain, whereas only 2 (7%) of the respondents mentioned that state, explain and convert. None of the respondents who used taxonomies mentioned explain, convert and create but 3 (10%) of the respondents mentioned that create, identify and define were used to classify test questions in the lowest level of cognitive domain.

Among the 34 respondents who did not use taxonomies 17 (50%) indicated that the words used to classify test questions in the lowest level of cognitive domain were define, state, and identify, 6 (17.6%) mentioned that they were state, explain and convert, 9 (26.5%) mentioned that they were explain, convert and create and only 2 (5.9%) mentioned that they were create, identify and define.

The chi square test was used to test the null hypothesis ( $H_0$ ) that there was no relationship between use of taxonomies when asking questions and knowledge of words used to classify test questions in the lowest level of cognitive domain. The alternative hypothesis ( $H_1$ ) tested was that there was a relationship between use of taxonomies when asking questions and knowledge of words used to classify test questions in the lowest level of cognitive domain. The p-value used for testing was set at  $\alpha = 0.05$ . P-value of 0.007 which lied below the standard  $\alpha = 0.05$  was found. Therefore, the null hypothesis was rejected and concluded that there was a significant relationship between use of taxonomies when asking questions and knowledge of words used to classify test questions in the lowest level of cognitive domain.

**Table 13: Use of Taxonomies and Knowledge of cognitive levels promoting critical thinking in students**

	Cognitive levels promoting critical thinking in students				Total	
	Knowledge and analysis	Knowledge and comprehension	Application and comprehension	Application and analysis		
Do you follow taxonomies in asking questions	Yes	7	2	12	8	29
	No	20	7	3	4	34
<b>Total</b>		27	9	15	12	63

According to Table 13 above, 7 (24%) out of the 29 respondents that used taxonomies mentioned that knowledge and analysis levels of Bloom’s hierarchy of cognitive levels of educational objectives promoted critical thinking in students, whereas 2 (7%) of the respondents mentioned knowledge and comprehension, 12 (41%) of the respondents mentioned application and comprehension and 8 (28%) of the respondents mentioned application and analysis.

On the other hand, out of 34 respondents who did not use taxonomies, 20 (59%) mentioned that knowledge and analysis levels of the Bloom’s hierarchy of cognitive levels of educational objectives promote critical thinking in students, whereas 7 (20%) of the respondents mentioned knowledge and comprehension, 3 (9%) mentioned application and comprehension and 4 (12%) mentioned application and analysis.

The chi square test was used to test the null hypothesis ( $H_0$ ) that there was no relationship between use of taxonomies when setting questions and knowledge of cognitive levels promoting critical thinking in students. The alternative hypothesis ( $H_1$ ) tested was that there was a relationship between use of taxonomies when asking questions and knowledge of cognitive levels promoting critical thinking in students. The p-value used for testing was set at  $\alpha = 0.05$ . P-value of 0.001 which lied below the standard  $\alpha = 0.05$  was found. Therefore, the null hypothesis was rejected and concluded that there was a significant relationship between use of taxonomies when setting questions and knowledge of cognitive levels promoting critical thinking in students.

## **CHAPTER FIVE**

### **5.0 DISCUSSION OF FINDINGS**

#### **5.1 Introduction**

This chapter discusses findings of the investigation conducted on knowledge and use of Bloom's hierarchy of cognitive levels of educational objectives in preparing test items for examinations by nurse educators.

#### **5.2 DEMOGRAPHIC INFORMATION**

The study had 63 participants. There was a relative gender balance though more weight tilted towards Females. Females made up 60% while Males contributed 40% of the total number of participants (figure 4). This may be as a result of the fact that there are always more female nurses than males because by design the Nursing fraternity is dominated by females as compared to males. In most Zambian communities it is perceived to be a woman's profession. The age range of participants was between 25-50 years. The largest proportion of respondents (41%) fell within the age bracket, 30-35 years. Respondents aged 45 years and above constituted 38%. This finding is consistent with the Zambian education system in which majority of students tend to complete secondary education in the age range of 15-20 years (Educating Our Future, 1996). Considering that the entire team of respondents in the study went for tertiary education for at least 3-4 years and then practiced for a number of years in order for them to qualify to be nurse educators. This was prior to the introduction of the straight nursing study program. As a result Nurse Educators are likely to be 30 years and older.

In this study only nurse educators who handle student nurses at certificate to Diploma levels were considered. A greater proportion (89%) of the respondents had a Bachelor's degree while 11% had already attained a Master's degree level qualification (Figure 6). This result was anticipated as well since most certificate and diploma student nurses are taught by Bachelor's degree level holders.

The experiences of the nurse educators were analyzed. The results were such that, majority 31 (49%) of the respondents had 1-5 years of experience while 22 (35%) respondents had experience ranging between 6-10 years. The smaller proportion of respondents 7 (11%) had experience ranging 11-15 years while 3 (4%) of the respondents had 16 years and above of teaching experience (figure 7). Majority, 91%, of the Nurse educators obtained their qualification from the University of Zambia (figure 8). This may be attributed to the fact that UNZA is the first institution in the country that offered a Bachelors level degree in nursing sciences.

### **5.3 NURSE EDUCATORS' KNOWLEDGE LEVELS ON BLOOM'S TAXONOMY OF EDUCATIONAL OBJECTIVES.**

The first specific objective of this study was to assess nurse educators' knowledge levels on Bloom's Taxonomy of educational objectives. Knowledge of Bloom's taxonomy is believed to be useful for educators to ask questions at various levels (Brown, 2001; Mkandawire, 2013; Cook, 2013). De young (2009) affirms that basic knowledge of Bloom's taxonomy would help educators to build an informational data base at lower level first before proceeding to higher levels of cognitive domain during teaching and assessments.

The findings in this study revealed that only 41% of the respondents defined Blooms taxonomy correctly whereas more than half (59%) of the respondents did not know what Bloom's Taxonomy is (figure 9). Bloom's Taxonomy is a tool used to classify learning objectives and to assess students' abilities (Krathwohl, 2002; Ferris and Azizi, 2005). This clearly demonstrates that less than the average number of nurse educators who participated in the study know what Bloom's taxonomy is. However, when an inquiry into the words that should be used to classify test questions in the lowest level of cognitive domain was made, 65% of the nurse educators gave a correct response whereas the rest (35%) got it wrong (Figure 12). This could be the reason why a greater percentage of questions (95%) were observed at lower order level compared to (5%) at higher order in all the reviewed past question papers (figure 36). Sithole (2011) argues that continuous usage of questions in the lowest cognitive domain serves no purpose in nursing since the nurse is expected to apply a scientific method in nursing in order to function as an independent practitioner.

Athanassiou, et al., (2003); Clauss and Geedey (2010); Cook, (2013); Agbedia and Ogbe (2014) affirms that it is important to know the cognitive levels of educational objectives as they are necessary for learning since they are classified in order of the complexity of the thought process involved. Surprisingly, the findings of this study revealed that a few (19%) of the respondents knew the cognitive levels of educational objectives that promote critical thinking in students which are Application and Analysis as shown in the answer key (figure 13). Majority (81%) did not know them. These results are similar to the findings in the study by Mkandawire (2013) who observed that teachers had no knowledge of cognitive levels that promote critical thinking. Studies by Garekwe (2010); Mkandawire (2013) ; Agbedia and Ogbe (2014) noted that knowledge and usage of cognitive levels that promote critical thinking facilitate the development of students' thinking ability, decision making and problem solving. This would have an impact on their performance and prepare them to be vigilant when caring for clients thereafter.

Perry and Potter (2000), observes that an understanding of each learning domain and its use helps the nurse educator to select suitable words to use during assessments/ examinations at each level of training. According to the findings of this study, most respondents (52%) correctly stated that Bloom's taxonomy has 3 domains while 48% gave a wrong answer (figure 10). Furthermore, it also emerged that majority (44%) of the respondents correctly pointed out that the cognitive domain has 6 levels of educational objectives (figure 11). This result is quite low and is very worrying in that if educators do not even understand the levels of cognitive domain so well then it is very unlikely that they will attempt to use the tool during classroom assessments. It would also be very difficult for them (nurse educators) to choose the right verbs for each domain during test item preparation. These findings are in line with the results from the studies by Mkandawire (2013) which revealed that teachers did not remember any of the cognitive levels of Bloom's Taxonomy. The same study further endorsed that teachers' lack of knowledge of cognitive levels of Bloom's taxonomy might have led them to ask questions at knowledge level most of the times, neglecting the higher levels. It is this knowledge that may be very essential for nurse educators in using the Bloom's hierarchy of cognitive levels of educational objectives. On the other hand, Eber and Parker (2007) argued that educators have knowledge on Bloom's taxonomy but fail to utilize it during classroom assessment.

## **5.4 LEVELS OF COGNITIVE DOMAIN ASSESSED IN EXAMINATION PAPERS BY NURSE EDUCATORS/ TUTORS.**

The second specific objective of this study was to determine the levels of cognitive domain assessed in examination papers. To achieve this objective analysis of cognitive levels of examination questions set in nursing schools was done and nurse educators were asked a number of questions whose responses have been discussed below.

### **5.4.1 Followed Bloom's hierarchy of cognitive levels tool when setting examinations**

From the analysis of responses of nurse educators, it is interesting to note that only 8% of the respondents affirmed that they followed cognitive levels when setting examinations. A larger percentage (92%) of the respondents mentioned that they did not follow Bloom's hierarchy of cognitive levels (Figure 15). The findings from the analyzed past examination question papers equaled the results above. The analysis revealed that questions were not set in application, analysis and evaluation levels of cognitive domain thus knowledge/recall and comprehension questions dominated (figures 30, 31, 32, 33, 34, 35 and tables 5, 6, 8). Mkandawire (2013) reported similar results and recommended that educators should be encouraged to follow cognitive levels of educational objectives during classroom assessments. Surprisingly, the greater percentage of the respondents (92%) felt that following the cognitive level tool was important in nursing education while (8%) of the respondents indicated that it was not important (figure 16). Masters et al., (2001); Clauss and Geedey, (2010); Cook, (2013) observes that following taxonomies during assessments is important. However, factors such as shortages of nurse educators and time affect the adherence to taxonomies thereby hindering quality in assessments.

#### **5.4.2 USE OF STANDARDISED GUIDELINES DURING THE PREPARATION OF TEST ITEMS FOR EXAMINATIONS**

Bloom's taxonomy stands unequalled as a helpful guide for students to improve their critical thinking (Kim, et al. 2012; Agbedia and Ogbe, 2014).

According to Clifton and Shriner (2010), non availability of easy to read guidelines for faculty to use as a reference for test item construction and test item review could attribute to non usage of Bloom's hierarchy of cognitive levels of educational objectives in setting examinations. The findings of this study tally with the observation by the scholars above. In this study (75%) of the respondents indicated that they did not follow any standardized guidelines for classroom assessment when setting examinations while 25% of the respondents affirmed that they followed standardized assessment guidelines (Figure 17).

Over the aspect of peer reviewing of test items, the findings of this study revealed that only 13% of the respondents had their test items peer reviewed before they were administered to students. The greater percentage (87%) of the respondents confirmed that they did not have their tests peer reviewed (Figure 18). The findings gleaned from the questionnaires anxiously correlate with the findings from the past examination papers. An analysis of past examination questions noted a repetition of questions at different levels and year of program study. Question repetition was noted in the multiple choice questions, matching questions and essay questions set in 2011 and 2012 for institution C's year one (1) examination papers. What was more intriguing in the said examination papers was the fact that the questions were the same and that names used in the case study scenarios were repeated. The section for essay questions galloped in monotonous, 'discuss the management, describe the managements and explain the nursing care' which further affixed the seal of repetition not only of questions but also in phrasing. The caustic implication of repeating questions in various nurse student assessments is the unavoidable imbalance of test items across cognitive levels of educational objectives with more questions leaning towards a single cognitive level. These findings are similar to the findings in the studies by Tarrant et al., (2006); Masters et al., (2001); Clifton and Shriner (2010); Garekwe (2010); Reichert (2011) whose studies also revealed that learners were repeatedly tested on the same questions that they were previously examined on.

The study further excavated more pitfalls related to non peer reviewing of test items. An investigation conducted on past examination papers showed that some of the questions prepared were unrelated to the program objectives. This was observed in mock and intermediate examinations of exiting students (finalists). A classical example of such parallel questioning includes matching of individual names with respective positions at the provincial health office. Such type of questioning not only has the potential to flair the percentage for general knowledge/recall questions in an assessment but also stands at crossroads in the promotion of higher order thinking among students. Garekwe (2010) and Reichert (2011) argues that repetition of questions in examination papers is associated to difficulties in the construction of own test items coupled with limited time to develop them. From this study, it is clear that most nurse educators prepared and administered test items to students without having a second person to look at them. This has serious implications in that tests may be of low quality and biased towards only one cognitive level of the Bloom's taxonomy.

Use of blue prints can effectively guide nurse educators to spread questions across cognitive levels of educational objectives. This view is supported by De Young (2009); Reichert (2011); Cook (2013). These scholars recommended the use of blue prints (table of specifications) as a guide on how many questions to set in each cognitive level. Contrary to this view, the findings in this study showed that very few (6%) nurse educators had a blueprint for test items across the cognitive levels in their institutions while the majority (94%) did not have (Figure 19). Additionally, the findings in this study revealed that only 3% of the respondents confirmed that they often times used the blue print whereas 5% said that they used the blueprint but not often. The majority (92%) of the respondents either did not use the blue print or did not even respond to the question (Figure 20). It may be alleged that those who did not respond to the question did not know what a blue print is. This implies that examinations are mostly set without such a guide and as such there may not be a clear balance on the number of questions set in each cognitive level. The above findings from the questionnaires were complemented with the analysis done from the question papers. The analysis indicated a greater percentage (88.5%) of the set questions at basic knowledge (recall) level. This was followed by comprehension, (6.4%) while the smaller percentages were observed at synthesis level with (4.2%), analysis accounting for (0.5%), application level, (0.3%) and evaluation level at (0.1%) respectively (figure 36).

It was clear from the findings that an immense percentage of questions were prepared at the lower cognitive level than the higher cognitive level which promote critical thinking. The resounding negative implication is that the graduating nurses go in the ward to practice armed with a low thinking baby mind who entirely depends on the external orders from the clinicians. No wonder, scholars such as Scheffer and Rubenfeld (2000); Agbedia and Ogbe (2014) observe that in the practical world of clinical nursing, critical thinking is the ability of nurses to see patients' needs and respond appropriately, beyond or in spite of the physicians' orders. A critical thinker, said the scholars, goes beyond being a robot machine who simply does as he or she is told. Critical thinking is thus a crucial professional skill which goes hand in hand with clinical reasoning and clinical reflection (Sithole, 2011). The findings of this study match the results of the studies conducted by Mkandawire (2013), Reichert (2011), Garekwe (2010). These scholars observed that educators do not use a blue print to balance questions according to cognitive levels.

Continuing Professional Development (CPD) is a process by which educators keep up-to-date with knowledge and improve their skills in assessment techniques (Tarrant et al., 2006). De young (2009) asserts that professional development meetings and other organized in-service programs are designed to foster the growth of educators that can be used for their further development. However, the findings of this study revealed that only 10% of nurse educators indicated that their departments conducted continuous professional development meetings on assessment techniques while the majority (90%) did not (Figure 22). This is glaring evidence that CPD meetings were not conducted on a large scale in nursing schools. It is also highly probable that nurse educators who might have had participated in the CPD meetings did not share knowledge with other nurse educators on assessment techniques including the use of taxonomies. This was evidenced from the past examination papers analyzed in this study. Majority of the questions in the analyzed past examination papers including Intermediate and Hospital final mock nursing examinations fell at the basic knowledge/recall level than the higher levels of cognitive domain (figures 32, 33, 35). Ultimately the standard of assessment was terribly compromised because in the final year of training, it is keenly expected that nursing students are assessed by appealing to questions and test items that promote higher order thinking.

Mkandawire (2013) notes that CPD is crucial because it enables educators to progress and develop their professional self, as well as remaining current with their skills and competencies. However, in his study also, 85% of teachers indicated that their departments did not conduct Continuing Professional Development meetings on classroom questioning.

Makandawire's findings are essentially homologous to the findings of the studies by Tarrant et al., (2006); Masters et al., (2001); Clifton and Shriner (2010). The said scholars observed that only few faculties in tertiary institutions of learning have formal education in test item construction as such there are insignificant numbers of seminars on Continuing Professional Development in institutions of high learning. Clifton and Shriner (2010) add that lack of orientation in the nursing colleges in setting examinations make nurse educators to rely on text book derived test questions for their examinations and the use of test bank items that assess lower cognitive levels which are often rife with bias. As Downing (2002) observes, this type of examinations threaten the integrity of nursing education. No wonder Sithole (2011) and Garekwe (2013) advise that educators should take advantage of stimulating questions more often to help create meaningful active learning instead of just prompting the simple recall of knowledge from students.

### **5.4.3. NURSE EDUCATORS' TEACHING WORKLOAD**

Among colleges and universities, the student-to-faculty ratio is often a major selling point touted on promotional materials to emphasize academic quality and rigor (Allen 2008). In this study, majority (65%) of the respondents indicated that the student-educator ratio in their institutions was 1:35. 8% mentioned the ratio of 1:30, 8% flagged the ratio of 1:25 and 19% stated that student educator ratio was 1:20 (figure 23). As observed, a larger proportion (65%) of respondents attested that student - educator ratio was high. With this kind of stretched educator-student ratio, the quality of teaching/learning is compromised. The findings above are substantiated with the observed negligible percentages of increase in the level of complexity of questions in the analyzed examination papers (tables 7 and 9). A study by Kim et al., (2012) affirms that higher student-faculty ratios are an obstacle to critical interaction between educators and students.

Students attend universities to glean direct knowledge from expert faculty members, but with too many students to attend to, instructors may be left to drown in paperwork, curriculum development and grading (Allen, 2008; Agbedia and Ogbe, 2014). The implication is that an increased student population against few nurse educators as observed by Agbedia and Ogbe (2014); Allen (2008); Tarrant et al., (2006) especially nurse educators with no formal education in test item construction; the quality of nursing education is threatened.

Quality and balanced test items that are well spread across cognitive levels are better prepared when nurse educators work in teams. Setting examinations in teams may warrant a sound opportunity to notice and correct various mistakes, strike a balance on the number of questions as well as balancing the actual content of the examination in terms of Bloom's hierarchy of cognitive levels of educational objectives (De Young, 2009). Findings in this study revealed that only 33% of the respondents indicated that they set examinations as teams whereas 67% stated that they did not (Figure 24). This means that setting of examinations is done at individual level. The latter tradition ensures that examinations are set quickly and administered in time but does not guarantee quality because examinations are not reviewed before they are administered to students (figure 18). The implication of this practice is that most examination questions are likely to hang in the lower cognitive levels of Bloom's taxonomy thus compromising quality.

#### **5.4.4 TIME TAKEN TO PREPARE EXAMINATIONS/TESTS BY NURSE EDUCATORS**

Time is a supreme resource in the preparation of examinations and other student assessments. Nurse educators require optimal time for them to prepare test items that can help to contribute to the development of high order thinking. This study however, revealed a surprisingly diminutive proportion (18%) of the respondents prepared examinations/tests after every lesson which is the most ideal/recommended practice (figure 25). Some respondents (6%) prepared their tests a month before the date of examination, 16% prepared tests two months before day of examination and majority (54%) prepared tests a week before examinations date. The latter percentage could be the reason why test items lacked peer reviewing. It is also absolutely clear that these tests are set at short notice and nurse educators may not have sufficient time to work in teams when setting tests/examinations.

The quality of the examination/test may be in question as a result of such a practice. Scholars such as Masters et al., (2001); Tarrant et al., (2006); Clifton; Shriner (2010) and Mkandawire (2013) in their studies, assent that majority of faculty did not have time to create their own test items instead, they depended on test banks test items which were full of mistakes as no team reviewed them.

A sound academic approach requires that nurse educators compile peer reviewed test items in time. As Downing (2002) observed, timely compilation of peer reviewed test items helps to offset possible last minute panic among educators, promotes quality of examination questions and upholds standards. The Affiliated health Training Institutions (2004) recommends educators to have their test items reviewed (moderated) and compiled two (2) weeks before the examination date. However, the findings of this study showed that 74% of the respondents did not compile peer reviewed test papers because most of them did not have their test papers peer reviewed at all. Only 26% of the respondents indicated that they compiled a peer reviewed paper a week before the examination/test (Table 3).

#### **5.4.5 USE TAXONOMIES IN ASKING QUESTIONS EITHER THROUGH TESTS, ASSIGNMENTS OR DURING LESSONS BY NURSE EDUCATORS**

Curriculum designers and educators are expected to use the taxonomic model of teaching/ learning in their work. Commenting on the importance of using taxonomies, Kim et al., (2012) states that it is an ideal practice for educators to use guides when setting tests, assignments and examinations to ensure compliance to educational standards at all levels. The essence is to analyze and formulate questions according to cognitive levels. This is because the hierarchical levels of student learning can be used to determine the extent to which educators emphasize both lower and higher order thinking behaviours (Kim et al., 2012).

The findings of this study however, indicated that 46% of the respondents followed Bloom's Taxonomy in asking questions either through tests, assignments or during lessons while 54% did not (figure 26). It is very clear from this finding that tests, examinations and assignments are usually set without any guide.

A similar observation was noted from the analyzed examination question papers that a colossal number of questions (74%) were constructed using verbs which made students to only recall previously learned information (table 10). Recall type of questioning does not stimulate higher order thinking among students.

Mkandawire (2013); Kanter (2013); Kim et al., (2012); Krathwohl (2002) assert that, although it is now customary to write educational objectives as outcomes, lack of a systematic framework (Bloom's taxonomy) means that quality is not evident, or verifiable, and there could be a mismatch between the stated (intended) outcomes and the actual behavior of students. In addition, Garekwe (2010) points out that the end result would be students attempting to understand the material according to their perceptions of the assessment requirements. Many students focus on the demands of the evaluation system instead of mastering essential content. The implication is that the students' desperate need to obtain a deep understanding of the content to enable them become more creative is never realized (Azer, 2003).

Furthermore, findings in this study showed that out of the 46% of the respondents who indicated that they used taxonomies (Figure 26), only 24% essentially used these guides often while 22% did not use them often (figure 27). This implies that even if 46% of the respondents used taxonomies, only about half of these used taxonomies consistently whereas the other proportion of respondents only used them sometimes. The findings of the analyzed question papers also indicated imbalances in the number of questions set across cognitive levels (figure 36). The stated findings match the results in the studies by Kim (1999); Azer (2006); Tarrant et al., (2006); Profetto-McGrath et al., (2008); Reichert (2011); Garekwe (2010) and Mkandawire (2013) who observed that the largest percentage of questions asked by educators were mainly factual and of lower cognitive levels.

However, Russels (2008) argued that the emphasis of asking higher order questions should not misdirect nurse educators from understanding the importance of acquisition of knowledge. Lower order questions are used to construct knowledge. On the other hand, Burton (2008); De young (2009); Garekwe (2010) refutes this and recommend that a problem based program should have a balance between higher and lower order questions especially at the level when students are almost graduating since they have to be vigilant when caring for patients.

Contrary to the stated view by the said scholars, the findings in this study have shown that there was no balance between higher and lower order questions which has been depicted by a difference of 90% from the analyzed past examination papers (figure 36).

This could be due to the fact that very few nurse educators (6%) had a blueprint (table of specification (Figure 19), making it difficult for them to strike a balance between lower and higher order questions when setting examinations. Such study results as observed by Krathwohl (2002), pose a great risk to the quality of assessments, the nursing institution and even the quality of graduates the institutions produce.

It is therefore crucially important that nurse educators use Bloom's taxonomy when assessing students. However, studies by Reichert (2011) and Allen (2008) revealed that some factors like faculty shortages, lack of knowledge on Bloom's taxonomy, student population and time pose a big problem in the usage of Bloom's taxonomy in nursing education. The findings of this study also indicated that factors such as lack of time, knowledge on Bloom's taxonomy, inadequate orientation to test item preparation, large student numbers, poor attitude towards Bloom's taxonomy usage, no standard assessment guidelines, shortage of teachers and heavy workload affects use of the Blooms taxonomy when preparing test items in nursing (figure 29). The study further indicated that majority of the respondents 92% strongly agreed that factors which affected nurse educators' usage of Bloom's taxonomy in questioning also affected performance of student nurses. On the other hand, 8% of the respondents argued that these factors did not affect student nurses' performance (Figure 28).

Higher order thinking among students can be achieved if test items are spread across the cognitive levels. In this study, all (100%) of the respondents indicated that asking questions at different levels of cognitive domain helps student nurses/learners to have critical thinking skills in nursing. The findings match the study results by Mkandawire (2013); Garekwe (2010); Boikhutso (2010); Kim (1996) who observed that a mixture of questions at various levels of the taxonomy during instruction and assessments promote critical thinking and induce different levels of student learning. Reichert (2011) and Garekwe (2010) further highlighted the advantage of having papers with mixed questions.

The two scholars indicated that low ability students performed better on knowledge/recall questions while high ability students performed better on application level questions. It is for this reason that, Kim (1996) affirms that the hierarchical levels of student learning can be used to determine the extent to which educators emphasize both lower and higher order thinking behaviours.

Surprisingly, application, analysis and evaluation levels remained at 0% throughout the years in some of the reviewed examination question papers (2011 to 2013) in this study as indicated in figures 30, 31, 32, 33, 34 and 35, tables 5 and 6). Krathwohl (2002); Garekwe (2010); Kim et al., (2012); Mkandawire (2013); Agbedia and Ogbe (2014) describes these levels as higher order levels in the cognitive hierarchy necessary for critical thinking. This clearly shows that the schools may produce students that will have problems with application, evaluation and analysis related issues during their nursing practice. These results are in line with findings by Zheng et al., (2008); Garekwe (2010) and Mkandawire (2013). One may link the higher number of questions which were asked at knowledge level (91% and 92%) (Tables 8 and figure 35) to a problem of construction of questions.

A colossal number of questions (74%) were constructed using verbs which made students to recall previously learned information (table 10). In agreement, Sithole (2011); Garekwe (2013) advises that educators should take advantage of stimulating questions more often to help create meaningful active learning instead of just prompting the simple recall of knowledge from students. However, Profetto –McGrath et al., (2008) notes that the pedagogy of nursing education only equips students with knowledge to enable them carry out nursing routine in unreflective manner.

## **5.5 RELATIONSHIP BETWEEN KNOWLEDGE AND USE OF COGNITIVE LEVELS OF EDUCATIONAL OBJECTIVES IN SETTING EXAMINATIONS**

The third specific objective of this study was to determine the relationship between knowledge and use of Bloom's hierarchy of cognitive levels of educational objectives in setting examinations. In order to achieve this objective, a number of cross tabulations between the use of taxonomies and knowledge of Bloom's taxonomy were done.

From the findings of this study, out of a total number of 29 respondents who indicated that they used taxonomies when preparing test items for examinations, 21 (72%) correctly indicated that Bloom's taxonomy has three domains while 8 (28%) gave a wrong response.

Therefore, it is expected that when educators have knowledge to the extent of knowing the number of domains in Bloom's taxonomy, then they were more likely to use or follow it when preparing tests items for examinations or assignments.

However, among the 34 respondents who indicated that they did not use taxonomies, 12 (35%) correctly said that it has three (3) domains, while 22 (65%) gave a wrong response. The chi square (asymptotic significance 2 sided) was 0.015 and the Degree of Freedom (df) were 3. P-Value = 0.015, significant, indicating that there is an association between use of taxonomies when asking questions and knowledge of domains of Bloom's taxonomy (figure 37).

Kim et al., (2012), Boikhutso (2010), Eber & Parker (2007) argue that educators may have knowledge of Bloom's Taxonomy but are likely not to conceptualize it enough to apply it in their teaching and assessments. The scholars' argument fits in the findings of this study. Nurse educators who essentially indicated in the questionnaire that they had graduated from reputable institutions of higher learning (figure 8), where they had been taught Bloom's taxonomy could not spread examination questions across the cognitive levels on past examination papers analyzed ( figures 31, 32, 33 and 35, tables 6 and 8). Most of the questions set fell in the lower than the higher order cognitive domain of educational objectives.

A more interesting result was unveiled when respondents indicated according to their knowledge about the correct number of educational objectives in the cognitive domain. Of the 29 respondents who stated that they followed taxonomies when preparing test items for examinations, 13 (45%) correctly mentioned that there are 6 levels of educational objectives in the cognitive domain whereas the other 16 (55%) gave wrong responses (Table 11). This means that even among those who indicated that they used taxonomies; a larger proportion did not know the number of educational objectives in the cognitive domain. This entails inadequacy in terms of knowledge among nurse educators regarding the Bloom's taxonomy.

These findings are similar to the findings by Mkandawire (2013) who indicated that even though teachers claimed asking questions at various levels in their lessons they did not even remember any of the cognitive levels within Bloom's Taxonomy.

The analytical findings from the past examination papers revealed a lack of understanding of Bloom's taxonomy among nurse educators.

Clear huge portions (74%) of questions set carried with them verbs at knowledge/recall level (Table 10).

However, among the other 34 respondents who did not use taxonomies when setting examinations, only 15 (44%) correctly stated that the cognitive domain has 6 levels of educational objectives. The rest 19 (56%) gave incorrect responses (table 11). The 44% who gave the correct response may be hailed as champions but additional findings that cast more light on them prove that indeed they did not essentially use any taxonomy when setting examinations. The analyzed past examination papers (figures 31 to 35) revealed the dominance of knowledge/recall questions in all the levels and years of training (2011 to 2013).

The p - value was 0.295 as indicated in table 4 which strongly shows that there is no relationship between use of taxonomies and ability to tell how many levels of educational objectives the cognitive domain has. This finding is refuted by Eber and Parker (2007) who state that educators can have knowledge and even claim to use the Bloom's Taxonomy but fail to utilize it in classroom assessments.

There are specific words/verbs educators use in questioning. The words are primordial to classification of questions whether they fall in the lower or higher order of cognitive domain. Table 5 shows that 24 (83%) out of 29 respondents who indicated that they followed taxonomies when preparing test items, correctly mentioned the words used to classify test questions in the lowest level of cognitive domain as define, state and identify. Only 5 (17%) of the respondents gave incorrect responses. On the other hand, among 34 respondents who indicated that they did not follow taxonomies when preparing test items, 17 (50%) correctly identified the words used in the lowest level of cognitive domain whereas the other 17 (50%) could not. Considering the p - value of 0.007 as indicated in table 18, it is clear that the relationship between knowing the words used in the lowest level of cognitive domain and usage of taxonomies is statistically significant. Since the greater percentage of respondents (83%) who knew the words used in the lowest level of cognitive domain demonstrated high use of Bloom's taxonomy is a real relationship.

It can therefore be inferred that an educator who knows the words used in the lowest level of cognitive domain would most likely use taxonomies when setting test items for examinations.

However, Kim (1996) and Azer (2006) argue that problem- based study programmes such as nursing should use complex questions especially in the final years of training, which are demanding intellectually not just the ability to recall information. The argument put forth by the two scholars snugly matches the researcher's observation of the questions in the past papers investigated. The questions were overly dubbed with words that localized the set examination questions in the inferior order (table 10). Perhaps as Kelly (1999) observes, educators fail to move their students up the levels of Bloom's taxonomy because questions of higher order cognitive level are difficult to prepare.

Use and knowledge of cognitive levels is crucial to educators. In the nursing profession, as Sithole (2011) refutes, nurse educators are responsible for the accurate assessment and evaluation of students' competence. They aspire to produce nursing students who become critical thinking independent practitioners. In this study, only 28% of the respondents who indicated that they used Bloom's taxonomy when preparing test items identified the correct cognitive levels of educational objectives that promote critical thinking as application and analysis. The other 72% could not. On the other hand only 12% of those who did not use Bloom's hierarchy of cognitive levels of educational objectives gave a correct response (table 13).

This clearly means that there was low knowledge among nurse educators on cognitive levels of educational objectives which promote critical thinking in students. It is highly probable therefore that nurse educators may prepare high order content but set low order test items. The likely reason could be due to lack of knowledge and expertise in the construction of examination questions as observed by Mkandawire (2013) and Garekwe (2010). Masters et al., (2001) note that lack of guidelines as to the percentage of questions to be written within each cognitive level might make educators set only questions pointing to a single cognitive domain.

Having a P-value of 0.001 as shown in ( table 13), clearly affirms that the relationship between ability to identify Bloom's hierarchy of cognitive levels of educational objectives that promote critical thinking in students and use of Bloom's hierarchy of cognitive levels of educational objectives is statistically significant.

Any serious intervention to improve the use of Bloom's hierarchy of cognitive levels of educational objectives should consider methods that will increase knowledge in this particular important dimension.

## **5.6 CONCLUSION**

It was the objective of this study to investigate whether nurse educators are knowledgeable about Bloom's hierarchy of cognitive levels of educational objectives and whether they used it when setting test items for examinations. The hallmark was to assess and make a prediction of the kind of nursing students produced following successive assessments. Defining learning in terms of what nursing students should be able to do after studying the programme in relation to learning outcomes or learning objectives is the real spine of the product model on which this study was based. The product model gave the study its focus, direction and guidance.

The study found that nurse educators had low knowledge (64%) on Bloom's Taxonomy (figure 14). This was the sole reason why an immense percentage (92%) of nurse educators did not use Bloom's hierarchy of cognitive levels of educational objectives (figure 15).

Based on the findings, it can be concluded that the outcome of the training of nurses could not reflect the objectives of the curriculum. The objective of the nursing curriculum is to train an independent nurse who will work as an independent practitioner. This was not achieved because the designed classroom assessments done by nurse educators were not according to Bloom's hierarchy of cognitive levels of educational objectives. Most of the questions set by nurse educators wiggled at the inferior knowledge/recall and comprehension levels (95%) (figure 36). The implication could be that nurses would fail to recognise a problem in a patient or take prompt action when the patient's condition changes during their practicum. The practice is both malignant and brain reversing for it sits directly at crossroad with the desired universal concern of producing nurses who are critical thinkers.

As long as the current scenario which this study has brought to light is lived and carried on, then hundreds to thousands of graduating nurses who shall enter the labour market will lack the element of critical thinking which they dearly need to be able to recognize deteriorating ill conditions and respond appropriately.

## **6.0 IMPLICATIONS TO NURSING**

Knowledge on Bloom's hierarchy of cognitive levels of educational objectives is important as it makes nurse educators prepare test items at various levels of cognitive domain, help them to ask questions of different types, produce nurses who have critical thinking and improve quality in nursing education.

### **6.1 Nursing Education**

This study has revealed that nurse educators have a knowledge deficit on Bloom's hierarchy of cognitive levels of educational objectives. A combination of knowledge deficit and failure to use the Bloom's hierarchy of cognitive levels of educational objectives as revealed by this study, majority of nurse educators opted to set more low order questions (knowledge and comprehension) (95%) than higher order questions (application, analysis, synthesis, evaluation) (5%) (Figure 36). Setting a colossal number of examination questions at basic knowledge/recall level (58%, 91%, 92%) even in advanced students' years of study (figures 31, 35 and table 12) stunts the students' prospects of developing a critical thinking mind.

This study further revealed that nurse educators did not have blue prints to act as a guide on what number of questions to set in various categories of Bloom's taxonomy. The implication is that there is no uniformity in the distribution of examination questions within the cognitive levels of Bloom's taxonomy across the nursing schools.

The study also revealed that Continuing Professional Development meetings, workshops or seminars on effective techniques on test item preparation were not conducted in the institutions. This implies that nurse educators did not share knowledge on effective techniques in preparing test items which would keep them abreast with the current information.

In addition, the study revealed that a greater proportion of nurse educators prepared examination test items a week before the examination date. This implies that there is a greater likelihood that examination papers were prepared in a hurry and might have had more of knowledge/recall questions and a number of questions were repeated across levels and years of study.

The study further revealed that examination test items were not reviewed by either peers or any committee before being administered to students to eliminate item writing flaws and for appropriateness of cognitive levels of educational objectives within the exam. This implies that examinations were being written without eliminating item writing flaws. This could compromise quality in nursing education.

The General nursing Council of Zambia in conjunction with the Nursing Schools therefore need to formulate and strengthen the use of Blue prints in line with cognitive levels of educational objectives. The General nursing Council of Zambia and principal tutors also need to reinforce on Continuing Professional Development meetings, workshops and seminars to keep nurse educators abreast with information on test item construction. Principal tutors and Senior lecturers – academic need to see to it that test items are prepared early and peer reviewed before students sit for examinations. This will promote quality in nursing education.

## **6.2 Nursing Practice**

From the results of this study, it was observed that there was no correlation between the scenarios and the questions asked. Questions did not force students to go back to the scenario before answering the question. The study also revealed that some questions were not in line with the curriculum's course outline. They slant more towards general knowledge.

The study further showed that majority (95%) of the questions set were of lower order category (figure 36). This type of questions does not promote students' higher order thinking skills instead they measure students' surface learning. The implication is that graduating nurses who are being poured into the market lack the element of critical thinking which they dearly need to enable them recognize deteriorating ill conditions and respond to them appropriately. The researcher observed that a number of nursing schools did not have test banks in a central place. This implies that each nurse educator keeps the question papers she /he sets in a course they teach.

This would promote repetition of questions and educators failing to use fellow educators' questions as references.

All nursing schools should have a mandatory peer review system of test items. Additionally, use of a blue print to map up a number of questions in each category of cognitive level would make a difference and promote quality. Schools of nursing to develop central test banks.

### **6.3 Nursing Administration**

The study revealed that nursing schools had no standardized assessment guidelines to follow when setting examinations. This implies that each nurse educator sets examination test items the way they felt like without referring to any guidelines. The General nursing Council of Zambia working hand in hand with Principal tutors should come up with standardized assessment guidelines for uniformity and quality.

### **6.4 Nursing Research**

Studies have been conducted globally and regionally in nursing education but no research has been conducted locally on the said field of nursing. Therefore, there is need to conduct a research that can explore nurse educators' questioning techniques during students' clinical practice and assessments.

## **7.0 RECOMMENDATIONS**

### **7.1 Continuing Professional Development meetings**

Continuing Professional Development meetings, workshops and seminars should be developed and made mandatory for all academic staff in all the schools of nursing. These programs should focus on constructing test items that stimulate higher order thinking skills. Improving nurse educators' knowledge on effective techniques in preparing test items using Bloom's taxonomy will improve quality in nursing education and keep all nurse educators abreast with the new information.

### **7.2 Developing standardised guidelines for assessments.**

There is need to develop and implement easy to read guidelines for nurse educators to use as a reference for test item construction and test item review. This will promote quality in nursing education and uphold high standards of students' achievement

#### **7.2.1 Peer review**

There is need to have a review team as a standard during examination preparation and administration. This team made of nurse educators should also own the examination. Prior to test administration, a review process should be implemented to evaluate and eliminate item writing flaws and for appropriateness of cognitive levels of educational objectives within the exam. The team should also offer suggestions and guidelines for improvement of underperforming test items.

#### **7.2.2 Formulation of blue prints**

There is need for the regulatory board (Nursing Council) to develop a blue print for each level of training as a standard and reinforce supervision on the preparation of test items using Bloom's taxonomy. The blue print will map out the desired distribution of examination questions within the cognitive levels of Bloom's taxonomy.

Giving questions which involve both lower and higher cognitive levels will enable learners practice on both categories and also help them to develop critical thinking which they need during their practicum. Using blue prints at each level of training will also help nurse educators plan assessments that increase in the level of complexity as students progress in the program.

### **7.3 Preparation of test items**

This study revealed that majority, 54% of the respondents prepare test items a week before the examination date (figure 24). Therefore, nurse educators should be encouraged to prepare test items after every lesson. This practice will help ensure that examination questions are well spread across the cognitive domain hierarchy. This is important for eventual quality of the questions and the examination.

### **7.4 Suggestion for further research**

This study investigated the usage of Bloom's taxonomy in examinations in the classroom setting. In view of the fact that in a practice profession such as nursing, questioning should be heavily weighted at higher levels of knowing and expect nurse students and nurses to incorporate theory into practice, a research that can explore nurse educators' questioning techniques during students' clinical practice is recommended. The research should make use of multiple data collection methods to strengthen the quality of data.

## **WHAT IS NEW IN THIS STUDY**

1. In comparison to other studies on assessments globally, this study revealed that nurse educators did not have blue prints to act as a guide on the number of questions to prepare in each level of cognitive domain.
2. Test items/examination questions were prepared a day before the examination. They were not reviewed to evaluate, eliminate item writing flaws, offer suggestions and encourage appropriateness of cognitive levels of educational objectives within the examination paper by either peers or any committee before being administered to students.

## **STRENGTHS OF THE STUDY**

1. In comparison to similar studies conducted globally and regionally on this topic where only one (1) school was used as a study unit, this study used five (5) nursing schools, spread across Eastern and Lusaka provinces respectively. An enlarged area of study complimented with a diversity of government, private, mission schools and a difference in the duration of study training flecked the desired elements of generalizability and validity of the study findings.
2. The study investigated both the knowledge of nurse educators on Bloom's taxonomy and its use during the preparation of test items for examinations. Other scholars either investigated knowledge or usage only.
3. The study used two (2) data collection tools; a questionnaire used to collect data from the nurse educators and a checklist consisting of cognitive levels of educational objectives to collect data from the past examination question papers. The findings from these tools complimented each other.

4. The study also analysed a large number of questions (3, 358) covered in three (3) years from 2011 to 2013. Furthermore, the questionnaire used had a wider coverage in investigating the nurse educators' knowledge and usage of Bloom's taxonomy during the test item preparation. It covered; Demographic data, Nurse Educators' knowledge on Bloom's Taxonomy, Use of Bloom's hierarchy of Cognitive Levels of educational objectives during test item preparation, Use of standardized guidelines on test item preparation, Nurse Educators' workload, Time taken to prepare test items for examinations.

## **8.0 LIMITATIONS OF THE STUDY**

**8.1** Non availability of examination test banks made the researcher reduce the years of analysis of question papers from a period of five (5) years (2009 to 2013) as intended to a three (3) year period (2011 to 2013).

**8.2** The researcher removed some of the schools from the study because they had no past examination papers available in a central place.

**8.3** This also made the researcher to change the sampling technique from simple random sampling in selecting question papers to convenient sampling method.

## **9.0 DISSEMINATION AND UTILISATION OF FINDINGS**

The findings of the study were presented to the faculty of Nursing Sciences Department. They were disseminated to major stakeholders like the General Nursing council of Zambia as it is an examining board for the nurses, Nursing schools and the University of Zambia. Copies of the report were deposited in the medical library, Department of Nursing Sciences and the Ministry of Health. The research reports works as reference for educators, curriculum designers, researchers, students, stake holders and policy makers. The findings have been submitted for possible publishing in the Journal of Agriculture and Bio-Medical Sciences (JABS).

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# ANNEXURES

## **APPENDIX I**

### **INFORMATION SHEET FOR RESPONDENTS**

**TITLE OF STUDY: Knowledge and use of Bloom's hierarchy of cognitive levels of educational objectives in setting examinations by nurse educators in Lusaka and Eastern provinces.**

#### **INTRODUCTION**

My name is Patricia Mambwe; a student of Masters of Science in Nursing at the University of Zambia who is kindly requesting for your participation in the research study mentioned above. The participation in this study is entirely voluntary. You may choose not to participate or to withdraw from the study at any time, without any penalties whatsoever. You will derive no direct benefit from participating in the study. No monetary favors will be given in exchange for information obtained. However, I hope that the results of the study will provide valuable information regarding usage of Bloom's Taxonomy when setting examinations and make a contribution to nursing education and nursing. Furthermore, the information which will be obtained will help generate data that can be used as a basis for subsequent studies or reference by educators, examiners as well as policy makers.

If you are willing to participate, you will be asked to sign a consent form. Please ask where you do not understand.

#### **PURPOSE OF THE STUDY**

The study will determine knowledge and usage of Bloom's hierarchy of cognitive levels of educational objectives in setting examinations by nurse educators in Lusaka and Eastern provinces. The findings of the study will therefore, assist by generating data that can be used as a basis for subsequent studies or reference by educators, examiners as well as policy makers. It has a potential to contribute to the existing body of knowledge on the cognitive levels of examination questions. This is important as there is a worldwide concern that examinations used in the assessment of learning lacks a deep approach to learning, and measure only a very little of the students' potential (Handingham, 2003 as cited in Garekwe, 2010).

Furthermore, it is hoped that the schools of nursing may also seek to improve the standard of examinations by utilizing the different cognitive domains to ensure that the students' critical thinking skills are properly assessed by using the findings of the study. This consequently may benefit the society as a whole as they will be attended to by graduates with higher order thinking skills.

## **PARTICIPATION**

If you agree to participate in the study and upon signing consent, the researcher will proceed to administer a questionnaire and you will be requested to answer 20 questions. The questionnaire consists of section A with five (5) questions on demographic information and other sections with 15 questions on knowledge and usage of Bloom's Taxonomy. Answering of the questionnaire will take about 10 to 15 minutes.

## **RISKS AND DISCOMFORTS**

I do not anticipate that any harm will occur to you as a result of participation in this study though part of your time will be utilized to answer some questions. If you will need further discussion, it will be offered to help you understand the topic more.

## **CONFIDENTIALITY**

Your research records and any information you will give will be kept confidentially. You will be identified by a number. The General Nursing Council, Excellence in Research Ethics and Science Converge or the School of Medicine may review your records again but this will be done with confidentiality.

You are kindly requested to answer all questions in the questionnaire as sincerely as you can. Thank you for taking time to read this information sheet. If you consent to be part of the study, please complete the attached consent.

## APPENDIX II

### INFORMED CONSENT FORM

**Consent to participate in a research on factors determining knowledge and usage of Bloom's hierarchy of cognitive levels of educational objectives in setting examinations by nurse educators in Lusaka and Eastern provinces.**

I have read and understood the purpose, the benefits, risks and confidentiality of the study. I further understand that if I agree to take part in this study, I can withdraw at any time without having to give an explanation and that taking part in this study is purely voluntary.

Kindly indicate by signing at the end of this information your willingness to participate in the study.

I \_\_\_\_\_ agree to take part in this study.

(Names)

Signed: \_\_\_\_\_

Date: \_\_\_\_\_

(Participant)

Participant's signature: \_\_\_\_\_

Date: \_\_\_\_\_

Witness (Researcher) Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Should you require any further information regarding the study or your rights as a study participant, you are free to contact the following:

1. The Head of Department, University of Zambia, School of Medicine, Department of Nursing Sciences, P.O. Box 50110, Lusaka. Telephone Number 252453.
2. The Secretary, ERES Coverge, 33 Joseph Mwilwa Road, Rhodes Park, Lusaka. Zambia.  
Email: [eresconverge@yahoo.co.uk](mailto:eresconverge@yahoo.co.uk)

## APPENDIX III: BUDGET

BUDGET CATEGORY	UNIT COST (ZMK)	QUANTITY	TOTAL
<b>1. STATIONERY</b>			
a) External hard drive	500.00	X 1	500.00
b) Bond paper	30.00	x10	300.00
c) Pens	2.50	x10	25.00
d) Pencils	2.50	x 4	10.00
e) Rubbers	5.00	x2	10.00
f) Note book	8.00	x2	16.00
g) Tippex	12.00	x2	24.00
h) Bag for questionnaires and past examination papers	150.00	x1	150.00
i) Stapler	25.00	x1	25.00
j) Staples	10.00	x1 Box	10.00
			1070.00
<b>SUBTOTAL</b>			<b>1070.00</b>
<b>2. PERSONNEL</b>			
a) Lunch allowance			
Principal researcher	30.00	x1 x 30 days	900.00
Research assistant	30.00	x3 x 30 days	2,700.00
<b>SUBTOTAL</b>			<b>3, 600.00</b>
<b>3. SECRETARIAL SERVICES</b>			
a) Ethics committee	1, 000.00	1	1, 000.00
b) Data entry	500.00	1	500.00
c) Data analysis	1 000.00	1	1 000.00
d) Photocopying proposal	2.50	320 pages	800.00
e) Photocopying questionnaire	2.50	10 pages x 65	1 625.00
f) Photocopying report	2.50	100 x 4 pages	1 000
g) Binding	7.00	5 copies	35.00
<b>SUBTOTAL</b>			<b>5, 960.00</b>
<b>TOTAL</b>			<b>10, 630.00</b>
<b>CONTIGENCY FUND10%</b>			<b>1, 063.00</b>
<b>GRAND TOTAL</b>			<b>11, 693.00</b>

## **JUSTIFICATION FOR THE BUDGET**

### **STATIONERY**

The 10 reams of bond paper were used for the research proposal development and the final report. Paper was also required to make extra copies of the proposal for submission to the Research Ethics Committee and the Board of Graduate Studies. In addition the questionnaire consisted of 9 pages while the check list with Bloom's taxonomy cognitive objectives had 1 page making the total of 10 pages which was photocopied. The bag was for the researcher to ensure that the questionnaires and past examination papers are kept safe from different research sites. The external hard drive was for copying, storing and safe keeping of research data. Other accessories such as pens, pencils rubbers, stapler and staple and note books were required for the routine collection of research data.

### **PERSONNEL**

Data collection was conducted throughout the day as such the researcher needed lunch allowance. The research was allocated 30 days to allow adequate time for administration of questionnaires and selecting past examination papers.

### **SECRETARIAL SERVICES**

Funds for photocopying services and binding of the proposal and report was needed. The charge for photocopying implied that one copy was printed and the rest photocopied to cut down on the cost. The researcher needed five copies of the proposal to submit to Post Graduate Research Committee for dissertation and dissemination.

### **CONTIGENCY**

Contingency fund which is 10% of the budget was required for any extra costs due to inflation and for any eventualities.





**APPENDIX V**

**DATA COLLECTION TOOL**

**THE UNIVERSITY OF ZAMBIA**

**SCHOOL OF MEDICINE**

**DEPARTMENT OF NURSING SCIENCES**

SELF ADMINISTERED QUESTIONNAIRE ON FACTORS INFLUENCING KNOWLEDGE AND USAGE OF BLOOM'S HIERARCHY OF COGNITIVE LEVELS OF EDUCATIONAL OBJECTIVES IN SETTING EXAMS BY NURSE EDUCATORS IN EASTERN AND LUSAKA PROVINCES

**Date of answering the questionnaire:** \_\_\_\_\_

**Questionnaire number:** \_\_\_\_\_

**INSTRUCTIONS FOR THE RESPONDENT**

- 1 Do not write your name or any of your identity numbers on the questionnaire.
- 2 Answer all the questions in this questionnaire.
- 3 Questions with responses tick your response in the box provided e.g.
3. Questions without responses, write your response in the space provided clearly.
4. All the information you will provide will be kept in strict confidence.

**SECTION A: DEMOGRAPHIC DATA**

**For official use**

1. What is your gender?

a) Male

b) Female

2. Indicate your age range

a) 25 to 30 years

b) 30 to 35 years

c) 36 to 40 years

d) 45 years and above

3. What is the level of your professional qualification?

a) Bachelor's degree

b) Master's degree

c) Doctoral degree

d) Others, specify \_\_\_\_\_

4. Indicate the years of experience in classroom teaching and assessment.

- a). 1 to 5 years
- b). 6 to 10 years
- c). 11 to 15 years
- d). 16 years and above


5. Where did you attain your highest level of professional qualification? \_\_\_\_\_

**SECTION B: NURSE EDUCATORS' KNOWLEDGE  
ON BLOOM'S TAXONOMY**

6. What is Bloom's taxonomy?

\_\_\_\_\_

7. How many domains does Bloom's Hierarchy of Educational objective has?

- a) 2
- b) 3
- c) 4
- d) 5


8. How many levels of educational objectives does cognitive domain has?

- a) 3
- b) 4
- c) 5
- d) 6


9. Among the words listed below, which of the following would be used to classify test questions in the lowest level of cognitive domain?

- a) Define, state, identify
- b) State, explain, convert
- c) Explain, convert, create
- d) Create, identify, define


10. Which of the following Bloom's hierarchy of cognitive levels of educational objectives promote critical thinking in students?

- a) Knowledge and analysis
- b) Knowledge and comprehension
- c) Application and comprehension
- d) Application and analysis


**SECTION C: BLOOM'S HIERARCHY OF COGNITIVE  
LEVELS OF EDUCATIONAL OBJECTIVES WHEN PREPARING  
TEST ITEMS**

**I. Use of Bloom's hierarchy of cognitive Levels**

11. Do you always follow Bloom's hierarchy of cognitive levels of educational objectives when setting examinations?

- a) Yes
- b) No


12. In your opinion, do you think following Bloom's hierarchy of cognitive levels of educational objectives when setting examinations is important in nursing education?

- a) Yes
- b) No


**II. Follows standardized guidelines**

13. Do you follow any standardized assessment guidelines for classroom assessment when setting examinations?

- a) Yes
- b) No


14. Does any team (committee) or peer review the test items before being administered to the students?

- a) Yes
- b) No


15. Do you have any blue print (table of specification) which act as a guide on how many questions to set in each cognitive level?

- a) Yes
- b) No


16. If the answer to question 15 is yes, how often do you use

the blue print?

- a) Very often
- b) Not often
- c) Non


For official use

17. What percentage of questions do you set for low order,

application and higher order levels? \_\_\_\_\_,

\_\_\_\_\_ , \_\_\_\_\_

18. Does your department conduct continuous

professional development meetings on assessment techniques?

- a) Yes
- b) No


**III. Nurse Educators' workload**

19. What is the educator – student ratio at your institution?

- a) 1:20
- b) 1:25
- c) 1:30
- d) 1:35 and above


20. Do you set examination questions in teams?

a) Yes

b) No


**For official use**

**IV. Time taken to prepare test items for examinations**

21. How often do you prepare test items (questions)?

a) After every lesson

b) A month before exam date

c) Two (2) weeks before exam date

d) A week before exam date

22. When do you compile peer reviewed (moderated) test paper?

a) A week before exam date

b) Two (2) days before exam date

c) Two (2) weeks before exam date

d) Not done


**V. Use of Taxonomies during test item preparation**

For official use

23. As a nurse educator, do you follow certain taxonomies in asking questions either through tests, assignments or during lessons?

a) Yes


b) No

--

24. If the answer to question 23 is yes, how often do you use the same taxonomy in setting tests, assignments or during lessons.

a) Very often


b) Not often

--

c) None

25. What are the factors that affect the usage of Bloom's taxonomy in questioning technique in nursing?

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26. Do you think that the factors which affect nurse educators' usage of Bloom's taxonomy in questioning also affect the performance of student nurses/ learners?

a) Yes


b) No

--

27. Do you feel asking questions of different levels help student nurses/  
learners to have critical thinking skills in nursing?

a) Yes

b) No


--

---

**End of the questionnaire.**

**Thank you for your co-operation and time.**

## APPENDIX VI

University of Zambia  
School of Medicine  
Department of Nursing Sciences  
P.O. Box 50110  
**LUSAKA, ZAMBIA.**

28<sup>th</sup> May 2014.

Mr Mukandawire Chidongo  
Petauke Boarding Secondary school  
P.O. Box 560050  
**PETAUKE**

Dear Sir,

**RE: REQUESTING PERMISSION TO USE A RESEARCH INSTRUMENT FOR A  
MASTERS RESEARCH STUDY.**

I write to kindly seek permission to use your data collection instrument for my Masters in nursing dissertation. I'm a student at the University of Zambia. My study will be investigating factors influencing knowledge and usage of Bloom's Hierarchy of cognitive levels of educational objectives in setting examinations by nurse educators.

Please feel free to check my candidature with the University of Zambia, School of Medicine, Department of Nursing Sciences.

I would like to thank you in anticipation for your favorable response to my request.

Yours faithfully,

Patricia Mambwe.

[mambwe.patricia@yahoo.com](mailto:mambwe.patricia@yahoo.com)

OR [mambwepatricia105@gmail.com](mailto:mambwepatricia105@gmail.com)

**APPENDIX VII: A TEMPLATE FOR COLLECTING DATA ON COGNITIVE LEVELS FROM EXAMINATION PAPERS**

**ACADEMIC LEVEL:** \_\_\_\_\_ **EXAM PERIOD:** \_\_\_\_\_

**FINAL/SUPPLEMENTARY EXAM:** \_\_\_\_\_ **INSTITUTIONAL CODE:** \_\_\_\_\_

**CATEGORISATION OF EXAM QUESTIONS ACCORDING TO COGNITIVE LEVELS**

Question number	Action verbs or Question stems used	Cognitive levels/Domains					
		Lower order questions		Higher order questions			
		Level 1 (Knowledge)	Level 2 (Comprehension)	Level 3 (Application)	Level 4 (Analysis)	Level 5 (Synthesis)	Level 6 (Evaluation)
<b>TOTAL</b>							

**APPENDIX VIII**

University of Zambia  
School of Medicine  
Department of Nursing Sciences  
P.O. Box 50110,  
**LUSAKA**  
15<sup>th</sup> August, 2014.

The Permanent Secretary  
Ministry of Health  
P.O. Box 3205  
**Ndeke House,**  
**LUSAKA**

Dear Sir/ Madam

**RE: REQUEST TO USE THE SCHOOLS OF NURSING AS RESEARCH SITES.**

I'm a first year Master in Nursing Science student at the University of Zambia, School of Medicine. I intend to conduct a study as part of the course requirement. The title of my study is "Knowledge and use of bloom's hierarchy of cognitive levels of educational objectives in setting examinations by nurse educators in Lusaka and Eastern provinces, Zambia". The study sites include; Chipata, Mwami, St Francis, St Lukes and Lusaka schools of nursing. The objective of the study is to determine the knowledge and usage of Bloom's hierarchy of cognitive levels of educational objectives in setting exams by nurse educators. The results of the study will be used to improve quality in assessments in nursing schools and promote critical thinking in nursing students which in turn promotes quality patient care.

The purpose of the letter is to request for permission to utilize the nurse educators and review the examination papers in the schools of nursing in Eastern and Lusaka provinces of Zambia.

Find attached a letter of ethical approval.

If you would like to get more information, please contact me by phone on 0972 864 466 or 0963 819 730 or by email on Mambwe.patricia@yahoo.com

I am looking forward to your favorable response.

Yours faithfully,

Patricia Mambwe  
**(MSc. Nsg. Student).**

University of Zambia  
School of Medicine  
Department of Nursing Sciences  
P.O. Box 50110  
**LUSAKA**  
15<sup>th</sup> August, 2014.

The Director  
Lusaka Health Institute  
P.O. Box  
**LUSAKA**

Dear Sir/ Madam

**RE: REQUEST TO USE THE SCHOOL OF NURSING AS RESEARCH SITE.**

I'm a first year Master in Nursing Science student at the University of Zambia, School of Medicine. I intend to conduct a study as part of the course requirement. The title of my study is "Knowledge and use of bloom's hierarchy of cognitive levels of educational objectives in setting examinations by nurse educators in Lusaka and Eastern provinces, Zambia". The study sites include all government and private nursing schools, Lusaka Health Institute inclusive. The objective of the study is to determine the knowledge and usage of Bloom's hierarchy of cognitive levels of educational objectives in setting exams by nurse educators. The results of the study will be used to improve quality in assessments in nursing schools and promote critical thinking in nursing students which in turn promotes quality patient care.

The purpose of the letter is to request for permission to utilize the nurse educators and review the examination papers in the school of nursing from 2009 to 2013. If you would like to get more information, please contact me by phone on 0972 864 466 or 0963 819 730 or by email on Mambwe.patricia@yahoo.com

I am looking forward to your favorable response.

Yours faithfully,

Patricia Mambwe

**(MSc. Nsg. Student)**

**APPENDIX IX**

University of Zambia  
School of Medicine  
Department of Nursing Sciences  
P.O. Box 50110  
**LUSAKA**  
15<sup>th</sup> August, 2014.

The Director  
Dovcott School of Nursing  
P.O. Box  
**LUSAKA**

Dear Sir/ Madam

**RE: REQUEST TO USE THE SCHOOL OF NURSING AS A PILOT STUDY SITE.**

I'm a first year Master in Nursing Science student at the University of Zambia, School of Medicine. I intend to conduct a study as part of the course requirement. The title of my study is "Knowledge and use of bloom's hierarchy of cognitive levels of educational objectives in setting examinations by nurse educators in Lusaka and Eastern provinces, Zambia". The study sites include all government and private nursing schools. The objective of the study is to determine the knowledge and usage of Bloom's hierarchy of cognitive levels of educational objectives in setting exams by nurse educators. The results of the study will be used to improve quality in assessments in nursing schools and promote critical thinking in nursing students which in turn promotes quality patient care.

The purpose of the letter is to request for permission to utilize the nurse educators in your institution to participate in the pilot study which will be done from 15<sup>th</sup> to 18<sup>th</sup> September, 2014. If you would like to get more information, please contact me by phone on 0972 864 466 or 0963 819 730 or by email on Mambwe.patricia@yahoo.com

Your favourable response will be greatly appreciated.

Yours faithfully,

Patricia Mambwe

**(MSc. Nsg. Student)**

## APPENDIX X

### **The Principal Investigator**

Patricia Mambwe

The University of Zambia

School of Medicine

Department of Nursing Sciences

**Lusaka.**

**Mobile no:** +260 972 864 466 or  
+260 963 819 730.

### **Email:**

[mambwe.patricia@yahoo.com](mailto:mambwe.patricia@yahoo.com)

[mambwepatricia105@gmail.com](mailto:mambwepatricia105@gmail.com)

18<sup>th</sup> August, 2014.

The Secretary

ERES CONVERGE

33 Joseph Mwilwa Road, Rhodes Park

**Lusaka.**

Dear Sir/Madam,

**RE: SUBMISSION OF MY RESEARCH PROTOCOL ENTITLED “KNOWLEDGE AND USE OF BLOOM’S HIERARCHY OF COGNITIVE LEVELS OF EDUCATIONAL OBJECTIVES IN SETTING EXAMINATIONS BY NURSE EDUCATORS IN LUSAKA AND EASTERN PROVINCES.**

Reference is made to the above subject requesting ERES CONVERGE IRB to review the proposal for my study. The objective of the study is to determine the knowledge and usage of Bloom’s hierarchy of cognitive levels of educational objectives in setting exams by nurse educators in Eastern and Lusaka provinces.

The result of the study will contribute to the improvement of quality in assessments and promote critical thinking in students. It will also help with the provision of safe, quality and optimum care to those seeking health services and being attended to by the qualified nurses. The result of the study will also give an insight to policy makers and all educators. The study is likely to take six (6) months from the time clearance and approval will be granted.

The tool used for the study was modified from Mukandawire's tool, who did a similar study in secondary schools in Petauke, Zambia. The tool was reviewed and modified with help of the specialists in medical education to suit it to what is on the ground in the nursing schools. Permission to use and modify the tool was sought from the source. A copy of the letter allowing the researcher to use the tool is attached as part of the appendix.

The purpose of this letter is to request ERES CONVERGE IRB to review this proposal, before the investigator can engage into the main study. Your input is specifically important in trying to protect and give respect to participants and to addresses ethical issues, in scientific and meaningful outcome of the proposed study. However, the study has no risk of injury to the participants. Commencement of the actual study will depend on your advice.

Your favourable response will be greatly appreciated.

Yours faithfully,

Patricia Mambwe

**(MSc. Nsg. Student).**

## APPENDIX XI: ACTION VERBS OF BLOOM'S TAXONOMY

CATEGORY	COGNITIVE	ACTION VERBS USED
<b>Knowledge</b>	Recall	What; when; who; which; Define; list; name; recall; state; yes/no questions; outline; mention; find; draw; choose; select; label; group; match; arrange; locate; complete
<b>Comprehension</b>	Understanding	Restate; discuss; describe; identify; report; explain; express; recognize; give examples of...; review; why; predict; tell in your own words.....
<b>Application</b>	Solving	Relate; apply; change; demonstrate; discover; illustrate; predict; relate; show; counsel; translate; interpret; employ; schedule; use; How would this information apply.....; why
<b>Analysis</b>	Exploration of reasoning	Analyze; calculate; categorize; compare; contrast; differentiate; discriminate; distinguish; examine; experiment; question; test; convert; solve; does the evidence support the conclusion?; support your position on.....; what assumptions are your interventions based on?
<b>Synthesis</b>	Creating	Arrange; collect; compose; construct; create; design; develop; formulate; organise; plan; prepare; propose; set up; manage; write; think of a way; suggest; put together; based on this information.....
<b>Evaluation</b>	Judging	Evaluate in terms of....; defend your position on this issue; classify; assess; appraise; argue; estimate; judge; predict; rate; Support; revise; value; score, justify.

(Anderson et al., (2001); Nicholl and Tracey (2007); Clauss and Geedey (2010); Kim et al., (2012); Cook (2013).

