RELATIONSHIP BETWEEN TEACHERS' UTILIZATION OF BLOOM'S COGNITIVE TAXONOMY IN TEACHING AND EXAMINATION AND STUDENTS' ACADEMIC PERFORMANCE IN PUBLIC SECONDARY SCHOOLS IN NANDI COUNTY, KENYA

BY

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DECLARATION

DECLARATION BY THE CANDIDATE

I declare that this thesis is my original work and has not been presented for a degree award at any other educational institution. No portion of this thesis may be reproduced in any manner without prior permission of the author, or Moi University.

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DEDICATION

This work is devoted to my parents, Mr. Joel and Mrs. Roselyne, my siblings Vicky, Dorothy, Mercy, and Patrick, my wife Valentine, and children Brevin, Bright, and Brilliance, and the entire family of Joseph Kenduiywo for their persistent encouragement and prayers.

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ABSTRACT

There is a widespread concern by stakeholders about the academic performance in public secondary schools in comparison to private schools. The utilization of Bloom's Taxonomy should ideally inculcate improvement in performance. The study therefore endeared to investigate the relationship between teachers' utilization of Bloom's Cognitive Taxonomy in teaching and examination and students' academic performance in public secondary schools in Nandi County, Kenya. The objectives of the study were to determine teachers' utilization of Bloom's Taxonomy in teaching and the construction of internal exams; to investigate the relationship between the utilization of Bloom's Taxonomy in teaching and academic performance; and to examine the relationship between the utilization of Bloom's Taxonomy in the construction of exams and academic performance in public secondary schools. The study adopted a pragmatic paradigm. This study was based on Bloom's Cognitive Taxonomy. This study utilized a mixed method research approach with an explanatory sequential design. The research population consisted of 2055 teachers from 137 public secondary schools. The sample size was 360 teachers from 30 county schools. 30 county schools were selected using simple random sampling, from which 12 Form 3 teachers teaching 6 selected subjects were identified. Lesson observation, questionnaires, and document analysis were used to collect data from teaching and examination. Data was analyzed using frequencies, means, and Chi-square. The results showed that 58% of the teachers utilized Bloom's Taxonomy when teaching, while 86% utilized it in setting exams. The overall percentages for using Bloom's Cognitive Taxonomy in teaching during lesson observation were as follows: remembering 30%, understanding 29%, applying 16%, analyzing 10%, evaluating 8.0%, and creating 6.0%, whereas on the examination papers were: remembering 29.4%, understanding 28.5%, applying 14.5%, analyzing 9.9%, evaluating 8.7%, and creating 8.8%. The study revealed a positive relationship both between the utilization of the taxonomy in teaching and academic performance (χ^2 = 25.57 with C = 0.26) and also between the utilization of the taxonomy in setting exams and academic performance (χ^2 = 97.89 with C = 0.47). Similarly, teachers' utilization of Bloom's taxonomy had a positive influence on different subjects and teaching (χ^2 = 27.69) and the construction of internal exams (χ^2 = 20.89) and also between utilization of the taxonomy and the mode of test construction (χ^2 = 35.0). The study therefore concluded that, most teachers used Bloom's Taxonomy when developing internal tests, and these had a significant positive relationship with academic performance. This study recommended that all teachers should utilize Bloom's Taxonomy and maximize all the levels of it in exams and teaching so as to promote an insightful approach to learning and critical thinking experience that will enhance academic performance for the students.

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1.0 CHAPTER ONE

INTRODUCTION TO THE STUDY

1.1 Overview

The relationship between teachers' utilization Bloom's Cognitive Taxonomy in teaching and examination and students' academic performance in public secondary schools is outlined in this chapter. It examines at the background information, the statement of the problem, the objectives, hypotheses, and the study's goal. It also emphasizes the study's significance, reasons, assumptions, and limitations, as well as the study's scope, theoretical framework, conceptual framework, and operational definition of keywords.

1.2 Background of the Study

Bloom’s Taxonomy is a multi-tiered sculpt of categorizing thoughts in accordance with the six stages of cognitive taxonomy of difficulty that is remembering, understanding, applying, analyzing, evaluating, and creating. The stages have often been portrayed as a journey of steps all over the years, making many teachers persuade their students to “ascend to advanced level of thinking” (Forehand, 2017). The taxonomy helps teachers describe and differentiate various stages of human cognition; thoughts, knowledge, and understanding. Teachers frequently utilized Bloom’s Cognitive Taxonomy to keep informed or steer the setting of appraisals (examination and further assessment of learner education), syllabus (units, lessons, projects, and other educational actions), and teaching methods such as questioning strategies (Bloom’s Taxonomy, 2014 as cited by Forehand, 2017).

Nkhoma et al (2017) said that the Bloom’s Cognitive Taxonomy offers an outline that teachers can utilize to reassure the provision of intellectual skillfulness such as applying, analyzing, evaluating, and creating in delivered educational actions and evaluation (Jideani and Jideani, 2012 as cited by Nkhoma et al, 2017). The cognitive developments that bring about the critical idea are linked totally to a subject theme, class content, and reflection (Hamilton & Klebba, 2011 as cited in Nkhoma et al, 2017). Inquest into most excellent performances designed for mounting educational goals, actions, and evaluations using Bloom’s Cognitive Taxonomy, still requires more assessment to inform the relationship between teacher’s utilization of Bloom’s Cognitive Taxonomy and academic performance of county public secondary schools in Nandi County, Kenya.

In accordance with Armstrong (2016), Bloom’s Cognitive Taxonomy aids tutors in the following ways: foremost, it assists teachers to establish educational objectives that are essential during an instructive exchange as a result instructors and learners equally comprehend the rationale of that exchange. Secondly, teachers can gain from using scaffolds to sort out goals since putting in order goals assists teachers to make clear goals for themselves and for scholars. Last but not least, having a well-organized set of goals can help instructors prepare, carry out effective teaching, establish valid evaluation tasks and policies, and ensure that teaching and evaluation are linked to the goals.

Bloom's Revised Cognitive Taxonomy, according to Zareian et al (2015), can be used to evaluate educational actions and align instructional resources with cognitive educational domains such as remembering, understanding, applying, analyzing, evaluating, and creating. The underlying principle behind such a laser-like focus on Bloom's Taxonomy dates back to the late 1950s and early 1970s, when student thought was still growing. Attempts to categorize different domains of human education, namely cognitive, affective, and psychomotor, were made during this time. The results of these tests result in a variety of nomenclatures for each domain. Bloom's Taxonomy (1956), which has been used in a variety of situations, is the most common and oldest of them. However, studies on the relationship between teachers' use of Bloom's Cognitive Taxonomy in teaching and exam setting and students' academic performance in county public secondary schools in Nandi County, Kenya are scarce or nonexistent.

Examination, according to Yuliana and Iwan (2018), is an important aspect of the educational system that has certain goals to achieve and is a continuous process that involves both the teacher and the student. Exams are beneficial because they track a student's progress toward defined goals. Examining a student's talents or achievement in any area of their academic curriculum is referred to as an examination. According to Lumadede et al (2020), exams have a direct influence on students' academic advancement.

However, there are some elements that make it difficult to assess a student's true achievement, and the current examination system does not assess a student's true comprehension or intellectual advancement (Oyieko, 2017). This indicates that inappropriate question structure, pattern, and type of question papers, subjective marks and individual differences in evaluating the answers, dishonest invigilating staff, incorrect script marking, and inadequate preparation, among other things, are the main factors affecting a student's examination performance. As a result, a large number of students fail the test. In reality, students' failure is caused by challenges they encounter, which function as a stumbling block to their achievement. Controlling these characteristics is important in order for the current test system to be meaningful (Lumadede et al, 2020). The relationship between teachers' utilization of Bloom's Cognitive Taxonomy in teaching and examination and students' academic performance in public secondary schools in Nandi County, Kenya may help to solve the problems posed above thus the purpose of the researcher to undertake this study.

The Bloom's Cognitive Taxonomy model offers teachers with a set of guidelines for delivering learning content in accordance with the constructivist view of learning, in which learning is meant to be learner-centered. In his research, Benson (2012) looked at ways to ensure that mastery levels of performance are obtained through education. He believes that both teachers and students must see instances of learning and performance expectations in order to ensure that the learning and performance levels are met. Long-term learning goals and objectives are also necessary for students to have a clear image of mastery level performance, he adds.

Benson (2012) goes on to say that demonstrations and models are important and should be made available to students in daily lessons as examples of expected performance in assignments and lesson activities. Additionally, learning metrics such as checklists, scoring guides, rubrics, and scales can be used to determine how learners perform over time in order to be considered masters. Benson (2012) goes on to say that using examples and exemplars ensures that both teachers and students have clear learning and mastery goals. He emphasizes the importance of examples and standards, stating that they should be accompanied by performance metrics that define performance mastery cut-off levels. Valid samples and exemplars can also be utilized in the classroom to help students rate and analyze their work using performance models. They also provide a vital platform for teachers to assess their students' performance. Bloom's Cognitive Taxonomy is a useful model for teaching and learning that depicts all of the steps in the learning process, from lower to higher thinking skills. It may be used by both the instructor and the learner.

According to Ibtihal and Oqlah (2015), social, economic, and technological advancements have reduced the likelihood of knowledge alone imparting skills adequate to enable citizens to navigate more dynamic trends. Wagner (2008, p. 21), as referenced by Ibtihal and Oqlah (2015), states that a variety of abilities are required to make sense of the global information economy, in contrast to earlier generations. "Critical thinking and problem solving; teamwork and leadership; effective oral and written communication; acquiring and evaluating information; curiosity and imagination" are the seven survival skills that learners must acquire.

Curricula are increasingly embracing cognitive skills in teaching and learning in diverse places throughout the world (Shaheen, 2010; Gallagher et al., 2012). Curriculum revisions that emphasize higher-order thinking skills, which are included in educational programs in many nations, are on the rise (Shaheen, 2010; Lin, 2011). Kenya has not been left behind in implementing reforms that prioritize the use of inquiry and higher-order thinking in classrooms (Republic of Kenya, 2012). The fundamental goal of these reforms is to help students understand the substance of the lessons and be more critical and creative rather than just memorize it.

According to research, students' academic success is determined by their thinking and non-thinking traits as well as the sociocultural setting in which the learning process takes place (Lee & Stankov, 2016; Liem & McInerney, 2018; Liem & Tan, 2019). This demonstrates that student accomplishment is extremely important and should be given top attention in any developing country's short-and long-term goals to be achieved. This is why all education stakeholders in Nandi County, Kenya, are concerned about the poor academic performance in public secondary schools. As a result, the researcher was compelled to look into the relationship between teachers' use of Bloom's Cognitive Taxonomy in teaching and examination and students' academic performance in a county public secondary school in Nandi County, Kenya.

Higher-order thinking, according to Lewis and Smith (1993) as cited by Abosalem (2016), is the ability of an individual to use novel material or previous knowledge and manipulate the information to reach possible answers in new situations, whereas lower-order thinking emphasizes merely routine, mechanistic application of previously acquired knowledge. Higher-order reasoning activities necessitate the student's ability to comprehend, investigate, or alter data. Higher-order thinking skills, on the other hand, "push students to grasp, evaluate, or manipulate information," according to Newman (1993) as stated in Abosalem (2016, P.44).

According to Carson and Marshall (2008), as cited in Saido et al. (2018) and Tuzlukova and Heckadon (2020), in their study to determine the level of learning as defined by Bloom's Taxonomy in textbook problems used mostly in common courses in the schools of business at Samford University in the United States, they discovered that the vast majority of end-of-chapter problems examined only required students to function at Level 1 (remembering) or Level 2 (understanding). They also proposed that other strategies should be used to encourage students to think at a higher cognitive level (Saido et al., 2018; Tuzlukova & Heckadon, 2020).

Graduates with higher-order thinking abilities are in high demand in today's financial market, and civic education plays a critical role in assisting learners in acquiring these skills. Unfortunately, multiple studies have shown that access to high-quality instruction that fosters higher-order thinking skills is unequal, which could lead to large gaps in utilization of Bloom's Cognitive Taxonomy (Mitani, 2021).

According to research, the flexibility of continuous assessment tests allows teachers to create tests without having to follow strict test-building guidelines. Such assessments lack a regular or structured format, and therefore do not reflect all of the curriculum's topics. The tests are also susceptible to measurement errors, which have a significant impact on their accuracy (Ochieng, 2021). If this was the case of education in other countries and counties, then it was necessary to look at the Kenyan situation, and specifically in Nandi County. However, as evidenced by the preceding debates, there is a difficulty with utilizing Bloom's Cognitive Taxonomy of objectives in teaching and assessing students. As a result, a study of the relationship between teachers' utilization of Bloom's Cognitive Taxonomy in teaching and examination and students' academic performance in county public secondary schools in Nandi County, Kenya, is required.

1.3 Statement of the Problem

There is poor academic performance in Nandi County. The analysis from the Kenya National Examination Council shows that Nandi County has not been able to produce more than 20 schools in the top hundred schools in the Kenya Certificate of Secondary Education (KSCE) for the past four years since 2016 (Kenya National Examination Council report, 2019). This showed that the county’s academic performance is dismal compared to other counties in the country. There are various efforts to mitigate this, including resources put in by the government of Kenya, for instance, supplying all public schools with teaching and learning resources, but seemingly little research talks about the role of the teachers’ utilization of Bloom’s Cognitive Taxonomy in teaching and examination. In reality, teaching and exam design should ideally assist students in learning and preparing for an examination, thereby improving performance.Therefore, the study sought to investigate whether teachers are keen on utilizing the Blooms Cognitive Taxonomy and the relationship that its utilization has on academic performance in a quest to improve academic performance in Nandi County, Kenya.

According to research, in order to be competent, knowledgeable, and skilled, one must have both low and high-order thinking skills (Abosalem, 2016). However, this is not the case as it is supported by the research and recommendations made by the following scholars: Ulmer and Torres (2007 as cited in Figland, Roberts & Blackburn, 2020), Carson and Marshall (2008 as cited in Tuzlukova & Heckadon, 2020), Kinyua and Okunya (2014), Chelang' at (2014), Wilson (2016a), Saido et al (2018), Mitani (2021) and Ochieng (2021). As per these researchers, teachers do not exhaust the utilization of Bloom's Cognitive Taxonomy in teaching and setting of exams. As a result, learners would be unable to possess both low-order and high-order thinking skills, resulting in academically incompetent learners. Thus, the need for the researcher to conduct research on the relationship between teachers' utilization of Bloom's Cognitive Taxonomy in teaching and examination and students' academic performance in public secondary schools in Nandi County, Kenya.

As referenced by Gichuhi (2014), Stiggins (1988) brings out the effects of a poorly constructed test, claiming that "teacher-produced tests are dominated by questions that urge students to recall facts and knowledge." Despite the fact that instructional objectives and even instructional practices may aim to improve thinking skills, classroom examinations frequently fall short of these goals. Students who utilize tests to try to figure out what the teachers expect might see how much emphasis is put on memorizing and respond accordingly. As a result, low-quality assessment that fails to recognize and reward higher-order thinking skills will stymie their growth. As a result, it is critical that teachers perform assessments with a clear objective in mind and feel that their assessments will help students achieve excellence (Murray, 2006, as referenced in Gichuhi, 2014). This also serves as the foundation for the researcher's investigation into the relationship between a teacher's utilization of Bloom's Cognitive Taxonomy in teaching and examination and students' academic performance in public secondary schools in Nandi County, Kenya.

The utilization of Bloom’s Cognitive Taxonomy enables learners to be academically competent by acquiring higher and lower-order thinking skills, which will enable them to be productive and academically competent in solving problems they face in the classroom and work place. Therefore, the mode of evaluation matters a lot when it comes to evaluating a learner for placement in various opportunities, since if the learner is used to a lower level of thinking, he/she may not be able to do tasks that require a high-ordered level of thinking. These levels can be assessed through the utilization of Bloom’s Cognitive Taxonomy, hence the need to do an assessment on the relationship between a teacher’s utilization of Bloom’s Cognitive Taxonomy in teaching and examination and students’ academic performance in public secondary schools in Nandi County, Kenya.

1.4 Purpose of the Study

The goal of this study was to see if there was a link between instructors' use of Bloom's Cognitive Taxonomy in teaching and examinations and students' academic performance in public secondary schools in Nandi County, Kenya.

1.5 Objectives of the Study

The researcher's goals in looking at the relationship between teachers' utilization of Bloom's Cognitive Taxonomy in teaching and examination and students' academic achievement in public secondary schools in Nandi County, Kenya were as follows:

i. To determine teachers’ utilization of Bloom’s Cognitive Taxonomy in teaching in public secondary schools in Nandi County
ii. To determine teachers’ utilization of Bloom’s Cognitive Taxonomy in exam construction in public secondary schools in Nandi County
iii. To investigate the relationship between teachers’ utilization of Bloom’s Cognitive Taxonomy in teaching and academic performance in public secondary schools in Nandi County
iv. To examine the relationship between teachers’ utilization of Bloom’s Cognitive Taxonomy in the construction of exams and academic performance in public secondary schools in Nandi County
v. To determine teachers’ utilization of Bloom’s Cognitive Taxonomy in teaching selected subjects in public secondary schools in Nandi County
vi. To determine teachers’ utilization of Bloom’s Cognitive Taxonomy in exam construction in selected subjects in public secondary schools in Nandi County.

vii. To determine the relationship between the mode of exam construction and the teachers' utilization of Bloom's Cognitive Taxonomy in public secondary schools in Nandi County

viii. To examine gender influence on teachers' utilization of Bloom's Cognitive Taxonomy in teaching and exam construction in public secondary schools in Nandi County

ix. To examine professional qualification influences on teachers' utilization of Bloom's Cognitive Taxonomy in teaching and exam construction in public secondary schools.

1.6 Research Questions

The research questions which quided the researcher to conduct this study were as follows:

i. Is there teachers' utilization of Bloom's Cognitive Taxonomy in teaching in public secondary schools in Nandi County?

ii. Is there teachers' utilization of Bloom's Cognitive Taxonomy in setting of internal exams in public secondary schools in Nandi County?

iii. Is there a relationship between teachers' utilization of Bloom's Cognitive Taxonomy in teaching and academic performance in public secondary schools in Nandi County?

iv. Is there a relationship between teachers' utilization of Bloom's Cognitive Taxonomy in setting of internal exams and academic performance in public secondary schools in Nandi County?

v. Does teachers' utilization of Bloom's Cognitive Taxonomy vary among the selected teaching subjects in teaching in public secondary schools in Nandi County?

vi. Does teachers' utilization of Bloom's Cognitive Taxonomy vary among the selected teaching subjects in setting of internal exams in public secondary schools in Nandi County?

vii. Does the teachers' utilization of Bloom's Cognitive Taxonomy vary among modes of exams construction in setting of exams in public secondary schools in Nandi County?

viii. Does teachers' gender have influence on teachers' utilization of Bloom's Cognitive Taxonomy in teaching and exam construction in public secondary schools in Nandi County?

ix. Does teachers' professional qualification have influence on teachers' utilization of Bloom's Cognitive Taxonomy in teaching and exam construction in public secondary schools in Nandi County?

1.7 Hypotheses

The researcher tested the following null hypotheses in this study.

HO_1: There was no significant relationship between teachers' utilization of Bloom's Cognitive Taxonomy in teaching and students' academic performance in public secondary schools in Nandi County.

HO_2: There was no significant relationship between teachers' utilization of Bloom's Cognitive Taxonomy in setting of internal exams and students' academic performance in public secondary schools in Nandi County.

HO_3: Teachers' utilization of Bloom's Cognitive Taxonomy has no significant influence on teaching selected subjects in public secondary schools in Nandi County.

HO_4: Teachers' utilization of Bloom's Cognitive Taxonomy has no significant influence on setting of internal exams in public secondary schools in Nandi County.

HO_5: The teachers' utilization of Bloom's Cognitive Taxonomy does not significantly differ among the modes of exam construction in setting of exams in public secondary schools in Nandi County.

HO_6: The teachers' gender has no significant influence on teachers' utilization of Bloom's Cognitive Taxonomy in teaching and exam construction in public secondary schools in Nandi County.

HO_7: Teachers' professional qualification has no significant influence on teachers' utilization of Bloom's Cognitive Taxonomy in teaching and exam construction in public secondary schools in Nandi County.

1.8 Justification of the Study

According to Ochieng (2021), the lower levels of Bloom's Cognitive Taxonomy were tested the most, while the higher levels were generally ignored. The majority of teachers did not appear to be proficient in test construction, since many of them had not attended in-service courses in test development and did not follow test construction norms. As a result of his research, the Ministry of Education should implement in-service courses for instructors to improve their test development skills, with a focus on test construction.

According to Masinde (2012), a decent and appropriate test paper should have a variety of difficulty levels aligned with Bloom's Cognitive Taxonomy to accommodate students' varying skills. Unfortunately, teachers set exams that primarily focus on lower levels of taxonomy, according to her research, and it is recommended that teachers be taken for in-service training on the construction of quality tests and to promote knowledge transformation rather than transmission in order to enhance critical thinking and enable today's learners to acquire 21st century skills.

The Bloom’s Cognitive Taxonomy was utilized in this study since it provides six levels of objectives that teachers or instructors should utilize during the teaching and learning process. It also provides a clear process of constructing exams utilized for the assessment of learners for the purpose of promotion to the next level, for scholarship purposes, for career guidance, job selection, and for placement of learners according to ability and individual needs. This taxonomy was utilized because little research has been done on it, especially in the area of the relationship between a teacher’s utilization of Bloom’s Cognitive Taxonomy in teaching and examination and students’ academic performance in public secondary schools in Nandi County, Kenya.

Subjects are the methods for teaching fundamental competencies, ideas, and knowledge at all levels of education. These disciplines, such as English, Mathematics, Science, and Technology, are taught at various levels of education. They are not, however, static and may evolve to meet society's ever-changing requirements. In this study, six subjects were utilized, namely: English, Mathematics, Chemistry, Computer Studies, Christian Religious Education, and Business Studies. These subjects were selected because there was little research that had been done about them on Bloom's Cognitive Taxonomy in Nandi County and Kenya at large. These subjects were also selected to represent subjects offered in the Kenya secondary school curriculum. For instance, English represents language and learners utilize it in most of their activities in academics and nation building. Also, these subjects were also selected so as to check whether Bloom's Taxanomy was utilized in teaching and examination.

Mathematics as a subject supports other subject areas and therefore is specifically tailored to support students who are science-oriented and intend to focus on areas such as technical and engineering fields in post-secondary institutions. It was noted that modern science, medicine, architecture, social sciences, engineering, and all branches of technology utilize mathematics to express physical and social economic laws (Kingoriah, 2013). This subject would therefore provide the learner with a firm foundation to pursue courses in Science, Technology, Engineering, and Mathematics (STEM) related areas. Mathematics is a subject that provides a platform for learners to develop skills to solve day-to-day problems in life. It has become a widely utilized subject in all fields and therefore is crucial in accurately analyzing everyday problems (Kingoriah, 2013). This subject was utilized because it was poorly done in Nandi County.

The science of Chemistry is the study of the structure of substances and how they interact with one another. It was selected in this study because it equips the learner with foundational competencies that prepare them for advanced sciences and technical and engineering courses at the tertiary level. Learners should be able to study through hands-on experiences and achieve a higher-ordered degree of learning as a result. In this study, Computer studies were chosen because the learner should be able to use Information and Communication Technology (ICT) in his or her daily activities in secondary school because digital literacy is critical in today's environment. Learning ICT skills in secondary school would allow all students to carry out their academic tasks. The importance of Computer science as a subject in secondary schools cannot be overemphasized, as some form of ICT is utilized in nearly every aspect of our lives. Thus, learners must have a firm foundation in ICT and be exposed to high-level skills for them to learn and utilize to achieve Vision 2030 objectives. Both Christian Religious Education and Business Studies were used to represent the humanities and applied subjects. Moreover, these subjects were selected because there was little research that had been done about them in Bloom’s Cognitive Taxonomy in Kenya.

Explanatory sequential mixed research design was utilized because there was little research done on the same area and it also assisted the pollster to explain the relationships between the teachers’ utilization of Bloom’s Cognitive Taxonomy in teaching and students’ academic performance as well as explain the relationship between teachers’ utilization of Bloom’s Cognitive Taxonomy in internal examination and students’ academic performance. It would also help to predict teachers’ utilization of Bloom’s Cognitive Taxonomy in teaching, internal examination and students’ academic performance.

1.9 Significance of the study

This study was designed to investigate the relationship between teachers' utilization of Bloom's Cognitive Taxonomy in teaching and examination and students' academic performance in public secondary schools in Nandi County, Kenya. The findings from the study would help generate new knowledge on the relationship between teachers' utilization of Bloom's Cognitive Taxonomy in teaching and the setting of internal examinations and its relation to students' academic performance in public secondary schools in Nandi County, Kenya.

The findings of the study will be useful to secondary school students and teachers in order to gain a better understanding of the relationship between teachers' use of Bloom's Cognitive Taxonomy in teaching and examinations, in order to prepare appropriate teaching materials and enable learners to perform well in the Kenya Certificate of Secondary Education examination, as the internal examination is a reflection of the Kenya Certificate of Secondary Education examination.

The knowledge and detailed awareness about the teachers' utilization of Bloom's Cognitive Taxonomy in teaching and examination would help teachers to accelerate the teaching and learning process in the classroom since the teacher would concentrate on the specific areas that are guided by the six levels of Bloom's Cognitive Taxonomy and the objectives provided by the Kenya Institute of Curriculum Development in collaboration with the Kenya National Examination Council.

Teachers would be able to provide a suitable environment for the success of the teaching and learning process and examine learners. The textbook writers would get insights on how to write textbooks that best fulfill the teaching and examination needs of the students since Bloom’s Cognitive Taxonomy would act as a guide to teaching and setting questions for assessment of students.

Teachers would know what it takes to have a good examination that measures all the levels of cognitive abilities and brings out the best learning material for each learner according to the six levels of Bloom’s Cognitive Taxonomy. Individuals whose interests may be in teaching and assessment would have a check list on how to improve teaching and examinations. Curriculum developers and examination designers would understand the importance of testing and come up with a solution to the poor performance in the Kenya Certificate of Secondary Education by re-training teachers on how to teach well and construct classroom tests that would not compromise the teaching and learning process and standards by using in-service refresher courses after teaching for a certain period of time.This will serve as a reminder to tutors on the required pedagogy and standards for setting an examination.

Education stakeholders would be able to supervise the implementation of the use of Bloom’s Cognitive Taxonomy in teaching and examinations. It will enable school administrators to set up panels to supervise the setting of examinations using Bloom’s taxonomy. The Teachers' Service Commission (TSC) will be able to provide and organize refresher courses for teachers on the use of Bloom's Cognitive Taxonomy in teaching and examinations in order to prepare skilled learners.

1.10 Scope of the Study

The study seeks to investigate the relationship between teachers' utilization of Bloom's Cognitive Taxonomy in teaching and examination and students' academic performance in county public secondary schools in Nandi County, Kenya. The study targeted 2055 teachers and sixteen teaching subjects from 137 public county secondary school in Nandi County, Kenya because they possessed the characteristics that the researcher was interested in. The sample size was limited to six teaching subjects and 360 teachers for quantitative strategy and 60 teachers for qualitative strategy. This study was limited to teachers' utilization of Bloom's Cognitive Taxonomy in teaching and the construction of internal examinations and students' academic performance in county public secondary schools in Nandi County, Kenya.

The study was limited to public county secondary schools in Nandi County, Kenya since they have common teaching and learning facilities. There was no manipulation of variables by the researcher. This study utilized form three class to study teachers' utilization of Bloom's Cognitive Taxonomy in teaching and the construction of internal examinations in Mathematics, Business studies, English, Christian Religious Education, Chemistry, and Computer studies and its relation to students' academic performance. This study also utilized teachers' gender and educational level to study the influence of teachers' utilization of Bloom's Cognitive Taxonomy in teaching and the construction of internal exams in county public secondary schools in Nandi County, Kenya.

The study used a pragramatic philosophical approach to the world and a mixed method research technique since it allows and encourages the use of both quantitative and qualitative strategies. The study also utilized an explonatory sequential mixed research design because it provides an opportunity for the researcher to predict scores and explain relationships between variables. According to the literature review, the majority of the other research was done on other designs.

1.11 Limitations of the Study

This study was conducted in public county secondary schools in Nandi County, Kenya, and therefore, the results may not be generalized to all secondary schools in the country since not all secondary schools have the same teaching and learning facilities. Also, the study was carried out only in public county secondary schools in Nandi county since they have similar facilities for teaching and learning. However, the results may be generalized to all public county secondary schools in Nandi County, Kenya. This study was limited to teachers' utilization of Bloom's Cognitive Taxonomy in teaching and the construction of internal examinations in Mathematics, English, Chemistry, Christian Religious Education, Business studies, and Computer studies. Therefore, the results would not be generalized to all subjects but be limited to the subjects utilized in the study.

1.12 Assumptions of the Study

This study was based on the following assumptions:

- Public county secondary schools have a minimum of two teachers per subject, teaching form three, so that the number of respondents was attained per subject.

- Public county secondary schools were offering the six subjects utilized in this study so as to enable the researcher to achieve the objective of the study by meeting the required number of subjects.
- All the teachers teaching the subjects used in the study were all trained teachers. This was to ensure that all teachers met the professional qualification of an instructor.
- The schools used in this study use different modes of setting exams and the teachers know them.
- The schools used in this study examine their learners at least once every term in order to measure their academic performance.

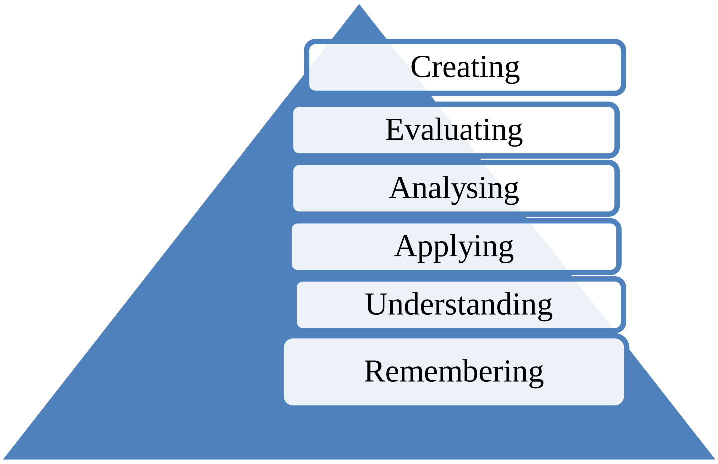
1.13 Theoretical Framework

Bloom's Cognitive Revised Taxonomy of objectives served as the theoretical framework for this research. Bloom's Revised Cognitive Taxonomy is a multi-tiered approach for categorizing thought into six stages of cognitive complexity: remembering, comprehending, applying, analyzing, evaluating, and generating. Many professors have encouraged their students to climb to a higher level of thought by depicting the levels as a stairwell over the years. Bloom's Cognitive Taxonomy is hierarchical in the sense that upper levels consider each level. To put it another way, a student who is performing at the application level has mastered the content at the remembering and comprehending levels as well (Forehand, 2010; Wilson, 2016a).

Bloom's Cognitive Taxonomy is a classification system for claims about what students are expected to understand as a result of educational instruction. Bloom established six levels in an orderly manner, ranging from simple to more complicated and from concrete to abstract; mastering the next more complex skill or talent necessitates mastering the previous (Krathwohl, 2002, as cited in Cengiz & Cakir, 2016). It's frequently depicted as a pyramid in classroom posters, as shown in Figure 1.

Figure 1

Bloom's Cognitive Taxonomy



Source: Google images

As a result, it is a method of allowing members of diverse learning institutions to exchange test items in order to establish banks of items that all measure the same educational goal (Krathwohl, 2002 as cited in Cengiz & Cakir, 2016).

According to Bloom, the major goal of taxonomy was to improve the exchange of ideas and resources between test workers and those involved in educational research and curriculum creation (Bloom, 1956, as cited in Cengiz & Cakir, 2016). Depending on the situation, all levels of Bloom's Cognitive Taxonomy have a role, but the ultimate goal must be to reach the higher stages of cognitive growth. Bloom's Cognitive Taxonomy, for example, according to Bloom et al. (1956) as cited in Deal and Hegde (2013), is a description of educational objectives that has been used by educators for the construction of learning goals, the creation of assessment tools, which include exam questions, and other efforts to coordinate best practices with cognitive development theory over the last fifty years, and it has continued to enjoy widespread use at all levels of education in the United States and around the world since its inception (Krathwohl, 2002) as cited in Deal and Hegde (2013).

As a result, the purpose of this study is to examine the relationship between instructors' use of Bloom's Cognitive Taxonomy and students' academic achievement in public secondary schools in Nandi County, Kenya, in terms of teaching and internal examination construction. This is because learners will be able to think at both low and higher levels of thinking when Bloom's Cognitive Taxonomy of objectives is used in instruction and the creation of internal examinations. This would allow people to address problems by thinking critically, analyzing, and manipulating data rather than being mechanistic.

According to Krathwohl (2002) as cited in Deal and Hegde (2013) and Wilson (2016a), the six levels of Bloom's Cognitive Taxonomy were as follows: remembering, understanding, applying, analyzing, evaluating, and creating. The first level is remembering, which entails recalling basic terminology and facts related to Mathematics, Chemistry, English, Christian Religious Education (C.R.E.), Business studies, and Computer studies.In business studies, for example, students were expected to understand the concepts of supply and demand, as well as the factors that shift supply and/or demand curves.

The second level of Bloom's Cognitive Taxonomy is understanding, which is achieved when the student can restate an idea or problem in his/her own words, provide an example of a concept, or extrapolate a trend in Mathematics, Chemistry, Christian Religious Education (C.R.E.), English, Business studies, and Computer studies. In non-technical terms, the student in business studies must be able to provide a real-world example of supply and demand or explain how a market would reach equilibrium.

The third level of the taxonomy is applying, which is achieved if the student can apply concepts to a new problem that embodies those concepts in a different way than originally presented in Mathematics, Chemistry, Christian Religious Education (C.R.E.), English, Business studies, and Computer studies. For example, the student in Business studies was confronted with a description of conditions in a market and asked to determine the impact of those conditions on market allocation.

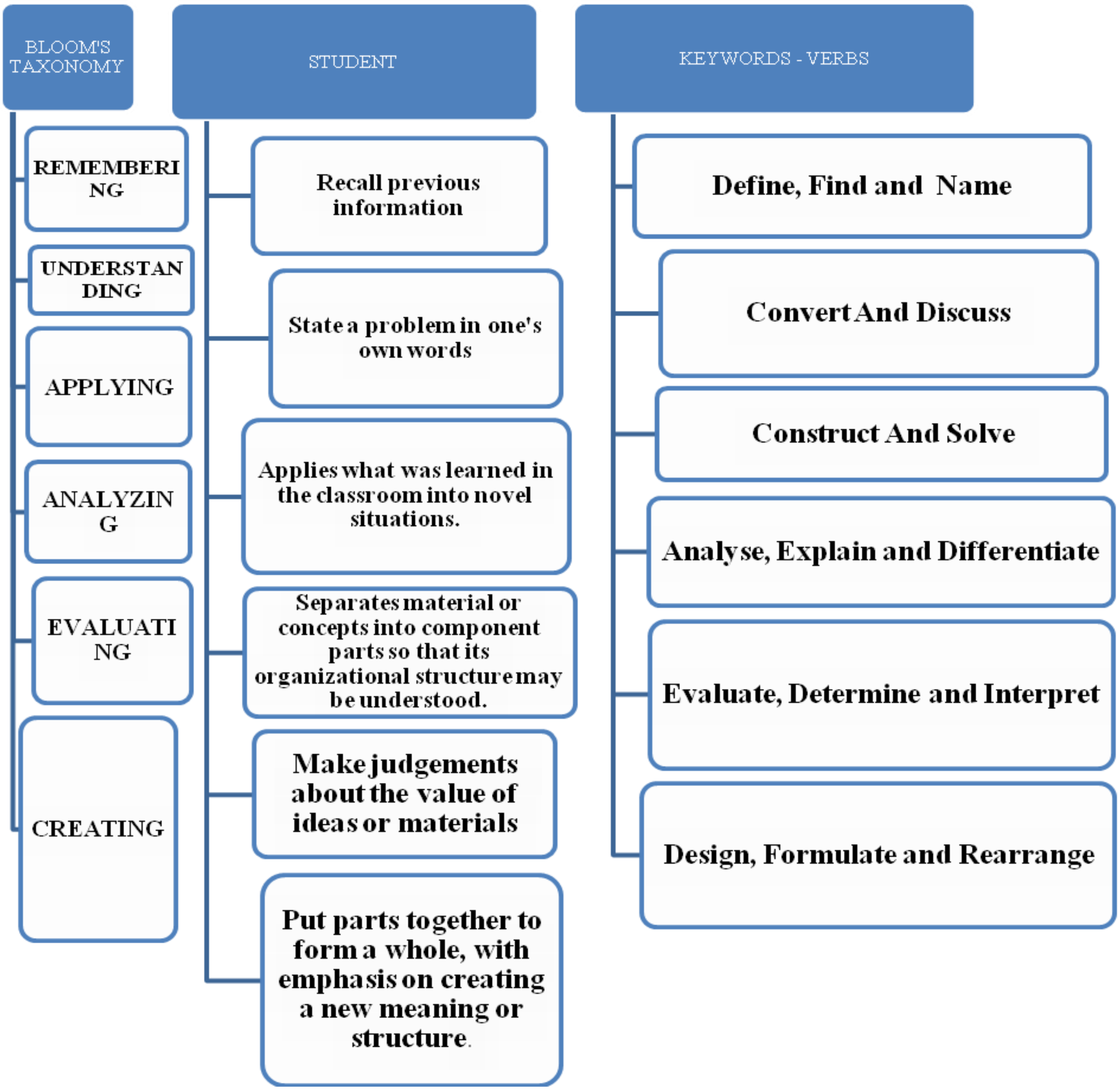
The fourth level of the taxonomy is analyzing, which requires students in Mathematics, Chemistry, English, Christian Religious Education (C.R.E.), Business studies, and Computer Studies to break down material into its component parts and determine how they fit together. For example, in Business studies, a student was required to identify the assumptions underlying an efficient market allocation or demonstrate an understanding of causation versus correlation when analyzing data presented in graphical form.

The fifth level of Bloom’s Cognitive Taxonomy is evaluating, which requires the student to critique an idea in Mathematics, Chemistry, Christian Religious Education (C.R.E.), English, Business studies, and Computer studies. Students were able to do so if they could show that they could spot fallacious arguments and that they could evaluate hypotheses based on external evidence and internal consistency. Students in Business studies, for example, could be given a list of characteristics of numerous market structures and asked to rate them in terms of efficiency or innovation incentives.

Finally, Bloom's Cognitive Taxonomy's sixth level, creating, asks the learner to reorganize elements of knowledge in a new way or construct a new theory to explain a set of facts. For example, a business studies student was given the task of developing a hypothesis to explain what would happen to aggregate output if private investment declined. These levels are summarized as shown in figure 2 below.

Figure 2

A structure of Bloom's Revised Cognitive Taxonomy Pyramid



1.14 Conceptual Framework

Figure 3 below summarizes visually the associations the study conceptualized to exist between teachers' utilization of Bloom's Cognitive Taxonomy in teaching and examination, and their relation to students' academic performance in public secondary schools.

Figure 3

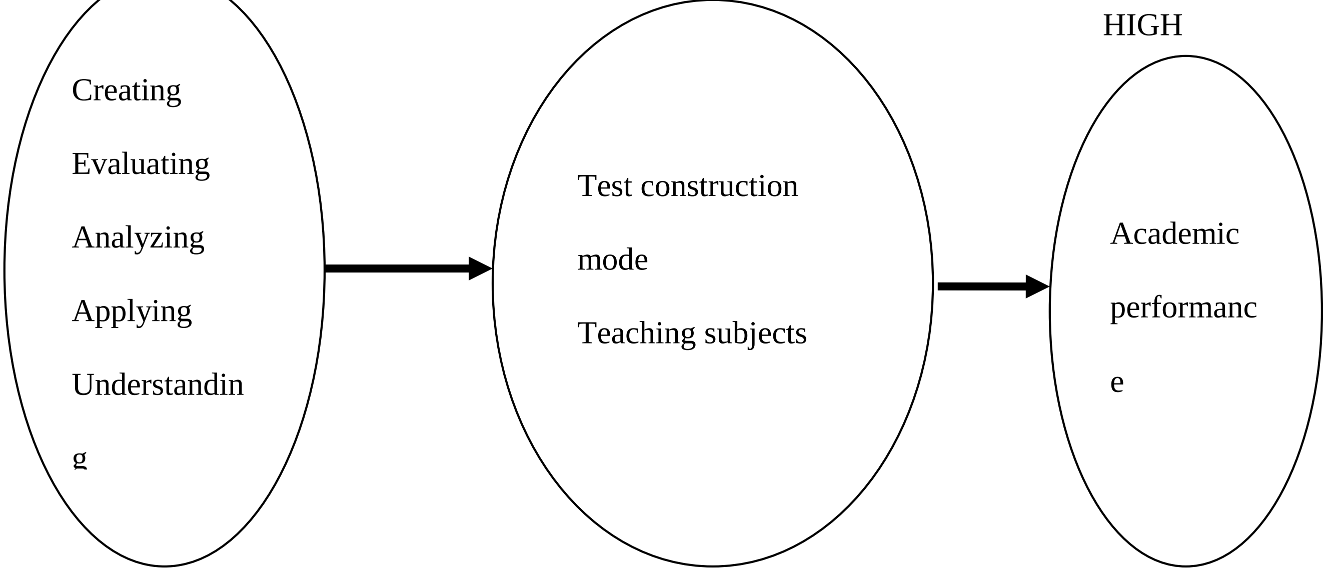
Relation between Bloom's Taxonomy, Teaching, Examination and Academic performance

Independent Variable

(Teaching and Internal Examination)

Dependent Variable

(Academic performance)



Bloom's Taxonomy **Intervening variables** **LOW**

Note: Intervening Variables: Teaching subjects and Mode of Test Costruction

Teaching Subjects: Mathematics, Chemistry, English, Business Studies, C.R.E & Computer Studies.

In Mathematics, Chemistry, English, Business Studies, Christian Religious Education, and Computer Studies, teachers' utilization of Bloom's Cognitive Taxonomy in teaching and the setting of internal examinations might influence students' academic performance. As illustrated in figure 3 above, frequent utilizatio of Bloom's cognitive taxonomy at a lower or higher level by teachers can result in excellent or low academic performance in Mathematics, Chemistry, English, Christian Religious

Education, Business Studies, and Computer Studies. This conceptual framework will aid the researcher in determining the relationships between teachers' utilization of Bloom's Cognitive Taxonomy and academic performance in public secondary schools in Nandi County, Kenya, in terms of teaching and internal examination construction.

1.15 Operational Definition of Terms

The following terms were operationalized in this study:

Academic performance. Is the ability of the learner to show mastery of information learned in the classroom through assessment and apply it in a new situation. This was measured in the study by using standardized form three end of term results submitted by the teacher for the end of third term exams.

Bloom’s Cognitive Taxonomy. Is a six-tiered approach for identifying thinking skills, including remembering, understanding, applying, analyzing, evaluating, and creating. Bloom's Cognitive Taxonomy, according to this study, is a framework for classifying statements of what form three learners should understand as a result of instruction and examination. The six levels of Bloom’s Cognitive Taxonomy are:

Analyzing. Is The learner's ability to break down material or concepts into component elements in order to comprehend their organizational structure; the ability to discriminate between facts and conclusions.

Applying. Is the student's capacity to relate an idea in a novel setting or to use an abstraction without prompting. The capacity to relate what was learnt in class to novel scenarios in the exam.

Creating. Is the ability to fit parts together to form a whole or develop a structure or pattern out of different facets, with the goal of producing a new meaning or structure.

Evaluating. Is the ability of a learner to make value judgments about what they've learnt in class.

Examination Construction. Refers to the science and art of planning, preparing, administering, scoring, statistically analyzing, and reporting results of the test. This research underlines the need of following a systematic procedure when creating and evaluating a test for educational purposes.

Remembering. Is the ability of the student to remember previously learned information in the classroom.

Understanding. Is the student's ability to understand, translate, interpolate, and interpret instructions and problems in his or her own language.

Gender: Refers to either a male or female. Gender in this study refers to the male or female teacher teaching the subjects understudy, that is, Mathematics, Chemistry, English, C.R.E, Business studies, and Computer studies.

Internal examinations. These are assessments set by teachers within a school and given to learners under certain conditions for them to do and then marked and utilized for grading and evaluating.

Professional training. It refers to building knowledge, skills, and competence in individuals, a group, or a team. It refers to the highest level of professional qualification that teachers teaching form three Mathematics, Chemistry, English, C.R.E., Business studies, and Computer studies have in this study.

Teaching. Is s performing particular ethical tasks or actions with the goal of inducing or causing learning. The ethical task in this study entails influencing students' knowledge or training them to master skills in Mathematics, Chemistry, English, Christian Religious Education (C.R.E), Business studies, and Computer studies.

Utilization of Bloom’s Taxonomy. For this study, it relates to the use of an item specifying a specific rule to be followed, which is the Bloom's Cognitive Taxonomy domain of remembering, understanding, applying, analyzing, evaluating, and producing. Document analysis, questionnaires, and teaching observation were used to assess this.

2.0 CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

A literature review, according to Creswell and Creswell (2018), provides a framework for identifying the value of research as well as a baseline against which results can be compared to other findings. It informs readers about the findings of other studies that are directly relevant to the current study. A literature review, on the other hand, can be defined as disseminating research to a larger audience, continuing the conversation in the literature, filling gaps, and extending previous research (Cooper, 2010; Marshall & Rossman, 2016 as cited in Creswell & Creswell, 2018). A literature review is a good technique of summarizing research findings to shows evidence on a meta-level and identifying areas where additional study is needed, which is an important part of developing theoretical frameworks and conceptual models (Snyder, 2019). This chapter reviewed related studies: Bloom's Cognitive Taxonomy of objectives, broad categories of Bloom's Taxonomy of objectives for example, cognitive taxonomy, affective domain, and psychmotor domain, the significance of Bloom's Taxonomy in the construction of exams, the weakness of Bloom's original taxonomy, and teaching, rethinking Bloom's Taxonomy, studies on teachers' utilization of Bloom's Taxonomy, academic performance, and synopsis of the literature review.

2.2 Bloom's Taxonomy of objectives

Specific concepts of educator accountability and responsibility are closely tied to policy discourses on teaching quality. Teachers' work is evaluated in terms of value-added metrics, which promise to analyze individual teacher production versus individual child and the whole class test score performance and compensate teachers accordingly, according to the accountability reform paradigm (Berliner, 2014, cited in Singh , Allen , & Rowan, 2019). Teachers' work is being influenced by the market-driven per-formativity agenda of neoliberal education policies, which pits teachers' success against students' achievement on high-stakes standardized national testing. As teachers manage and handle the paradoxical and clashing discourses of this policy terrain, critical policy scholars report high levels of fear, anxiety, sorrow, and loss of hope (Ball, 2016; Clarke, 2013; Singh, 2018). This has forced education stakeholders to take teachers to in-service training so that they improve their mode of teaching, thus improving the academic performance of learners.

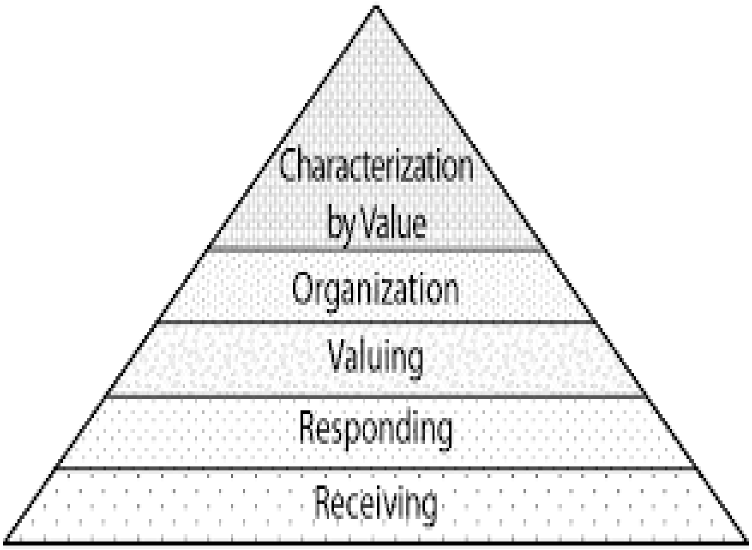
Internal exams give teachers crucial information that they can use to make judgments regarding their students' instruction and academic achievement. A checklist is useful for guiding instructors through the test creation decision-making process and validating teachers' evaluations based on tests created for classroom use. The subject discussed in class and the material tested at the end of a chapter or unit assessment are both genuine and considered to be out of harmony. This lack of coherence results in a test that does not offer teachers with sufficient evidence to make reliable assessments of students' development (academic achievement) (Brookhart, 1999, as cited by Fives & DiDonato-Barnes, 2013). Developing a Table of Specifications (TOS) based on Bloom's Taxonomy of goals may be one technique teachers can use to alleviate this challenge.

Bloom's Taxonomy is a classification, according to Atherton (2013), therefore the taxonomy of teaching and education aims is an endeavor within the behavioural paradigm to categorize forms and stages of learning. The three learning domains recognized are cognitive, emotional, and psychomotor, and each is structured as a series of levels or prerequisites. It is claimed that lower levels of taxonomy must be addressed first before moving on to higher levels. Bloom's Taxonomy proposes a means of classifying learning levels in terms of the expected maximum quantity for a specific subject and gives an elementary progressive model for dealing with themes in educational programs. For example, in the cognitive domain, during the preparation of trainees in colleges, tutors may teach comprehending, recalling, and applying but may not concern themselves with analyzing, evaluating, or creating, but comprehensive professional training may be required to include synthesis and evaluation as well. As a result, this research into the relationship between instructors' use of Bloom's Cognitive Taxonomy in teaching and assessment and students' academic achievement in public secondary schools in Nandi County, Kenya was necessary. As indicated in the diagram below, Bloom's taxonomy is divided into three levels: cognitive, affective, and psychomotor domains.

Affective domain. This is one of Bloom's taxonomies that has received very little attention compared to the cognitive domain. Its main interest is values, or more accurately, concerns about value perception, and it spans the spectrum from simple awareness to the ability to detect implicit values through analysis. Attitudes, behaviours, and physical abilities can all be part of learning. Our feelings, emotions, and attitudes are all part of the affective domain (Atherton, 2013, Hoque, 2016, Kin et al., 2021), as seen in Figure 4.

Figure 4

Bloom's Affective domain



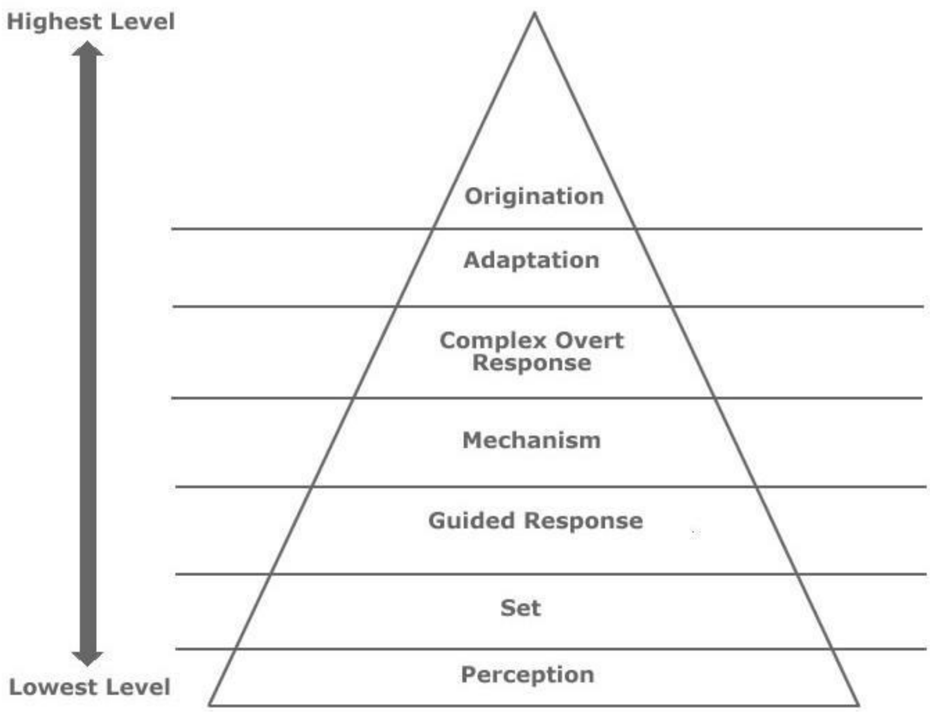
Bloom's Affective domain (Hoque, 2016).

This domain encompasses our emotional responses to things like feelings, values, appreciation, enthusiasm, motivations, and attitudes. It's broken down into five sub-domains: (1) receiving, (2) responding, (3) valuing, (4) organizing, and (5) characterization (Hoque, 2016).

Psycho-Motor Domain. According to Atherton (2013) and Hoque (2016), there have been some efforts to complete the psycho-motor domain because Bloom did not complete it until the 1970s, when it was completed. One of the fundamental variants, as suggested by Dave (1975) and quoted by Atherton (2013), fits within the growing skills paradigm. Reynolds (1965), as mentioned by Atherton (2013), establishes and emphasizes the importance of imitation in skill acquisition. The domain's basic components are depicted in Figure 5 below.

Figure 5

Bloom's Psycho-Motor Domain



Bloom's Psycho-motor domain (Hoque, 2016).

The physical encoding of information, movement, and/or activities using the gross and fine muscles for expressing or understanding information or concepts have traditionally been the focus of these types of aims. Natural autonomic responses or reflexes are included in this category. Using and coordinating motor skills is part of the psychomotor domain. Perception, set, directed reaction, mechanism, complicated overt response, adaptability, and genesis are the seven categories under which this is classified (Hoque, 2016).

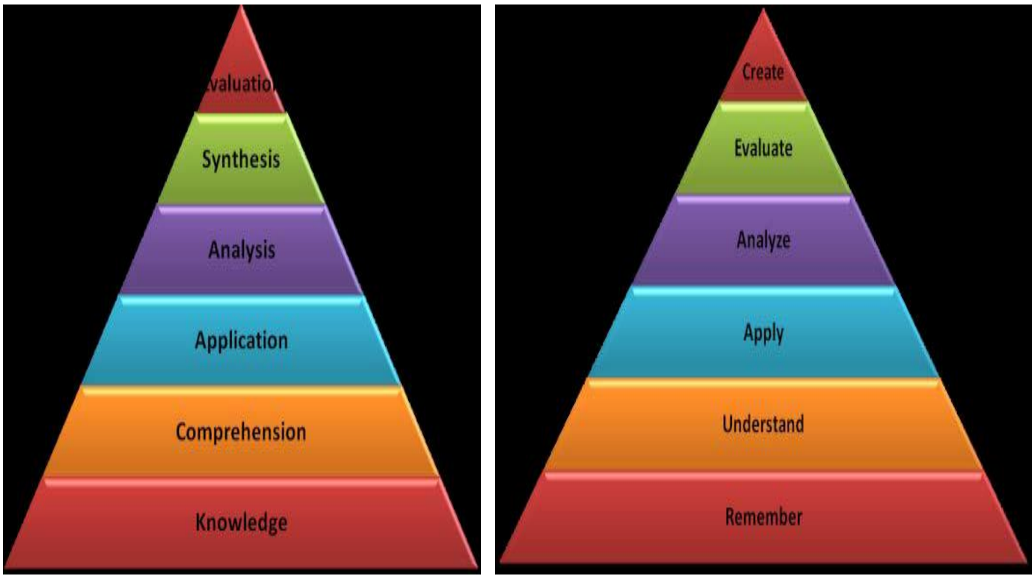
Cognitive Domain. The cognitive domain is the one that is used the most. Bloom's Cognitive Taxonomy is a classification system for claims about what students should understand as a result of learning in a specific educational goal. Six stages were recognized, ranging from the most basic to the most advanced, and from concrete to abstract; a simpler skill or ability must be mastered before moving on to a more advanced skill or ability (Krathwohl, 2002 as cited in Cengiz & Cakir, 2016). Bloom's Cognitive Taxonomy is a concept for categorizing thinking into six stages of complexity, with each level being swallowed by the next higher level (Forehand, 2010 & Atherton, 2013). As a result, it provides a means of facilitating the exchange of test items among members of various educational institutions in order to construct banks of things that all measure the same educational goal (Krathwohl, 2002 as cited in Cengiz & Cakir, 2016).

The goal, according to Bloom (1956), as stated by Cakir and Cengiz (2016), is to improve the exchange of beliefs and learning resources among test professionals and those involved in educational research and curriculum creation. Bloom's Cognitive Taxonomy was first published in 1956 and has since been translated into 22 other languages. In educational research, it is still commonly used (Davidson & Baldwin, 2005, as cited in Cengiz & Cakir, 2016).

Figure 6

Old and New version of Bloom's Cognitive Taxonomy

Old Version **New Version**



Bloom's Cognitive Taxonomy: Old Version and New Version (Cengiz & Cakir, 2016)

Bloom's Cognitive Taxonomy was revised and republished in the year 2001, using new terms. This was due to adjustments made by a group of cognitive psychologists led by Anderson, a Bloom student. Figure 6 above shows a comparison of the two variants.

The key difference between the two types is that six major phases from noun to verb forms have been switched. For instance, "knowledge" became "remember," and "fully comprehend" became "understand." Another difference is that the old version's synthesis and evaluation levels have been replaced with evaluate and produce levels. As a result, recall, understand, apply, analyze, evaluate, and create are the phases of the revised Bloom's Cognitive Taxonomy. Every level has a verb that symbolizes a cognitive process and a word that describes the expected knowledge. Depending on the situation, each has a purpose, but the ultimate goal must be to reach higher degrees of cognitive development in learning (Cengiz & Cakir, 2016, Kin et al., 2021). It's worth noting that the new top category, which focuses on the ability to generate new knowledge inside the area, marks still another distinction (Wilson, 2016a). As a result, a study of the association between instructors' use of Bloom's Cognitive Taxonomy in teaching and assessment and students' academic achievement in public secondary schools in Nandi County, Kenya, was necessary.

The knowledge dimension and the cognitive process dimension are the two aspects of Bloom's updated Cognitive Taxonomy, as discussed below (Anderson & Krathwohl, 2001 as cited in Atherton, 2013; Wilson, 2016a).

Bloom's revised Cognitive Taxonomy's knowledge dimension has the following structure:

a) Familiarity with the facts. This is the most important thing for kids to understand.

b) Conceptual comprehension. This is the interplay that allows the basic pieces of a bigger structure to function together.

c) Procedural knowledge. This is the process of doing something, the methods of investigation, and the criteria for employing skills, algorithms, procedures, and methodologies.

d) Knowledge of metacognition It is the consciousness and knowledge of one's own cognition, as well as general cognition knowledge.

Bloom's Revised Cognitive Taxonomy has a structure for the cognitive process component.

a) Remember. This is the process of retrieving relevant information from long-term memory.

b) Understand. This entails determining the meaning of instructional messages, which may be delivered orally, in writing, or graphically.

c) Apply is referred to as the ability of a learner to relate an idea in a novel environment or to employ an abstraction without prompting.

d) Analyze. It entails dismantling a material into its component elements and determining how the parts interact with one another as well as with a larger structure or purpose.

e) Evaluate. This entails evaluating items using criteria and standards.

f) Create. This is the process of combining pieces to create a unified whole or a unique product. In this study, the researcher looked into the link between instructors' use of Bloom's Cognitive Taxonomy in teaching and assessment and students' academic achievement in public secondary schools in Kenya's Nandi County.

2.3 Utilization of Bloom's Taxonomy in Teaching and Examinations

Teaching is described as a series of planned and organized activities carried out under the direction of teachers in a controlled environment with the goal of providing effective learning for the individual (Orhaner & Tunç, 2003; Taşpinar, 2005 as referenced in ztürk, 2021). Teachers are the most important component in achieving rational teaching in an environment that includes students, teachers, subjects, objectives, methods, and equipment. Teachers must also be familiar with their pupils and subjects, develop objectives, and plan the teaching location in order for these components to work together (Orhaner & Tunç, 2003; Riedler & Eryaman, 2016 in ztürk, 2021). When a teacher is able to identify what he or she wants to accomplish during the teaching process, it is possible to create meaningful teaching. This not only makes it easier to achieve goals when they are well defined, but it also makes it easier for students to achieve higher levels of cognitive development because they know exactly what is expected of them during and after the teaching process because instructional objectives are clearly defined and structured (Sobral, 2021).

Teachers utilize questions to guide their students' thinking and increase their level of comprehension when educating and assessing them. As a result, questioning is a vital and effective educational strategy for teachers. This expertise is beneficial to both new and veteran teachers. This means that different types of questions are suited for various teaching methods (Walsh & Sattes, 2005; Pagliaro, 2011in Bibi, Butt & Reba, 2020). As a result, one of the markers of a successful teacher is the ability to ask good questions, and another crucial aspect for these teachers is to fit the questions to the students' abilities and the pedagogy they use. This would make it easier for all types of learners to answer to questions (Bibi, Butt & Reba, 2020).

The most effective questioning procedure should be able to serve several functions and generate various types of thought processes. As a result, teachers' questions can range from simple factual memory to more complex cognitive processing, allowing students to engage in a variety of mental processes. Teachers, on the other hand, frequently ask factual inquiries, which do not generate a beneficial educational environment (Cooper, 2013 in Bibi, Butt & Reba, 2020). The use of several levels of inquiries, as suggested by Bloom's cognitive table of requirements, is a beneficial and effective questioning approach that all educators should employ.

Bloom's Taxonomy (1956 in Agarwal, 2019) is the sole method of defining educational objectives and offering a cluster for recognizing diverse classroom questions and thoughts that has been proven to be beneficial. This taxonomy is divided into six levels: remembering, understanding, applying, analyzing, creating, and evaluating, with verbs used to establish questions and objectives for teaching and assessment at each level. Teachers who are knowledgeable can frame questions for each student to engage them in different types of thinking processes. The many forms of questions might be related to a learner's intellectual talents and demands. There are two types of set questions: closed-ended and open-ended. Divergent or open-ended questions urge a full or comprehensive response, whereas convergent (closed-ended) inquiries necessitate a short or limited response. Bloom's Taxonomy has a distinct advantage over all other methods of exam design in that it allows for both convergent and divergent inquiry. To foster active engagement and motivate learner participation in teaching and learning, a qualified teacher might construct closed or divergent questions. However, Tritapoe (2010 in Bibi, Butt, & Reba, 2020) stated that there is a lack of passion and drive for students in a number of classrooms when the instructor is active in teaching the topic, and the main rationale was that the teachers lack skill in questioning.

At all stages of education, examinations are an important component of the teaching-learning process. The primary goal of the classroom examination principle is to improve learning. Because evaluation is such an important part of a student's future, there is no doubt that any test system will influence what students learn and how they learn it. As a result, the assessment will establish how teachers educate and what they teach. Teachers can assess the value or success of a learning experience by examining it in order to achieve the desired goal (Tanalola, Fattahb, Sulong, & Mamat, 2017).

One of the most prevalent methods of evaluating learners' knowledge gain is to examine them. The outcomes of an examination can be utilized to help students improve their cognitive abilities and behavior. A written examination is used to assess a student's academic achievement, and it is a common and ubiquitous instrument in the educational field. The questions on the examination paper play a big role in determining a student's competence, and a good examination paper should have a range of difficulty levels to test students' different skills. This aligns with the examination's goal of classifying students into three categories: good, average, and poor. Bloom's cognitive taxonomy (Tanalola, Fattahb, Sulong, & Mamat, 2017) is one technique to demonstrate this. As a result, in public secondary schools in Nandi County, Kenya, this study looked at the relationship between instructors' use of Bloom's Cognitive Taxonomy in teaching and examination and students' academic performance.

Exams primarily access mid to low level cognition such as recollection and application, according to Gates and Pugh (2021), whereas competencies required by employers tend to demand higher-level cognition such as synthesis and creation, which are not as typically examined by examinations. They also suggested that in formal examinations, careful question design employing distinct quantifiable verbs from Bloom's Cognitive Taxonomy should be employed to support the development of higher-level meta-cognitive skills. Exams that mostly consist on recalling questions encourage students to spend more time memorizing, resulting in superficial learning and cramming of content (Momsen et al., 2013 in Gates & Pugh, 2021).

Furthermore, according to Scully (2017), there have been recurrent requests for the establishment of both curriculum and assessment models that prioritize higher-order thinking rather than simply recall of information throughout schooling, certification, and licensure. Bloom's Taxonomy of educational objectives, which outlines six increasingly mental processes in which a learner might engage, is associated to higher-order thinking. Assessments give both evaluative and instructional information about the learner. Research findings indicated that the best assessment is one that has been matched to higher-order thinking skills, because students who experience assessments that require higher-order thinking are much more likely to embrace purposeful, comprehensive approach to their studies rather than relying on surface-level or routine learning strategies. Furthermore, these exams enable teachers to provide more extensive and precise feedback, which can help to stimulate and steer intellectual development (Jensen et al., 2014; Leung, Mok & Wong, 2008; Momsen et al., 2010 in Scully, 2017). It would also close the perceived gap between what students learn and what employers appreciate, because students would have gained the following skills: creativity, collaborative problem-solving, and critical thinking, all of which can be matched with the higher levels of Bloom's Cognitive Taxonomies (Scully, 2017).

Taxonomies are created to provide a framework for organizing a sequence of events along a common structure. Based on their underlying grammatical structure and origin, languages can be classed as English, Germanic, Romantic, and so on. Bloom's Cognitive Taxonomy of Objectives gives teachers a place to start when creating course teaching objectives. There are a variety of reasons why a teacher might desire to employ Bloom's Cognitive Taxonomy in the classroom (Anderson, Krathwohl & Bloom, 2001, as cited in Kin et al., 2021; Zapalska et al., 2018).

It can be used primarily to improve one's comprehension of the educational process. Teachers can see and understand how lower-level abilities lead to higher-order thinking, such as retaining data and comprehending past difficulties, which helps a student to apply their knowledge to comparable challenges. This knowledge can aid in the prioritization of material and the arrangement of lessons in order to maximize class time. Lower-level abilities (for example, memorizing factual knowledge) can be developed before higher-level skills (for example, relationship analysis) are taught (Anderson, Krathwohl & Bloom, 2001, as cited in Wei & Ou, 2019).

Educators nowadays are typically confronted with a bewildering mix of standards and curriculum requirements. Bloom's Cognitive Taxonomy of objectives provides a framework for breaking down these criteria into manageable chunks that may be used to guide day-to-day lesson planning and easily contrasted to their own class goals. Different evaluation approaches are required for different levels, just as different instructional delivery methods are required for different levels (Masapanta-Carrión & Velázquez-Iturbide, 2018). As a result, the researcher conducted this investigation into the relationship between instructors' use of Bloom's Cognitive Taxonomy of objectives in teaching and exams and students' academic achievement in public secondary schools in Nandi County, Kenya.

According to a study by Setiyana and Muna (2019), remembering (45 percent) was the most commonly used level of Bloom's Cognitive Taxonomy, followed by understanding (42 percent), applying (11 percent), and analyzing (2%), with none of the levels of evaluating or creating being used in the test items. To summarize, the usage of Bloom's Taxonomy in test items is still prone to lower-order thinking, which manifests itself in students' weak skilled thinking abilities.

According to Kozikolu (2018), more than half of the objectives in the 8th grade English curriculum are at the apply level, half of the objectives are for procedural knowledge, and 23% of the objectives are for higher order thinking skills such as analyzing, evaluating, and creating, in an examination of alignment between national assessment and English curriculum objectives using revised Bloom's Taxonomy. The bulk of English course questions on the national test were geared toward lower-order thinking skills, and there was no correlation between the English curriculum's objectives and the national exam's English course questions. Internal examinations in Nandi County, Kenya, could also be hampered by this.

Furthermore, a study by Lalogiroth and Tatipang (2020) found that the test items covered remembering, understanding, applying, and analyzing levels, with the dominant Bloom's Revised Taxonomy cognitive domains of remembering and understanding levels being used in the test questions of the 2015/2016 English National Exam for senior high school level. In the exam questions, there were no questions about evaluating and creating levels. It signifies that question items for the 2015/2016 English National Exam for senior high school level were created using Bloom's Revised Taxonomy's cognitive domain. The outcomes of the research by Köksal and Ulum (2018) also showed that the studied exam papers lacked the higher-level cognitive skills included in Bloom's Taxonomy, and they suggested how exam papers currently being produced or would be composed should refer to Bloom's taxonomy.

In their study of Geography tests in the Finnish matriculation examination in paper and digital forms, Virranmäki, Valta-Hulkkonen, and Pellikk (2020), an analysis of questions based on revised Bloom's taxonomy reported that the questions mainly required an understanding of conceptual and factual knowledge, but that due to digitalization, questions that required remembering were reduced, while questions that required analyzing were increased. They stressed the necessity for a comprehensive re-evaluation of the types of cognitive processes and information that should be examined in geography tests, both nationally and internationally, based on their research findings. Himmah, Nayazik, and Setyawan (2019) found a similar result in their study of Revised Bloom's taxonomy to examine final mathematics examination problems in junior high school. The study's detailed findings revealed that the majority of issues were in the understanding category, with up to 25 items, while the others were in remembering, applying, and analyzing. The process of evaluating and creating categories went without a hitch.

From 2007 to 2018, the use of Bloom's Revised Cognitive Taxonomy in the Chemistry curriculum changed learning outcomes, according to Yaşar and Sibel (2020). They therefore recommended more research to determine students' Bloom's Revised Cognitive Taxonomy levels at the end of chemistry courses or questions asked to students in examinations at all levels of study. Similarly, according to a study by Azzopardi and Azzopardi (2021) on the classification of Maltese Biology examination questions using Bloom's Revised Taxonomy, not all objectives were present in every examination paper, the questions set did not promote higher levels of thinking, and the bulk of the marks were in the types of objectives that required remembering and understanding. The study emphasizes the limited scope of student accomplishment in high-stakes exams and demonstrates how current biology assessment processes encourage low-level learning. As a result, because the majority of the questions were based on Bloom's Cognitive Taxonomy's lower learning levels, which restricts students from accessing higher learning levels, paper setters were recommended to improve by generating more questions from the higher learning levels.

Bloom's Cognitive Taxonomy of objectives can be used as a checklist to ensure that all levels of a domain have been assessed and that assessment methods are aligned with the proper teachings and procedures. In this approach, the taxonomy assists teachers in maintaining consistency among assessment techniques, content, and instructional materials, as well as identifying weak areas (Anderson, Krathwohl, & Bloom, 2001, as cited in Lee, Kim, Jin, Yoon, & Matsubara, 2017). Bloom's cognitive taxonomy is a useful tool for teaching and assessing computer science, particularly programming (Ullah, Lajis, Jamjoom, Altalhi, & Saleem, 2020). These considerations explain why Bloom's Cognitive Taxonomy of objectives was used in this study.

2.4 Significance of Bloom’s Cognitive Taxonomy in Teaching and Examination

Internal exams offer teachers with critical information that they can use to make judgments regarding their teaching and students' academic achievement. Instructors can use a table of test specifications to help structure the exam building decision-making process and increase the quality of teachers' evaluations based on tests created for classroom use. Between the subject examined in class and the material scored on an end of chapter or unit examination, there are commonly both real and perceived mismatches. Because there is a lack of coherence in the examination, teachers are unable to make reliable assessments of students' academic performance (Fives & DiDonato-Barnes, 2013; Stronge, 2018). Developing a Table of Specifications based on Bloom's Taxonomy of goals may be one technique teachers might use to alleviate this challenge.

Teachers can use a Table of Specifications, also known as a test design, to match objectives, instruction, and assessment (DiDonato-Barnes, Fives & Krautilize, 2014). This concept can be applied to a wide range of assessment systems, but it is most usually connected with the creation of traditional summative examinations. Teachers must ensure that the test measures an acceptable sampling of the subject content at the cognitive level and that the material was taught while creating a test. The Table of Specification (TOS) can assist teachers in mapping the amount of class time spent on each target to the cognitive level at which each objective was taught, allowing them to determine the types of items they should include on their examinations (Fives & DiDonato-Barnes, 2013; Alade, & Igbinosa, 2014). The table of requirements is designed to assist teachers in creating summative exams that are effectively matched to the subject matter being studied as well as the cognitive processes being used during instruction. However, in order for this method to be useful in the classroom, a teacher must take ownership of it and determine how to adapt the underlying strategy to their specific teaching needs (Fives & DiDonato-Barnes, 2013 & Scully, 2017).

Teachers who understand the intent of Bloom's Cognitive Taxonomy of Objectives, which is to increase the validity of a teacher's ratings based on a particular assessment, can adjust the table of specifications to best suit their needs. The building of internal examinations and instruction in public secondary schools in Nandi County, Kenya, is the subject of this study. Validity refers to the degree to which teacher evaluations or assessments of learners may be relied upon depending on the quality of data gathered (Wolming & Wilkstrom, 2010, Reeves & Marbach-Ad, 2016).

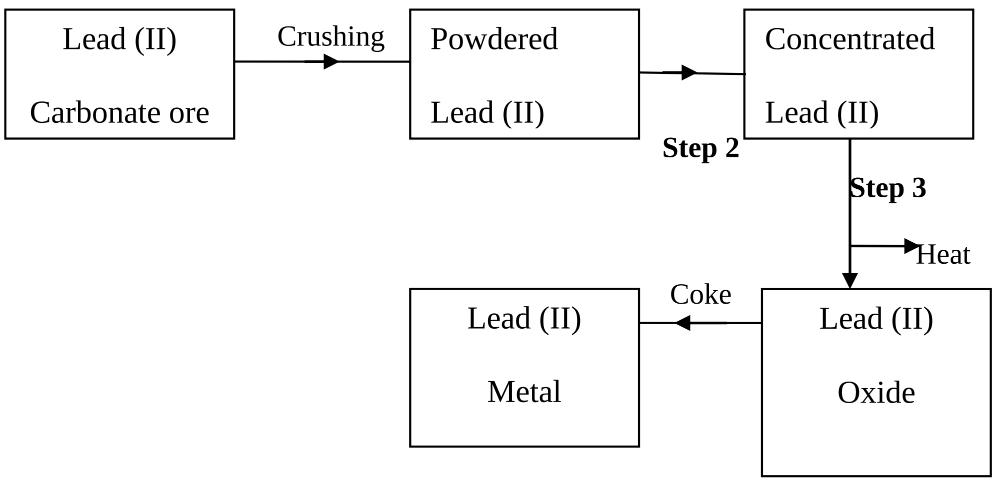
It's vital to remember that validity is a quality of the conclusions teachers draw based on the information received from a test, not the test itself. Teachers doubt the legitimacy of their judgment when they evaluate whether or not the grades they assign to students are correct. When these questions are posed, the emphasis is on the kind of evidence endorsed by educational measurement researchers and theorists to support the statements made about the pupils. Two types of validity evidence are required for classroom assessments: evidence based on test content and evidence based on response process (APA, AERA, and NCME, 1999, as cited by Fives & DiDonato-Barnes, 2013 & Scully, 2017). Students can express dissatisfaction with the lack of consistency between the subject matter presented in class (test content evidence) and the type of thinking required on the test (response process evidence).

Evidence Based on Test Content. The degree to which a test or an assessment assignment assesses what it is planned or supposed to measure is highlighted by evidence based on test content (Wolming & Wilkstrom, 2010, Reeves & Marbach-Ad, 2016). It may be claimed that if a mathematics instructor conducted an exam on Pythagoras' theorem proof and based her mathematics grades on her students' responses to that exam, the exam and ratings were unreasonable. It may be argued that her evaluation lacked evidence of test content agreement in this case since the evidence used to generate the evaluation did not reflect the students' grasp of the targeted material (algebra). Another instance is when a teacher instructed on metal extraction. For instance, the instructor may have given out the extraction of aluminum metal during class time, but during exam time, the teacher may have given out the extraction of zinc, as illustrated in Figure 7.

The flow chart below shows steps utilized in the extraction of zinc from one of its ores.

Figure 7

Steps utilized in the extraction of zinc from one of its ores



(a) Name the process that is utilized in **step 2** to concentrate the ore.

(b) Write an equation for the reaction which takes place in **step 3.**

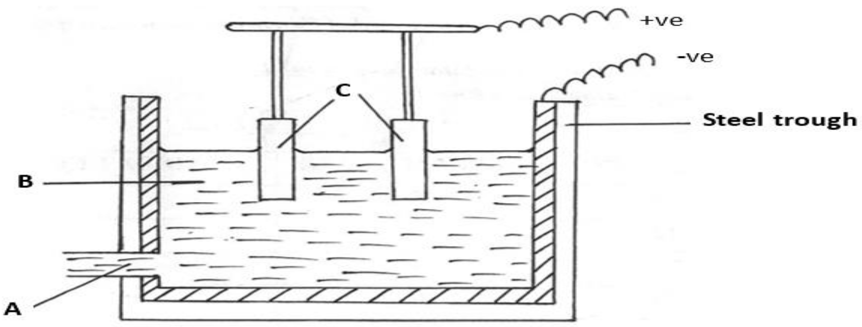
(c) Name **one** utilize of lead.

Whereas the specific questions for extraction of Aluminium should have been as shown in figure 8 below.

(a) The figure shows the extraction of Aluminium from bauxite.

Figure 8

The extraction of Aluminium from bauxite.



(i) Write the formula of bauxite

(ii) How is the ore (bauxite) concentrated before it is electrolyzed?

(iii) Identify;

(I) Product **A**

(II) Electrolyte **B**

(III) Material utilized to make electrode **C**

(b) What is the purpose of dissolving electrolyte **B** in molten cryolite (Na_3AlF_6)

(c) Explain why anode has to be replaced from time to time.

(d) Write the equation for the chemical reaction that take place when aluminium reacts with Iron (III) Oxide.

(e) State any **two** utilizes of Aluminium.

In order for any of the teacher's evaluations of student understanding and learning to be meaningful, classroom tests must be matched to the topic (subject matter) taught. Essentially, the goal of test-content evidence is to determine whether the measured (tested/assessed) objectives correspond to what the teacher claims to have measured. The second source of validity evidence that teachers need is response process evidence.

Response Process Evidence in examination. It is concerned with the alignment of the types of thinking that students are expected to do throughout instruction and during assessment (testing) (Stronge, 2018). Students may argue that while much of their class time was spent comparing the stock exchanges of Uchumi and Equity Bank Limited for the years 2018 and 2019, the teacher only posed a low-level question on the economy based on the Nairobi Stock Exchange market on the test. Evidence of test content supports the inclusion of a question like this. The matter was brought up by the student, and he remembered it. During instruction, however, the level of processing required to compare the Equity Bank Limited and Nairobi Stock Exchange markets necessitated more attention and comprehension of the content. As a result, this student thought that the kind of thinking required for the test and during instruction were incompatible.

The test material is documented in the tests that teachers occasionally conduct, but the response method is not. As a result, while the content is matched with instruction, the test does not go into the same depth or provide the same amount of meaning as in class. When students feel misled or that the test is extremely detailed, there is most likely a problem with the response process at hand. As a result, documentation of the response process is important to teachers as test constructors. Consider whether the same type of thinking is used in class activities and summative assessments as well.
If the class activity emphasizes memorizing, the final test should emphasize memorization as well, rather than a more sophisticated thinking task (Fives & DiDonato-Barnes, 2013, Scully, 2017 & Stronge, 2018).

Bloom's Cognitive Taxonomy in examination. Bloom identified six levels of thinking in the 1950s, and scholars refined these levels in 2001. (Anderson et al., 2001, as cited in Deal & Hegde, 2013, Lee et al., 2017). Remembering, recall, identification, and comprehension are often regarded lower-level thinking skills. Processes that require learners to apply, analyze, evaluate, and synthesize are included in higher levels of thinking (Fives & DiDonato-Barnes, 2013; Scully, 2017). People frequently confuse the type of item—multiple choice, true or false, essay, etc.—with the style of thinking required to reply to them while contemplating test items. Depending on the context of the question, any format can be used to assess thinking at both high and low levels. "Describe four causes of renal problems," for example, would be a question on an essay. This appears to be a higher-level question on the surface, and it very well may be. If learners were taught "The four causes of kidney problems were..." directly from a text, this item would be reduced to a low-level memory exercise. As a result, each item's thinking level must be considered in connection with the learning experience. The thinking level of items must match the thinking level of instruction in order for teachers to perform effective assessments of their students' thinking and understanding. By offering content and response process data, Bloom's Taxonomy of specifications provides a framework for teachers to increase the validity of the evaluations they make about their pupils based on test results.

Bloom's Table of Specification Supports Validity in teaching. The Bloom's table of specifications is a two-way chart that helps teachers connect their instructional objectives, cognitive level of instruction, and the length of the test that should be used to evaluate each objective (Nortar et al., 2004, cited in Fives & DiDonato-Barnes, 2013). Table 1 below is an excellent example of chemistry. Teachers do this for practical reasons: checking out exam items by level is laborious, and teachers have less and less time to devote to these activities.

Table 1

Table of Specification for Chemistry

Lesson	Objectives	Remembering	Understandin	Applying	Analyzing	Evaluation	Creation	**Total items**
1. Organic Chemistry II	Define Alcohols State the functional group of alcohols	1	1					2
2. Organic Chemistry II	State examples of alcohols State the classes of alcohols (put emphasis on primary alcohols only)	2						2
3. Organic Chemistry II	Name un branched primary alcohols		3					3
4. Organic Chemistry II	Draw the open structure of primary alcohols Draw the alcohol isomers of $C_4H_{10}O$					4		4
Total		3	4			4		11

Furthermore, by utilizing this broader classification, philosophical critiques of the taxonomy's hierarchical nature and the distinction between categories are reorganized (Kastberg, 2003, cited in Fives & DiDonato-Barnes, 2013, Stronge, 2018).

Utilized to show Evidence for test content. Consider the amount of actual class time spent on each objective while obtaining proof of test content for internal exams. The exam should include a higher proportion of objectives that were discussed in more depth or for a longer period of time. This technique is especially helpful in subject areas where students are taught a variety of topics at various cognitive levels. There should be a direct correlation between the amount of class time spent on an objective and the portion of the final assessment that tests that objective in an objective unit of study. If an objective accounted for 10% of the instructional time, the objective should only account for 10% of the assessment. A table of specs can be used to help you make these decisions. Teachers can be held accountable for the content they teach and the time they devote to each target by using a table of standards (Nortar et al., 2004, as cited in Fives & DiDonato-Barnes, 2013, Alade & Igbinosa, 2014). An example of this is shown in Table 2.

Table 2

Table of specification for time allocated

Content	Time owed	Remembering	Understanding	Applying	Analyzing	Evaluation	Creation	No. of Items
Meaning of ecology	3 minutes	1			1			2
Basic concepts in ecology	12 minutes	1	1	1	1	1	1	6
Factors affecting the ecosystem	20 minutes	2		3			5	10
Interrelationships between organisms	5	1	1		2			4
Competition								
Total	40 minutes	5	2	4	4	1	6	22

Utilized to decide how many items should be on the test. As stated in Table 1 above, the amount of items to include on any given test is a professional decision made by the instructor based on the number of objectives in the unit, his or her understanding of the students, the class time allocated for testing, and the value of the assessment. Shorter assessments can be valid if they offer enough evidence for the teacher to make judgments about the students' grades. Longer tests typically allow for more meaningful inferences since they cover a larger sample of the instructional objectives and student performance. This is true only if the test items are of good quality. Furthermore, with longer tests, learners are more likely to become exhausted and perform poorly as the test progresses. As a result, the ideal test is one that students can do in the time provided, with enough time to brainstorm any writing sections and double-check their answers before submitting the whole assessment (Fives & DiDonato-Barnes, 2013). Thus, the purpose of this study was to see if Bloom's table of specifications is used in teaching and assessment, and if so, what effect it has on students' academic performance at public secondary schools in Nandi County, Kenya.

2.5 Weakness of Bloom's Original Cognitive Taxonomy

Bloom's taxonomy was completed and published in 1956. The Cognitive Domain has six levels according to Bloom's Taxonomy. In that it is hierarchical, from simple to more complicated, each level is encompassed by the higher ones (Ari, 2011, Irvine, 2017). Knowledge is the lowest level of the cognitive domain, followed by understanding, application, analysis, synthesis, and evaluation in that order. Each category must first be mastered before moving on to the next. To master comprehension, for example, which is at a higher level in Bloom's Taxonomy's hierarchy, the learner must first master knowledge, which is at a lower level. Bloom's Taxonomy classifies knowledge, comprehension, and application as lower levels, while analysis, synthesis, and assessment are regarded higher (Bloom, 1956; Krathwohl, 2009; Küçükahmet, 2005; Oliva, 1988; Wulf & Schave, 1984, as mentioned in Ari, 2011 & Wilson, 2016a).

Bloom's original taxonomy is hierarchical and collaborative in nature. It is regarded as communal since each level contains the behaviors of the previous level, and it is hierarchical because the levels are planned in ascending order of complexity (Ari, 2011, Wilson, 2016a). Bloom's original taxonomy, according to experts, has some limits and flaws when used in the Bloom's Taxonomy of Cognitive Domain (Ari, 2011; Irvine, 2017). Moving from the simplest level of knowledge to the most difficult level of evaluation is considered as a major flaw in Bloom's Taxonomy's structure (Ari, 2011; Irvine, 2017). In some cases, for example, some knowledge objectives are more complex than analysis and assessment objectives. Furthermore, (Amer, 2006, referenced in Ari, 2011) claims that the evaluation level isn't any more difficult than the synthesis level, and that the synthesis level contains an assessment level.

Hierarchical categorization, in which mastery of each lower category is a condition for mastery of the next higher category, is another criticism of progressive classification. In some disciplines, however, before mastering the behaviors of a level, other behaviors from a higher level can be observed. Consider a literary critic: according to Bloom's Taxonomy, one cannot create a novel at the level of syn-thesis, but one can review a published novel at the level of evaluation. In addition, some experts believe that the hierarchical classification is inappropriate for each subject field (Senemolu, 2007, as cited in Ari, 2011).

Ari (2011) went on to say that behaviouralism influenced curriculum and instruction heavily during the time when the first taxonomy was established. However, the world now is not in the same position as it was in 1956 when taxonomy was reflected. Learning has been regarded as a period when learners actively construct or build new ideas or concepts based on current and previous knowledge or experience, and constructivism and student-centered education have gained popularity. Furthermore, learners are in charge of their own education. Today, it is suggested that the taxonomy be changed, and that all student-centered approaches be grouped together under the same heading (Amer, 2006 as cited by Ari, 2011).

Bloom's Revised Cognitive Taxonomy addresses some of the original Bloom's taxonomy's critiques, such as the failure to account for the active aspect of learning. The updated version is still under fire for imposing a hierarchical framework on learning outcomes (Deal & Hegde, 2013 as cited in Senthilkumar & Kumar, 2017). Many critics argue that the taxonomy's sequential form does not correspond to the cognitive processes involved in learning (Wineberg & Schneider, 2010, as cited by Deal & Hegde, 2013; Ahmad, Zamri, & Kadir, 2015).

2.6 Transforming Bloom’s Cognitive Taxonomy in Teaching and Examination

Lorin W. Anderson, a former Bloom student, formed a group in 1995 to improve the original taxonomy in the hopes of adapting it to 21st-century students and teachers. The group included professionals from the domains of curriculum and instruction, cognitive psychology, and assessment and evaluation. The group included cognitive psychologists Richard Mayer, Paul Pintrich, and Merle Wittrock; curriculum and instruction experts Lorin W. Anderson, Kate Cruikshank, and James Raths; and assessment and evaluation experts Peter Airasian and David Krathwohl. The group met twice a year for five years, from 1995 to 2000, in order to improve Bloom's initial taxonomy. The group meeting in Syracuse (New York/USA) was co-chaired by Lorin W. Anderson and David Krathwohl (Anderson, 1999, 2005; Forehand, 2005, cited in Ari, 2011, Kocakaya, & Kotluk, 2016).

The task of going over Bloom's taxonomy drew a lot of interest. However, while there was no fundamental change at the end of the long-term study to improve and revise Bloom's taxonomy, there were some notable changes. The original taxonomy's subtitles are broader, more complete, and more understandable than the subtitles for the all levels (Ari, 2011, Wilson, 2016a & Kocakaya, & Kotluk, 2016). Anderson and Krathwohl's Taxonomy, according to Wilson (2016a), is called Bloom's Revised Cognitive Domain Taxonomy.

Three basic categories were used to assess the changes in the new taxonomy: 1) terminology shifts, with nouns being replaced by verb forms in Bloom's six primary categories. Furthermore, the original's lowest level, knowledge, was renamed to "remembering." Finally, the terms "evaluation" and "synthesis" were renamed. 2) Structural Changes: Unlike Bloom's original cognitive taxonomy, which was a one-dimensional table, the Revised Bloom's Taxonomy is a two-dimensional table. 3) Shifts in Emphasis, where the redesigned taxonomy was created with a much broader readership in mind (Forehand, 2005, cited in Ari, 2011; Wilson, 2016a & Lee et al., 2017).

2.7 Studies on Utilization of Bloom’s Taxonomy in teaching and Tests

Several studies have found there to be a discrepancy in the application of Bloom's Cognitive Taxonomy in teaching and assessment. This is demonstrated by the studies listed below.

Yaz and Kurnaz (2020) employed document analysis to perform a technical and taxonomic study of the learning outcomes mentioned in the scientific curriculum that was implemented in 2000, 2005, 2013, and 2017 according to Bloom's Revised Cognitive Taxonomy. Because there was significant parallelism across the analyzed curricula in terms of the characteristics of Bloom's Revised Cognitive Taxonomy, it was judged that Turkey had not been effective enough in constructing the examined curriculum according to Bloom's Revised Cognitive Taxonomy. Similarly, the analysis revealed that rather than making major adjustments, the teaching curriculum lessened the focus on knowledge and cognitive skills.

According to Mitani (2021), there is a significant test score disparity in the application of Bloom's Cognitive Taxonomy, particularly in higher order thinking skills in mathematics, among kids of all socioeconomic backgrounds. Similarly, teaching students using various teaching methods such as group ability, discussion, and problem solving while under the supervision of an instructor showed a positive correlation with assessments.

In their study of classrooms in three high-performing public secondary schools serving high-need areas, Nehring, Charner-Laird, and Szczesiul (2019) discovered that 7 out of 22 classes observed demonstrated teaching approaches for 21st-century skills and knowledge. Teachers appeared to apply assumptions about 21st century skills in many of the remaining subjects, thus reinforcing the restricted and shallow skill set associated with test-based accountability. The question, therefore, is, could the same feedback be found in the current area of study? As a result, the researcher's motivation for conducting the research.

In their study, Polikoff, Rabovsky, Silver, and Lazar-Wolfe (2021) discovered that there was poor alignment between the textbooks in their sample and the common core state standards, as well as low overall levels of cognitive demand, but only limited evidence of systematic differences in alignment or cognitive demand coverage associated with student characteristics at the school or district level, indicating that more research is needed to determine whether the same status will be achieved.

According to Carson and Marshall (2008), in their study, they investigated textbook issues by selecting some of the most frequent core courses found in business schools across the United States to see what level of learning, as described by Bloom's Taxonomy, was being achieved. It was discovered that the vast majority of end-of-chapter issues only required pupils to function at Level 1 (remembering) or Level 2 (problem solving) (understanding). In their study, Carson and Marshall (2008) proposed that alternative strategies be used to encourage students to think at higher cognitive levels. Thus, the need for researcher to investigate the utilization of Bloom's Revised Cognitive Taxonomy in teaching and construction of internal examination and it's relation to studens' academic performance in public secondary schools in Nandi County, Kenya.

Higher-order thinking is a desired educational goal, according to studies in Missouri, since it allows one to be responsible and empowered, to be a competent worker, and to manage personal affairs while continuing to learn (Newmann, 1990, quoted in Ulmer and Torres, 2007). Higher-order thinking, according to Lewis and Smith (1993) in Ulmer and Torres (2007), is the ability of a person to use new information or prior knowledge and manipulate it to arrive at possible answers in new situations, whereas lower-order thinking requires only routine, mechanistic application of previously acquired knowledge. Higher-order thinking requires students to comprehend, evaluate, and modify data. Poor thinking is to blame for a lot of difficulties in life. When people are thoughtful, they are more likely to act in ways that benefit both themselves and others. People who make educated decisions, it is argued, must be able to synthesize information and evaluate options (Ulmer & Torres, 2007).

Furthermore, Beyer (1987), as referenced by Ulmer and Torres (2007), outlined two reasons why schools and instructors should be concerned about teaching thinking skills. The first problem is that if people are left to their own devices, they are unlikely to develop their thinking skills to their maximum potential. Many people, however, assume that thinking is a skill that develops on its own, which is not totally accurate.

Ulmer and Torres (2007) did a study comparing the cognitive behaviors of secondary Agriculture and Science teachers in Missouri and discovered that teachers in both groups had similar attitudes toward teaching at higher levels of cognition. Teachers in agriculture and science spent 83 percent and 84 percent of their time, respectively, on lower-order behavior. Bloom's Cognitive Taxonomy classifies remembering, understanding, and applying as lower levels, whereas analyzing, synthesis, and evaluation are considered upper levels (Bloom, 1956; Krathwohl, 2009; Küçükahmet, 2005; Oliva, 1988; Wulf & Schave, 1984, as quoted in Ari, 2011). Ulmer and Torres

(2007) came to the conclusion that pre-service and in-service training should focus on teaching at higher cognitive levels. This means that teachers in Agriculture and Science should take pre-service and in-service courses to learn how to teach utilizing Bloom's cognitive taxonomy's higher order levels. "Possibilities for Agriculture teachers to model higher-order thinking are plentiful," they said. "Teachers should take advantage of these opportunities to assist in the development of students' higher-order thinking skills (Ulmer & Torres, 2008, p. 106). They also suggested that secondary agriculture and science teachers raise the cognitive level of instruction and establish and implement in-service instruction in higher-level behavior. If higher-order thinking is a goal of secondary education, teacher preparation programs should focus on developing and supporting instructors' capacities to improve students.

Teacher professional development through supported pedagogical innovations is dependent on teachers' knowledge of what is being offered, how the innovation may be implemented, and how an innovation can be effectively tailored to local circumstances. Based on a two-dimensional neo-Bloomian framework, it was discovered that different forms of teacher understanding were somewhat associated with various tactics used at specific phases in the innovation program. As participating teachers developed their own understandings of how to use the new educational practices, worries regarding cultural appropriateness began to diminish. Other teacher worries evolved from hypothetical to more concrete concerns about how to improve classroom interactions, demonstrating that teachers' understanding is improving. While studying in-class practices only reveals the outcome of an invention, following instructors' evolving understanding was critical for gaining insight into the ongoing teacher professional development process (Silver, Kogut, & Huynh, 2019).

In his study of the competence of secondary school Science teachers in the use of Bloom's cognitive taxonomy of educational objectives in lesson preparation, presentation, and student assessment in Nigeria, Folasayo (2021) concluded that, despite being professionally qualified and having adequate knowledge of Bloom's Cognitive Taxonomy, science teachers in Nigeria did not use the taxonomy of educational objectives in their lesson preparation, presentation, and student assessment. The majority of them place a premium on the taxonomy's remembering level, which jeopardizes the ideal creation of intended learning outcomes. Teachers forgot to prepare and implement lesson studies in a way that would strengthen the active roles of the teacher and students and contribute to the improvement of the educational process and learning results. Based on the findings, it was suggested that all teachers use Bloom's cognitive taxonomy of educational objectives appropriately in their lesson preparation and presentation in order to encourage students to express themselves freely, contribute to the improvement of the educational process, and achieve better learning outcomes. Bloom's Taxonomy was also recommended to be used in students' assessments by teachers. This would reflect a more accurate and clear picture of the learners' learning objectives as well as their ability to apply the concepts taught in a real-world setting.

According to Masinde (2012), a research study aimed at determining the quality of tests that teachers developed and administered in schools by examining the extent to which they reflected high level learning, critical thinking, and meeting the 21st century skills as outlined in Bloom's Cognitive Taxonomy, the results showed that teachers asked questions in the knowledge category the majority of the time and designed examination questions that did not match the required mental process and knowledge dimension, and thus, more work needed to be done to improve test quality.

It also revealed that teachers lack appropriate knowledge and abilities in test creation, with the majority of questions posed by teachers focusing on the cognitive process and factual knowledge components, resulting in poorly constructed exams. The study recommended that instructors receive in-service training to improve their item writing abilities in order to improve the quality of teacher-created tests. It also recommended that teachers be reminded of the importance of measuring skills other than the memory of facts while creating tests. Instructors at teacher education institutes and universities should place a strong emphasis on the unit on testing in order to provide teacher candidates with the requisite testing abilities. Bloom's Cognitive Taxonomy's role in test creation should be highlighted during training to promote knowledge transformation rather than transmission in order to boost critical thinking and enable today's learners to gain 21st century abilities. Exam panels must be established by school administrators, who will be responsible for setting and moderating exams as well as overseeing the entire process of testing in various disciplines to address essential cognitive skills. Secondary school curricula should be altered to include and stress objectives at a higher level of cognitive process and dimension, which would be an important component in developing quality tests.

In addition, Kinyua and Okunya (2014) found that teacher experience, training on examination construction and analysis, level of education, use of Bloom's taxonomy, and test moderation and length affect the validity and reliability of teacher-made tests in their study of the validity and reliability of teacher-made tests, a case study of year II physics in the Nyahururu District of Kenya. Each of these characteristics has a different effect on the validity and reliability of exams created by teachers. Teachers having a track record of designing more valid and trustworthy tests and exams. Teachers who had been trained in test development and analysis, on the other hand, created tests that were more reliable and valid (Kinyua & Okunya, 2014). According to Stiggins (1994), referenced in Kinyua and Okunya (2014), the teacher's degree of education has a significant impact on the reliability and validity of teacher-created assessments. This influence of training on test quality has expanded to other parts of testing, as emphasized by Marso and Pigge (1988) in Kinyua and Okunya (2014), who believe that a lack of good test planning is related to a lack of training. Another aspect that impacts the quality of testing is moderation before administration. The reliability and validity of moderated tests are higher than those of unmoderated tests.

In addition, Bloom's Cognitive Taxonomy has a direct impact on validity and dependability. Teachers who use the table of specifications to create test items create more valid and reliable tests than those who don't. This statement is supported by the findings of Afr Educ Res J 70 by Linn and Gronlund (1995), as cited by Kinyua and Okunya (2014), who recommended that when planning a test, it is important to use a table of specifications such as Bloom's taxonomy to ensure proper item sampling in order to meet validity and reliability conditions (Kinyua & Okunya, 2014). Also, according to Fives and DiDonato-Barnes (2013), including a table of specifications such as Bloom's taxonomy in test construction can improve the quality of the exam. In order to ensure good practice in the development of teacher-made tests, Kinyua and Okunya (2014) suggest that teachers be refreshed with in-service testing training on a regular basis.

Another study by Chelang' at (2014) in an Analysis of Teacher Prepared Examination Questions in History and Government along Blooms Taxonomy on the Cognitive Domain, a case study of secondary schools in Bureti District shows that History and Government teacher prepared questions in Continuous Assessment Tests and during instruction do not largely relate to Bloom's Taxonomy along the cognitive domain and therefore she recommended that History and Government teachers should balance the setting of questions by setting questions that cut across the six levels of Bloom's Taxonomy along the cognitive domain. This shows that there is a problem in the internal examination in relation to Bloom's Taxonomy of Cognitive domain which needs to be studied in other areas to check if the same results are obtained.

A study on the relationship between the reliability of school-based tests and students' Kenya Certificate of Secondary Education (KSCE) performance in Kenya, and measures that could be put in place to improve standards of the same tests by Ochieng (2021) revealed that there was a negative association between school-based tests and KCSE performance which means that the majority of the tests which were administered in the sampled schools were not that reliable since the Cronbach's Alpha obtained was 0.473 which was below the statistical value of a reliable test of more than 0. 6. The researcher also concluded that teachers concentrated mostly on the lower levels of the Bloom's Cognitive Taxonomy that is remembering, understanding and applying whereas the higher levels that is analysis, synthesis and evaluation were largely neglected and the majority of teachers seemed not to be competent in test construction given that quite a number of them had not attended in service courses in test development and did not employ rules governing test construction. Therefore, the study recommended that the Ministry of Education should introduce refresher courses for teachers to enhance skills in test development and more attention to be given to test construction skills.Therefore, this study seeks to find out the relationship between teachers' utilization of Bloom's Cognitive Taxonomy in teaching and examination and students' academic performance in public secondary school in Nandi County, Kenya.

2.8 Bloom's Cognitive Taxonomy, Examinations and Teaching Subjects

Educational assessment process is still the major method to assess the degree to which the final outcomes in education are realized even though in the current decades various alternative ways of assessment have arise, teachers are extensively still using written examinations (Güler, 2021).

Azzopardi and Azzopardi (2021) conducted a study with the main goal of examining the question types according to Bloom's Revised Taxonomy in the final Paper 1 Advanced Biology examinations at a public post-secondary institution and national ones in the cognitive domain, where the questions were classified in terms of the Bloom's Revised Taxonomy cognitive levels. The objectives were not covered in the examination papers, and questions in the Advanced Biology examination papers 1 and National one primarily comprised problems that foster low levels of thinking, according to Azzopardi & Azzopardi. For example, Institution Paper 1 is divided into two sections: Section A, which assesses the theoretical aspect (similar to the national exam), and Section B, which assesses the practical part. The remembering kind of objective accounted for the majority of questions in Section A of the National and Institutional exams, whereas the applying type accounted for the majority of questions in Section B. The study emphasized the limited scope of student accomplishment in high-stakes exams and demonstrated how current Maltese biology testing practices encourage low-level learning.

When it comes to evaluating students' academic success and improving their critical thinking skills, the question levels teachers ask them on exams have an important influence. This is because research has shown that asking high-level questions encourages scholars to be more creative and multi-dimensional in their thinking. Low-level questions, on the other hand, encourage students to recall information because they do not help them enhance their conceptual skills (Brualdi, 1998 as cited in Azzopardi & Azzopardi, 2021). Furthermore, Azzopardi and Azzopardi argued that exams used to assess students' academic success are slow to change because assessments are primarily focused on the lower level of Bloom's cognitive after examining examination papers from two decades ago. This posed a significant pedagogical challenge because it prevents students from progressing to higher levels of learning. As a result, paper setters can help by setting up extra questions from higher levels of education.

In terms of Bloom's Cognitive Taxonomy's application in the Physics test, the study found that the majority of the questions were on the lower level of Bloom's Cognitive

Taxonomy. The following researchers backed this up: Exams mostly evaluate middle- to low-level cognition such as remembering and applying, according to Gates and Pugh (2021), however the competencies required by employers tend to demand higher-level cognition such as synthesis and creation, which are not frequently examined by examinations. Teachers should construct test questions carefully to focus on different levels of Bloom's taxonomy in order to stimulate more development of higher-level meta-cognitive skills in formal examinations, according to the researchers.

Iqbal, Ullah, and Nisar (2019) found that at the secondary level, Physics question papers measured students' remembering capabilities by 57 percent over a five-year period, 18 percent of their understanding capability, 10% of their applying capability, 8% of their analyzing capability, 4% of their creating capability, and 4% of their evaluating capability. As a result, Iqbal, Ullah, and Nisa came to the conclusion that, according to Bloom's taxonomy, Physics tests focused solely on the recall of memorized data, ignoring all other cognitive domains. The evaluation of student inventiveness as well as the evaluation of judgment was completely overlooked. Physics assessments solely measured elements that could be easily replicated by recall, ignoring higher-order skills like analyzing, generating, and assessing. Physics assessments at the secondary level have not been able to assess higher-order skills such as analyzing, generating, and evaluating. Based on the findings, they recommended that Bloom's taxonomy be well utilized so that future examinations achieve objectives to the learner's full ability; there should be a balance between all the categories of Bloom's taxonomy's cognitive domain, i.e. the application, analysis, synthesis, and evaluation of students at the secondary level; and teachers who set Physics exams should be experts in the subject and have thorough knowledge of the assessment techniques in the subject. Examiners should be given training so that they may create exams that cover all of Bloom's cognitive phases, ensuring that learning objectives are met.

In a qualitative research design study titled "Items Analysis of Physics Assessment Based on Cognitive Level of High-Order Thinking Skills in Bloom Taxonomy," Damayanti, Subali, Nugroho, and Sureeporn (2020, April) found that as per the assessment of matthayom 5th and 6th physics students' final exams items, remembering scored 0 percent in both grades, understanding scored 3.3 percent, applying scored 33.3 percent, analyzing scored 50 percent, evaluating scored 3.3 percent, and creating 3.3 percent in matthayom 5th physics exams, whereas understanding had 0 percent, applying had 25.7 percent, analyzing had 51.4 percent, evaluation had 3.3 percent, and creating 3.3 percent in matthayom 5th physics exams. According to these findings, the physics exam items only covered a small portion of evaluating and generating, thus these findings can serve as a beginning point for meeting the demands of Thailand's updated curriculum.

Despite evident changes in the three Physics syllabi during the fifty-year period with variations in examination question style, Letmon, Finlayson, and McLoughlin (2021, May) noted that there was no notable shift in the application of Bloom's Cognitive Taxonomy in examination papers. This was due to the findings of their study, which revealed that despite all question parts being classified according to four levels of cognitive domain, remembering received the highest rating, ranging from 73 percent in 1967 to 46 percent in 2008, and none of the nine examination papers examined in their study contained questions centered on evaluating or creating. According to Bhaw and Kriek (2020), the primary reason why students do poorly on the Physics examination is a lack of practical work and learners' inability to solve problems by integrating their knowledge from various topics in Physical Sciences, which is exacerbated by an incoherent synchronization between both the education system and the tests.

However, the following scholars detail their findings from numerous studies on the usage of Bloom's Cognitive Taxonomy in Chemistry exam questions: Yildirim (2020) discovered that the majority of the questions presented by chemistry teachers (98 percent) are in Bloom's Cognitive Taxonomy's lower levels, which include memorizing, comprehending, and applying. Furthermore, neither chemistry teacher has ever offered a question about meta-cognitive capacity, leading to the conclusion that chemistry teachers ask a lot of questions in written exams based on remembrance. Yaşar and Sibel (2020) state that curriculums control the development of topic contents, aims, durations, and procedures of subjects at various levels of teaching and learning. The teaching and learning outcomes in the curriculum as well as student assessment in the educational system can be understood by teachers using Bloom's Cognitive Taxonomy. In turn, when they examined the chemistry curriculum by year and grade, they found that learning outcomes linked to conceptual knowledge were abundant in the knowledge dimension whereas learning outcomes related to understanding were abundant in the cognitive process dimension. The study was noteworthy in that it demonstrated how learning outcomes in chemistry curricula changed in terms of Bloom' Revised Taxonomy from 2007 to 2018, and they recommended that more research be done to determine students' Revised Bloom's Taxonomy levels at the end of chemistry assessments or the Revised Bloom's Taxonomy levels of questions asked to students to support their research.

An examination of teaching textbooks in terms of several qualities, according to Andargie and Asmellash (2020), is required in order to devise the overall desired purpose and outcome of teaching textbooks. The goal of their research was to compare the contents of grade 8 chemistry textbooks to Bloom's Revised Cognitive Taxonomy. The content analysis was conducted using Bloom's revised Cognitive Taxonomy's six levels, and the results revealed that the textbook's learning objectives and activities primarily focus on lower order thinking levels, while experiments are more prevalent at Bloom's revised cognitive taxonomy's higher order thinking levels. As a result, the textbooks' teaching content encouraged passive participation from students, which was not ideal given the large variation in Bloom's Revised Cognitive Taxonomy of teaching and learning objectives, experiments, and activities between the lower and higher levels. In light of the findings, the textbook's teaching and learning objectives, experiments, and activities should be organized in such a way that learners are equipped with a higher order thinking level, implying that the textbook for grade 8 chemistry students should be revised in such a way that students are prepared for a higher order thinking level.

Similarly, Agung, Alhumaira, Yuskar, and Fuadi (2021) stated that teachers use school exams to determine the success of students' learning; as a result, they conducted research to determine the extent of students' learning using a qualitative research design to analyze end-of-year exam items based on Bloom's cognitive complexity. According to Agung et al., the bulk of items in Chemistry (82.7 percent) determined students' learning of a lower order cognitive skill such as remembering, comprehending, and applying, while analytical skills was the only higher order cognitive skill detected in the exam questions (17.3%). In terms of the knowledge component, conceptual knowledge counted the most (54.7 percent), whereas procedural knowledge weighed the most in the application skills (27.9 percent). They also suggested that chemistry teachers carefully align exam questions according to Bloom's Cognitive Taxonomy in order to ensure the amount of learning that students receive, and that the Bloom's Cognitive Taxonomy can be used by curriculum developers to consider the depth of students' learning outcomes because it serves as the foundation for exam development. They also suggested that research be conducted to evaluate the difference between exam results and desired learning outcomes, since this will help school leaders understand the extent to which schools can exceed the government's required learning goals.

Rahayu, Syah, and Najib's (2021, June) assessment of High Ordered Thinking Skills (HOTS) in Mathematics revealed that the students' HOTS were very low. This was due to the fact that in the factual knowledge dimension, an analyzing level scored 6.7, which was medium, evaluating level scored 4.6, which was low, and creating level scored 4.3, which was low, whereas in the conceptual knowledge dimension, an analyzing level scored 6.9 (medium), evaluating level (low). This was similar to the findings of a study by Subia, Marcos, Valdez, Pascual, and Liangco (2020), which found that remembering, understanding, and applying were all above average in terms of cognitive levels of the respondents, but that analyzing and evaluating were below average, particularly in probability and statistics, pre-calculus, and basic calculus. These findings indicated that the student had not progressed to the level of higher-order thinking skills in their mathematics courses. Students require higher-order thinking skills to manage higher-level tertiary mathematics courses, therefore enhancement is critical.

Furthermore, a study carried out by Güler (2021) to determine the quality of the questions used by middle school Mathematics teachers on exams exposed that teachers mostly preferred open-ended types of questions and mostly preferred the questions at remembering and understanding at low cognitive level whereas higher levels at evaluating and creating questions were never used at all grade levels. According to Rasyidi and Winarso (2020), mathematical textbooks are one source of learning that plays a key part in learning activities, but the quality of the government-issued mathematics textbook, which is presently used mostly in class X high schools, is unknown. Furthermore, according to Rasyidi and Winarso, the cognitive allocation of questions in high school mathematics class X textbooks was still not optimum, based on the proportional arrangement of questions according to cognitive taxonomy. This was reinforced by the study's findings, which revealed that 17 percent of questions were about remembering, 14 percent about understanding, 30 percent about analyzing, and 39 percent about knowledge.

Mita, Agustinsa, and Susanto (2021) conducted a study on the cognitive level analysis of problems in mathematics textbook class XII revision 2018 materials of congress and construction based on the revised Bloom Taxonomy and found that the distribution of the cognitive level of questions on the congruence and similarity material contained the cognitive level of understanding at 18.2 percent, applying at 50 percent, and analyzing at 31.8 percent, with the dodominant cognitive level being cognitive level of applying and does not include cognitive levels of remembering, evaluating, and creating.m. As a result, it was discovered that the distribution of the cognitive levels of the questions on the congruence and similarity theme material did not differ. It was also observed that there is a moderate association between all levels of Bloom's Cognitive ability in Mathematics across two separate schools in Tapah, with each cognitive level's score ranging from 20% to 50% and needing to be improved (Shuhaimi, Ismail, Sahar, Jabar, Yaakob, & Razi, 2020).

Heflin (2021) looked at how Jesus' inquiries in Matthew's gospel correspond to Bloom's taxonomy categories, as well as how Jesus' audience shaped the questions he asked. According to the data, Jesus posed higher-level questions to the religious leaders more frequently than he did to the disciples, who got a greater number of lower-level queries. These distinctions influence how teachers develop questions to aid student learning. Teachers should develop questions that account for students' preparedness, motivation, the value of silence, and the complexity of inquiries, according to Heflin.

Further research indicated that in English exam questions, lower-order thinking skills (LOTS) outnumber higher-order thinking skills (HOTS) by a significant margin (98.79 percent) (1.21 percent). As a result, the study addressed a vacuum in the present literature on high-stakes and accountability-driven assessment methods in postcolonial contexts including language educational policies involving the use of English as a classroom language and curricular reforms. The study, in particular, provides educators and policymakers with a body of knowledge that will help them write high-quality tests that will improve effective instruction and student learning and performance in schools and beyond (Muhayimana, Kwizera, and Nyirahabimana, 2022).

According to Ndlela, Pereira, and Oloyede (2020), Business Studies teachers in Eswatini rely on instructional strategies that create lower order thinking skills rather than higher order thinking skills. According to the findings, the majority of Business Studies teachers employ question and answer, lecture, and teacher-led discussion techniques. Even when teachers asked students closed-ended questions, the question-and-answer style was the most popular. Most of the instructional strategies proposed for teaching Business Studies subjects were not used by Business Studies instructors.

According to the findings, the use of curriculum-required instructional approaches to build higher-order thinking skills is insufficient and unsatisfactory. As a result, students studying Business Studies are underprepared to excel in national exams, the workplace, and life in general. Cluster workshops were suggested as a way to help instructors understand how the revised Bloom's Taxonomy might be used to apply instructional strategies that can help them build higher order thinking abilities.

According to Alzu'bi (2014), the overall proportion of the lower levels of Bloom's Cognitive Taxonomy (remembering, understanding, and applying) was (69.6), while the overall rate across the last three stages of taxonomy (analyzing, evaluating, and creating) was (30.4), implying that English questions in general secondary examinations focused primarily on the lower order thinking ranks of Bloom's Cognitive Taxonomy. As a result, teachers should improve their question-writing skills so that they can ask questions in exams that span all levels of taxonomy. According to Kasim, Zulfikar, and Zaiturrahmi (2017), the majority of instructional questions in English textbooks (198 questions) focused on lower-order thinking skills. Similarly, in a study conducted by Bayaydah and Altweissi (2020), remembering received the highest percentage of 30.75 percent and analyzing received the lowest percentage of 4.07 percent on final exams given by English teachers using Bloom's Cognitive Taxonomy. The study also revealed that there was a significant statistical difference between the results of the analyzed questions from final exams and textbooks for grades 9 and 10, with remembering ranking first with 17 percent and 31 percent for textbook revision questions and final exams for teachers, respectively. As a result, the Ministry of Education of should use the findings of the study to produce an English course book that is based on all levels of Bloom's Cognitive Taxonomy, as opposed to the current situation. Furthermore, teachers have a positive attitude toward the use of higher order thinking skills in English examinations, despite their lack of knowledge about higher order thinking skills. As a result, more research was needed to reveal teachers' competence in setting questions in English subjects based on higher order thinking skills, as this is an important skill in curriculum implementation (Rachmawati & Purwati, 2021).

Because the results of their study showed that most of the question papers prepared by the Board of Intermediate and Secondary Education were assessing students' ability to remember and understand whereas very few questions were assessing analysis, evaluation, and creation, Mahroof and Saeed (2021) recommended for training of Computer studies exam setter or panels because the results of their study showed that most of the question papers prepared by the Board of Intermediate and Secondary Education were assessing students' ability to remember and understand whereas very few questions were assessing analysis, evaluation, and Bloom's Cognitive Taxonomy model, according to Ongesa (2020), is a requirement for critical thinking in Kenyan secondary school curriculum, which is a 21st-century talent required by both teachers and students. Thus, the need for the researcher to examined the relationship between teachers' utilization of Bloom's Cognitive Taxonomy in teaching and examination and students' academic performance in public secondary schools in Nandi County, Kenya

2.9 Teaching methods and teacher education in the 21st Century

Learners have changed, teaching has changed, and society/learner expectations have all evolved in the modern world. The introduction of information, communication, and technology (ICT) has caused additional changes in the education industry, posing a greater challenge to instructors on how to best support modern learners at all grade levels. Students today are proficient users of technology; they are constantly multitasking and are sometimes more at ease interacting with teachers and peers in the virtual world than they are in the actual world. While they are familiar with a variety of technology and can effectively use them outside of the classroom, their usage of these same tools as learning support tools can be limited. Scholars who grew up in the digital age have distinct learning styles and concerns than prior generations of students. Educators must adapt to the changing world and learn, develop, and invent new approaches to support today's students.

Supporting today's learners entails more than simply educating them in a certain academic area; it also entails assisting them in the use of technology in the classroom (Elliott & Tunks, 2021). He further said that supporting educators through areas of primary training to fit into the 21st century such as teacher preparation programs and degree programs are one way to accomplish this but also the many credible teacher training programs such as Kenya Educational Management institute (KEMI) which trains teacher on managerial skills, and Strengthening Mathematics And Science in Secondary Education (SMASSE) in training and re-training of teachers at enhancing quality classroom activities in Mathematics and Science subjects through Activity, Student-centre, Experiments, Improvisation (ASEI)-Plan, Do, See, Improve (PDSI) instructional strategy that provide experience, peer support or certifications are also excellent tools (Shuaibu, 2016).

In their study on the extent of usage of instructional techniques in teaching Biology in public secondary schools in Kakamega North Sub-County, Kenya, Sikolia, Toili, Sikolia, and Owiti (2016) backed up this assertion. The results demonstrated a significant degree of utilization of the Strengthening Mathematics and Sciences in Secondary Education (SMASSE) instructional strategies in biology teaching (70 percent and above), according to them. SMASSE (Strengthening Mathematics and Sciences in Secondary Education) in-service training results in a positive gradient, indicating that performance increases over time. The findings of this study provided a foundation for education stakeholders to improve the structure of instructional strategies for efficient and effective teaching and learning in secondary schools throughout the country by mobilizing refresher courses for all teachers in order to adapt to rapid changes in the educational system and raise learners who are 21st century ready.

The 21st century student, according to Kafwa, Gaudience, and Kisaka (2015), is a holistic learner who possesses physical, emotional, social, intellectual, and spiritual attributes as outlined in Kenya's National Educational Goals, which a classroom instructor is required to meet (Republic of Kenya, 2012). The teacher is the master implementer of the curriculum that contributes to the learner's holistic development. In this light, it is critical to examine the teacher's role in contributing to the holistic development of the learner based on how the teacher delivers information in order to produce a holistic learner.

Furthermore, as cited by Kafwa, Gaudience, and Kisaka (2015), the Millennium Development Goals (MDGs) No.2, the Kenya Vision 2030, the Modern Goals of Education (CfBT, 2012), and the Constitution of Kenya 2010 are the guiding national and international documents that advocate for quality and relevant education, training that is appropriate for modern needs, and that makes the learner's relevance felt in today's society. These policy documents signal a new age in teacher education, in which teachers are required to embrace innovative teaching methods such as reflective teaching and the integration of educational technology in order to holistically develop learners.

Enhancing student participation using technology as well as face-to-face interaction can help students develop creativity, critical thinking, and innovation. The philosophy underlying this should include authentic learning activities taken from the learners' daily lives and the global arena, and technology facilitates this engagement by allowing learners to access knowledge from contexts outside their own circles via the internet. Innovation skills, information media and technology skills, and life and career skills are all intertwined with the curriculum areas being explored. Each of these content areas can be handled using the proper degrees of cognitive domain to help the learner develop holistically, but the focus should be on the top three tiers of the hierarchy, which are analyzing, evaluating, and producing. These three stages are part of higher order thinking and are ideal for creating a learner-centered learning environment. The individual learner should have the capacity for: Problem solving and decision making, creative and critical thinking, collaboration, communicative, and negotiation, intellectual curiosity and the ability to - find, select, structure, and evaluate information, and the motivation to be - an independent self-starter who is responsible, persevering, self-regulating, reflective, self-evaluating, self-correcting, and a lifelong learner who is flexible and able to adapt to change (Kafwa, Gaudience & Kisaka, 2015)

The contemporary view of learning, on the other hand, is that people develop new information and understandings based on what they already know and believe. In practice, this means that teachers must have a thorough understanding of their students and be able to expand on their prior knowledge and abilities. More precisely, a wider diversity of teaching styles is needed to guarantee that each student gets the attention and support they need to gain deeper levels of information and understanding, as well as develop a wider range of skills. As teachers add to their repertoire of teaching techniques, they are better positioned to adopt different strategies to ensure that each learner's personal learning needs can be met. Similarly, policy makers have turned to instructional approaches that reflect a constructivist understanding of how learners learn; it becomes increasingly clear that pedagogy for the 21st century comprise four main interwoven factors namely: the learner centred learning, the teachers' use of strategies and skills nurturing creativity and collaborative learning, the use of interdisciplinary and project-based approaches conducive for team work, and need for authentic learning that engage learners by appealing to their existing passions and interests in terms of the technology usage (Huitt, 2011 & Nabwire, 2014 in Kafwa, Gaudience & Kisaka, 2015)

According to Kenya Institute of Curriculum Development, KICD (2019) social reconstruction lessons are considered valuable in the execution of a curriculum that is value-based and one that emphasizes in inculcating holistic, meaningful and sustainable education. Mutisya, Itolondo and Ikinya, (2021) adds another ingredient to modern teacher; social reconstruction. They explain that, social reconstruction orientation looks upon the curriculum as a driving force to changes in society and as such the type of education offered in schools should be capable of stabilizing social order and conserving culture in the society. The main focus of a tutor whose curriculum orientation is social reconstruction is on developing social competencies and values that will enable the trainee to understand the prospects of the society he or she lives in. Social reconstruction orientation lays emphasis on issues that face society. Similarly, a social reconstruction curriculum should provide opportunities for collaborative interaction between learners and their peers, learners and the teachers, learners and their environment and other learning resources so as to develop socially adaptive behaviours and competencies that enable them to solve social problems (Shrivastava, 2017, Schiro, 2013, Hunkins &Ornstein 2016, Sukri et al., 2018 in Mutisya, Itolondo & Ikinya, 2021)

Instructors oriented to social reconstruction use issues emerging in the society such as diseases, pollution, corruption, and unemployment to enable students to make informed judgments and act on them (Bay et al., 2012; Abakay, Şebin, & Şahin, 2013 in Mutisya, Itolondo & Ikinya, 2021). Teachers' social reconstruction orientation is critical in addressing emerging curriculum issues in line with the competency-based curriculum. Broome (2014) and Aloni (2013 in Mutisya, Itolondo & Ikinya, 2021) argues that teachers should teach beyond facts and concepts and engage students in transformational activities in order to develop their social competencies and that social competences require more than knowledge and skills and therefore tutors should create warm, caring, multi-dimensional classrooms that encourage students to debate alternatives to controversial social issues, incorporate collaborative learning experiences and set up projects that emphasize on developing creativity, problem-solving, critical thinking and responsibility skills. According to Mosley (2010) and Orpinas (2010 in Mutisya, Itolondo & Ikinya, 2021), social competence is premised on a wide range of cognitive abilities, emotional processes, behaviours skills, and social awareness, personal and cultural values that enable individuals to socially adjust and make informed decisions on issues that challenge and affect them. The beliefs and assumptions tutors hold with regard to a social reconstruction curriculum will likely impact the choice of instructional approaches they use in classroom teaching. Therefore, teachers should be competent in social reconstruction as well as so that they will model learners are full of higher order skills.

In an increasingly globalized 21st century, an education that is student-centered is invaluable because it supports the development of collaborative, communication, and problem-solving skills, according to Ng'ang'a and Kambutu (2017) on preparing teachers for a globalized era: an examination of teaching practices in Kenya. As a result, it is critical for all educational institutions to assist students in developing the skills, knowledge, and attitudes that promote teamwork. Despite the necessity for such education, many educators are hesitant to educate for globalization because they mistrust their ability to teach relevant skills, particularly international communication skills. However, given the importance of a globally-ready education, educators should discover ways to overcome the obstacles that prevent them from teaching for globalization. They discovered the following barriers to teaching for a globalized 21st century faced by Kenyan educators: limited teaching and learning resources, as well as a lack of adequate training; these educators rarely taught for globalization; and they used exclusively teacher-centered teaching strategies. While teacher-centered instructional approaches are important in the teaching and learning process, they are not optimal for teaching globalization skills, knowledge, and dispositions. As a result, it is preferable to employ student-centered instructional methods.

Mailo (2021) found that policies on instructional skills were strongly associated to teacher competency in secondary schools in Kajiado County, Kenya, in a study that sought to investigate the influence of policies regulating pedagogy on teacher competency in Business Studies. The study also discovered that policies directing teacher qualification standards were quite relevant, and that policies guiding qualification standards were not strongly associated to teacher competency. However, it was discovered that effective implementation of regulations on teacher certification standards for Business Studies was more likely to produce acceptable procedures and accountability necessary for improving sanity in the teaching profession. Furthermore, policies directing the professional development of Business teachers were found to be substantially associated to teacher competency, according to the study.

As a result, the study concluded that proper implementation of policies guiding pedagogy is likely to direct Business teachers on acceptable instructional skills that cater for all learners regardless of specific learning differences for better scores, as well as proper qualification standards and professional development, which are critical in the teaching profession. The study recommended that the Teachers Service Commission (TSC) and Ministry of Education should formulate more policies that place emphasis on instructional skills that lead teachers of Business to accommodate all learners during the learning process, make teacher training in the country more practical by formulating policies that improve teaching practice periods and institutions' frequenting micro teaching sessions in colleges that equip trainees fully before they graduate; and formulate feasible policies that guide and create morale through professional development of teachers of Business for better learner achievement.

2.10 Role of Examination in Secondary schools.

When offered to learners under standard settings, an examination is described as a task or a group of tasks or questions designed to elicit a specific sort of behavior (Bishop, 1985, as cited in Gichuhi, 2014). The major reason teachers conduct classroom assessments is to gather information about their pupils' school achievement (Bennett & Gitomer, 2009; Nitko & Brookart, 2007; Harlen, 2007; Musial et al., 2009, as cited in Gichuhi, 2014). Teachers, on the other hand, recognize that they are not the only ones who benefit from the knowledge gained during the process. Students desire to know how they did in an assessment process in the form of feedback or feed-forward (Cohen et al., 2000; Mbelani, 2008; Murray, 2006, as cited in Gichuhi, 2014). Students must be able to see how they can improve their performance based on the findings of the evaluation procedure (Bennet & Gitomer, 2009; Mory, 1992, as cited from Gichuhi, 2014). Parents may be interested in learning how their children are doing in school as well. Information received from tests is frequently used by school administrators and other teachers.

Tests are defined by Cangelosi (1990), as referenced by Gichuhi (2014), as planned measurement by which teachers seek to generate opportunities for students to demonstrate their achievement in relation to set goals. One of the functions of a school, according to Oguneye (2002), as stated in Gichuhi (2014), is to evaluate the performance of an individual learner. Assessment is required to perform this position effectively. Assessment is a method by which a teacher gathers information about a student's knowledge gains, behavioral changes, and other elements of their growth (Gichuhi, 2014). The goal of student evaluation is to increase the effectiveness of learning and teaching as a whole (Sparks, 2005, as cited in Gichuhi, 2014). The assessment process is an important aspect of the teaching and learning process. There is a clear connection between stated learning outcomes, learning activities pupils are exposed to, and assessment tasks during the assessment process. The teacher can diagnose pupils' learning challenges and schedule additional education for them based on the results of the exam. It gives students feedback on their learning, teachers comment on their teaching, parents input on their children's performance, and communities' feedback on the educational system's quality (Gichuhi, 2014).

Teachers assess learning by identifying specific goals and objectives for each subject or class, carefully gauging the amount to which these expected outcomes are met, and determining the degree to which learning occurs (Raty et al., 2006, cited from Gichuhi, 2014). Teachers are also obliged to clarify the role of assessment in making instructional and pedagogical decisions when conducting assessments in the classroom (Danielson, 2008; Stake, 2004, as cited from Gichuhi, 2014). It is possible for teachers to become engrossed in their work and lose sight of the precise aim of a particular assessment aspect, according to Rust (2002), as stated by Gichuhi (2014). There's a chance that the goal won't be met, or that they'll ignore another type of evaluation that would be more suited. In addition, according to Rust (2002, as referenced in Iron & Elkington, 2021), teachers assess students for a variety of reasons, including motivating, creating learning opportunities, providing feedback, grading, and as a quality assurance process (both internal and external systems).

Sumner (1987), as cited by Gichuhi (2014), defined the role of testing by identifying two types of roles: those that are external to the school and include information transfer, monitoring standards, accountability, allocating resources, identification of students in specific categories, accreditation, selection, and target setting; and those that are internal to the school and include information transfer, monitoring standards, accountability, allocating resources, identification of students in specific categories, accreditation, selection, and target setting. Internal roles outlined by him include providing feedback to students on their learning, providing input to teachers on student learning-diagnostic evaluation, identifying specific learning challenges, categorizing students, assisting with education guidance, and improving the curriculum.

The main purposes of the assessments, according to Bone (1999) as cited from Gichuhi (2014), are: (1) To grade or rank a student; (2) To pass or fail a student; (3) To provide feedbacks to students; (4) To provide feedbacks to lecturers; (5) To provide feedbacks to professional bodies; (6) To contribute to a student profile; (7) To motivate students; (8) To motivate lecturers; (9) To predict success in research and/or professional courses; (10) To predict success in future employment organization; (11) To provide a SWOT (strengths, weaknesses, opportunities and threats) analysis for students; (12) To provide a SWOT analysis for teachers; and (13) To assist an institution in establishing quality in their provision of courses.

"In addition to guiding classroom instruction," Kuhs et al. (2001, p. 2), as cited by Gichuhi (2014), add that assessment helps teachers:

• Formulate plans and strategies to support students' instructional needs

• Share information with students about their progress

• Collect information to assign student grades

• Evaluate the effectiveness of their instructional strategies and curricula.

• Compile summative data on student progress in order to make decisions such as promotion, retention, special program assignment, and referrals to other needed assistance programs.

Teachers' assessments of student achievement are based on information from tests and observations. As a result, educational, managerial, and communicative goals are the three main goals of classroom assessment. Unfortunately, investigations looking into the quality of frequent school examinations have found that testing malpractice and erroneous evaluations are common (Gichuhi, 2014 as cited in Dagdag & Dagdag, 2020).

'Teacher-developed assessments are dominated by questions that ask students to remember facts and information,' according to Stiggins (1988) as referenced by Xu

(2019). Despite the fact that instructional objectives and even instructional practices may aim to build thinking skills, classroom examinations frequently fall short of these goals. Students who use tests to try to figure out what the teachers want can see how much emphasis is put on memorization and respond accordingly'. As a result, bad assessment that fails to recognize and reward higher order thinking skills may stymie their development. As a result, it's critical that teachers conduct assessments with a clear goal in mind and that they feel their tests will help students achieve excellence (Murray, 2006, as cited in Gichuhi, 2014). This forms the basis also for researcher to carry out a research on relationship between teachers' utilization of Bloom's Cognitive Taxonomy in teaching and examination and students' academic performance in public secondary schools, Nandi County.

2.11 Role of Academic Performance for learner and society

Academic performance is a major worry for educational experts since failure in national exams signifies doom for students, whose lives become unpredictable and depressing. Academic performance impacts whether pupils will attend university or other tertiary institutions after high school. As a result, a student's life is shaped by their academic success on national exams. As a result, secondary school administrators in Kenya are under pressure to improve pupils' marks on the Kenya Certificate of Secondary Education (KCSE) (Nyagosia,Waweru & Njuguna, 2013). Edmonds (1981), Scheerens and Bosker (1997), Lezotte, Skaife and Holstead (2002), Kirk and Jones (2004), and Daggett (2005), all cited in Nyagosia, Waweru, and Njuguna (2013), have shown that successful schools have distinct characteristics and processes that enable all students to achieve high levels of learning.

As a result of public pressure on school administrators and teachers to improve academic performance, schools have devised a variety of performance improvement strategies, including extra supplementary tuition, reward and punishment systems for good and bad students, and forced grade repetition, among others. However, some of the methods used by schools to increase academic achievement are not supported by research, and some, such as grade repetition and extra supplementary tutoring, have been proved to be ineffective (Bray, 2007, as cited in Nyagosia et al, 2013).

According to research on effective schools, there are seven fundamental qualities that all successful schools have in common. These seven qualities have been known as the Effective Schools Model (Lezotte, 2010, as referenced in Nyagosia et al, 2013) or the correlates of an effective school. The approach is viewed as a technique of obtaining high levels of student learning in which students are expected to gain critical skills, knowledge, and concepts.Strong instructional leadership, a clear and focused mission, safe and orderly schools, a climate of high expectations for success, frequent monitoring of student progress, positive home-school relations, and the opportunity to learn are the seven correlates of effective schools, according to the model. These seven Correlates of Effective Schools, according to Lezotte (2010, as referenced in Nyagosia, 2013), are important predictors of effective settings where all students learn, regardless of socioeconomic position or ethnicity.

According to Mbugua, Kibet, Muthaa, and Nkonke (2012), student performance in mathematics has been consistently low in Baringo County, with factors such as understaffing, insufficient teaching/learning materials, a lack of motivation and poor attitudes among both teachers and students, and retrogressive practices contributing to poor performance. They also suggested that strengthening these characteristics and sensitizing the local population to abandon habits that prevent students from fully participating in mathematics instruction could increase math performance.

According to Makewa, Role, and Yegoh (2011), school climate is an important factor in improving academic performance, particularly in the Nandi-Central district, which has long relied on a few outlier schools that consistently perform well while the rest of the district continues to perform poorly in national exams. They discovered that school climate has a significant impact on students' academic performance in provincial secondary schools in the Nandi–Central district, and they recommended that schools work to improve: 1) the school's ecology; the physical and material elements of a school, such as building design, size and age, state of décor, facilities, and technology in use; and the school's ecology.

The physical and architecture of schools plays a significant role in communicating meaning in schools, 2) milieu, which includes the characteristics of the people in the organization such as their skills, motivation, feelings, morale, values, and leadership, 3) social climate, which includes the social interactions in the school between teachers and students, teachers and administrators, and students and administrators. Respect, caring, support, and dependence, shared decision-making, good communication, equal opportunities for student participation, community-school relations, and 4) school culture; the values, beliefs, norms, and behavior patterns of the people who are members of the school community, resulting in a positive climate that will encourage better academic performance among students. Thus, this study seeks to find out the relationship between teachers' utilization of Bloom's Cognitive Taxonomy in teaching and examination and students' academic performance in public secondary schools in Nandi County, Kenya.

2.12 Summary of Literature Review

The results of other research that are closely linked to the one being studied are shared with the reader in a literature review, which connects a study to the larger, ongoing dialogue in the literature, filling gaps and extending prior studies (Cooper, 2010, Marshall & Rossman, 2011, as cited in Creswell, 2013).

Bloom's Taxonomy of Educational objectives is a classification system for claims about what students should learn as a result of instruction. Bloom proposed six levels in a hierarchical framework, ranging from simple to more complex and from concrete to abstract; mastery of the next more sophisticated skill or ability necessitated achievement of the previous one. The taxonomy is a concept for categorizing thinking into six stages of complexity, each of which is absorbed by the next higher level. As a result, it is a method of allowing the exchange of test items among members of different schools in order to construct banks of things that all measure the same educational goal. In other words, it was created as a way to categorize the educational system's objectives.

The three subcategories of Bloom's taxonomy are cognitive, emotional, and psychomotor. Remembering, understanding, applying, analyzing, evaluating, and producing are all part of the cognitive domain. The other domains are the affective and psychomotor domains. When it comes to employing Bloom's taxonomy of cognitive domains, experts claim that it has various restrictions and weaknesses (Ari, 2011). Moving from the simplest level of knowledge to the most difficult level of evaluation is considered as a major flaw in Bloom's Taxonomy's structure (Ari, 2011). In some instances, for example, some objectives at the knowledge level are more difficult than some objectives at the analysis and assessment level. Furthermore, according to (Amer, 2006, cited in Ari (2011), the evaluation level is not more difficult than the synthesis level, and the synthesis level contains the evaluation level.

According to research, lower level thinking is usually dealt with in teaching and learning by Agriculture and Science teachers, whereas the majority of questions in the back of Business textbooks at the University of Missouri are in the lower level of cognitive domain. Academic performance is a major worry for educational experts since failure in national exams signifies doom for students, whose lives become unpredictable and depressing. Academic performance impacts whether pupils will attend university or other tertiary institutions after high school. As a result, a student's life is shaped by his or her academic success in national exams. As a result, secondary school administrators in Kenya are under pressure to improve learners' marks in the Kenya Certificate of Secondary Education (KCSE) Nyagosia eta l., 2013. Hence the need to investigate the relationship between teachers' utilization of Bloom's

Cognitive Taxonomy in teaching and examination and students' academic performance in public secondary schools in Nandi County, Kenya.

3.0 CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This chapter examined the study's techniques and procedures for determining a relationship between teachers' utilization of Bloom's Cognitive Taxonomy in teaching and examination and students' academic performance in Nandi County public secondary schools. The study's location, philosophical worldview, research technique, and research design are all briefly described in this chapter. It also includes information about the research population, sample size and sampling methodologies, research variables and themes, data collection instruments, research instrument reliability and validity, and research instrument trustworthiness. Data collection protocols, instrument scoring and coding, ethical considerations, data analysis, and thematic analysis are all covered in this chapter.

3.2 The Study Location

The research was carried out in Kenya's Nandi County public secondary schools. Nandi County is located in Kenya's North Rift and covers an area of 2,884.4 square kilometres. The county is bordered on the west by Kakamega County, on the north by Uasin Gishu County, on the south by Kericho County, on the south by Kisumu County, and on the south west by Vihiga County. Emgwen, Nandi Hills, Tindiret, Aldai, Chesumei, and Mosop Sub-Counties are among the county's six sub-counties. Nandi County's unusual jug-shaped structure is restricted to the south by the Equator and extends northwards to latitude 0034'N. As illustrated on the map in Appendices V and VI, the western boundary reaches longitude 34045'E, while the eastern boundary reaches longitude 35025'E.

The county public secondary schools in Nandi County were used because they have the same facilities for teaching and learning as well. There was no study carried out in the county on the relationship between teachers' utilization of Bloom's Cognitive Taxonomy in teaching and examination and students' academic performance in public secondary schools. Despite the county's public secondary schools having common teaching and learning resources, there exists a disparity in academic performance; some perform better than others, while others generally perform dismally in academics. The possible reasons for this could be variation in teaching methods, mode of setting exams, or teachers' utilization of Bloom's Cognitive Taxonomy in teaching and examinations, conducive environment for learning, among other factors. As a result, the researcher determined that a study of the relationship between teachers' use of Bloom's Cognitive Taxonomy in teaching and examination and students' academic performance in public secondary schools in Nandi County, Kenya, was warranted.

3.3 The Philosophical worldview

Gub (1990, p. 17, as referenced in Creswell & Creswell, 2018) defines a "philosophical worldview" as "a fundamental set of beliefs that influence action." A philosophical perspective frames a study issue and determines how the researcher thinks about it, in accordance with Creswell and Creswell (2018). This study used a pragmatic philosophical approach to the world.

Pragmatic researchers allow and encourage the use of both quantitative and qualitative research methodologies in a single study in order to best address the research issue (Morgan, 2007; Creswell and Plano Clark, 2011; Denscombe, 2014; Midgley et al., 2017 in Shah, Shah, & Khaskhelly, 2019). Scholars who believe in pragmatism think that there is an objective reality that exists separate from human experience, and that this reality is rooted in the environment and can only be discovered via human experience (Goles and Hirschheim 2000; Morgan 2014a; Tashakkori and Teddlie 2008 in Kaushik & Walsh, 2019). The study was concerned with the human experience and practical aspects of teachers' utilization of Bloom's Cognitive Taxonomy in teaching and examination and its relation to students' academic performance. Thus, a pragmatic approach was used. The starting point for research is that the researcher has to develop study schedules anchored in participants' familiarities to ensure the practicability and relevance of the study (Kelly & Cordeiro, 2020).

The researcher chose pragmatism because it is not wedded to any one system of philosophy or reality, and it allows independent researchers to make their own decisions. As a result, the researcher was free to select the research methodologies, strategies, and procedures that best suited his or her needs and goals. Furthermore, pragmatists do not perceive the world as an absolute unity; rather, different methods for collecting and interpreting data can be used rather than adhering to a single methodology. What works at the moment is the truth. It isn't founded on a distinction between reality outside of the mind and reality inside the mind. As a result, the investigator used both quantitative and qualitative data in this mixed methods study to provide the best knowledge of a research problem. Furthermore, pragmatist researchers consider what to investigate and how to do it based on the desired outcomes—the direction they wish to take it. Pragmatists believed in both an outward and an internal universe, both of which were independent of the intellect. However, they believe that we should cease questioning reality and natural rules (Cherryholmes, 1992, as cited in Creswell and Creswell, 2018). As a consequence, pragmatism opens the door to a variety of approaches, worldviews, and assumptions, as well as different types of data gathering and analysis for the mixed methods researcher (Creswell, 2013; Chih-Pei, & Chang, 2017, Creswell & Creswell, 2018).

3.4 Research Methodology

Research methodology, as per Nayak and Singh (2021), is a research strategy that translates ontological and epistemological concepts into recommendations that illustrate how research should be conducted as well as the rules, methods, and practices that regulate it. The paradigm that leads the research activity, more particularly, ideas about the nature of reality and humankind (ontology), the theory of knowledge that informs the research (epistemology), and how that knowledge can be achieved (methodology), all influence the choice of research methodology (methodology).

A mixed method research technique was used in this study, which combined quantitative and qualitative strategies. The research scientist used a mixed method approach because it provides rich insights into the relationship between teachers' use of Bloom's Cognitive Taxonomy in teaching and examination and students' academic performance that cannot be fully understood by using only qualitative or quantitative methods because it can integrate and synergize multiple data sources, which aids researchers in studying and seeking a broad view of the study by allowing researchers to view the data from multiple perspectives (Poth & Munce, 2020; Shorten & Smith, 2017).

Quantitative research is used to measure an issue by creating numerical data or data that can be converted into useable statistics, whereas qualitative research is used to identify patterns in thoughts and viewpoints (Abuhama, Ismail & Bsharat, 2021). Quantitative research is a technique for investigating the relationship between the variables in order to test objective hypotheses. These variables can then be measured with tools, resulting in numbered data that can be evaluated using statistical processes (Creswell and Creswell, 2018). Quantitative research, as per Mohajan (2020), is a phenomena in which numerically stable precise data is collected and analyzed using mathematically based methodologies, particularly statistics that ask who, what, when, where, how much, how many, and how questions. Quantitative research, on the other hand, is original research in which the researcher chooses what to explore, asks a precise, narrow topic, obtains quantifiable data from participants, analyzes these numbers with statistics, and conducts the investigation in an unbiased, objective manner (Creswell, 2011 in Mohajan, 2020). As an outcome, a quantitative research approach was chosen for the investigation. As stated in Appendices IV and III, the study used a questionnaire to collect quantitative data, while lesson observation and document analysis were used to acquire qualitative data.

Qualitative research, according to Hennink, Hutter, and Bailey (2020), is a method that allows researchers to examine people's practices in depth using a specific set of research methods such as in-depth interviews, focus group discussions, observation, document analysis, visual methods, and life history. The ability to detect issues from the perspective of study participants and understand the meanings and interpretations they assign to behavior, events, or objects is a distinguishing aspect of qualitative research. Qualitative researchers, on the other hand, examine individuals in their natural contexts to see how the context of their life, such as the social, economic, cultural, or physical milieu in which they live, influences their experiences and behaviors. For this reason, the researcher used lesson observations and document analysis; examination papers and students' academic records to gain a better understanding of the relationship between teachers' utilization of Bloom's Cognitive Taxonomy in teaching and examinations and students' academic performance in Nandi County's public secondary schools.

The reasons for combining quantitative and qualitative data in the study are as follows: The first justification is that it permits scholars to broaden the scope of their research while maintaining appropriate depth and breadth. Second, the researcher combines the two data sets to answer the same research question with more certainty and broader implications in the conclusion, as well as provide a holistic understanding of a phenomenon. Third, employing two approaches in such a way that the strengths of the qualitative methods offset the flaws of the quantitative methods, and vice versa, aids in the development of more rigorous findings. Fourth, using the outcomes of one approach to guide or influence the usage of another method allows the researcher to come up with more effective and refined conclusions (Plano Clark & Ivankova, 2016; Maxwell, 2016; Morgan, 2014; Ventakesh et al., 2013 as referenced in Dawadi, Shrestha & Giri, 2021).

However, as Bryman (2012, as referenced in Dawadi, Shrestha, & Giri, 2021) notes, research should avoid making an epistemological distinction between quantitative and qualitative approaches because one type of method will usually be predominant, but all research will benefit from the incorporation of other methods. Because diverse viewpoints and in-depth investigation are encouraged, the researcher used a quantitative research methodology to pick instruments before moving on to qualitative theory (Creswell & Plano, 2018). As a conclusion, while being a mixed method study, this one went more toward the quantitative design than the qualitative design. The study looked at the link between teachers' use of Bloom's Cognitive Taxonomy in teaching and assessment and students' academic performance. The researcher used a quantitative research method to answer questions about the relationship between teachers' use of Bloom's Cognitive Taxonomy in teaching and examination and students' academic performance, with the goal of explaining and predicting the results so that the recipient of the results could understand them clearly (Leedy, 1993 in Mohajan, 2020).

3.5 Research Design

A research design is essentially a framework or strategy for a study that is used to guide the collection and analysis of data in a research study (Pandey & Pandey, 2021). Research design is beneficial because it directs the procedures and decisions that researchers must make during their investigations and establishes the logic by which researchers form conclusions at the conclusion of their studies. Different models for conducting research are represented by research designs, each of which has its own set of terms and processes (Creswell & Plano, 2018). Explanatory sequential design was adopted in this investigation. The researcher advanced the problem and researched the literature about it in order to complete the explanatory sequential research design; the researcher then highlighted flaws in the literature (Creswell & Creswell, 2018). The researcher developed the conceptual framework and reviewed related literature before choosing the design. Furthermore, the researcher developed the questionnaire, lesson observation checklist, and document analysis checklist for collecting data.

The interactive aspects of the explanatory sequential design took place in two stages. The first researcher gathered and evaluated quantitative data, which was followed by a qualitative phase based on the quantitative findings in order to expand on the first phase's quantitative findings (Dawadi, Shrestha & Giri, 2021). After generating a summary and interpretations of the quantitative data, the researcher analyzed the qualitative data, then integrated the findings, and ultimately came to a conclusion based on the findings (Creswell & Plano, 2018). Using the variables, the design was able to gather quantitative data. Teachers' use of Bloom's Cognitive Taxonomy in teaching and examination, as well as students' academic performance, were among the factors considered.

To produce an appropriate representation of the study as well as satisfy the principles of maximum variation and prevent errors during analysis and interpretation of the findings, the sample size for quantitative data collection was 360 and that for qualitative data collection was 60 (Daniel, 2019; Wilkinson & Staley, 2019). The researcher gathered the two datasets, evaluated them individually, and then combined the results by comparing quantitative data with qualitative data analysis, followed by a conclusion, using the research objectives. The study went on to evaluate the research hypotheses using both quantitative and qualitative data in order to find the core phenomenon of the participants and observers (Wisdom & Creswell, 2013 in LoGiudice, & Bartos, 2021).

3.6 The Study Population

A population is a group of people with similar features (Creswell, 2012; Bloomfield & Fisher, 2019). In a quantitative method, a target population is defined as a group of people who share some common traits and may be identified and studied by the researcher (Babbie, 2015). The target population in this study was comprised of 2055 teachers from 137 public secondary schools in Nandi County, Kenya. This was selected because all the schools have all the levels, from form one to form four, and have teachers who are qualified to teach and set exams for students. It was also used because the schools had the same basic facilities for teaching and learning in terms of classrooms, libraries, textbooks, and laboratories, which could facilitate teaching and learning. Sixteen teaching subjects also formed the target population of the study since they are offered by the various public secondary schools in Nandi County, Kenya. The accessible population of the study consisted of 705 teachers teaching form three the six teaching subjects, that is, Mathematics, Chemistry, English, Christian Religious Education, Business studies, and Computer studies, which formed the accessible population in terms of subjects in public secondary schools in Nandi County, Kenya. Out of the accessible population, 395 were male and 310 were female; thus, both genders were taken into consideration.

3.7 Sample size and Sampling procedure

Researcher can determine the sample from an accessible population by employing either probability or non-probability sampling approaches (Creswell, 2012; Creswell & Creswell, 2018). In this research, the accessible population was 705 teachers from 47 county public secondary schools teaching form three Mathematics, English, Computer Studies, Chemistry, Christian Religious Education, and Business Studies. Six teaching subjects were also accessible to the population from sixteen teaching subjects in form three in county public secondary schools in Nandi County. In this research, non-probability and probability sampling were used; that is, a random sampling technique was employed, where each participant's likelihood of being chosen from the population was equal, and a purposive sampling technique was utilized as a non-probability sampling approach to select form three classes to observe the utilization of Bloom’s Cognitive Taxonomy in teaching, construction of internal examinations, and academic performance in Mathematics, English, Chemistry, Christian Religious Education, Business study, and Computer study. Two teachers teaching form three Mathematics, English, Chemistry, Business Studies, Christian Religious Education, and Computer Studies were selected randomly from the county public secondary schools in Nandi County.

Regarding the number of participants or sample size, the following arguments from experts were considered: Creswell (2012), Creswell (2017), and Meckenzie (in Daniel, 2019) explained that there should be at least 30 participants in the correlation method and not less than 20 in the structured observation method to establish a relationship. Frankeal, Wallen, and Hyun (2012) and Anderson, Kelley, and Maxwell (2017) also stated that the minimum acceptable size for correlation studies is 30. In structured observation studies, other factors such as data adequacy, saturation, and maximum variation are considered in selecting the sample size for qualitative research. Thus, a sample of not less than 30 was considered adequate for qualitative data collection (Blaikie, 2018, & Daniel, 2018 in Daniel, 2019). Based on the two arguments above, in this study, the researcher randomly selected 360 teachers teaching form three from 30 county public schools out of 47 county public schools. Out of the 360 teachers selected, both male and female teachers numbered 180. This sample size was used to collect data for the quantitative phase. Similarly, a follow-up explanation model was considered to purposively select 60 teachers to collect data for the qualitative phase.

Out of the 30 schools selected randomly, the researcher purposefully selected a Form Three class to be used to observe the utilization of Bloom’s Cognitive Taxonomy in teaching, the construction of internal examinations, and students’ academic performance in Mathematics, English, Chemistry, Christian Religious Education, Business Study, and Computer Study. These subjects were selected randomly to represent the languages, Science, Mathematics, and Technology (STEM), humanities, and applied subjects in the curriculum. The form three classes was selected out of the four other forms because they do internal examinations, which are comprehensive, and they have covered a lot of work compared to forms one and two. Also, most schools would not allow the interruption of form four classes. This sample fully fulfilled the minimum requirement of the number that should be assigned in a correlation study and a structured observation study.

3.8 Research Variables

A variable is a property or attribute of a person or an organization that researchers can measure or observe and that varies among the people or organizations studied. They are crucial concepts about which researchers want to gather data in order to answer the study's question (Creswell, 2012; Creswell & Creswell, 2018). The dependent, covariates, and independent variables were the focus of this investigation. A dependent variable, according to Creswell (2012) and Howitt and Cramer (2017), is a quality or characteristic that is impacted or dependent on the independent variable. Continuous and categorical ratings can be used to measure dependent variables. Academic performance in the fields of Mathematics, English, Chemistry, Christian Religious Education, Business Studies, and Computer Studies is the dependent variable in this study.

An independent variable is a property or trait that influences or influences a dependent variable or outcome (Sassenberg & Ditrich, 2019). The use of Bloom's

Cognitive Taxonomy in teaching and the development of the internal examination are the independent variables in this study. Subjects and the style of exam construction are the covariate variables in this study.

3.9 Research Themes

Themes and research variables that are dependent and independent variables were utilized to represent qualitative and quantitative research designs, respectively, because the study was a mixed design. The themes used were derived from Bloom's Cognitive Taxonomy (Gates & Pugh, 2021): a) use of all verbs concentrating on recalling (select, describe, locate, what, branding, outline, fit, title, ignore, recollect, connect, pick, display, write a sentence, inform, how, when, in which, in what, who, how it was that, organize, highlight) in teaching and examination b) use of all verbs focusing on understanding in teaching and examination (classify, compare, contrast, demonstrate, explain, extend, illustrate, infer, interpret, outline, relate, re-enact, show, summarize, translate). c) in teaching and examination, usage of all verbs emphasizing on application (apply, build, choose, construct, develop, experiment with, identify, interview, make use of, model, organize, plan, select, solve, utilize) d) in teaching and examination, the use of all verbs that focus on analyzing (analyze, assume, categorize, classify, compare, conclusion, contrast, discover, dissect, distinguish, divide, examine, function, inference, inspect, list, motive, relationships, simplify, survey, take part in, test for, theme) e) use of all the verbs focusing on evaluation (agree, appraise, assess, award, choose, compare, conclude, criteria, criticize, decide, deduct, defend, determine, disprove, estimate, evaluate, explain, importance, influence, interpret, judge, justify, mark, measure, opinion, perceive, prioritize, prove, rate, recommend, rule on, select, support, value) in teaching and examination and f) use of all the verbs focusing on creation (adapt, build, change, choose, combine, compile, compose, construct, create, delete, design, develop, discuss, elaborate, estimate, formulate, happen, imagine, improve, invent, make up, maximize, minimize, modify, original, originate, plan, predict, propose, solution, solve, suppose, test, theory) in teaching and examination (Anderson, & Krathwohl, 2001 in Saravanan, 2021).

Additionally, the study looked at the relationship between the use of Bloom's Cognitive Taxonomy in teaching and examination and students' academic achievement, which was taken as another theme in the study. Other themes were: teachers' utilization of Bloom's Cognitive Taxonomy in teaching selected subjects and in exam construction in selected subjects; the relationship between mode of exam construction and teachers' utilization of Bloom's Cognitive Taxonomy in public secondary schools; gender influence on teachers' utilization of Bloom's Cognitive Taxonomy in teaching and exam construction in public secondary schools; and professional qualification influence on teachers' utilization of Bloom's Cognitive Taxonomy in teaching and exam construction in public secondary schools in Nandi County. Therefore, in total, the study had nine themes that were in line with the research questions stated in chapter one.

3.10.0 Data Collection Instruments

This is the entire data collection procedure. It includes not just the instrument's choosing or design, but also the circumstances in which the instrument was used. A tool for measuring, monitoring, or documenting quantitative data is known as an instrument. The instrument may be a test, questionnaire, tally sheet, log, observational checklist, inventory, or assessment tool that is identified before the researcher gathers data (Creswell & Creswell, 2018). The researcher developed three instruments for sourcing data from the participants. The three instruments were the teachers' questionnaire for collecting quantitative data (Appendix IV), document analysis, that is, examination papers and students' academic performance, and an observant's performance checklist for collecting qualitative data (Appendix III).

3.10.1 Performance Checklist

According to Creswell (2012) and Creswell and Creswell (2018), who argued that to collect data on specific behaviours, one can observe behavior and record scores on a checklist or scoring sheet, the researcher used a performance checklist (Appendix III) to collect qualitative data from teachers during actual teaching in class and to get information from examination papers and students' academic records. A performance checklist is a list of actions that constitute a specific type of performance, such as answering a math problem. It is used to see if someone acts a certain manner when they are requested to do a task. When a researcher observes an individual, he or she crosses it off the list if that behaviour is present (Fraenkel & Wallen, 2000; Howitt & Cramer, 2017).

The checklist was filled by the researcher as the teachers took the class through the lessons for the case of the utilization of Bloom's Cognitive Taxonomy in teaching; section I of the performance checklist; whereas for the case of the utilization of Bloom's Cognitive Taxonomy in the construction of internal examination, the researcher counter checked the end of term three examination questions for each of the subjects under study, collected from 360 teachers from 30 county public secondary schools for the year 2018 for evidence of utilization of Bloom’s Cognitive Taxonomy by marking or ticking in the performance checklist (Section II) against each level of Bloom’s Cognitive Taxonomy as shown in appendix III. The researcher collected data on academic performance by filling in Section III of the performance checklist from students’ academic records collected from 30 public secondary schools in Nandi County, Kenya.

3.10.2 Questionnaire

The study used a questionnaire (Appendix IV) to collect quantitative data as well as obtain information from teachers about students' academic performance and past examination question papers. To gather information on teachers' use of Bloom's Cognitive Taxonomy in teaching and examination, the researcher prepared a set of closed-ended questions that are closely related to research questions (Van Khuc, Pham & Tran, 2021). Because the data acquired from questionnaires constituted the data of research subjects, it was saved. The data from the questionnaire was digitized to create a useful data set, which was then analyzed using various models and statistical formulas to develop new knowledge and draw new conclusions, thereby addressing research questions and validating research hypotheses. Face-to-face questionnaires were used in the study because they provided instant response (Van Khuc, Pham & Tran, 2021).

Two teachers from each of the selected subjects, teaching in form three, completed a questionnaire independently from 30 county public secondary schools in Nandi

County. It also requested the specific subject teachers to provide form three end of term three examination papers and results thereof for the purpose of getting information on the utilization of Bloom's Cognitive Taxonomy in the construction of internal examinations and academic performance as shown in Appendix IV. The questionnaire consisted of four sections, namely sections I, II, III, and IV.

Section I, parts 1, 2, and 3 provide data for gender, profession, and teaching subjects, respectively. Section II provides data on the mode of test construction in parts 1 and 2. Section III provides data on teachers' utilization of Bloom's Cognitive Taxonomy in teaching and exam construction. Section IV requested teachers to provide data on students' academic performance for form three and the respective examination papers.

3.10.3 Document analysis

The researcher collected form three end-of-term examination papers from the six selected subjects and requested teachers to provide the analysis results of the examination papers so as to get qualitative data on teachers' utilization of Bloom's Cognitive Taxonomy in examinations and its relation to students' academic performance. As discussed above, the researcher analyzed the question papers to get themes in the form of verbs, focusing on the six levels of Bloom's Cognitive Taxonomy: remembering, understanding, applying, analyzing, evaluating, and creating, then recording them in the performance checklist (part II of Appendix III). The researcher also counter checked the form three analyzed results from the 30 county public secondary schools and recorded grades on section III of the performance checklist (Appendix III) for further coding and analysis.

3.11. Reliability of Questionnaire

When a research instrument is employed in the same context on multiple occasions, its reliability, or accuracy, is the amount to which it consistently produces the same results (Heale & Twycross, 2015). As stated in Lai and Bower (2020), Wallen and Fraenkel (2000) defined dependability as the consistency of the scores obtained: how consistent they are for each individual from one administration of an instrument to the next and from one set of items to the next. According to Mugenda & Mugenda (1999), as stated in Kandagor (2019), a measuring instrument's reliability is defined as its capacity to produce consistent results every time it is used.

Before collecting data, the researcher double-checked the study instrument to confirm that it was still reliable. Homogeneity (or internal consistency) is the degree to which all of the items on a scale measure the same construct, stability is the consistency of results using an instrument with repeated testing, and equivalence is consistency among responses of multiple users of an instrument or between alternate forms of an instrument (Heale & Twycross, 2015).

However, this study used all three levels of reliability, that is, stability, equivalence, and homogeneity, for instance; internal consistency, to measure the reliability of the instrument. Homogeneity (internal consistency) is measured using item-to-total correlation, split-half reliability, the Kuder-Richardson coefficient, and Cronbach's alpha, according to Lobiondo-Wood and Haber (2013 in Lobiondo-Wood & Haber, 2021) and Shuttleworth (2015).This study adopted Cronbach’s alpha to measure the internal consistency of the instrument because it is the most commonly employed test to determine the internal consistency of an instrument and is also used in instruments that have questions with more than two responses. In this study, the average of four scales in every combination of split-halves was determined. A Cronbach's coefficient of 0.74 was obtained, which was higher than 0.7, which was considered an acceptable reliability score according to Heale and Twycross (2015) and Singh (2017).

Test reliability is affected by scoring accuracy, sufficiency of content sampling, and the stability of the trait being measured. Scorer reliability refers to the consistency with which different people who score the same test agree (Aldridge, Dovey, & Wade, 2017). In this study, the researcher tested the reliability of the instrument by using an instrument that requires specific answers. To test the reliability of the questionnaire, that is, internal consistency, the researcher utilized questions that required defined answers. For the performance checklist, that is, equivalence reliability, the researcher scored the list himself so as to avoid any difference in scoring. For the document analysis, that is, examinations that were done by form three students (stability reliability), the researcher tested the reliability by checking specific terms used in the question papers and using standard examinations, such as the end of term three examination. The Cronbach's alpha was utilized to calculate the internal consistency of the instrument where an average value of 0.74 was obtained for the scales and it was considered reliable for the instrument (Heale & Twycross, 2015; Mueller & Knapp, 2018).

3.12 Validity of the Questionnaire

The ability of an instrument to measure what it claims to measure in terms of measuring techniques is referred to as validity. The degree to which the researcher has measured what he or she planned to measure is characterized as validity (Eisner, 1991, p. 58, as cited by Mohajan, 2018; Creswell & Creswell, 2017). Validity is defined by Cohen and Manion (1994, as referenced in Tak, 2021) as the degree to which an instrument measures what it is supposed to measure. Validity is defined by Fraenkel and Wallen (2000), as referenced by Ngala (2018), as the appropriateness, meaningfulness, and usefulness of certain inferences. As a result, validity refers to an instrument's ability to measure and provide valuable data. The process of gathering evidence to support such judgments is known as validation.

The degree to which data obtained using a certain instrument represents a specific set of indicators or the substance of a particular idea is referred to as content validity (Mugenda & Mugenda, 2003, cited by Mwangi & Bwire, 2020; Singh, 2017). Content validity was realized through the identification of the variables that were measured in the relationship between teachers' utilization of Bloom's Cognitive Taxonomy in teaching and examination and students' academic performance.

That is, the researcher wrote the operational definitions of terms of utilization of Bloom's Cognitive Taxonomy in teaching and the construction of internal examinations on a separate sheet of paper and then gave the instrument and a description of the intended sample to experts from the department of Educational Psychology, School of Education, and Moi University since they have more knowledge of the instrument validity to check if it was valid. The experts looked at the operational definition, read over the items or questions in the questionnaires, and checked if each question or item measured what it was supposed to measure according to the objectives.

The experts also assessed the suitability of the instrument format. The researcher then rewrote any item or question that needed to be double-checked and resubmitted to the experts, as well as creating new items for any objectives that were not fully covered. This process was repeated until all of the items in the instrument were approved by the experts, who also stated that the overall number of items was a sufficient representation of the whole domain of material covered by the variable being assessed.

The construct validity of a test refers to how well it evaluates an individual's attributes. In this study, the utilization of Bloom’s Cognitive Taxonomy in teaching and internal examinations and its relation to academic performance was achieved by defining the utilization of Bloom’s Cognitive Taxonomy in teaching and internal examinations and its relation to academic performance, and clearly stating the objective concerning the utilization of Bloom’s Cognitive Taxonomy in teaching and internal examinations and its relation to academic performance. The researcher sought supervisory support from professionals in the field of Educational Psychology at Moi University's School of Education in order to attain construct validity. This was done by giving them the questionnaire to assess if it measured what was intended. Also, factor analysis, the centroid method of factor analysis, was employed to achieve construct validity (Kothari, 2004 as cited by Suhendi, 2018).

3.13 Trustworthiness of the Performance Checklist and documents

The utility and honesty of qualitative research findings, according to Cope (2014 as cited in Connelly, 2016), are dependent on the reliability of qualitative research and the transparency of the study's conduct. The process of maintaining the degree of assurance in the collection of data, interpretation, and techniques that are required to assure the study's quality is characterized as the study's trustworthiness (Pilot & Beck, 2014 as cited by Gilani, Waheeds, & Shaheen, 2020). Many qualitative researchers have embraced and considered crucial four such trustworthiness principles, as outlined by Lincoln and Guba (1985, referenced in Jones & Donmoyer, 2021). Credibility, transferability, dependability, and confirmability have been proposed as parallel substitutes for the traditional quantitative research concepts of internal validity, external validity, reliability, and objectivity.

The researcher evaluated the trustworthiness of a performance checklist in qualitative data by collecting data from 30 public secondary schools. These data included 720 question papers from six selected subjects under study and analysis of students' academic performance from 30 secondary schools under study, which was then examined until results yielded were similar before making a conclusion. The convergence of many sources of data or perspectives from participants into concepts might improve the reliability of a study in general. Also, triangulation of several data sources by reviewing evidence from the sources and applying it to construct a coherent argument for topic matters (Creswell & Creswell, 2018).The different sources of data from the respondents gave the basis of the results.

According to Creswell and Creswell (2018), the researcher must compare data generated independently to cross-check the coding developed by multiple researchers. The researcher accomplished this by using performance checklists to avoid obvious transcription errors. Assuring that there was no float in the definition of codes, or that the meaning of the codes did not vary when coding. The study compared the data to the codes on a regular basis and made memoranda regarding the codes and their descriptions until all of the objectives were met.

3.13.1 Credibility of Performance Checklist and documents

Credibility is referred to as the degree to which the study findings and conclusions may be regarded as legitimate; it deals with the authenticity of the findings and the amount to which they reflect the reality of the issue under investigation (Nassaji, 2020). This was similar to internal validity in quantitative research, which examines whether there is a strong link between an observer's observations and the theoretical notions developed by the researcher. To create credibility, the researcher engaged with participants for an extended period of time, kept a close eye on the study, and used peer-debriefing, member-checking, and reflective journaling. Evidence presentation of iterative data questioning resulted in many examinations of the data. Negative case analysis or alternative explanations were also investigated, enhancing the findings' validity and believability (Connelly, 2016).

Another strategy is triangulation, which entails the use of numerous data collection methods, sources, interpretations, or points of view. Lesson observations were undertaken when the teacher was teaching the selected subjects under study, and question papers/examination papers for the various subjects under study were gathered to see if Bloom's Cognitive Taxonomy was being used in teaching and examination. The use of triangulation increased the validity and credibility of the findings by allowing for a more accurate and complete understanding of the relationship between teachers' use of Bloom's Cognitive Taxonomy in teaching and examination and students' academic performance in public secondary schools (Nassaji, 2020).

3.13.2 Transferability of Performance Checklist and documents

Transferability refers to the process of making generalizations or transferring the researcher's interpretation and conclusion to other similar situations or groups (Stenfors, Kajamaa, & Bennett, 2020). It's referred to as "external validity" by quantitative researchers, and it refers to the extent to which findings may be generalized across social situations. To evaluate transferability, the research provided a detailed description of the teachers' utilization of Bloom's Cognitive Taxonomy in teaching and examination, making assumptions central to the research and how it shaped the findings of the study. The researcher additionally used peer debriefs to review the study to enable others to scrutinize the teachers' use of Bloom's Cognitive Taxonomy in teaching and examination and the evidence used to support the findings and conclusions (Geertz, 1973a in Stahl & King 2020).

The researcher used a rich, thick description to convey the findings and to provide a comprehensive understanding of the relationship between teachers' utilization of Bloom's Cognitive Taxonomy in teaching and examination and students' academic performance in public secondary schools; the researcher did an extensive literature review of the previous studies and methods used to reduce misinterpretation of data (Creswell & Creswell, 2018).

The questionnaire and performance checklist were triangulated by the researcher to explore evidence from various sources and to create a cohesive rationale for ideas by combining multiple sources of data. Parts of the primary findings of the thoughts were returned to the participants by the researcher to determine the accuracy of the results. The researcher also reported on the individuals' contradictory information (Creswell & Creswell, 2018).

3.13.3 Dependability of Performance Checklist and documents

In quantitative research, dependability parallels reliability and it is defined as the extent to which the research can be reproduced under the same settings as the original study and identical data may be acquired over time and under the same conditions (Stenfors, Kajamaa, & Bennett, 2020). Maintaining an audit trail of process logs and doing peer-debriefings with a colleague are two procedures for ensuring dependability. Process logs are notes by the researcher of all activities that occur during the study, as well as decisions about parts of the study, such as whom to interview and what to watch (Connelly, 2016).

To ensure dependability is recognized, the researcher ensured that there was sufficient documentation of information such as objectives, research design and implementation, methodology and approaches, and the details of data collection procedures that another researcher could easily follow, even if a different conclusion may be attained.

3.13.4 Confirmability of Performance Checklist and documents

According to Nassaji (2020), confirmability refers to a clear relationship between the data and the findings or the extent to which others back up the researcher's claims and conclusions. The researcher ensures that confirmability is established in qualitative research by expressing the data and conclusions in such a way that their accuracy can be checked by others. An audit trail is a valuable method in which the researcher records and rationalizes all of the procedures taken and decisions made during data coding and analysis. These records are then available for additional analysis and validation (Nassaji, 2020).

To achieve confirmability of the findings, the researcher clearly links the findings and conclusions and outlines all the steps followed to observe and record the data correctly. In addition, the researcher reported all the findings correctly as observed from the field and did not add any personal values or theoretical inclinations that could sway the results of the study (Lincoln & Guba, 1994, as stated in Prochner & Godin, 2022). The study used experts from Moi University, School of Education, Department of Educational Psychology external auditors to review the entire process to ensure that the research process, data collection procedure, data analysis, interpretation, and conclusions of the findings were all followed to the letter.

3.14 Data collection Procedure

The candidate applied to the Ministry of Education, Science, and Technology for permission to undertake research, as shown in Appendix VII. The County Director of Education, Nandi County, as shown in Appendix VIII, and the County Commissioner, Nandi County, as shown in Appendix IX, granted the researcher a letter of introduction to the heads of county public secondary schools, allowing the researcher to visit the schools in Nandi County. As noted in Appendix II, the researcher visited chosen county public secondary schools, obtained permission from the school administration, and described the aim of the visit. The administrator in charge of the schools introduced the researcher to the teachers and students.

The researcher requested the teachers teaching Mathematics, English, Chemistry, Christian Religious Education, Business Studies, and Computer Studies to fill in a questionnaire in every school so as to get information on the relationship between teachers' utilization of Bloom's Cognitive Taxonomy in teaching and examination and students' academic performance in county public secondary schools in Nandi County, Kenya.

The researcher further requested the teachers teaching Mathematics, English, Chemistry, Christian Religious Education, Business study and Computer study to accompany them to class after seeking their consent as shown in Appendix I so that the researcher can make lesson observation on the utilization of Bloom's Cognitive Taxonomy in teaching by using performance checklist and requested them to give end of term three examination question paper to check the utilization of Bloom's Cognitive Taxonomy in internal examination. Also the researcher requested the teachers teaching the subjects under study to provide the results of the internal examination of the end of term three examination once form three students do it so as to be used to check the relationship between teachers' utilization of Bloom's Cognitive Taxonomy in teaching and internal examination and students' academic performance. The results collected was converted into standard scores since the exams done were not the same in all schools.

3.15 Scoring and Coding the Instruments

Once the data was collected from the teachers, the researcher arranged all the data in order to sort out all the valid questionnaires, question papers, and students' academic performance that corresponded with the teaching subjects understudy. The researcher then coded the data after recording all the information on the utilization of Bloom's Cognitive Taxonomy from each section of the Bloom's Cognitive Taxonomy model as shown in Appendix IV. Teachers' gender and professional qualifications were also coded. The frequency for each section of the questionnaire was analyzed into frequencies and keyed into the computer using a statistical analysis program after coding them.

However, the researcher also analyzed all the question papers per subject and checked Bloom's Cognitive Taxonomy verbs, focusing on each level of taxonomy employed in setting the questions and recording them in the performance check list (Appendix III), then coded their frequencies according to each level of Bloom's Cognitive Taxonomy and digitalized them for analysis. The data from lesson observations was also sorted out and coded from the performance checklist.

In addition, the academic performance of students from each school was standardized for uniformity, then categorized into grades and coded. The academic performance of each subject was also standardized and coded independently. The results obtained from the analysis of each level of Bloom’s cognitive taxonomy were categorized into six items on a five point scale where the minimum score equals to six and the maximum score equals to 30, so that the following categorization was considered: low/unbalanced (6.0–16.0), ambivalent/average (17–20), and high/balanced (21–30).

3.16 Data Analysis

Mixed methods data analysis, according to Creswell and Clark (2018), entails assessing data using methods that may be used to both quantitative and qualitative data, followed by the integration of the two types of data. Data analysis can occur at any moment during the mixed research process or at many times, and it entails particular steps conducted by the researcher as well as key decisions made at various stages. Following the end of the analysis, an interpretation is carried out, which entails looking at both the quantitative and qualitative results and evaluating how the information addressed the study's mixed methods question. As a result, the researcher derived conclusions or interpretations separately from both the quantitative and qualitative strands of the study, as well as across both strands (meta-inferences). Mixed techniques were seen by Teddlie and Tashakkori (2009 in Creswell and Clark, 2018) as a way to improve the quality of conclusions obtained from both quantitative and qualitative methods. They agreed, but described the importance of mixed methods research as providing knowledge beyond what can be gained from only quantitative or qualitative research.

The study was biased towards quantitative research design; therefore, major data analysis was quantitatively analyzed and qualitative analysis was used to strengthen and explain the quantitative analysis. Thus, the research used an explanatory sequential mixed research design to analyze, integrate, and draw conclusions. The researcher analyzed the quantitative and qualitative data independently, integrated them and then interpreted them.

The quantitative data collected was analyzed using both descriptive (frequency and mean) and inferential statistical (Chi square) techniques. The mean was calculated to check the utilization of Bloom's Cognitive Taxonomy in teaching and the construction of internal examinations by using the frequencies obtained from the 360 questionnaires and performance checklist. The Chi square was used to analyze the relationships between teachers' utilization of Bloom's Cognitive Taxonomy in teaching and the construction of internal exams and students' academic performance in public secondary schools in Nandi County, as well as to analyze the relationships between the teachers' utilization of Bloom's Cognitive Taxonomy and teaching subjects, mode of exam construction, teachers' gender, and professional qualifications as shown in Table 3 below. The Chi-square was utilized since the data was categorical and presented as frequencies.

Table 3

Methods of testing hypotheses

Hypothesis	Method	Variables
Ho_1	Chi square	Bloom's Cognitive Taxonomy, teaching and students' academic performance
Ho_2	Chi square	Bloom's Cognitive Taxonomy, exam construction, and students' academic performance
Ho_3	Chi-square	Teaching subjects, Bloom's Cognitive Taxonomy, exam construction and teaching
Ho_4	Chi-square	Mode of exam construction, Bloom's Cognitive Taxonomy, teaching and test construction .
Ho_5	Chi square	Teachers'gender, Bloom's Cognitive Taxonomy, teaching and exam construction
Ho_6	Chi square	Teachers' professional qualification, Bloom's Cognitive Taxonomy, teaching and exam construction

3.17 Thematic analysis

However, the qualitative data obtained from the performance checklist was sorted out and categorized into themes using verbs according to each level of Bloom's Cognitive Taxonomy. For example, all the verbs focusing on remembering (list, define, name, arrange, outline, find) from lesson observation per selected subjects were grouped together, counted, and coded into the computer for analysis. The same process was followed in the other levels of Bloom's Cognitive Taxonomy (understanding, applying, analyzing, creating, and evaluating). The researcher also categorized all the themes using verbs in Bloom's Cognitive Taxonomy for each level of taxonomy for every question paper collected from all the selected subjects under study (Mathematics, Chemistry, English, Christian Religious Education, Business studies, and Computer studies). The themes focusing on each level of taxonomy were counted, coded, and keyed into the computer for analysis. For example, the frequency of the following verbs: sketch, illustrate, prepare, construct, and solve, which focus on application, were grouped together for all the exams from each of the selected subjects and keyed into for analysis.

The researcher analyzed the qualitative data after grouping them into themes independently using frequencies, means, and Chi square, followed by a summary of the findings according to research objectives. The findings were further integrated with the quantitative and a conclusion was made. After the data analysis, the interpretation and discussion were made in chapters 4 and 5.

3.18 Ethical Consideration

An ethical consideration refers to the respect, confidentiality, and security of participants, as well as the norms and regulations that govern research (Korir, Mittelmeier, & Rienties, 2020). The researcher obtained a research approval from the Department of Educational Psychology through the School of Education at Moi University (Appendix X) and a research permit from the National Commission for Science, Technology, and Innovation (NACOSTI, Appendix VII) before going to the field to conduct the study. The researcher also obtained permission from the Nandi County Commissioner (Appendix IX) and the Nandi County Education Office (Appendix VIII).

In correlational data analysis, it is unethical for the researcher not to measure suitable controls such as age, gender, race, and others, according to Creswell (2012 as quoted in Figa, Tarekegne, & Kebede, 2020) and Ishtiaq (2019). This is especially problematic, as others have pointed out, if controls are missing. The researcher used an adequate conceptual framework and theory to guide the selection of variables for measurement in this study. In order to guarantee that gender was taken into account, the gender of respondents was also recorded.

Furthermore, for enough power and to meet the assumptions required by certain statistical tests employed in the study, the sample size in data collection must be sufficient (Suri, 2020).In this study, the researcher used 360 teachers from 30 county public secondary schools, which met the minimum requirement for an explanatory sequential mixed research method.

When it comes to data analysis, educational researchers should avoid manipulating or fabricating data. For example, when researchers claim to have discovered cause and effect, or even probable cause and effect, when their findings just reveal patterns of relationships (Creswell, 2012, cited by Figa, Tarekegne, & Kebede, 2020) and Ishtiaq (2019). By going to the field to collect data, this study was able to tackle the problem of data editing. Failure to assess and disclose the null hypothesis significance tests might also be considered unethical, as the APA manual plainly states (APA, 2010 as cited in Creswell, 2012; Chih-Pei & Chang, 2017). Null hypotheses were well-analyzed and reported in this study.

Furthermore, ethical considerations affect the quality of research, according to Fraenkel and Wallen (2000) and Ishtiaq (2019). As a result, the following crucial points should be considered by the researcher during research: To begin with, all participants in research should have their identities secured at all times; care should be made to guarantee that none of the material gathered will embarrass or hurt them. Participants must be notified and given the option to withdraw from the study if confidentiality cannot be maintained. Second, all participants should be treated with respect at all times. It's crucial to enlist the help of all participants in the research project. Participants should typically be informed of the pollster's interest and given permission to proceed. A pollster should never lie to respondents or use a covert tape device to record any talks. Finally, researchers should make every effort to ensure that no one who takes part in the study suffers any bodily or psychological injury.

The study's goal was presented to the participants by the researcher in this investigation. He further informed the participants that their information would be kept private and that they may opt out of the study at any time. In addition, the researcher respected and protected the privacy of the individuals. That is, the responder was not compelled to engage in the study (Creswell & Creswell, 2018; American Psychological Association (APA), 2020).

In addition, the researcher took into account the following ethical considerations: The information gathered was kept private; the researcher did not reveal the results, and the respondents were asked not to put their names or Teachers Service Commission (TSC) numbers on the questionnaire (APA, 2020). The respondents were not offered any incentives to encourage them to participate. The contacts were supplied in the consent letter so that the respondents may contact them if the information provided was misused or if more information was needed. All participants gave their consent by indicating their willingness to participate, and the principals of the institutions included in the study signed letters on their behalf, as stated in Appendix I and II.

Likewise, during research, the researcher developed trust with the respondents by using a well-developed instrument, using appropriate language, and sticking to the research objectives. He also assured the respondents that the study’s true goal was to allow the pollster to complete his research and that any information handed out would be kept private. The researcher also communicated the results of the study using good and easy language to avoid confusion and enhance the clarity of the findings. The researcher also acknowledged all the work of other scholars whose scholarly works were quoted in the study so as to avoid plagiarism (Creswell & Creswell, 2018).

4.0 CHAPTER FOUR

DATA PRESENTATION, ANALYSIS, INTERPRETATION, AND DISCUSSION

4.1 overview of the Chapter

This chapter focuses on the data presentation, analysis, interpretation, and discussion of the research findings as they were guided by the objectives of the study. In the first section, descriptive statistics are utilized to provide background information about the respondents who participated in the study. The second section presents the analysis of the responses to the specific research objectives of the study as provided by the respondents in the questionnaires and performance checklists. The purpose of this study was to determine a relationship between teachers' utilization of Bloom's Cognitive Taxonomy in teaching and examinations and students' academic performance in county public secondary schools in Nandi County, Kenya. Thus, the data in this chapter is organized according to the nine objectives of the study, with the first part presenting the preliminary results of the study.

4.2 Preliminary Results of the Study

The background of respondents who took part in the study is presented in this section. It includes the overall response, the teaching subjects, and the gender of the teachers. The greatest level of professional training of the teachers was also examined.

Overall, there were 355 responses, from the expected response of 360. This constituted 98.6%, as shown in Table 4. As shown in Table 4, there were generally more male teachers (207) than female teachers (148). This was equivalent to 58.3 percent and 41.7 percent, respectively. All teaching subjects had a 100% return rate with all the 60 questionnaires returned, with the exception of Computer Studies, with 55 respondents, corresponding to 91.6%.

Table 4

Respondents per Subjects and Gender

Teaching subjects	Male		Female		Total
Mathematics	32	(53.3 %)	28	(46.7 %)	60
Chemistry	42	(70 %)	18	(30 %)	60
English	30	(50 %)	30	(50 %)	60
Christian Religious Education	30	(50 %)	30	(50 %)	60
Business Studies	36	(60 %)	24	(40 %)	60
Computer Studies	37	(67.3 %)	18	(32.7 %)	55
Total	207	(58.3 %)	148	(41.7 %)	355

On the other hand, in regards to the respondents' highest level of professional qualification, as shown in Table 5, the study establish that the mainstream of teachers in secondary schools that is 84.5 percent had a bachelor's degree qualifications, while the least that is 7.3 percent had a diploma certificate qualification.

Table 5

Professional qualification of the respondents.

Professional Qualification	Frequency	Percent
Diploma	26	7.3
Degree (Bachelor or Postgraduate)	300	84.5
Masters degree	29	8.2
Total	355	100.0

4.3 Utilization of Bloom's Cognitive Taxonomy in Teaching

The first research objective was to determine teachers' utilization of Bloom's Cognitive Taxonomy in teaching in county public secondary schools in Nandi County, Kenya. To accomplish this, two teachers in each of the six teaching subjects in each of the 30 county public secondary schools were given questionnaires to fill out, of which 355 questionnaires were returned. In addition, one lesson observation was carried out per subject in each of the six selected teaching subjects in each school. The study deliberated at the general utilization of Bloom's Cognitive Taxonomy by teachers as well as an analysis of the utilization per each level of the taxonomy. The results are as presented below.

4.3.1 Teachers' Utilization of Bloom's Cognitive Taxonomy in Teaching

Generally, as shown in Table 6, 58% of the teachers utilized Bloom's Cognitive Taxonomy in teaching and 42% did not utilize it. This showed that teachers utilized Bloom's Cognitive Taxonomy in their teaching in their classes. The percentages for each subject illustrate that Christian Religious Education utilized Bloom's Cognitive

Taxonomy the most in teaching, with 80%, followed by Chemistry (68%), Computer Studies (60%), English (55%), Business Studies (50%), and Mathematics, which was the least to utilized Bloom's Cognitive Taxonomy in teaching, with 37%. These results concurred with Hess, Jones, Carlock, and Walkup (2009 as cited by Karuguti, Phillips, & Barr, 2017), who stated that utilization of Bloom's Cognitive Taxonomy helps tutors to invent lessons that perform and build up thinking skills over a wide range of cognitive complexity. Fetogang (2016) argued that teaching and assessing learners using Bloom's Cognitive Taxonomy does not favour any particular subject and helps to determine the quality of cognitive skills and academic performance attained.

Table 6

Teachers' Utilization of Bloom's Cognitive Taxonomy in Teaching

Subjects	Yes		No		Total	
	Frequency	%	Frequency	%	Frequency	%
Mathematics	22	37	38	63	60	100
Chemistry	41	68	19	32	60	100
English	33	55	27	45	60	100
C. R. E	48	80	12	20	60	100
Business studies	30	50	30	50	60	100
Computer studies	33	60	22	40	55	100
Total	**207**	**58**	**148**	**42**	**355**	**100**

4.3.2. Teachers' Utilization of Different Levels of Bloom's Cognitive Taxonomy

Bloom's Cognitive Taxonomy consists of the following six levels: remembering, understanding, applying, analyzing, evaluating, and creating. The first level is called remembering, and it requires students to recall previous information. The second level is understanding, which requires a student to state a problem or an idea in its own words. The third level of the taxonomy is applying, which needs the student to apply concepts to a new problem that embodies those concepts in a different way than originally presented. The fourth level of the taxonomy is analyzing, which requires students in Mathematics, Chemistry, English, Christian Religious Education (C.R.E.), Business studies, and Computer studies to break down material into its component parts and determine how they fit together. The fifth level of Bloom's Cognitive Taxonomy is evaluating, which entails the student having to critique an idea in the selected subject understudy. Finally, creating is the sixth level of taxonomy, which is defined as the ability of the student to reorganize parts of knowledge into a different form or develop a new theory to explain some set of facts.

Zareian et al. (2015) said that Bloom's Cognitive Taxonomy can be an effective criterion to assess learning activities and align teaching materials with the cognitive learning domains such as remembering, understanding, applying, analyzing, evaluating, and creating. Hence, teachers were requested to indicate their level of agreement or disagreement with regard to the utilization of different levels of Bloom's Cognitive Taxonomy in teaching. The results were as shown in Table 7.

Table 7

Teachers' utilization of different levels of Bloom's Cognitive Taxonomy's in Teaching

BLOOM'S COGNITIVE TAXONOMY INDEX, BCTI							
Levels of Bloom's Cognitive Taxonomy / Subjects	Remembering	Understanding	Applying	Analysing	Evaluating	Creation	Average
Mathematics	4.6	3.8	3.8	3.3	2.9	2.6	**3.50**
Chemistry	4.3	4.2	3.7	3.0	2.8	2.7	**3.45**
English	4.5	4.6	4.2	3.0	2.8	2.5	**3.60**
C. R. E.	4.8	4.4	4.1	3.2	3.2	2.7	**3.73**
Business	4.6	4.1	3.8	3.0	2.8	2.8	**3.52**
Computer	4.7	4.1	3.3	3.2	2.9	2.8	**3.50**
Total BCTI	**4.6**	**4.2**	**3.8**	**3.1**	**2.8**	**2.7**	**3.55**
Percentage	**77**	**70**	**63**	**52**	**47**	**45**	**59**

The results in Table 7 show that secondary school teachers generally strongly agreed (BCTI = 4.6) that they required students to remember what had been taught. However, only the chemistry teachers agreed (BCTI = 4.3) that they required students to remember the content taught. It also shows that at the understanding level, the secondary school teachers agreed (BCTI = 4.2) that they expected students to interpret information in their own words. However, English teachers strongly agreed (BCTI = 4.6) that students should interpret information in their own words. It was further found that secondary school teachers agreed (BCTI = 3.8) that they required students to utilize the knowledge taught to apply it in new situations. Teachers for all subjects agreed, except for computer studies, who were undecided (BCTI = 3.3) on requiring students to apply knowledge to new situations.

Additionally, from the results in Table 7, it was deduced that secondary school teachers for all the six subjects were generally undecided ($2.7 \leqq BCTI \geqq 3.1$) on the utilization of Bloom’s Cognitive Taxonomy at the level of analyzing, evaluating, and creating. However, it was evidently clear that during teaching, teachers concentrated mainly on the lower levels of Bloom’s Cognitive Taxonomy since they scored high in terms of rating, with remembering scoring a Bloom’s Cognitive Taxonomy Index, BCTI = 4.6, followed by understanding with 4.2 and applying 3.8, while the higher levels were not utilized mostly because they scored low in rating, as follows: analyzing scoring a Bloom’s Cognitive Taxonomy Index, BCTI = 3.1, evaluating 2.8, and creating the least with a BCTI = 2.7, as shown in Table 7. These results translated to an overall Bloom’s Cognitive Taxonomy Index of 3.55, which shows that the secondary school teachers generally agreed (BCTI = 3.55) that they utilized Bloom’s Cognitive Taxonomy in teaching.

The use of Bloom's Cognitive Taxonomy in the classroom has a substantial influence on teaching. For instance, according to Armstrong (2016), using Bloom's Cognitive Taxonomy in the classroom is critical for producing an instructional dialogue in which both teachers and students grasp the aim of the conversation. Teachers benefit from utilizing Bloom's Cognitive Taxonomy to organize teaching goals because classifying objectives helps them and their students define their goals. Teachers may plan and deliver appropriate instruction, devise legitimate assessment tasks and procedures, and verify that instruction and assessment are aligned with the objectives with the support of an organized set of objectives.

4.3.3 **Utilization of Verbs at Different Levels of Bloom's Cognitive Taxonomy in Teaching**

Further, teachers were asked to indicate how often they utilize verbs at different levels of Bloom's Cognitive Taxonomy in teaching and the following were the results of their responses. The results in Table 8 indicate that, on the aggregate scale, secondary school teachers often utilize terms focusing on remembering (BCTI = 4.2) and understanding (BCTI = 4.3) in teaching. However, in terms of subjects, Mathematics, Chemistry, Christian Religious Studies (C.R.E.) and Computer studies often ($3.5 \leq$ BCTI ≤ 4.1) utilize terms focusing on understanding, while English and Business studies teachers very often ($4.5 \leq$BCTI≤ 5.0) utilize terms at the understanding level in teaching.

Moreover, Table 8 indicates that secondary school teachers rarely utilize terms at the level of applying (BCTI = 3.4), analyzing (BCTI = 2.9), evaluating (BCTI = 3.4) and creating (BCTI = 3.1) in teaching.When specific subjects are considered, only the Mathematics (BCTI = 3.3) and Computer studies (BCTI = 2.8) rarely utilized the terms, focusing on application, while the teachers for other subjects often ($3.5 \leq$ BCTI ≤ 4.5) utilized the terms at this level. Furthermore, English, Christian Religious

Education (C.R.E), and Business Studies teachers frequently used terms at the evaluating level to teach ($3.5 \leqq$ BCTI $\leqq 4.4$), whereas Mathematics, Chemistry, and Computer Studies teachers rarely ($2.5 \leqq$ BCTI $\leqq 3.4$) used terms at this level to teach. Generally, secondary school teachers rarely (BCTI = 3.1) utilize terms at creating level in teaching, as shown in Table 8.

Table 8 shows that teachers teach using the lower level of Bloom's Cognitive Taxonomy for example from Table 8 remembering, understanding and applying scored a value between $3.4 \leqq$ BCTI $\geqq 4.3$ that they utilize Bloom's Cognitive Taxonomy in teaching their learners. However, the higher level of Bloom's Cognitive Taxonomy scored low responses in teaching for instance analyzing (BCTI =2.9), evaluating (BCTI = 3.4) and creating scored a BCTI of 3.1 which implied that they rarely utilize analysis, evaluation and creation in teaching. On aggregate the results in Table 8 showed that teachers oftenly (BCTI = 3.6) utilized Bloom's Cognitive Taxonomy in teaching. This finding was inagreement with Setiyana and Muna, (2019) who noted that the utilization of Bloom's Cognitive Taxonomy in exam items and teaching was still prone to the utilization of lower lever order thinking which then manifests in the poor skilled thinking ability in students. This was supported by Alshare (2018) and Tuzlukova and Singh (2018) who said that to make students to think beyond the lower level of Bloom's Taxonomy in teaching and academics performance is still an area of concern amongst theorists and teachers, especially in this era of increased automation and digitization of traditional knowledge-based career fields. This is because employers in the 21st century are yearning for graduates who can think critically and solve problems.

Table 8

Utilization of Verbs at Different Levels of Bloom's Cognitive Taxonomy in Teaching

BLOOM'S COGNITIVE TAXONOMY INDEX, BCTI

Levels of Bloom's Cognitive Taxonomy / Subjects	Remembering	Understanding	Applying	Analyzing	Evaluating	Creation	Average
Mathematics	3.5	3.9	3.3	2.8	3.3	2.9	**2.73**
Chemistry	3.9	4.2	3.5	3.0	3.2	3.2	**3.50**
English	4.3	4.9	3.8	2.7	3.7	3.2	**3.77**
C. R. E.	4.5	4.1	3.6	2.8	3.5	3.4	**3.60**
Business	4.9	4.6	3.5	3.3	3.5	3.1	**3.82**
Computer	3.9	3.5	2.8	3.1	3.0	2.8	**3.18**
Total BCTI	**4.2**	**4.3**	**3.4**	**2.9**	**3.4**	**3.1**	**3.6**
Percentage	**70**	**72**	**57**	**48**	**57**	**52**	**60**

4.3.4 Utilization of Different Levels of Bloom's Cognitive Taxonomy During Lesson Observation

In addition, the researcher observed and documented 60 lesson observations in the performance checklist to verify the use of different levels of Bloom's Cognitive

Taxonomy in teaching. The findings of the analysis derived from the checklist are shown in Table 9.

Table 9 shows that in all subjects, namely Mathematics, Chemistry, English, Christian Religious Education, Business studies, and Computer studies, Bloom's Cognitive Taxonomy was utilized in teaching, as shown by the frequencies and percentages of each level. The results for specific subjects were as follows: in Mathematics' lesson observation, the percentages were as follows: remembering indicated 29%, understanding 17%, applying 24%, analyzing nine percent, evaluating twelve percent, and creating eight percent. This demonstrated that during Mathematics lessons, teaching was in the lower levels of Bloom's Cognitive Taxonomy that is, remembering, understanding, and applying, and few lessons were in the higher order, that is, analyzing, evaluating, and creating. This result agrees with Karaali (2011 as cited in Meke, Wutsqa, & Alfi, 2018); among the questions and tasks he assigned to his students, he found that the majority of the teaching and questions were at the lower level of Bloom's Cognitive Taxonomy, and a few questions and teaching were at the higher level of Bloom's Cognitive Taxonomy. He argued that if Mathematics tutors do not find ways of using the highest level of Bloom's Cognitive Taxonomy, then the claim for the centrality of Mathematics to the intellectual development of students may seem less justified. Instructors in mathematics education at both the secondary and post-secondary levels can improve students' critical thinking skills by (i) using instructional strategies that actively engage students in the learning process rather than relying on lectures and rote memorization, (ii) focusing instruction on the process of learning rather than solely on the content, and (iii) using assessment techniques that provide students with an intellectual challenge rather than memory routinization (Peter, 2012 as cited in Widana, Parwata, Parmithi, Jayantika, Sukendra, & Sumandya, 2018).

On the other hand, in Chemistry lessons, the percentages were as follows: remembering 30%, understanding 32%, applying 14%, analyzing 12 percent, evaluating eight percent, and creating six percent. This revealed that the majority of Chemistry lessons were in the lower levels of Bloom's Cognitive Taxonomy, which are remembering, understanding, and applying, with only a few lessons in the higher order category, which is analyzing, evaluating, and creating. Yang, Zhang, Lu, and Ma (2012 as cited by Wang, Wang, Cai, Su, Ding, & Xu, 2021) urged instructors to utilize approaches that nurture the development of higher-order cognitive skills to connect concepts and apply the knowledge gained to new contexts during teaching and learning of Chemistry in the classroom.

Moreover, in English, it shows that 33% of lessons were on remembering, 27% were on understanding, 15% were on applying, 11% were on analyzing, eight percent were on evaluating, and five percent of teaching were on creating, as shown in Table 9. This showed that the bulk of the teaching was in the lower order of Bloom's Cognitive Taxonomy that is remembering, understanding, and applying, and few teaching lessons were in the higher order, that is analyzing, evaluating, and creating. According to Kamlasi (2018), remembering taxonomy resulted in 22 items, or 44 percent of the total. Taxonomy presented two items, accounting for 4% of the total. The use of taxonomy yielded 21 entries, or 42 percent of the total. Five items were discovered at the analytical level, accounting for 10% of the total. As a result, because neither the evaluating nor the creating levels had any items, the evaluation and creation levels were not used to ask the students in the English test. Teachers should use Bloom's Cognitive Taxonomy in constructing exam items and teaching across all levels, according to the findings of this study. Other studies have found that teachers ask "remember" questions more frequently than "think provoking" questions. If learners and adults are to tackle challenges that necessitate reflective decision-making, higher levels of thinking are required (Mutay, 2012 as cited by Kamlasi, 2018; Setyowati, Heriyawati, & Kuswahono, 2020).

Further, in Christian Religious Education teaching lessons, the responses showed that 33% of teaching lessons were on remembering, 36% were on understanding, nine percent were on applying, 12 percent were on analyzing, five percent were on evaluating, and six percent were on creating, as shown in Table 9.

Furthermore, in Business studies' teaching lessons, the scores were as follows: As shown in Table 9, 27% of the lesson observations were on remembering, 32% were on understanding, 16 percent were on applying, and both analyzing and evaluating had nine percent, while seven percent of the lessons observed were on creating. Also, the feedback for lesson observation during teaching in Computer Studies was as follows: remembering 34%, understanding 29%, applying 14%, analyzing nine percent, evaluating and creating seven percent.

However, in conclusion as indicated in Table 9, the overall percentages for using Bloom's Cognitive Taxonomy in teaching during lesson observation were as follows:

remembering 30%, understanding 29%, applying 16%, analyzing 10%, evaluation scored 8.0 percent , and creating scored 6.0 percent. This demonstrates that the greater part of the teaching was at the lower level of Bloom's Cognitive Taxonomy that is, remembering, understanding, and applying, and a small number of teaching was at the higher order, that is, analyzing, evaluating, and creating. This was in agreement with Setiyana and Muna (2019), who stated that the utilization of Bloom's Cognitive Taxonomy in the classroom still leads to the use of lower-order thinking, which manifests itself in students' weak skilled thinking capacity.

In addition, the results from Table 9 also showed that χ^2 = 173.936 with a critical value of 37.652 at $\boldsymbol{\alpha}$ = 0.05 and a degree of freedom of 25 with N = 15222. Therefore, the relationship between teachers' utilization of Bloom's Cognitive Taxonomy in teaching subjects and teaching was significant but weak since the contingency coefficient, C = 0.32 in county public secondary schools in Nandi County. The utilization of Bloom's Cognitive Taxonomy in teaching subjects contributed very little (about 8.35%) towards quality teaching.

Table 9

Utilization of different levels of Bloom's Cognitive Taxonomy during lesson observation

Subjects / Levels of Bloom's Cognitive Taxonomy		Mathematics	Chemistry	English	C. R. E.	Business	Computer	Total
Remembering	Frequency	91	78	65	86	71	66	457
	%	29	30	33	33	27	34	30.0
Understanding	Frequency	54	96	52	95	85	57	439
	%	07	33	27	36	32	29	29
Applying	Frequency	76	41	30	24	43	28	242
	%	24	14	15	9	16	14	16
Analyzing	Frequency	29	35	22	31	24	18	159
	%	9	12	11	12	9	9	10.0
Evaluating	Frequency	37	22	16	13	25	14	127
	%	12	8	8	5	9	7	8.0
Creating	Frequency	24	17	10	15	19	13	98
	%	8	6	5	6	7	7	6.0
Total	Frequency	311	289	195	264	267	196	1522
	%	100	100	100	100	100	100	100

The summary of the first objective shows that the results obtained from the researcher’s observation, as shown in Table 9, and the results obtained from participants’ perspective, as shown in Table 7 and 8 shows that teachers utilized Bloom’s Cognitive Taxonomy in teaching though the level of percentages differed greatly. For example, in table 7, each level of Bloom’s Cognitive Taxonomy participants’ response were: remembering scored 77%, understanding scored 70%, applying scored 63%, analyzing scored 52%, evaluation scored 47%, and creation scored 45% which was higher than the researcher’s observation where remembering scored 30%, understanding scored 29%, applying scored 16%, analyzing scored 10%, evaluation scored 8 percent and creation scored 6 percent.

The findings of this study matched those of Folasayo (2021), who found that teachers were lacking in their use of Bloom's cognitive taxonomy of educational objectives in both lesson planning and presentation. It was revealed that in their class delivery, all of the teachers utilized in the study focused solely on the knowledge component of the taxonomy and only partially considered comprehension verbs. Despite the teachers' comprehension of what Bloom's cognitive taxonomy comprises, other levels of Bloom's cognitive taxonomy were mostly ignored. This suggests that the students produced by these educators may not be as productive as skillfully upright as they could be. The findings were consistent with those of Rupani (2011), Kolb (2014), and Irfan and Shelina (2016) as stated by Folasayo (2021), all of whom agreed that courses provided without proper incorporation of Bloom's taxonomy of educational objectives will make learning difficult and ineffective.

4.4 Utilization of Bloom’s Cognitive Taxonomy in Examinations

The second research objective was to determine teachers’ utilization of Bloom’s Cognitive Taxonomy in the examinations in county public secondary schools in Nandi County. To achieve this, two teachers in each of the six selected teaching subjects in each of the 30 schools were given questionnaires to fill out, of which 355 were returned. In addition, form three end of year examination question papers were analyzed per subject in each of the six selected teaching subjects from each of the 30 schools selected. Additionally, the study focused on the general utilization of the Bloom’s Cognitive Taxonomy by teachers as well as an analysis of the utilization per each level of the Bloom’s Cognitive Taxonomy. The results are as presented below.

4.4.1 Teachers’ Utilization of Bloom’s Cognitive Taxonomy in Examination

The results are generally shown in Table 10, which generally shows that 307 teachers (86%) utilized Bloom’s Cognitive Taxonomy in the construction of the examination, whereas only 14% of teachers did not utilize it. This shows that teachers utilized Bloom’s Cognitive Taxonomy in constructing exams since the majority (86%) of respondents accepted that they utilized it in constructing exams. This echoed Adams' (2015b) claim that the taxonomy is advantageous in two respects. To begin with, tutors who use the taxonomy are encouraged to think about teaching objectives in behavioural terms, concentrating on what the student can do as a result of the lesson. A teaching objective expressed with action verbs will be the most effective way to assess the skills and knowledge given. Second, analyzing instructional goals using Bloom's taxonomy highlights the need to include learning objectives that require higher levels of cognitive skills, resulting in deeper learning and the transfer of information and skills to a broader range of tasks and settings.

However, in terms of different teaching subjects under study, Table 10 shows that 75% of Mathematics teachers utilized Bloom’s Cognitive Taxonomy for constructing exams, while 25% of them did not utilize Bloom’s Cognitive Taxonomy in the construction of examinations. This was in line with a study by Radmehr and Drake (2018), who found using the two frameworks helps develop questions that aim to broaden students' thoughts and a variety of cognitive processes, including constructive ones, than traditional questions do when they use Bloom’s Taxonomy (Anderson et al., 2001 as stated by Zapalska et al., 2018) in conjunction with Efklides’s metacognition framework (Efklides, 2006, 2008 as refereced in Radmehr & Drake, 2019) to design questions to address the different Bloom’s Taxonomy cognitive processes and knowledge types in senior secondary schools.

Furthermore, Table 10 revealed that 93% of English teachers, Christian Religious Education teachers and Chemistry teachers utilized Bloom’s Cognitive Taxonomy when constructing examinations ,while 7% did not utilize it in both subjects this was similar to studies by Alzu'bi, (2014), which found that the English questions included in general secondary examinations utilized Bloom’s Cognitive Taxonomy but emphasize low-order thinking levels and according to Cook, Kennedy, and McGuire (2013) Chemistry teachers utilized Bloom’s Cognitive Taxonomy in examination but biased to lower ordered thinking examinations in external and mark-based examinations whereas Castelli (2015) supported utilization of Bloom’s Taxonomy in Christian Religious Education with a recommendation that instructors should not limit the utilization on the lower level but utilize higher order too for maximum understanding of skills in examination.

Response from Business studies showed that 88% of Business studies teachers utilized Bloom's Cognitive Taxonomy to construct exams while 12% of teachers did not utilize it as shown in Table 10. This was similar to a study by Tyran (2010 as cited by Suud, Chaer,& Setiawan, 2020) who said utilization of Bloom's Cognitive Taxonomy is worthwhile for instructors in teaching, learning and assessing designs in spreadsheets. In Computer Studies 75% of respondents utilized Bloom's Cognitive Taxonomy to construct examinations while 25% of the respondents did not utilize Bloom's Cognitive Taxonomy to construct exams. This was similar to studies by Masapanta-Carrión, and Velázquez-Iturbide (2018) which says teachers utilized mostly Bloom's Cognitive Taxonomy in programming education and assessing student's performance. This showed that teachers utilized Bloom's Cognitive Taxonomy in constructing exams in Mathematics, English, and Chemistry, Christian Religious Education, Business studies and Computer studies since all of them scored above 75% in their responses. Thus, the study found out that majority of teachers (86%) in public secondary schools in Nandi County viewed Bloom's Cognitive Taxonomy as an important tool in exam construction.

Table 10

Teachers' Utilization of Bloom's Cognitive Taxonomy in Examination

Subjects	Yes		No		Total	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Mathematics	45	75	15	25	60	100
Chemistry	56	93	4	7	60	100
English	56	93	4	7	60	100
C. R. E.	56	93	4	7	60	100
Business studies	53	88	7	12	60	100
Computer studies	41	75	14	25	55	100
Total	307	86	48	14	355	100

4.4.2. Teachers' Utilization of Different Levels of Bloom's Cognitive Taxonomy in Examination

The following are responses to teachers' utilization of different levels of statements from Bloom's Cognitive Taxonomy in exam construction, as shown in Table 11. The aggregate score (BCTI = 4.5) indicates that all the teachers for all the subjects strongly agreed that they required students to remember what had been taught. It is only in Chemistry that teachers on average agreed (BCTI = 4.2), but in all the other subjects they strongly agreed since the Bloom's Cognitive Taxonomy Index (BCTI) was equal to or greater than 4.5.

However, generally all the teachers agreed (Bloom's Cognitive Taxonomy Index, BCTI = 4.4) that they expected students to understand information in their own words. In respect to specific subjects, Chemistry, English, and Business Studies teachers strongly agreed since Bloom's Cognitive Taxonomy Index was greater than 4.5 ($BCTI \geqq 4.5$) and Mathematics, Christian Religious Education, and Computer Studies agreed ($3.5 \leqq BCTI \leqq 4.4$) that learners should understand information in their own words. This result was similar to studies by Jideani & Jideani (2012), which say "the cognitive weight in the examination was larger for comprehending (1.781) and remembering (0.787) than conceptual (1.416) information."

The results in Table 11 show that, in general perspective, all teachers, regardless of their teaching subjects, strongly agreed that learners should apply knowledge to new situations (Bloom's Cognitive Taxonomy Index, BCTI = 4.5). However, Mathematics, Chemistry, and Computer Studies ($3.5 \leqq BCTI \leqq 4.4$) agreed that they required students to utilize the knowledge taught to apply it in new situations.

In addition, the results in Table 11 indicate that normally, all teachers' inferences to all teaching subjects agree that students should analyze knowledge into parts and show relationships ($3.5 \leqq BCTI \leqq 4.4$). However, in contrast, on aggregate, all the teachers are undecided as to whether students should base their evaluations on a given criteria or standard (Bloom's Cognitive Taxonomy Index, BCTI = 3.3) except in Business studies, where the teachers agreed with the claim (Bloom's Cognitive

Taxonomy Index, BCTI = 3.5). Also, the results in Table 11 show that, in overall all teachers were undecided (Bloom’s Cognitive Taxonomy Index, BCTI = 2.7) on whether students should be expected to create knowledge and create new relationships for new situations. However, specifically Christian Religious Education teachers disagree (Bloom’s Cognitive Taxonomy Index, BCTI = 2.4) with this expectation. Hence, the utilization of Bloom’s Cognitive Taxonomy was high or balanced since the results gave an overall Bloom’s Cognitive Taxonomy Index (BCTI) of 3.88.

Generally, all the teachers agreed (BCTI = 3.88) that they utilize statements from Bloom’s Cognitive Taxonomy in exam construction.

The findings of this study are consistent with those of other investigations. Professionals who train or instruct others, for example, can use Bloom's Cognitive Taxonomy to create teaching objectives that characterize the skills and abilities they want their students to master and display, according to Adams (2015a). Bloom's Cognitive Taxonomy distinguishes between cognitive skill levels and emphasizes educational objectives that necessitate higher levels of cognitive skills and, as a result, lead to deeper learning and transfer of knowledge and skills to a wider range of tasks and settings. Likewise, "Revised Bloom's Taxonomy provides an assessment framework that can be used to aid instructors in extending beyond factual knowledge and understanding to incorporate academic skills such as application, analysis, evaluation, and creation," according to Jideani & Jideani (2012).

Table 11

Teachers' utilization of different levels of Bloom's Cognitive Taxonomy in Examination

BLOOM'S COGNITIVE TAXONOMY INDEX, BCTI							
Levels of Bloom's Cognitive Taxonomy / Subjects	Remembering	Understanding	Applying	Analyzing	Evaluating	Creation	Average
Mathematics	4.6	4.4	4.4	4.1	3.2	2.5	**3.87**
Chemistry	4.2	4.5	4.4	3.7	3.2	2.6	**3.93**
English	4.6	5.0	4.5	4.1	3.2	2.5	**3.98**
C. R. E.	4.6	4.3	4.7	3.8	3.3	2.4	**3.85**
Business	4.5	4.5	4.6	3.6	3.5	2.9	**3.93**
Computer	4.5	4.1	4.2	3.8	3.1	2.8	**3.75**
Total BCTI	4.5	4.4	4.5	3.9	3.3	2.7	**3.88**
Percentage	**75**	**73**	**75**	**65**	**55**	**45**	**65**

4.4.3 Utilization of Verbs at Different Levels of Bloom's Cognitive Taxonomy in Exams

Further, teachers were asked to indicate how frequently they utilize verbs at different levels of Bloom's Cognitive Taxonomy in the examination, and the following were the results of their responses.

Generally, the results in Table 12 show that all teachers indicated that they often (Bloom's Cognitive Taxonomy Index, BCTI = 4.1) utilize terms focusing on remembering in the construction of exams. However, it is only the Christian Religious Education teachers who very often (Bloom's Cognitive Taxonomy Index, BCTI = 4.6) utilize terms categorized as depicting remembering in examination construction. It was noted that on the aggregate scale, all teachers very often (Bloom's Cognitive Taxonomy Index, BCTI = 4.5) utilize terms at the cognitive level of understanding in examination construction. For specific subjects, Mathematics, Chemistry, and Computer studies often utilize the terms ($3.5 \leqq \text{BCTI} \leqq 4.1$), and English, Christian Religious Education, and Business Studies teachers very often utilize the terms at the understanding stage of Bloom's Cognitive Taxonomy level. Also, all the teachers for all the subjects generally often (Bloom's Cognitive Taxonomy Index, BCTI = 3.8) utilize terms at the cognitive level of applying them in exam construction.

The overall index shows that all the teachers rarely utilize terms focusing on the analyzing, evaluating, and creating levels of Bloom's Cognitive Taxonomy in exam construction (Bloom's Cognitive Taxonomy Index, $2.9 \leqq \text{BCTI} \trianglerighteq 3.3$). It is only Christian Religious Education and Chemistry who often utilize terms at the analytical level of cognition in exam construction (Bloom's Cognitive Taxonomy Index;

3.5≦BCTI≧4.0) as shown in Table 12. However, in mathematics, teachers very rarely (Bloom’s Cognitive Taxonomy Index, BCTI = 2.4) utilize terms at the level of creating of Bloom’s Cognitive Taxonomy in exam construction.

The grand overall with a Bloom’s Cognitive Taxonomy Index (BCTI) of 3.63 indicates that the secondary school teachers’ oftenly utilized the verbs from the different levels of Bloom’s Cognitive Taxonomy in exam construction. Each level of Bloom’s Cognitive Taxonomy scored the following Bloom’s Cognitive Taxonomy Index (BCTI): remembering scored 4.1, understanding 4.5, applying 3.8, analysis 3.3, evaluation 3.2, and creation 2.9, as shown in Table 12. This was similar to recommendations made by Cullinane (2010 as cited by Rozien and Retnawati, 2019), which postulated that while designing class tests, teachers should utilize the Bloom’s Cognitive Taxonomy verbs as a lead and source to help the encouragement of critical thinking among their students.

Generally, exams using a marks-based system tended to encourage lower-order thinking, with lower-order thinking problems receiving a larger share of the marks (Fensham & Bellocchi, 2013). This shows that well-designed multiple-choice exams based on Bloom's taxonomy could be a feasible and successful alternative to essay exams for assessing a wide group of students' critical-thinking skills (Kim, Patel, Uchizono, and Beck, 2012, as cited in Zaidi, Grob, Monrad, Kurtz, Tai, Ahmed,... & Santen, 2018). According to Cullinane (2010 as referenced in Sarah, 2019), in order for the various tasks to have a favorable influence on students, they must use and utilize a combination of all of the levels.

Table 12

Utilization of Verbs at Different Levels of Bloom's Cognitive Taxonomy in Examination

BLOOM'S COGNITIVE TAXONOMY INDEX, BCTI							
Levels of Bloom's Cognitive Taxonomy / Subjects	Remembering	Understanding	Applying	Analyzing	Evaluating	Creation	Average
Mathematics	3.8	3.9	3.7	2.9	3.0	2.4	**3.28**
Chemistry	3.8	4.3	3.6	3.7	3.1	3.4	**3.65**
English	4.1	4.8	4.2	3.4	3.4	2.9	**3.80**
C. R. E.	4.6	4.6	3.6	3.6	3.2	3.2	**3.80**
Business	4.3	4.7	3.7	3.2	3.2	2.9	**3.67**
Computer	3.9	4.1	4.1	2.8	2.9	2.6	**3.40**
Total BCTI	**4.1**	**4.5**	**3.8**	**3.3**	**3.2**	**2.9**	**3.63**
Percentage	**68**	**75**	**63**	**55**	**53**	**48**	**61**

4.4.4. Utilization of Bloom's Cognitive Taxonomy in Examination papers

The researcher also collected two question papers from Mathematics, Business studies, Computer Studies, and Christian Religious Education and three question papers each in English and Chemistry so as to analyze the utilization of Bloom's Cognitive Taxonomy in examinations, and the results were recorded in a check list. The following results were obtained from the checklist:

The results showed that in all selected subjects, namely Mathematics, Chemistry, English, Christian Religious Education (C.R.E.), Business studies, and Computer studies exams, Bloom's Cognitive Taxonomy was utilized as shown by the frequencies and percentages of each level in Table 13. For instance, in the mathematics examination, the percentages were as follows: remembering 28%, comprehending 19%, applying 27%, analyzing 7%, evaluating 11%, and creating 8%. This shows that the bulk of the questions set were in the lower levels of Bloom's Cognitive Taxonomy that is remembering, understanding, and applying, and a few questions were in the higher order category that is analyzing, evaluating, and creating. According to a study by Darlington (2013), the preponderance of the mathematics examinations in schools are at the lower level of Bloom's Taxonomy compared to undergraduate mathematics examinations. According to other researcher show that utilization of the Mathematical Assessment Task Hierarchy taxonomy revealed A-level Mathematics and Further Mathematics questions hub on requiring students to demonstrate a routine use of procedures in the secondary-tertiary level, whereas those students in first-year undergraduate mathematics were primarily expected to be able to draw conclusions, justify their answers, and develop conjectures (Darlington, 2014).

However, in the chemistry examination, the percentages were as follows: remembering 28%, understanding 32%, applying 14%, analyzing 11 percent, evaluating terms were utilized in eight percent of the items, and creating six percent of the items. This showed that the best part of the questions set were in the lower levels of Bloom's Cognitive Taxonomy that is remembering, understanding and applying, and a few questions were in the higher order category that is analyzing, evaluating and creating. The findings of this study agreed with those of Upahi, Issa, and Oyelekan (2015), who found that lower-order cognitive skills (LOCS) and factual knowledge were required in roughly 80 percent and 44 percent of the questions, respectively. There was also no question in the high-order cognitive abilities evaluation category, and none of the questions required students to apply metacognitive knowledge, according to the findings. They came to the conclusion that the chemistry questions were not as cognitively demanding as they could have been, and they suggested that the exam reflect the dual perspective of Bloom's Cognitive Taxonomy of cognitive process skills and knowledge aspects in examination questions.

The analysis from the English examination showed that 30% of questions set were on remembering, 31% were on understanding, ten percent were on applying, 11% were on analyzing, eight percent were on evaluating, and nine percent of the questions set were on creating, as shown in Table 13 above. This implied that the bulk of the questions set were in the lower order of Bloom’s Cognitive Taxonomy that is remembering, understanding and applying, and a few questions were in the higher order category that is analyzing, evaluating and creating. This conclusion was in line with Kamlasi's research (2018). His findings revealed that the majority of the questions on the English exam were at the lower level of Blooms Taxonomy, with only a few at the higher level; for example, according to Kamlasi (2018), "the mass of the questions on the English exam were at the lower level of Blooms Taxonomy and very few were at the higher order of taxonomy." "Remembering taxonomy resulted in

22 items, or 44% of the total. Understanding Taxonomy presented two items, accounting for four percent of the total. The use of applying taxonomy resulted in the creation of 21 items, or 42 percent of the total. Taxonomy analysis yielded five elements, or 10% of the total. Because no item was found in both the evaluating and creating taxonomies, the developing stage of the taxonomy was not used to question the students in the English test. According to the conclusions of this study, when creating examination items, teachers should use Bloom's taxonomy."

Furthermore, in the Christian Religious Education (C.R.E.) examination, the responses were as follows: As shown in Table 13, 34% of the questions set were on remembering, 38% on understanding, five percent were on applying, ten percent were on analyzing, five percent were on evaluating, and eight percent of the questions set were on creating. This demonstrated that the bulk of the questions set were in the lower order of Bloom’s Cognitive Taxonomy that is remembering, understanding, and applying, and a few questions were in the higher order category that is analyzing, evaluating, and creating. The data revealed that secondary school teachers do not appropriately apply Bloom's cognitive levels in the construction of their assessment items, according to Gichuhi (2014). It also indicated that while creating assessment items, teachers do not make enough use of action verbs. The results were consistent across all types of schools. As a result, the findings suggest that teacher training and retraining in examination construction could aid in the improvement of teacher-made tests for effective learning assessment.

Furthermore, the Business Studies examination illustrated that 28% of the questions set were on remembering, 30% on understanding, 16 percent were on applying, ten percent were on analyzing, nine percent were on evaluating, and seven percent of the questions set were on creating, as shown in Table 13. This also proved that the majority of the questions set were in the lower order of Bloom’s Cognitive Taxonomy that is, remembering, understanding, and applying, and a few questions were in the higher order category, that is, analyzing, evaluating, and creating.

Moreover, in the computer studies examination, the percentages were as follows: remembering 29%, understanding 23%, applying 14%, analyzing nine percent, evaluating 11%, and creating 14%. This explains that the greater part of the questions set were in the lower levels of Bloom’s Cognitive Taxonomy that is remembering, understanding, and applying, and a few questions were in the higher order category that is analyzing, evaluating, and creating.

However, in conclusion, the overall percentages for utilization of Bloom’s Cognitive Taxonomy in the examination were as follows: remembering 29.4%, understanding 28.5%, applying 14.5%, analyzing nine points nine percent, evaluating eight points seven percent, and creating eight points eight percent. This shows that there was utilization of Bloom’s Cognitive Taxonomy in the examination, though the majority of the questions set were in the lower levels of Bloom’s Cognitive Taxonomy that is remembering, understanding, and applying, and a few questions were in the higher order category that is analyzing, evaluating, and creating.

The data demonstrated that secondary school teachers do not make proper use of Bloom's cognitive levels when generating exam items. It was also shown that when constructing examination items, teachers do not make enough use of action verbs.

This was similar to studies by Chandio, Pandhiani, and Iqbal (2016), who acknowledge the utilization of Bloom’s Cognitive Taxonomy in exams, but the only challenge is that questions are set mostly at a lower level of thinking, whereas higher order thinking is neglected. Assessment systems, according to Chandio et al. (2016), can help to improve the teaching-learning process at the school and college level. Bloom's Taxonomy has succinctly proposed six stages/domains of learning, beginning with the lower degrees of learning, such as remembering, understanding, and applying, and progressing to the higher domains of learning, such as analyzing, evaluating, and creating, which, when implemented, greatly improve both the teaching-learning process and assessment practices. The results of this study show that question papers, whether objective or subjective, have a disproportionate bias towards the lower domains, which promote cramming and memorizing, while the higher domains of learning, such as analysis, assessment, and creativity, receive less attention. Thus, the teaching-learning process in public sector schools and colleges in Sindh can be improved to a significant degree and level by transcending the examination/assessment pattern from the lower level domains of remembering, understanding, and applying to the higher level domains of analyzing, evaluating, and creating.

Table 13

Teachers' utilization of Bloom's Cognitive Taxonomy in Examination

Subjects / Levels of Bloom's Cognitive Taxonomy		Mathematics	Chemistry	English	C. R. E.	Business	Computer	Total
Remembering	F	100	90	107	110	87	103	597
	%	28	28	30	34	28	29	29.4
Understanding	F	67	105	112	120	95	80	579
	%	19	32	31	38	30	23	28.5
Applying	F	98	45	37	16	53	48	297
	%	27	14	10	5	16	14	14.6
Analyzing	F	25	39	40	35	30	33	202
	%	7	11	11	10	10	9	9.9
Evaluating	F	41	27	28	15	27	39	177
	%	11	8	8	5	9	11	8.7
Creating	F	29	21	33	24	22	50	179
	%	8	6	9	8	7	14	8.8
Total	F	360	327	357	320	314	353	2031
	%	100	100	100	100	100	100	100

However, at the conclusion of the second research objective, it was observed that the researcher's observation and the respondents' perspective indicated a great significant difference. This is because the results in Tables 11 and 12 shows that each level of Bloom's Cognitive Taxonomy scored a higher percentage compared to the results obtained in Table 13. For instance, in Table 11, remembering scored 75%, understanding 73%, applying 75%, analyzing 65%, evaluation 55%, and creation 45%, whereas the scores in Table 13 were as follows: remembering 29.4%, understanding 28.5%, applying 14.5%, analyzing 9.9%, evaluating 8.7%, and creating 8.8%. However, both results confirmed that there was utilization of Bloom's Cognitive Taxonomy in the examination.

These findings matched those of Folasayo, (2021), who discovered that while Nigerian instructors were professionally prepared, they did not employ Bloom's cognitive taxonomy of educational objectives in the development of the items used to evaluate students' academic achievement. When assessing the learners' learning outcomes, the majority of teachers simply looked at the remembering level of Bloom's cognitive taxonomy. In the creation of the test items, other levels were virtually ignored. This meant that instructors' assessments were insufficient in creating flawless learning results, and that teachers who failed to include Bloom's cognitive taxonomy into their students' evaluations lacked the necessary teaching perspectives. The types of activities and skills obtained by their students were reflected in the deficiencies in science teachers' usage of Bloom's cognitive taxonomy. Students excelled in remembering verbs from the taxonomy, but they struggled with the rest of Bloom's

Cognitive Taxonomy levels and verbs (Riazi, 2010, Rupani, 2011, Kolb, 2014, Irfan and Shelina, 2016, and Mwakamele, 2017 as stated in Folasayo, 2021).

4.5. The Relationship between Bloom's Cognitive Taxonomy in Teaching and Academic Performance.

The third objective examined the relationship between teachers' utilization of Bloom's Cognitive Taxonomy in teaching and academic performance in public secondary schools in Nandi County. To accomplish this goal, the researcher used form three end-of-year examinations, which were standardized before being analyzed. The Chi square was utilized to analyze the relationship between teachers' utilization of Bloom's Cognitive Taxonomy in teaching and academic performance in public secondary schools in Nandi County by testing the null hypothesis below. The hypothesis was rejected when the calculated value was greater than the critical value and accepted when the critical value was greater than the calculated value.

H_{O1}: There is no significant relationship between utilization of Bloom's Cognitive Taxonomy in teaching and students' academic performance in Public Secondary schools in Nandi County.

The respondents were asked to indicate whether they utilize Bloom's Cognitive Taxonomy in teaching, as shown in Appendix IV Section III, and the results in Table 6 were obtained. These results were further analyzed using Chi square and the results achieved were as follows: $\chi^2 = 25.57$, p = 0.008, N = 355 and degree of freedom (df) = 11 at a significant level of 0.05 and the contingency coefficient, C equals to 0.26. This shows that there was a significant relationship between teachers' utilization of

Bloom's Cognitive Taxonomy and academic performance. The association between teachers' utilization of Bloom's Cognitive Taxonomy in teaching and academic performance is significant but weak (C = 0.26). The utilization of Bloom's Cognitive Taxonomy in teaching contributes very little (about 6.8%) towards improvement in academic performance.

However, when the results in Table 14 were utilized to test the significance of teachers' utilization of Bloom's Cognitive Taxonomy in teaching and students' academic performance, the results were $\chi 2$ = 159.589, degree of freedom, df = 10, at a significance level of five percent. The table value of χ^2 for 10 degrees of freedom at the 0.05 level of significance is 18.307. The results show that the calculated value of χ^2 is much higher than the table value, and hence the result of the research does not support the hypothesis. Thus, the relationship between teachers' utilization of Bloom's Cognitive Taxonomy in teaching and students' academic performance is significant but weak (C = 0.31). The utilization of Bloom's Cognitive Taxonomy in teaching contributes very little (about 8.15%) towards the improvement of students' academic performance.

Table 14

Relationship between Bloom's Cognitive Taxonomy in Teaching and Academic performance

Levels of Bloom's Cognitive Taxonomy	Academic performance							
	Below average		Average		Above average		Total	
	F	%	F	%	F	%	F	%
Remembering	75	21	105	30	175	49	355	100
Understanding	51	14	115	32	189	53	355	100
Applying	55	15	123	35	177	50	355	100
Analyzing	132	37	99	28	124	35	355	100
Evaluating	52	15	168	47	135	38	355	100
Creating	70	20	188	53	97	27	355	100
Total	435	20	798	38	897	42	2130	

The overall results indicate that 20% of the students scored below average, 38% scored average, and 42% scored above average when teachers utilized Bloom's Cognitive Taxonomy in teaching. This shows that most of the students (80% scored average and above) perform well when Bloom's Cognitive Taxonomy was utilized in teaching. Furthermore, the results in Table 14 indicate that the association between teachers' utilization of Bloom's Cognitive Taxonomy in teaching and students' academic performance is significant (χ^2 = 159.598, degree of freedom = 10, at a significance level of 0.05) but weak since the contingency coefficient (C) equals to

0.31. Hence, teachers' utilization of Bloom's Cognitive Taxonomy in teaching contributes very little (about 8.15%) towards improvement in academic performance. These results were similar to those of a study by Morton and Colbert-Getz (2017) who argued that there was a small difference in academic performance at a higher ordered level but no difference at a low-order level when Bloom's Cognitive Taxonomy is used in teaching.

The findings of this study were also similar to those of Malik's (2019) article, which compared the current teaching and learning approach of an introductory programming (IP) course with Bloom's taxonomy's six categories, where the assurance of learning (AOL) process was incorporated in the Introductory Programming course to assess students' learning outcomes on the basis of achiever (high, medium, and low) and performance (very good, good enough, and not good enough) categories. The findings revealed that the IP course's existing teaching and learning approach handled all six Bloom's taxonomy areas. The majority of pupils (63%) are in the middle achiever category. Furthermore, half of all learners' learning results fall into the "not good enough" group.

4.6 The Relationship between Utilization of Bloom's Cognitive Taxonomy in Examinations and Academic Performance.

The fourth objective examined the relationship between teachers' utilization of Bloom's Cognitive Taxonomy in the construction of exams and students' academic performance in public secondary schools in Nandi County, Kenya. The Chi Square (χ^2) was utilized to compute the relationship between teachers' utilization of Bloom's

Cognitive Taxonomy in the construction of exams and students' academic performance in public secondary schools in Nandi County, Kenya by testing the null hypothesis below.

H_{O2}: There is no significant relationship between teachers' utilization of Bloom's Cognitive Taxonomy in the construction of exams and students' academic performance in public secondary schools in Nandi County.

The following were the results obtained from research:

The respondents were asked to indicate teachers' utilization of Bloom's Cognitive Taxonomy in the construction of exams, and the following results were obtained: χ^2 = 97.989, p = 0.001, N = 355 and degree of freedom equals to 11 at a significant level of 0.05, which means the null hypothesis is rejected. This shows that there exists a significant relationship between teachers' utilization of Bloom's Cognitive Taxonomy in the construction of exams and students' academic performance with a contingency coefficient (C) of 0.47. Hence, the association between teachers' utilization of Bloom's Cognitive Taxonomy in exam construction and students' academic performance is weak but significant. It accounts for very little (about 11.5%) of improved academic performance.

However, the results in Table 15 show the results of teachers' utilization of Bloom's Cognitive Taxonomy from question papers and students' academic performance.

The results in Table 15 show that, on aggregate, 47% of the students scored low, 26% scored average, and 27% scored high when teachers utilized Bloom's Cognitive

Taxonomy in examinations. This shows that most (above 53 percent scored average and above) of the students perform well when teachers utilize Bloom's Cognitive Taxonomy in examinations.

However, the results in Table 15 also show that the association between teachers' utilization of Bloom's Cognitive Taxonomy in the examination and students' academic achievement is significant (χ^2 = 495.61, degree of freedom = 10 at a significance level of 0.05) but weak since the contingency coefficient (C) equals to 0.76. Hence, the utilization of Bloom's Cognitive Taxonomy in examinations is small (about 18.36%) and contributes little towards improvement in students' academic performance. As a result, Bloom's Cognitive Taxonomy can be used as a checklist to ensure that all levels of a domain have been assessed and that assessment techniques are aligned with the correct courses and procedures. In this approach, the taxonomy assists teachers in maintaining consistency among assessment techniques, content, and instructional materials, as well as identifying weak areas (Anderson, Krathwohl, & Bloom, 2001, as cited in Zapalska et al., 2018).

Table 15

The Relationship betweenUtilization of Bloom's Cognitive Taxonomy in examination and academics performance

Students' Academic performance		Levels of Bloom's Cognitive Taxonomy						
		Remembering	Understanding	Analysing	Applying	Evaluating	Creating	Total
Low	F	75	51	178	231	220	258	1013
	P	21	14	50	65	62	73	47
Average	F	105	115	107	82	67	72	548
	P	30	33	30	23	19	20	26
High	F	175	189	70	42	68	25	569
	P	49	53	20	12	19	7	27
Total	F	355	355	355	355	355	355	2130
	P	100	100	100	100	100	100	100

Moreover, the results in Table 16 show that when teachers utilized a balanced level of Bloom's Cognitive Taxonomy in the construction of exams, 40% of students scored below average, 49% scored average, and 11% of students scored above average. This implies 60% of students scored average and above average in academic performance when teachers utilized a balanced Bloom's Cognitive Taxonomy in constructing exams, while 40% scored below average in academic performance. However, when teachers' utilization of Bloom's Cognitive Taxonomy was ambivalent, 49% of students scored below average, 40% scored average, and 11% scored above average in academic performance. This means that when teachers utilized Bloom’s Cognitive Taxonomy in constructing exams at an average in each stages of Bloom’s Cognitive Taxonomy, 51% of students scored average and above, while 49% of students scored below average. This was in contrast to the findings of Sivaraman and Krishna (2015), who believed that using Bloom's Taxonomy allowed teachers to create well-balanced examination papers that tested many cognitive skills without favoring either a difficult or easy paper perception.

The grand conclusion of objective four as shown in Table 16 shows that the association between teachers’ utilization of Bloom’s Cognitive Taxonomy in the examination and students’ academic performance is significant since $\chi^2 = 121.262$, critical value = 5.791, and degree of freedom, df = 2, N = 15358 at a significance level of 0.05, although weak (Contingency coefficient, C = 0.09). It accounts for very little (about 2.17%) towards improvement in students’ academic performance.

Table 16

Comparison of students' academic performance and teachers' utilization oof different levels of Bloom's Cognitive Taxonomy in examinations

Utilization of Bloom's Cognitive Taxonomy in exams	Students Academic performance							
	Below average		Average		Above average		Total	
	F	P	F	P	F	P	F	P
Balanced	4157	40	5159	49	1107	11	10423	100
Ambivalent	2411	49	1998	40	526	11	4935	100
Total	6568	43	7157	47	1633	10	15358	100

4.7 Teachers' Utilization of Bloom's Cognitive Taxonomy in Teaching selected Subjects

The fifth research objective was to determine the influence of the utilization of Bloom's Cognitive Taxonomy in teaching selected subjects in public secondary schools in Nandi County. The following subjects were selected for the study: Mathematics, Chemistry, English, Christian Religious Education, Business studies, and Computer studies. The results were as shown in Table 17.

The results in Table 17 show that 37% of respondents in Mathematics utilized Bloom's Cognitive Taxonomy in teaching, while 63% of respondents did not utilize Bloom's Cognitive Taxonomy in teaching. The respondents in Chemistry showed that 68% utilized Bloom's Cognitive Taxonomy in teaching, while 32% did not utilize it in teaching. The responses in English showed that 55 percent of respondents utilized Bloom’s Cognitive Taxonomy in teaching, while 45 percent did not utilize it in teaching. The response in Christian Religious Education showed that 80 percent of respondents utilized Bloom’s Cognitive Taxonomy in teaching, while 20 percent did not utilize it. The responses in the Business studies indicated that 50% of the respondents utilized Bloom’s Cognitive Taxonomy in teaching, while 50% of the respondents did not utilize Bloom’s Cognitive Taxonomy to teach in class. Finally, the responses in the Computer studies showed that 60% of the respondents utilized Bloom’s Cognitive Taxonomy in teaching, while 40% of the respondents did not utilize it in teaching. This also showed that in Christian Religious Education, teachers utilized Bloom’s Cognitive Taxonomy mostly in teaching, with an 80 percent teaching rate, followed by Chemistry teachers with 68 percent, Computer Studies with 60 percent, English teachers with 55 percent, Business studies teachers with 50 percent, and lastly, Mathematics teachers with 37 percent.

Table 17

Utilization of Bloom's Cognitive Taxonomy in Teaching the selected subjects

Subjects	Yes		No		Total	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Mathematics	22	37	38	63	60	100
Chemistry	41	68	19	32	60	100
English	33	55	27	20	60	100
C. R. E.	48	80	12	50	60	100
Business studies	30	50	30	40	60	100
Computer studies	33	60	22	26	55	100
Total	207	58	42	148	355	100

However, to check whether utilization of Bloom's Cognitive Taxonomy has a significant influence on teaching the selected subjects in public secondary schools in Nandi County, the study utilized a Chi-square test to determine the influence of the utilization of Bloom's Cognitive Taxonomy on teaching the selected subjects in public secondary schools in Nandi County by testing the null hypothesis below using the results in Table 17 above, where the hypothesis would be rejected when the calculated value is greater than the critical value and accepted when the critical value is greater than the calculated value.

HO_3: Teachers' utilization of Bloom's Cognitive Taxonomy has no significant influence on teaching selected subjects in public secondary schools in Nandi County.

The results of the analysis from Table 17 show that $\chi^2 = 27.693$, the critical value is 11.07 at $\alpha = 0.05$, and the degree of freedom is five while N = 355. The results showed that the null hypothesis was rejected. This was because the critical value was less than the calculated value as shown. Therefore, it showed that teachers' utilization of Bloom's Cognitive Taxonomy in different subjects and teaching is significant but weak since the contingency coefficient, C = 0.28. Although it cannot be ignored, it accounts for very little (about 7.3%) towards quality teaching in public secondary schools in Nandi County.

Further, the results in Table 9 were also analyzed using the Chi-square test and the following results were obtained: $\chi^2 = 173.936$ with a critical value of 37.652 at $\boldsymbol{\alpha} = 0.05$ and a degree of freedom, df = 25, while N = 1522. The results showed that the null hypothesis was rejected. This is because the critical value is far less than the calculated value as shown. Therefore, the relationship between teachers' utilization of Bloom's Cognitive Taxonomy in teaching subjects and teaching is significant but weak since the contingency coefficient, C = 0.32 in public secondary schools in Nandi County. The teachers' utilization of Bloom's cognitive taxonomy in teaching the selected subjects contributes very little (about 8.35%) towards quality teaching.

In addition, the findings show that both the participants' and observer's responses agree that there exists a significant relationship between the teachers' utilization of Bloom's Cognitive Taxonomy and among the different selected subjects in teaching in public secondary schools in Nandi County, although the contribution is weak since it contributes about 7.3% and 8.35% towards quality teaching, respectively.

4.8 The Influence of Teachers’ Utilization of Bloom’s Cognitive Taxonomy in the Construction of Examinations

The sixth research objective was to determine the influence of the teachers’ utilization of Bloom’s Cognitive Taxonomy on the construction of internal examinations in selected subjects in public secondary schools in Nandi County. The results were as shown in Table 18.

The results are shown in Table 18, which shows that all the subjects under study utilized Bloom’s Cognitive Taxonomy in the construction of internal exams. In terms of ranking per subject, Chemistry, English, and Christian Religious Education had the highest percentage of 93% in utilization of Bloom’s Cognitive Taxonomy in setting exams, followed by Business Studies (88%), Mathematics (75%), and lastly, Computer Studies with 74%.

Table 18

Utilization of Bloom's Cognitive Taxonomy in the construction of Exams

Subjects	Yes		No		Total	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Mathematics	45	75	15	25	59	100
Chemistry	56	93	4	7	60	100
English	56	93	4	7	60	100
C. R. E.	56	93	4	7	60	100
Business studies	53	88	7	12	60	100
Computer studies	41	75	14	25	55	100
Total	307	86	48	14	355	100

However, to verify whether teachers' utilization of Bloom's Cognitive Taxonomy has an influence on teaching subjects in the construction of exams in public secondary schools in Nandi County, the researcher utilized the Chi-square test to determine the difference in the utilization of Bloom's Cognitive Taxonomy in selected teaching subjects and the construction of examinations in public secondary schools in Nandi County by testing the null hypothesis below, where the hypothesis would be rejected when the calculated value is greater than the critical value and accepted when the critical value is greater than the calculated value.

HO_4: Teachers' utilization of Bloom's Cognitive Taxonomy has no significant influence on the setting of internal exams in public secondary schools in Nandi County.

The results from Table 18 show that Chi-square, $\chi^2 = 20.89$, the critical value is 11.07 at $\boldsymbol{\alpha} = 0.05$ and the degree of freedom is five. This means that the null hypothesis is rejected because the critical value is less than the calculated value as shown. Therefore, it proved that teachers' utilization of Bloom's Cognitive Taxonomy has a significant influence on teaching subjects in the construction of internal exams in public secondary schools in Nandi County. Although significant, the association between teachers' utilization of Bloom's cognitive taxonomy among subjects and the construction of exams is weak (Contingency coefficient, $C = 0.24$). It contributed approximately 6.26 percent to the quality of exam construction. These findings concur with Chelang'at (2014), who recommended that History and Government teachers should equilibrium the construction of questions by developing questions that score transversely the six stages of Bloom's Taxonomy along the cognitive domain and Sivaraman and Krishna (2015), who also belief that the use of the Bloom's Taxonomy system has facilitated the tutors to instruct and develop examination papers that are well balanced, testing the different cognitive skills without a bias towards a hard or simple paper perception.

4.9 The Relationship between Mode of Exam Construction and Teachers' Utilization of Bloom's Cognitive Taxonomy.

The seventh objective sought to determine the relationship between the mode of exam construction and the teachers' utilization of Bloom's Cognitive Taxonomy in public secondary schools in Nandi County. The findings were as follows:

The results in Table 19 showed that most (95.5%) teachers prepared their exams within the school, as shown by their responses. For example, in Chemistry, English, Christian Religious Education, and Business Studies, teachers prepared fully for their exams within school since they had 100%, while in Computer Studies, 93% of teachers prepared their exams in school while seven percent did not prepare in school, whereas in Mathematics, 80% of teachers prepared exams in school while 20% of them did not prepare exams in school. Moreover, the results from Table 19 show that there exists a significance between different subjects and preparing for exams in school since the Chi-square test of the results from Table 19 indicated: $\chi^2 = 35.0$ with a critical value of 12.592 at a significance level of 0.05, degree of freedom is 6, and N = 353 with a contingency coefficient of 0.015. This means the association between the teachers' preparation for exams and the various teaching subjects is very small because the contingency coefficient, C, is very small (0.015).

Table 19

Percentage and Frequencies of Preparing exams per Subject at school level

Subjects	Yes		No		Total	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Mathematics	48	80	12	0	60	100
Chemistry	60	100	0	0	60	100
English	60	100	0	0	60	100
C. R. E.	60	100	0	0	60	100
Business studies	60	100	0	0	60	100
Computer studies	51	93	4	7	55	100
Total	339	95.5	16	4.5	353	100

Furthermore, Table 20 shows that in Mathematics 56% of teachers prepared their exams individually whereas 32% prepared their exams in a group of teachers and 14% of teachers indicated that heads of department prepared exams and no exams are prepared externally. Responses in Chemistry showed that 83% of individual teachers prepared their examination while 17% of the examinations were prepared by a group of teachers together. Heads of department did not prepare examinations or exams being prepared externally in Chemistry. It was also observed that 28% of English teachers prepared individually their examinations whereas 72% of English teachers prepared their examinations in a group of teachers. The heads of department does not prepare English exams or exams being prepared externally in English. Teachers indicated that in Christian Religious Education 63% of exams were prepared by individual teachers and 37% were prepared by a group of teachers whereas heads of department does not prepare any exams and no exams were prepared externally.

Furthermore, Table 20 indicates that in Business Studies, 33% of respondents indicated that exams were prepared by individual teachers and 67% of respondents showed that exams were prepared by a group of teachers, while no heads of department prepared exams, nor were exams prepared by external examiners or externally set. However, in Computer studies, 26% of respondents indicated that individual teachers prepared their examinations and 67% indicated that their examinations were prepared by a group of teachers, while six percent and zero point three percent indicated that exams were prepared by heads of department and externally, respectively.

In conclusion, Table 20 shows that the majority of examinations were prepared by individual teachers with 49%, followed by those prepared by a group of teachers with 48%, and very few exams were prepared by heads of department with 11%, and externally prepared with zero point three percent. The results in Table 20 also show that the mode of preparing exams and subjects had a significant influence since the Chi square tests showed that $\chi^2 = 120.06$ with a critical value of 28.869 at $\alpha = 0.05$, N = 355 and degree of freedom = 18, but weak since the contingency coefficient is equal to 0.25.

Table 20

Mode of preparing end of term examination in school

Mode	Mathematics	Chemistry	English	C.R.E	Business	Computer	Total
Individual subject teachers prepare examinations for their class.	33 56 %	50 83 %	17 28 %	38 63%	20 33%	14 26%	172 49%
A group of teachers prepare the examination together.	19 32%	10 17 %	43 72%	22 37%	40 67%	37 67%	171 48
The heads of departments prepare the examination	8 13%	0 0%	0 0%	0 0%	0 0%	3 6%	11 3%
Utilize already externally developed examinations e.g. from excelling schools	0 0%	0 0%	0 0%	0 0%	0 0%	1 2%	01 0.3 %
Total	60	60	60	60	60	55	355

The results in Table 21 show that during the setting of exams, 42.3% of individual teachers utilized Bloom's Cognitive Taxonomy in setting internal exams for their learners, whereas six point two percent of individual teachers did not utilize Bloom's Cognitive Taxonomy in setting exams for their learners. It also showed that 41.1% of a group of teachers utilized Bloom's Cognitive Taxonomy to prepare exams for their learners, whereas seven percent did not utilize it. Further, Table 21 shows that three point one percent of heads of departments utilized Bloom's Cognitive Taxonomy to prepare exams for their learners, and no external exams were utilized in public secondary schools in Nandi County, Kenya.

Table 21

Utilization of Bloom's Cognitive Taxonomy in different modes of setting exams

Mode of test setting	Utilize of Bloom's Cognitive Taxonomy in setting exams			
	Yes		No	
	Frequency	%	Frequency	%
Individual subject teachers prepare tests for their class	150	42.3	22	6.2
A group of teachers prepare the examination together	146	41.1	25	7
The heads of departments prepare the examination	11	3.1	0	0
Utilize already externally developed examinations e.g. from excelling schools	0	0	1	0.3
Total	307	86.5	48	13.5

However, to check whether utilization of Bloom's Cognitive Taxonomy has a significant influence on the mode of exam construction in public secondary schools in

Nandi County, the study utilized a Chi-square test to the null hypothesis below, where the hypothesis would be rejected when the calculated value is greater than the critical value and accepted when the critical value is greater than the calculated value.

HO_5: The teachers' utilization of Bloom's Cognitive Taxonomy does not significantly differ among the modes of exams construction in setting of exams in Public Secondary schools in Nandi County.

The results of the Chi-square test from the results in Table 21 shows that $\chi^2 = 8.371$, critical value was 7.815 at $\alpha = 0.05$ when the degree of freedom is three and N= 355 with a contingency coefficient of 0.15 was achieved. The results showed that the null hypothesis was rejected because the critical value is less than the calculated value as shown. Therefore, it proved that the utilization of Bloom's Cognitive Taxonomy has a significant influence on the mode of exams construction in Public Secondary schools in Nandi County, Kenya. In conclusion, the significant association between teachers's utilization of Bloom's Cognitive Taxonomy and mode of exams construction in Public Secondary schools in Nandi County is weak; and can account for very little (about 2.3 %) of variation in exam construction. This statement was supported by the findings by Linn and Gronlund (1995) as cited by Kinyua and Okunya (2014) who recommended that it is important to plan a test using the table of specification such as Bloom's taxonomy in order to ensure proper sampling of items to meet conditions of validity and reliability. Also Fives and DiDonato-Barnes (2013) supports the utilization of table of specification such as Bloom's taxonomy in exam construction as a way of improving quality of examination. Thus, Kinyua and Okunya (2014) recommended that teachers should be refreshed regularly with in-service training in testing to ensure good practice with regard to the construction of teacher-made exams.

4.10 The Gender Influence on Teachers' Utilization of Bloom's Cognitive Taxonomy in Teaching and Examination.

The eighth objective sought to examine gender influence on teachers' utilization of Bloom's Cognitive Taxonomy in teaching and exam construction in public secondary schools in Nandi County. The following were the findings:

The results in Table 22 showed that 57.3% of teachers were male and 41.7% were female, which means all genders were considered. The percentages for the specific subjects, as shown in Table 22, showed that 53.3% of teachers were male and 46.7% were female in Mathematics; 70% of teachers were male and 30% were female in Chemistry; in Christian Religious Education and English there was a balance in gender since both scored 50%, that is, both male and female had 50%; in Business studies, 60% of teachers were male and 40% were female; while in Computer studies, 67.3% of teachers were male and 32.7% were female.

Table 22

Gender response per subject

Teaching subjects		Gender		Total
		Male	Female	
Mathematics	Frequency F	32	28	60
	Percentage %	53.3%	46.7%	100.0%
Chemistry	Frequency F	42	18	60
	Percentage %	70.0%	30.0%	100.0%
English	Frequency F	30	30	60
	Percentage	50.0%	50.0%	100.0%
Christian Religious Education	Frequency	30	30	60
	Percentage	50.0%	50.0%	100.0%
Business Studies	Frequency	36	24	60
	Percentage	60.0%	40.0%	100.0%
Computer Studies	Frequency	37	18	55
	Percentage	67.3%	32.7%	100.0%
Total	Frequency	207	148	355
	Percentage	58.3%	41.7%	100.0%

However, to measure the gender influence on teachers' utilization of Bloom's Cognitive Taxonomy in teaching and exam construction in public secondary schools in Nandi County, the researcher utilized a Chi-square test to test the null hypothesis below, where the hypothesis was rejected when the calculated value was greater than the critical value and accepted when the critical value was greater than the calculated value.

HO_6: Teachers' gender has no significant influence on teachers' utilization of Bloom's Cognitive Taxonomy in teaching and exam construction in public secondary schools in Nandi County.

The results in Table 23 showed that 55.6% of males and 62.2% of females utilized Bloom's Cognitive Taxonomy in teaching, while 44.4% of males and 37.% of females did not utilize it. Overall percentages showed that 58.3% of both male and female teachers utilized Bloom's Cognitive Taxonomy in teaching while 41.7% didn't utilize it. Moreover, from Table 23, the Chi square value was χ^2 (1, N =355) = 1.549 and the critical value was 3.841. This means there was no significant gender influence on teachers' utilization of Bloom's Cognitive Taxonomy in teaching.

Table 23

Gender influence on teachers' utilization of Bloom's Cognitive Taxonomy in Teaching

			Yes	No	Total
Gender	Male	Count	115	92	207
		% within Gender	55.6%	44.4%	100.0%
	Female	Count	92	56	148
		% within Gender	62.2%	37.8%	100.0%
Total		Count	207	148	355
		% within Gender	58.3%	41.7%	100.0%

Further, results in Table 24 showed that 87% of male teachers and 85.8% of female teachers utilized Bloom's Cognitive Taxonomy in exam construction, whereas 13% of male and 14.2 percent of female teachers didn't utilize Bloom's Cognitive Taxonomy in exam construction. The overall percentages showed that 86.5 percent of both male and female teachers utilized Bloom's Cognitive Taxonomy to construct exams. Furthermore, from Table 24, the Chi square test shows that χ^2 (1, N = 355) = 0.097 and a critical value of 3.841 was obtained, which means there was no significant gender influence on teachers' utilization of Bloom's Cognitive Taxonomy in exam construction with a contingency coefficient of 0.02.

Table 24

Gender Influence on Teachers' Utlization of Bloom's Cognitive Taxonomy in Exams Construction

			Yes	No	Total
Gender	Male	Count	180	27	207
		% within Gender	87.0%	13.0%	100.0%
	Female	Count	127	21	148
		% within Gender	85.8%	14.2%	100.0%
Total		Count	307	48	355
		% within Gender	86.5%	13.5%	100.0%

However, the summary of objective eight showed that the null hypothesis was accepted and, therefore, teachers' gender has no significant influence on teachers' utilization of Bloom's Cognitive Taxonomy in teaching and examination in public secondary schools in Nandi County, Kenya. This result was in agreement with studies by Hogsett (1993) and Tidswell and Franzmann (2010), as cited in Wijaya Mulya and Aditomo (2019), who argued that the implementation of Bloom's Taxonomy did not miss critics from educational, philosophical, and psychological perspectives. It further said that none of the critics used the gender category as an assessment of the implementation of Bloom's Taxonomy in making their critique, and if there was sex-bias in Bloom's taxonomy, the harm that it could have done in the educational process for girls and women could have been measured by the extent of the immense influence it wields. Rahida Aini (2019) also discovered that there is no substantial gender difference amongst teachers in teacher delivery efficacy.

4.11 Influence of Teachers' Professional Qualification on Utilization of Bloom's Taxonomy

The nineth objective was to examine professional qualification influences on teachers' utilization of Bloom's Cognitive Taxonomy in teaching and exam construction in public secondary schools in Nandi County. To find an answer to this objective, the researcher asked the respondents to state their highest professional qualification in the questionnaire as indicated in Appendix IV. The analyses of the feedback are as shown below.

Table 25

Teachers' Professional qualification

Teaching subjects		Highest level of professional training			Total
		Diploma	Degree (Bachelor or Postgraduate)	Masters degree	
Mathematics	Count	8	42	10	60
	%	13.3%	70.0%	16.7%	100.0%
Chemistry	Count	0	60	0	60
	%	0.0%	100.0%	0.0%	100.0%
English	Count	0	52	8	60
	%	0.0%	86.7%	13.3%	100.0%
Christian Religious Education	Count	0	53	7	60
	%	0.0%	88.3%	11.7%	100.0%
Business Studies	Count	7	50	3	60
	%	11.7%	83.3%	5.0%	100.0%
Computer Studies	Count	11	43	1	55
	%	20.0%	78.2%	1.8%	100.0%
Total	Count	26	300	29	355
	%	7.3%	84.5%	8.2%	100.0%

The results in Table 25 show that 7.3% of respondents had a diploma, 84.5% had a bachelor's degree or postgraduate diploma, and 8.2% had a master's degree as their highest professional qualifications. This shows that all the respondents were qualified to be teachers. However, Table 25 also showed that the professional qualifications for each subject varied. For example, in Computer studies, 20% of respondents had a diploma, 78.2% had a bachelor's degree, and 1.8% had a master's degree, whereas in Business studies, 11.7% had a diploma, 83.3% had a bachelor's degree, and 5% had a master's degree as their highest professional qualification. The highest professional qualifications for Christian Religious Education were 88.3% had a Bachelor's degree and 11.7% had a Master's degree, while in English, 86.7% had a Bachelor's degree and 13.3% had a Master's degree. Moreover, in Chemistry, all teachers had Bachelor's degrees, while in Mathematics, 13.3% had a diploma, 70% had a bachelor's degree, and 16.7% had a master's degree. This showed that all respondents in each subject had a professional qualification to teach and set questions for learners within their subjects.

However, to determine whether the teachers' professional qualifications have an influence on teachers' utilization of Bloom's Cognitive Taxonomy in teaching and exam construction in public secondary schools in Nandi County, the researcher utilized the Chi-square test to test the following null hypothesis:

HO_7: Teachers' professional qualification has no significant influence on teachers' utilization of Bloom's Cognitive Taxonomy in teaching and exam construction in public secondary schools in Nandi County.

The results in Table 26 revealed that 50% of diploma-holding teachers utilized Bloom's Cognitive Taxonomy in teaching and the other 50% didn't utilize it, while 59.7% of Bachelor holders' teachers utilized Bloom's Cognitive Taxonomy in teaching and 40.3% did not utilize it. Masters' holder teachers showed that 51.7 % utilized Bloom's Cognitive Taxonomy in teaching and 48.3% didn't utilize it. The overall percentage was 58.3% of teachers utilized Bloom's Cognitive Taxonomy in teaching and 41.7% did not utilize it. The Chi Square results were χ^2 = 1.483, degree of freedom equal to 2, N = 355 and the corresponding critical value is 5.991 at α = 0.05 with a contingency coefficient of 0.06. This showed that teachers' professional qualifications have no significant influence on teachers' utilization of Bloom's Cognitive Taxonomy in teaching in public secondary schools in Nandi County.

Table 26

Teachers' utilization of Bloom's Cognitive Taxonomy and Professional qualification in Teaching

Highest level of professional training		Yes	No	Total
Diploma	Count	13	13	26
	%	50.0%	50.0%	100.0%
Degree (Bachelor or Postgraduate)	Count	179	121	300
	%	59.7%	40.3%	100.0%
Masters degree	Count	15	14	29
	%	51.7%	48.3%	100.0%
Total	Count	207	148	355
	%	58.3%	41.7%	100.0%

The second part of the null hypothesis was that the teachers' professional qualifications have no significant influence on teachers' utilization of Bloom's Cognitive Taxonomy in exam construction in public secondary schools in Nandi County and the results were as shown below.

Table 27 showed that 61.5 percent of diploma holders utilized Bloom's Cognitive Taxonomy in examination construction and 38.5 percent did not utilize it, while 87.3 percent of Bachelor's holders utilized Bloom's Cognitive Taxonomy in examination construction and 12.7 percent did not utilize it. However, all Masters' degree holders utilized Bloom's Cognitive Taxonomy in examination construction in public secondary schools in Nandi County, whereas the overall respondents indicated 86.5 percent utilized Bloom's Cognitive Taxonomy in examination construction while 13.5 % did not utilize it. The Chi square results were $\chi^2 = 18.553$; the degree of freedom was two with $N = 355$ and the corresponding critical value was 5.991 at $\alpha = 0.05$ with a contingency coefficient, C of 0.22. This implies that the association between teachers' professional training and the utilization of Bloom's Cognitive Taxonomy in exam construction is significant but weak. Accounting for approximately 4.8 percent of high-quality exam construction. This research is comparable to that of Stidyggins (1994), as mentioned by Kinyua and Okunya (2014), who stated that the teacher's degree of education has a significant impact on the reliability and validity of exams that are constructed by teachers. This effect of training on test quality expands to other parts of testing, as stated by Marso and Pigge (1988) in Kinyua and Okunya (2014), who argued that a lack of training causes a lack of preparation for effective tests.

Table 27

Teachers' utilization of Bloom's cognitive taxonomy and professional training in Exams

Highest level of professional training		Yes	No	Total
Diploma	Count	16	10	26
	%	61.5%	38.5%	100.0%
Degree (Bachelor or Postgraduate)	Count	262	38	300
	%	87.3%	12.7%	100.0%
Masters degree	Count	29	0	29
	%	100.0%	0.0%	100.0%
Total	Count	307	48	355
	%	86.5%	13.5%	100.0%

However, in conclusion, teachers' professional qualification has a significant influence on teachers' utilization of Bloom's Cognitive Taxonomy in exam construction in public secondary schools in Nandi County, while teachers' professional qualification has no significant influence on teachers' utilization of Bloom's Cognitive Taxonomy in teaching in public secondary schools in Nandi County, Kenya.

4.12 Summary of the Chapter

Overall, the responses in Table 6 and Table 10 showed that 58% and 86% of teachers utilize Bloom's Cognitive Taxonomy in teaching and to construct exams for their students, respectively, whereas 42% and 14 percent didn't utilize it. The results in Table 7 showed that secondary school teachers generally agreed (BCTI = 3.5) that they utilized Bloom's Cognitive Taxonomy in teaching. Also, the results in Table 8 showed that teachers often (BCTI = 3.6) utilized Bloom's Cognitive Taxonomy. The results of teachers' utilization of Bloom's Cognitive Taxonomy in teaching from lesson observation were: remembering 30 percent, understanding 29 percent, applying 16 percent, analyzing 10 percent, evaluating scored eight percent, and creating scored six percent, as shown in Table 9. The results obtained from the researcher's observation, as shown in Table 9, and the results obtained from the participants' perspective, as shown in Tables 7 and 8, showed that teachers utilized Bloom's Cognitive Taxonomy in teaching, although the levels of percentages differed greatly. For example, in each of Bloom's Cognitive Taxonomy participants' responses, remembering scored 79 percent, understanding scored 85 percent, applying scored 50 percent, analyzing scored 35 percent, and creation scored 27 percent, which was far higher than the researcher's observation, where remembering scored 30 percent, understanding scored 29 percent, applying scored 16 percent, analyzing scored 10 percent, evaluation scored 8 percent, and creation scored six percent.

Moreover, the results from Table 11 showed that all the teachers agreed (Bloom's Cognitive Taxonomy Index, BCTI = 3.88) that they utilized Bloom's Cognitive Taxonomy in exam construction at different levels of the taxonomy. The findings in

Table 12 showed that secondary school teachers in Nandi County often utilized verbs from Bloom's Cognitive Taxonomy in exam construction, with a grand overall Bloom's Cognitive Taxonomy Index (BCTI) of 3.6. In addition, the analysis of examination papers in all the six subjects under study, as shown in Table 13, illustrated that teachers utilized Bloom's Cognitive Taxonomy in examinations as follows: remembering 29.4 percent, understanding 28.5 percent, applying 14.5 percent, analyzing 9.9 percent, evaluating scored 8.7 percent, and creating scored 8.8 percent. It was also observed that the researcher's observation (Table 13) and the respondents' perspective (Table 11 & Table 12) demonstrated a significant difference, because both results indicated a great difference in percentages, but both confirmed that there was utilization of Bloom's Cognitive Taxonomy in exam construction.

Moreover, the association between teachers' utilization of Bloom's Cognitive Taxonomy in teaching and students' academic performance in public secondary schools in Nandi County, Kenya was significant but weak. The utilization of Bloom's Cognitive Taxonomy in teaching contributed 6.8 percent towards improvement in academic performance. Furthermore, the results showed that there was a significant relationship between the utilization of Bloom's Cognitive Taxonomy in the construction of examinations and students' academic performance in public secondary schools in Nandi County, Kenya. It was also established that the utilization of Bloom's Cognitive Taxonomy differed significantly according to the mode of examination construction in public secondary schools in Nandi County, Kenya. Further, the teachers' gender had no significant influence on the teachers' utilization of Bloom's Cognitive Taxonomy in teaching and examination construction in public secondary schools in Nandi County, Kenya. However, teachers' professional qualification had a significant influence on teachers' utilization of Bloom's Cognitive Taxonomy in exam construction in public secondary schools in Nandi County, Kenya, while teachers' professional qualification had no significant influence on teachers' utilization of Bloom's Cognitive Taxonomy in teaching in public secondary schools in Nandi County, Kenya.

5.0 CHAPTER FIVE

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

5.1 Preamble of the Chapter

This chapter focuses on a summary of the research findings, conclusions, and recommendations based on the research findings, as well as proposals for future research. The goal of this study was to gain a better understanding of the relationship between instructors' use of Bloom's Cognitive Taxonomy in teaching and exams and students' academic performance in public secondary schools in Nandi County, Kenya. This chapter includes a review of the major findings as they relate to the nine particular objectives, as well as a conclusion, recommendations, and proposals for further research based on the findings.

5.2.0 Summary of the Findings

The discussion in this section focuses on the relationship between Bloom's Cognitive Taxonomy in teaching and examinations and students' academic performance in public secondary schools in Nandi County, guided by the following nine objectives:

i. Teachers' utilization of Bloom's Cognitive Taxonomy in teaching in public secondary schools in Nandi County,

ii. Teachers' utilization of Bloom's Cognitive Taxonomy in the construction of examinations in public secondary schools in Nandi County,

iii. The relationship between the utilization of Bloom's Cognitive Taxonomy in teaching and students' academic performance in public secondary schools in Nandi County,

iv. The relationship between the utilization of Bloom's Cognitive Taxonomy in the construction of exams and academic performance,

v. The influence of teachers' utilization of Bloom's Cognitive Taxonomy on selected teaching subjects in teaching in public secondary schools in Nandi County,

vi. The influence of teachers' utilization of Bloom's Cognitive Taxonomy on selected teaching subjects in the construction of examinations in public secondary schools in Nandi County,

vii. The influence of the utilization of Bloom's Cognitive Taxonomy on the mode of exam construction in public secondary schools in Nandi County,

viii. The influence of teachers' gender on teachers' utilization of Bloom's Cognitive Taxonomy in teaching and examination in public secondary schools in Nandi County and

ix. The influence of teachers' professional qualifications on teachers' utilization of Bloom's Cognitive Taxonomy in teaching and examination in public secondary schools in Nandi County.

The study deliberated at the general utilization of the Bloom's Cognitive Taxonomy by teachers as well as an analysis of the utilization per each level in the taxonomy. The summary of the results were from the research objectives and the hypotheses findings as presented below.

5.2.1 Teachers' Utilization of Bloom's Cognitive Taxonomy in Teaching

Concerning the first objective, the study found out that the majority of the teachers (58%) utilized Bloom's Cognitive Taxonomy in teaching in the various subjects selected understudy. In specific subjects, Christian Religious Education used the most Bloom's Cognitive Taxonomy in teaching, with 80 percent, followed by Chemistry (68%), Computer Studies (60%), English (55%), Business Studies (50%), and Mathematics, which was the least to utilize Bloom's Cognitive Taxonomy in teaching, with 37 percent.

However, in terms of utilization of different levels of Bloom's Cognitive Taxonomy in teaching, public secondary school teachers concentrated mainly on the lower levels of Bloom's Cognitive Taxonomy during teaching for all the six subjects under study since they scored high in terms of rating. For example, remembering scored the highest (77%), followed by understanding with 70 percent and applying 63 percent, while the higher level was not utilized mostly because they scored low in rating, as follows: analyzing scored 52 percent, evaluating 47 percent and creating scoring the least with 45 percent. These results translated to an overall percentage of 60%, which demonstrated that the secondary school teachers generally utilized the different levels of Bloom's Cognitive Taxonomy in teaching Mathematics, Chemistry, English, Christian Religious Education, Business studies, and Computer studies.

Moreover, the finding also indicated that on the aggregate scale, the secondary school teachers utilized verbs from different levels of Bloom's Cognitive Taxonomy in their teaching, with the majority again focusing on the lower level of the taxonomy. For instance, remembering scored the highest with 70%, followed by understanding and applying with 72% and 57% respectively in teaching than the higher level of Bloom's Cognitive Taxonomy, which scored low responses in teaching. For example, analyzing scored 48%, evaluating scored 57%, and creating scored 52%, which implied that they rarely utilized analysis, evaluation, and creation in teaching. On aggregate, the results showed that 60% of teachers utilized Bloom's Cognitive Taxonomy in teaching Mathematics, English, Christian Religious Education, Chemistry, Business studies, and Computer studies.

Furthermore, the results showed that in all subjects understudy, Bloom's Cognitive Taxonomy was utilized in teaching during lesson observation with each level scoring: remembering 30 percent, understanding 29 percent, applying 16 percent, analyzing 10 percent, evaluation scoring 8 percent, and creating scored six percent. The results for specific subjects showed that the majority of the teaching was at the lower levels of Bloom's Cognitive Taxonomy that is remembering, understanding, and applying, and a small amount of teaching was at the higher order, that is analyzing, evaluating, and creating. For example, in Mathematics' lesson observation, remembering scored 29 percent, understanding scored 17 percent, applying scored 24 percent, analyzing scored nine percent, evaluating scored 12 percent, and creating scored eight percent. In Chemistry lessons, remembering scored 30 percent, understanding scored 32 percent, applying scored 14 percent, analyzing scored 12 percent, evaluating scored eight percent, and creating scored six percent.

To wrap up objective one, the results obtained from the researcher's observation and the participants' perspective demonstrated that teachers utilized Bloom's Cognitive Taxonomy in teaching, although the level of utilization differed greatly. For example, participants' scores in each level of Bloom's Cognitive Taxonomy illustrated that remembering scored 77 percent, understanding scored 70 percent, applying scored 63 percent, analyzing scored 52 percent, evaluation scored 47 percent, and creation scored 45 percent, which was higher than the researcher's observation, where remembering scored 30 percent, understanding scored 29 percent, applying scored 16 percent, analyzing scored 10 percent, evaluation scored eight percent, and creation scored six percent.

5.2.2 Teachers' Utilization of Bloom's Cognitive Taxonomy in Examinations

Pertaining to the second research objective, which was to determine teachers' utilization of Bloom's Cognitive Taxonomy in examinations in public secondary schools in Nandi County, generally the majority of teachers in public secondary schools in Nandi County viewed Bloom's Cognitive Taxonomy as an important tool in exam setting since the analysis of the responses scored 86 percent. The results also showed that English teachers, Christian Religious Education teachers, and Chemistry teachers utilized most (93%) Bloom's Cognitive Taxonomy when constructing examinations, followed by Business Studies teachers (88%), then Mathematics teachers and Computer Science teachers with 75 percent each.

Generally, on the teachers' utilization of different levels of Bloom's Cognitive Taxonomy, all the teachers utilized statements of Bloom's Cognitive Taxonomy in the setting of exams with a 65 percent for the entire subjects understudy. The research findings further showed that teachers utilized statements of Bloom's Cognitive Taxonomy in the construction of examinations, focusing majorly on the remembering and application levels with a score of 75% each, followed by the understanding level with a score of 73%, the analyzing level scored 58%, the evaluation level scored 55%, and lastly the creating level with a score of 45%, which implied that the majority of examinations were on the lower level of Bloom's Cognitive Taxonomy.

Further on teachers' utilization of verbs of different levels of Bloom's Cognitive Taxonomy in examinations, the researcher established that, on the aggregate, 61 percent of public secondary school teachers utilized the verbs of the different levels of Bloom's Cognitive Taxonomy in exam construction in Mathematics, Chemistry, English, Christian Religious Education, Business studies, and Computer studies. For the specific level of Bloom's Cognitive Taxonomy, the results showed that teachers utilized most verbs at an understanding level with a score of 75%, followed by remembering (68%), applying (63%), analysis (55%), evaluation (53%), and creation with a score of 48 percent.

In addition, on teachers' utilization of Bloom's Cognitive Taxonomy in end-of-year examination papers for the following subjects: Mathematics, Business studies, Computer studies, Christian Religious Education, English, and Chemistry, the results indicated that there was low utilization of Bloom's Cognitive Taxonomy in examination papers since the scores obtained from the question papers scored a very low percentage. For instance, remembering scored 29.4 percent, understanding scored 28.5 percent, applying scored 14.5 percent, analyzing scored 9.9 percent, evaluating scored 8.7 percent, and creating scored 8.8 percent. It was also noted that a bulk part of the questions set promoted cramming since the results revealed that the majority of the questions set were in the lower levels of Bloom's Cognitive Taxonomy that is remembering, understanding, and applying, and a few questions were in the higher order category that is analyzing, evaluating, and creating across all the subjects.

For instance, in the Chemistry examination, the lower level of Bloom's Cognitive Taxonomy dominated the questions set (remembering scored 28 percent, understanding scored 32 percent, applying scored 14 percent, analyzing scored 11 percent, evaluating scored eight percent, and creating scored six percent). This was similar to the other subjects under study. For example, in the mathematics examination, remembering scored 28 percent, understanding scored 19 percent applying scored 27 percent, analyzing scored seven percent, evaluating scored 11% and creating scored eight percent. The analysis from the English examination showed that the same trend was achieved since remembering scored 30 percent understanding scored 31 percent, applying scored 10 percent, analyzing scored 11 percent, evaluating scored 8 percent, and creating scored 9 percent.

However, the synopsis of the second objective showed that the researcher's observation and the respondents' perspective indicated a great significant difference in teachers' utilization of Bloom's cognitive taxonomy in the examination because the results explained that each level of Bloom's cognitive taxonomy scored a higher percentage (remembering scored 75%, understanding 73%, applying 75%, analyzing 65.0%, evaluation 55.0%, and creation 45%) compared to the observers' results, where remembering scored 29.4%, understanding scored 28.5%, applying scored 14.5%, analyzing scored 9.9 percent, evaluating scored 8.7 percent, and creating scored 8.8 percent, which implied that teachers did not fully utilize Bloom's cognitive taxonomy in the examination practically.

5.2.3 The Relationship between Bloom's Cognitive Taxonomy in Teaching and Academic Performance

Moreover, with reference to the third objective, which was to examine the relationship between teachers' utilization of Bloom's Cognitive Taxonomy in teaching and academic performance in public secondary schools in Nandi County, the outcome indicated that the association between teachers' utilization of Bloom's Cognitive Taxonomy in teaching and academic performance was significant but weak (contingency coefficient, C = 0.31). The utilization of Bloom's Cognitive Taxonomy in teaching contributed very little (about 8.15%) towards improvement in academic performance.

It was also found out that most of the students performed well (80% scored average and above) when Bloom's Cognitive Taxonomy was utilized in teaching. Furthermore, the results indicated that the association between teachers' utilization of Bloom's Cognitive Taxonomy in teaching and students' academic performance was significant ($\chi^2 = 159.598$, degree of freedom = 10, at a significance level of 0.05) but weak since the contingency coefficient (C) equals 0.31. Hence, teachers' utilization of Bloom's Cognitive Taxonomy in teaching contributed very little (about 8.15%) towards improvement in academic performance.

5.2.4 The Relationship between Utilization of Bloom's Cognitive Taxonomy in Examination and Academic Performance

However, in relation to the fourth objective, which examined the relationship between teachers' utilization of Bloom's Cognitive Taxonomy in the construction of exams and students' academic performance in public secondary schools in Nandi County, Kenya, the results indicated that the null hypothesis (HO_2) was rejected ($\chi^2 = 97.989$, $p = 0.001$, $N = 355$, and degree of freedom equals to 11 at a significant level of 0.05) which implied that there existed a significant relationship between teachers' utilization of Bloom's Cognitive Taxonomy in exams and students' academic performance with a contingency coefficient, C of 0.47. Therefore, the association between teachers' utilization of Bloom's Cognitive Taxonomy in exams and students' academic performance was weak although significant and accounted for very little (about 11.5%) towards improved academic performance.

Additionally, the results from question papers and students' academic performance illustrated that most of the students performed well (above 53 percent scored average and above) when teachers utilized Bloom's Cognitive Taxonomy in examinations, and there was a significant association between teachers' utilization of Bloom's Cognitive Taxonomy in examinations and students' academic ($\chi^2 = 495.61$, degree of freedom = 10 at a significance level of 0.05) but weak since the contingency of coefficient, C = 0.76. Hence, the utilization of Bloom's Cognitive Taxonomy in examinations contributed very little (about 18.36%) towards improvement in students' academic performance. Therefore, Bloom's Cognitive Taxonomy can be utilized as a checklist to ensure that all levels of a domain have been assessed and to align assessment methods with the appropriate lessons and methodologies.

5.2.5 The Influence of Teachers' Utilization of Bloom's Cognitive Taxonomy in Teaching Selected Subjects

Regarding the fifth research objective, which was to determine the influence of the utilization of Bloom's Cognitive Taxonomy in teaching selected subjects in public secondary schools in Nandi County, the results demonstrated that Christian Religious Education teachers utilized Bloom's Cognitive Taxonomy mostly in teaching with a rating of 81%, followed by Chemistry teachers with a rating of 68 percent, Computer Studies with 60 percent, English teachers with 55 percent, Business studies teachers with 50 percent, and lastly, Mathematics teachers with a rating of 37 percent. In addition, the findings confirmed that both the participants' and observer's responses agreed that there existed a significant relationship between teachers' utilization of Bloom's Cognitive Taxonomy among the different selected subjects in teaching in public secondary schools in Nandi County, although weak, since it contributed about 7.3 percent and 8.35 percent towards quality teaching, respectively.

5.2.6 The Influence of Teachers' Utilization of Bloom's Cognitive Taxonomy in the Construction of Examinations

Concerning the sixth research objective, which was to determine the influence of the teachers' utilization of Bloom's Cognitive Taxonomy in the construction of examinations in selected subjects in public secondary schools in Nandi County, the results confirmed that all the subjects under study utilized Bloom's Cognitive Taxonomy in the construction of exams. In terms of ranking per subject, Chemistry, English, and Christian Religious Education had the highest percentage of 93% in utilization of Bloom's Cognitive Taxonomy in setting exams, followed by Business

Studies with 88 %, Mathematics with 75%, and lastly, Computer Studies with 74%. The results also showed that teachers' utilization of Bloom's Cognitive Taxonomy had a significant influence among the selected teaching subjects in the construction of exams in public secondary schools in Nandi County (χ^2 = 20.89, critical value is 11.07 at $\boldsymbol{\alpha}$ = 0.05 and degree of freedom is five) but weak since the contingency coefficient, C, is equal to 0.24 and it contributed about 6.26 percent towards the quality construction of examinations.

5.2.7 The Relationship between Mode of Exam Construction and Teachers' Utilization of Bloom's Cognitive Taxonomy

Regarding the seventh objective, which sought to determine the relationship between mode of examination construction and teachers' utilization of Bloom's Cognitive Taxonomy in public secondary schools in Nandi County, the results demonstrated that 95.5% of teachers prepared their exams within the school and a significance existed between different subjects and preparing exams in the school (χ^2 = 35.0 with a critical value of 12.592 at a significance level of 0.05, degree of freedom is 6, and N = 353 with a contingency coefficient, C of 0.015). The results showed that the majority of examinations were prepared by individual teachers with 49%, followed by those prepared by a group of teachers with 48%, and very few exams were prepared by heads of department with 11 percent, and externally prepared with zero point three percent. In conclusion, the significant association between teachers' utilization of Bloom's Cognitive Taxonomy and the mode of examination construction in public secondary schools in Nandi County is weak and accounted for very little (about 2.3 percent) of the variation in the construction of examinations.

5.2.8 The Gender Influence on Teachers' Utilization of Bloom's Cognitive Taxonomy in Teaching and Examination

Relating to the eighth objective, which sought to examine gender influence on teachers' utilization of Bloom's Cognitive Taxonomy in teaching and exam construction in public secondary schools in Nandi County, the feedback showed that gender was considered because 57.3 percent of teachers were male and 41.7 percent were female, and the results further illustrated that 55.6 percent of male and 62.2 percent of female teachers utilized Bloom's Cognitive Taxonomy in teaching. The overall percentages showed that 86.5 percent of both male and female teachers utilized Bloom's Cognitive Taxonomy to construct exams. The findings also showed that the null hypothesis (HO_5) was accepted and therefore teachers' gender had no significant influence on teachers' utilization of Bloom's Cognitive Taxonomy in teaching and examination in public secondary schools in Nandi County, Kenya (χ^2 (1, N = 355) = 1.549 and the critical value was 3.841).

5.2.9 Influence of Teachers' Professional Qualifications on Utilization of Bloom's Taxonomy

Pertaining to the nineth objective, which endeavored to examine professional qualification influence on teachers' utilization of Bloom's Cognitive Taxonomy in teaching and exam construction in public secondary schools in Nandi County, the researcher findings showed that teachers' professional qualification had a significant influence on teachers' utilization of Bloom's Cognitive Taxonomy in exam construction in public secondary schools in Nandi County ($\chi2$ = 18.553; degree of freedom equals to 2, N = 355; and corresponding critical value equals to 5.991 at α =

0.05 with a contingency coefficient, C equal to 0.22) and contributed about 4.8 percent of quality exam construction. However, teachers' professional qualification had no significant influence on teachers' utilization of Bloom's Cognitive Taxonomy in teaching in public secondary schools in Nandi County, Kenya (χ^2 = 1.483; degree of freedom equal to 2, N = 355, and corresponding critical value was 5.991 at α = 0.05 with a contingency coefficient, C of 0.06). As a result, regardless of their professional qualification, all teachers can teach well using Bloom's Cognitive Taxonomy; those with diploma qualifications can teach equally well as those with doctor of philosophy in public secondary schools in Nandi County, but teachers with higher professions can set exams using Bloom's Cognitive Taxonomy better than those with lower profession.

5.3 The Conclusion of the Chapter

The following conclusions were made on the basis of the research findings:

First, the findings showed that teachers utilized Bloom's Cognitive Taxonomy when teaching their students in their classes. The results obtained from the researcher's observation and the results obtained from the participants' perspective showed that teachers utilized Bloom's Cognitive Taxonomy in teaching, although the level of percentages differed greatly since the participants' responses were higher than the researcher's observation, which means that practically all teachers do not fully utilize Bloom's Cognitive Taxonomy during teaching.

Secondly, the findings showed that all the teachers agreed that they utilized Bloom's Cognitive Taxonomy in the setting of exams at different levels of the taxonomy. However, the analysis of examination papers in all the six subjects under study also illustrated that teachers utilized Bloom's Cognitive Taxonomy in examinations. It was also observed that the researcher's observation and the respondents' perspective demonstrated a significant difference because both results indicated a great difference in percentages. This implies that practically most teachers do not exhaust the full utilization of Bloom's Cognitive Taxonomy in setting exams, as demonstrated by the qualitative results of the research.

Thirdly, the findings showed that the association between teachers' utilization of Bloom's Cognitive Taxonomy in teaching and students' academic performance in public secondary schools in Nandi County, Kenya was significant but weak. The utilization of Bloom's Cognitive in teaching contributed very little (about 8.15 percent) towards improvement in academic performance. Generally, the utilization of Bloom's Cognitive Taxonomy in various subjects under study was balanced or high, which means there was a high relationship between teachers' utilization of Bloom's Cognitive Taxonomy in teaching and academic performance in public secondary schools in Nandi County, Kenya.

Fourthly, the association between teachers' utilization of Bloom's Cognitive Taxonomy in the examination and students' academic performance was significant although weak and contributed for very little (about 2.17 percent) towards improvement in students' academic performance. The results for all the subjects under study also showed that there was a significant relationship between teachers' utilization of Bloom's Cognitive Taxonomy in exam construction and academic performance in public secondary schools in Nandi County, Kenya since it scored a high or balanced value.

Fifth, a significant relationship between teachers' utilization of Bloom's Cognitive Taxonomy among the different selected subjects in teaching existed since both the participants' and observer's responses agreed in public secondary schools in Nandi County, although weak since it contributed about 7.3 percent and 8.35 percent towards quality teaching, respectively.

Sixth, findings showed that teachers' utilization of Bloom's Cognitive Taxonomy had a significant influence on teaching subjects in the construction of exams in public secondary schools in Nandi County, Kenya. Although significant, the association between teachers' utilization of Bloom's Cognitive Taxonomy among subjects and the construction of exams is weak and contributes very little towards the quality setting of exams in public secondary schools.

Seventh, the significant association between teachers' utilization of Bloom's Cognitive Taxonomy and the mode of exam construction in public secondary schools in Nandi County was weak and accounted for very little variation in the setting of exams in public secondary schools.

Eight, both male and female teachers can use Bloom's Cognitive Taxonomy very well in both teaching and setting of examinations in public secondary schools since teachers' gender had no significant influence on teachers' utilization of Bloom's Cognitive Taxonomy in teaching and examinations in public secondary schools in Nandi County, Kenya.

In conclusion, teachers' professional qualifications had a significant influence on teachers' utilization of Bloom's Cognitive Taxonomy in exam construction in public secondary schools in Nandi County thus teachers with higher professional qualifications should mentor teachers with lower professional qualifications to utilize Bloom's Cognitive Taxonomy in setting exams in public secondary schools. However, teachers' professional qualifications had no significant influence on teachers' utilization of Bloom's Cognitive Taxonomy in teaching in public secondary schools in Nandi County, Kenya.

With the above synopsis of the study, generally, teachers utilized Bloom's Cognitive Taxonomy in teaching and setting exams in public secondary schools in Nandi County, although they did not exhaust it well and all levels of Bloom's Cognitive Taxonomy were not used equally since the respondents' and observant responses differed greatly. There was a significant relationship between teachers' utilization of Bloom's Cognitive Taxonomy in teaching and examination and students' academic performance in public secondary schools in Nandi County. In addition, teachers' utilization of Bloom's Cognitive Taxonomy had a significant influence in teaching and setting exams among the selected subjects understudy, and teachers' profession qualification had a significant influence in teachers' utilization of Bloom's Cognitive Taxonomy in setting exams in public secondary schools in Nandi County, Kenya.

5.4 Recommendations of the Study

Based on the findings, the study recommends that:

All teachers teaching Mathematics, English, Christian Religious Education, Chemistry, Business Studies, and Computer Studies utilize Bloom's Cognitive Taxonomy equally and avoid concentrating on the lower levels of Bloom's Cognitive Taxonomy in teaching and instead maximize all the levels that is remembering, understanding, applying, analyzing, evaluating, and creating when teaching their learners in public secondary school in Nandi County, Kenya so that it promotes a deep approach to teaching and critical thinking experience.

Teachers should continue utilizing Bloom's Cognitive Taxonomy in setting exams across all the subjects equally and both the lower order category and higher order category of Bloom's Cognitive Taxonomy should be utilized so exhaustively so that it enables the learners to understand their teaching and excel in exams, unlike the case now.

All teachers teaching selected subjects should utilize Bloom's Cognitive Taxonomy equally and avoid concentrating on the lower levels of Bloom's Cognitive Taxonomy in teaching and instead maximize all the levels that is remembering, understanding, applying, analyzing, evaluating, and creating when setting exams for their learners in public secondary schools in Nandi County, Kenya so that it promotes a deep approach to teaching and critical thinking experience that would enable their learners to master the content very well.

Since there was a significant but weak association between teachers' utilization of Bloom's Cognitive Taxonomy in the construction of exams and students' academic performance in public secondary schools in Nandi County, Kenya, this study recommends that teachers should continue utilizing Bloom's Cognitive Taxonomy across all the subjects equally and that both the lower order category and higher order category of Bloom's Cognitive Taxonomy be utilized so exhaustively so that it enables the learners to excel in exams, unlike the case now.

All teachers should utilize Bloom’s Cognitive Taxonomy in all subjects in teaching equally so that there will be no partiality in some subjects since this will disadvantage the learner, especially during real classroom teaching. For instance, a teacher utilizes Bloom’s Cognitive Taxonomy in setting exams whereas he/she didn’t utilize it during teaching.

All teachers should utilize Bloom’s Cognitive Taxonomy in the construction of exams in all subjects equally so that there will be no partiality in some subjects when setting exams since that would disadvantage the learner, especially during examinations. For instance, a teacher utilizes Bloom’s Cognitive Taxonomy in setting exams whereas he/she didn’t utilize it during teaching.

Teachers should adopt the following modes of setting exams: individual teachers, a group of teachers, and heads of departments so that there is uniform utilization of Bloom’s Cognitive Taxonomy in setting exams in public secondary schools in Nandi County, Kenya.

Teachers' gender should not be taken into account when hiring teachers because teachers' use of Bloom's Cognitive Taxonomy has no significant relationship in both teaching and examination and students' academic performance in Nandi County's public secondary schools.

Teachers with higher professional qualifications should mentor teachers with lower professional qualifications so that they too can utilize Bloom’s Cognitive Taxonomy when setting exams fully.

5.5 Suggestions for Further Studies

To attain educational goals, students go through preparation, teaching, and assessment stages, with evaluation being the most important stage in establishing whether or not their conceptual growth has progressed to higher-order cognitive skills. Assessment also tries to make assessments and decisions on the effectiveness of students and teachers. There is little question that any evaluation system will impact what and how kids learn because assessment plays such a vital and crucial role in their future. As a result, assessment will influence both what and how is taught. Examining students' knowledge and acceptance is a typical way of evaluation. The following suggestions for additional research are made by this study:

(1) The relationship between teaching and the development of examinations, as well as student academic success in public in tertiary institutions, should be investigated further.

(2) This research should be repeated, but with Kenya's Certificate of Secondary Examination and national results.

(3) This research should be carried out in various countries and regions.

(4) Other disciplines not included in this study, such as Kiswahili, Geography, Biology, Physics, History, and Government, Woodwork, French, and many others, should be investigated further.

(5) Other approaches should be used to further investigate the use of Bloom's Cognitive Taxonomy in test design and teaching, as well as its relationship to academic performance in Kenyan public secondary schools.

(6) The same study should be carried out in tertiary institutions.

REFERENCES

Abosalem, Y. (2016). Assessment techniques and students' higher-order thinking skills. *International Journal of Secondary Education*, *4*(1), 1.

Abuhamda, Enas & Ismail, Islam & Bsharat, Tahani. (2021). Understanding quantitative and qualitative research methods: A theoretical perspective for young researchers. International Journal of Research. 8. 71-87. 10.2501/ijmr-201-5-070.

Adams N. E. (2015a). Bloom's taxonomy of cognitive learning objectives. *Journal of the Medical Library Association : JMLA*, *103*(3), 152–153. https://doi.org/10.3163/1536- 5050.103.3.010

Adams, N. E. (2015b). Bloom's taxonomy of cognitive learning objectives. *Journal of the Medical Library Association: JMLA*, *103*(3), 152. https://doi.org/10.1027/1016-9040/a000298

Agarwal, P. K. (2019). Retrieval practice & Bloom's taxonomy: Do students need fact knowledge before higher order learning?. *Journal of Educational Psychology*, *111*(2), 189.

Agung, S., Alhumaira, A., Yuskar, D. I., & Fuadi, T. R. (2021). An analysis of Chemistry high school end-of-year exams according to Bloom's Cognitive complexity. *Edusains*, *13*(2), 194-203.

Ahmad, K. A., Zamri, M. L., & Kadir, N. L. A. (2015). An investigation of the frequency of HOT and LOT of Bloom Taxonomy in the Diploma English Entrance Exam. *AJELP: Asian Journal of English Language and Pedagogy*, *3*, 228-241.

Alade, O. M., & Igbinosa, V. O. (2014). Table of specification and its relevance in educational development assessment.

Aldridge, K. V., Dovey, M. T & Wade, A. (2017) Assessing test-retest reliability of psychological measures: Persistent methodological problems. *Volume 22 European Psychologist*, pp. 207-218.

Almalki, S. (2016). Integrating Quantitative and Qualitative Data in Mixed Methods Research--Challenges and Benefits. *Journal of education and learning*, *5*(3), 288-296.

Alshare, K. (2018). A gap analysis of business students' skills in the 21st century case study. Academy of Educational Leadership Journal, 22(1), 1-22. Retrieved February 22, 2020 from https://www.abacademies.org/articles/a-gap-analysis-of-business-students-skills-in-the-21st-century-a-case-study-of-qatar-6974.html.

Alzu'bi, M. A. (2014). The Extend of Adaptation Bloom's Taxonomy of Cognitive Domain In English Questions Included in General Secondary Exams. *Advances in Language and Literary Studies*, *5*(2), 67-72.

Andargie, M. G., & Asmellash, T. (2020). Analysis of grade 8 chemistry student textbook contents vis-à-vis bloom's revised taxonomy. *African Journal of Chemical Education*, *10*(2), 85-104.

Anderson, S. F., Kelley, K., & Maxwell, S. E. (2017). Sample-size planning for more accurate statistical power: A method adjusting sample effect sizes for publication bias and uncertainty. *Psychological science*, *28*(11), 1547-1562.

APA (Ed.). (2020). *Publication Manual of American Psychological Association*: The Official Guide to APA Style. APA

Ari, A. (2011). Educational Sciences: Theory & Practice: *Finding Acceptance of Bloom's Revised Cognitive Taxonomy on the International Stage and in Turkey* – 11(2) •Bahar/Spring • 749-772.

Armstrong, P. (2016). Bloom's taxonomy. *Vanderbilt University Center for Teaching*.

Atherton, J. S. (2013) Learning and Teaching; Bloom's taxonomy [On-line: UK]

http://www.learningandteaching.info/learning/bloomtax.htm

Appelbaum, M., Cooper, H., Kline, R. B., Mayo-Wilson, E., Nezu, A. M., & Rao, S. M. (2018). Journal article reporting standards for quantitative research in psychology: The APA Publications and Communications Board task force report. *American Psychologist, 73*(1), 3.

Azzopardi, M., & Azzopardi, C. (2021). Classification of Maltese biology examination questions using Bloom's Revised Taxonomy.

Ball, S. J. (2016). Subjectivity as a site of struggle: Refusing neoliberalism? *British Journal of Sociology of Education, 37*(8), 1–18. doi:10.1080/01425692.2015.1044072.

Babbie, E. (2015). The practice of social research (14th ed.). Belmont, CA: Wadsworth/Thomson.

Bayaydah, A. M., & Altweissi, A. I. (2020). A Bloom's Taxonomy-Based analaysis of 9th and 10th grades English language textbooks'final examinations and revision questions. *International Online Journal of Primary Education (IOJPE)*

ISSN: 1300-915X, *9*(2), 197-211.

Benson, J. D. (2012). *The Standards-Based Teaching/Learning Cycle*, Second edition. A guide to Standards- Based Education practices at the district, school, and classroom level. Denver, Co: The Colorado Coalition for Standards-Based Education.

Bhaw, N., & Kriek, J. (2020). The alignment of the Grade 12 physics examination with the CAPS curriculum:(November 2014–March 2018). *South African Journal of Education*, *40*(1).

Bibi, W., Butt, M. N., & Reba, A. (2020). Relating Teachers' Questioning Techniques with Students' Learning within the Context of Bloom's Taxonomy. *FWU Journal of Social Sciences*, *14*(1).

Bloomfield, J., & Fisher, M. J. (2019). Quantitative research design. *Journal of the Australasian Rehabilitation Nurses Association*, *22*(2), 27-30.

Çakır, H., & Cengiz, Ö. (2016). A study on Turkish motherese in the context of toy play. *Journal of Language and Linguistic Studies, 12*(1), 20-31.

Castelli, M. (2015). Dialogic skills for religious education. *Ricerche di Pedagogia e Didattica. Journal of Theories and Research in Education*, *10*(1), 151-167.

Cengiz, O. and Cakir, H. (2016). Turkish Fathers’ Language Utilize In The Context of Toy Play. *European Scientific Journal*, *ESJ*, *12(8)*,430.

Chandio, M. T., Pandhiani, S. M., & Iqbal, S. (2016). Bloom’s taxonomy: Improving assessment and teaching-learning process. *Journal of Education and Educational Development*, *3*(2), 203-221.

Cherorot, C. A. W. (2014). *An analysis of teacher prepared examination questions in history and government along blooms taxonomy on the cognitive* *domain: a case study of secondary schools in Bureti district* (Doctoral dissertation, Moi University).

Clarke, M. (2013). Terror/enjoyment: Performativity, resistance and the teacher's psyche. *London Review of Education*, *11*(3), 229–239.

Chih-Pei, H. U., & Chang, Y. Y. (2017). John W. Creswell, research design: Qualitative, quantitative, and mixed methods approaches. *Journal of Social and Administrative Sciences*, *4*(2), 205-207.

Connelly, L. M. (2016). Trustworthiness in qualitative research. *Medsurg Nursing*, *25*(6), 435.

Colbert-Getz, J. M., Ryan, M., Hennessey, E., Lindeman, B., Pitts, B., Rutherford, K. A., ... & Jung, J. (2017). Measuring assessment quality with an assessment utility rubric for medical education. *MedEdPORTAL*, *13*.

Cook, E., Kennedy, E., & McGuire, S. Y. (2013). Effect of teaching metacognitive learning strategies on performance in general chemistry courses. *Journal of Chemical Education*, *90*(8), 961-967.

Creswell, J. W., & Creswell, J. D. (2018). Research Design: Qualitative, Quantitative and Mixed Methods Approaches (5th ed.).

Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*.

Creswell, J. W. (2013). *Research Design: Qualitative, Quantitative and Mixed Methods Approaches*, 4th ed.

Creswell, J. W. (2012). *Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research*, 4th ed.

Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and Conducting Mixed Methods Research* (3rd ed.). Sage Publications.

Creswell, J. W., & Plano Clark, V. L. (2018). Designing and conducting mixed methods Research (3rd ed.). Thousand Oaks, CA: Sage.

Dagdag, J. M. H., & Dagdag, J. D. (2020). Constructivism and the Mathematics classroom assessments of elementary teachers. *Journal of Critical Reviews*, *7*(12), 816-823.

Damayanti, N., Subali, B., Nugroho, S. E., & Sureeporn, K. (2020, April). Items analysis of physics assessment based on cognitive level of high order thinking skills in bloom taxonomy. In *Journal of Physics: Conference Series* (Vol. 1521, No. 2, p. 022022). IOP Publishing.

Daniel, B. K. (2019, June). Student experience of the maximum variation framework for determining sample size in qualitative research. In *Proceedings of the European Conference on Research Methods for Business & Management Studies* (pp. 92-100).

Darlington, E. (2014). Contrasts in mathematical challenges in A-level Mathematics and Further Mathematics, and undergraduate mathematics examinations. *Teaching Mathematics and Its Applications: International Journal of the IMA*, *33*(4), 213-229.

Darlington, E. (2013). The utilize of Bloom's taxonomy in advanced mathematics questions. *Proceedings of the British Society for Research into Learning Mathematics (C. Smith ed.). Bristol, UK*, 7-12.

Dawadi, S., Shrestha, S., & Giri, R. A. (2021). Mixed-Methods Research: A Discussion on its Types, Challenges, and Criticisms. *Journal of Practical*

Studies in Education, *2*(2), 25-36.

Deal , J. & Hegde, S. A. (2013). Seinfeld and Economics: How to Achieve the Revised Bloom's Taxonomy in an Introductory Economics Class, Volume 25, *International Journal of Teaching and Learning in Higher Education*. http://www.isetl.org/ijtlhe/ ISSN 1812-9129.

DiDonato-Barnes, N., Fives, H., & Krautilize, E. S. (2014). Using a Table of Specifications to improve teacher-constructed traditional tests: an experimental design. *Assessment in Education: Principles, Policy & Practice, 21*(1), 90-108.

Elliott, D. J. C. , & Tunks, D. C. S. (2021). Modern Teacher Education - Supporting the Vast Landscape of 21st Century Pedagogy. In (Ed.), Teacher Education in the 21st Century - Emerging Skills for a Changing World. IntechOpen. https://doi.org/10.5772/intechopen.97032

Fensham, P. J., & Bellocchi, A. (2013). Higher order thinking in chemistry curriculum and its assessment. *Thinking Skills and Creativity*, *10*, 250-264.

Fetogang, E. B. (2016). Understanding and Application of Bloom Taxonomy By Senior Secondary School Teachers In Botswana, *Academic Research International Vol. 7(1)*, 110-122.

Figa, J. G., Tarekegne, W. M., & Kebede, M. A. (2020). The practice of formative assessment in Ethiopian secondary school curriculum implementation: The case of West Arsi Zone Secondary Schools. *Educational Assessment*, *25*(4), 276-287.

Figland, W., Roberts, R., & Blackburn, J. J. (2020). Reconceptualizing Problem-

Solving: Applications for the Delivery of Agricultural Education's Comprehensive, Three-Circle Model in the 21stCentury. *Journal of Southern Agricultural Education Research, 70*(1), 1-20.

Fives, H., & DiDonato-Barnes, N. (2013). Classroom test construction: The power of table of specification. Practical Assessment, Research and Evaluation, Volume 18, Number 3. *A peer-reviewed electronic journal,* ISSN 1531-7714.

Folasayo, A. L. (October, 2021). Competence of Secondary School Teachers' Usage of Bloom's Taxonomy of Education on Lesson Preparation, Presentation and Students' Assessments in Science. *International Journal of Research and Innovation in Social Science (IJRISS)* Volume V, Issue X, 2454-6186

Forehand, M. (2017). Ch. 8 Bloom's Taxonomy. *Instructional Methods, Strategies and Technologies to Meet the Needs of All Learners*.

Forehand, M. (2010). *Bloom's taxonomy. Emerging perspectives on learning, teaching,and technology.* http://projects.coe.uga.edu/epltt/index.php?title=Bloom%27s_Taxonomy *Evaluation*, *18*(3), 1-7.

Fraenkel, J. R.,Wallen, N. E., & Hyun, H. H. (2012): *How to Design and Evaluate Research in Education*. 588-615.

Fraenkel, R. J. and Wallen, E. N. (2000). *How to Design & Evaluate Research in Education*, 4th Ed.

Gallagher, C., Hipkins, R., & Zohar, A. (2012). Positioning thinking within the national curriculum and assessment systems: Perspectives from Israel, New Zealand and Northern Ireland. *Thinking Skills and Creativity*, *7*, 134-143. http://dx.doi.org/10.1016/j.tsc.2012.04.005

Gates, J., & Pugh, S. L. (2021). The Application of Bloom's Taxonomy to Higher Education Examination Questions in Physics. *New Directions in the Teaching of Physical Sciences, 16*(16).

Gichuhi C. (2014). *Teachers'competence in Tests Construction within Bloom's Taxonomy for Effective Learning Assessment*: A Case study of Kikuyu district, Kiambu County. (Unpublished thesis): University of Nairobi.

Gilani, N., Waheed, S. A., & Shaheen, A. (2020). Making a debut in teaching: Uncovering prospective teachers' first-time teaching experiences in schools. *Universal Journal of Educational Research*, *8*(11), 5443-5452.

Güler, M. (2021). An investigation of the questions mathematics teachers use on exams. *Journal of Pedagogical Research*, *5*(1), 141-153.

Heale, R. and Twycross, A. (2015). Validity and reliability in quantitative research. *Evidence-Based Nursing*, 18(3): 66-67. DOI: 10.1136/eb-2015-102129.

Heflin, H. (2021). That'sa Good Question: Inquiry as a Pedagogical Strategy of Jesus in Matthew. *Christian Education Journal*, 07398913211009524.

Hennink, M., Hutter, I., & Bailey, A. (2020). *Qualitative research methods*. Sage.

Himmah, W. I., Nayazik, A., & Setyawan, F. (2019, March). Revised Bloom's taxonomy to analyze the final mathematics examination problems in Junior High School. In *Journal of Physics: Conference Series* (Vol. 1188, No. 1, p. 012028). IOP Publishing.

Hoque, E. M. (2016). Three Domains of Learning: Cognitive, Affective and Psychomotor. J. EFL Educ. Res., 2, 45–51.

Howitt, D., & Cramer, D. (2017). *Research methods in psychology*. Pearson.

Ibtihal, R. A. & Oqlah, M. S. (2015). Using Bloom's Taxonomy to Evaluate the Cognitive Levels of Master Class Textbook's Questions, Vol. 8, No. 5, 100-110. *English Language Teaching*; Israel: Canadian Center of Science and Education. http://dx.doi.org/10.5539/elt.v8n5p100 ISSN 1916-4742 E-ISSN 1916-4750.

Iqbal, J., Ullah, O., & Nisar, M. (2019). Analysis of Question Papers of Physics on Bloom's Taxonomy at Secondary Level. *Global Regional Review*, *4*(4), 29-36.

Ishtiaq, M. (2019). Book Review Creswell, JW (2014). Research Design: Qualitative, Quantitative and Mixed Methods Approaches . Thousand Oaks, CA: Sage. *English Language Teaching*, *12*(5), 40.

Irons, A., & Elkington, S. (2021). *Enhancing learning through formative assessment and feedback*. Routledge.

Irvine, J. (2017). A Comparison of Revised Bloom and Marzano's New Taxonomy of Learning. *Research in Higher Education Journal*, *33*.

Jideani, V. A., & Jideani, I. A. (2012). Alignment of assessment objectives with instructional objectives using revised Bloom's taxonomy—The case for food science and technology education. *Journal of Food Science Education*, *11*(3), 34-42.

Jhangiani, R. S., Chiang, I. C. A., Cuttler, C., & Leighton, D. C. (2019). *Research methods in psychology*. Kwantlen Polytechnic University.

Jones, J. A., & Donmoyer, R. (2021). Improving the Trustworthiness/Validity of Interview Data in Qualitative Nonprofit Sector Research: The Formative Influences Timeline. *Nonprofit and Voluntary Sector Quarterly*, *50*(4), 889-

904.

Kaushik, V., & Walsh, C. A. (2019). Pragmatism as a research paradigm and its implications for social work research. *Social Sciences*, *8*(9), 255.

Kamlasi, I. (2018). Descriptive Analyses on English Test Items based on the Application of Revised Bloom's Taxonomy. *Metathesis: Journal of English Language, Literature, and Teaching*, *2*(2), 203-210.

Kandagor, D. R. (2019). Spiritual Approches in Conflict Resolution: The Case of Africa Inland Church Among The Tugen and Pokot of Baringo Plains, Kenya.

Karuguti, W. M., Phillips, J., & Barr, H. (2017). Analysing the cognitive rigor of interprofessional curriculum using the Depth of Knowledge framework. *Journal of interprofessional care*, *31*(4), 529-532.

Kasim, U., Zulfikar, T., & Zaiturrahmi, Z. (2017). Analysis of instructional questions in an English textbook for senior high schools. *English Education Journal*, *8*(4), 536-552.

Kelly, L. & Cordeiro, M. (2020, July 1). *Three Principles of Pragmatism for Research on Organizational Processes*. Methodological Innovations. doi.org/10.1177/2059799120937242

Kenya Institute of Curriculum Development (KICD). (2019). Teacher Education Curriculum Framework-Masada Draft. Retrieved from https://kicd.ac.ke.pdf

Kin, C.; Tsang, C.Y.J.; Zhang, L.W.; Chan, S.K.Y. (2021). A Nurse-Led Education Program for Pneumoconiosis Caregivers at the Community Level. Int. J. Environ. Res. Public Health, 18, 1092.

Kingoriah, G. K. (2013). *Principles of Calculus*. Jomo Kenyatta Foundation: Nairobi.

Kinyua, K., & Okunya, L. O. (2014). Validity and reliability of teacher-made tests: Case study of year II physics in Nyahururu District of Kenya. African *Educational Research Journal*, 2(2), 61-71.

Kocakaya, S., & Kotluk, N. (2016). Classifying the Standards via Revised Bloom's Taxonomy: A Comparison of Pre-Service and In-Service Teachers. *International Journal of Environmental and Science Education, 11*(18), 11297-11318.

Köksal, D. & Ulum, Ö. G. (2018). Language assessment through Bloom’s Taxonomy. Journal of Language and Linguistic Studies , 14 (2) , 76-88 . Retrieved from https://dergipark.org.tr/en/pub/jlls/issue/43364/527924

Korir, M., Mittelmeier, J., & Rienties, B. (2020). Is mixed methods social network analysis ethical?

Kozikoğlu, İ. (2018). The examination of alignment between national assessment and English curriculum objectives using revised Bloom's Taxonomy. *Educational Research Quarterly*, *41*(4), 50-77.

Krause, M. (2014). *The good project*. University of Chicago Press.

Lai, J. W., & Bower, M. (2020). Evaluation of technology utilize in education: Findings from a critical analysis of systematic literature reviews. *Journal of Computer Assisted Learning*, *36*(3), 241-259.

Lalogiroth, A., & Tatipang, D. P. (2020). An analysis of English national exam and English teachers’perception using Bloom’s Revised Taxonomy. *Journal of English Culture, Language, Literature and Education*, *8*(1), 1-19.

Lee, J., & Stankov, L. (2016). *Non-cognitive psychological processes and academic* *achievement*.

Lee, Y. J., Kim, M., Jin, Q., Yoon, H. G., & Matsubara, K. (2017). Revised bloom's taxonomy—the swiss army knife in curriculum research. In *East-asian primary science curricula* (pp. 11-16). Springer, Singapore.

Letmon, D., Finlayson, O. E., & Mcloughlin, E. (2021, May). Examining Irish Leaving Certificate physics examination questions (1966-2016) according to Bloom's Revised Taxonomy. In *Journal of Physics: Conference Series* (Vol. 1929, No. 1, p. 012064). IOP Publishing.

Liem, G. A. D., & McInerney, D. M. (Eds.). (2018). *Big theories revisited 2*. Charlotte, NC: Information Age Publishing.

Liem, G. A. D., & Tan, S. H. (Eds.). (2019). *Asian education miracles: In search of sociocultural and psychological explanations*.

LoBiondo-Wood, G., & Haber, J. (2021). *Nursing Research E-Book: Methods and Critical Appraisal for Evidence-Based Practice*. Elsevier Health Sciences.

LoGiudice, J. A., & Bartos, S. (2021). Experiences of nurses during the COVID-19 pandemic: A mixed-methods study. *AACN Advanced Critical Care*, *32*(1), 14-26.

Lumadede, H. U., Shiundu, J. O., & Poipoi, M. W. (2020) Teachers' Perceptions of the Role of Examination on Students' Academic Achievement in Public Secondary Schools, Kakamega County, Kenya.

Mahroof, A., & Saeed, M. (2021). Evaluation of Question papers by Board of Intermediate and Secondary Education using Item Analysis and Blooms Taxonomy. *Bulletin of Education and Research, 43*(3), 81-94.

Mailo, E. M. (2021). *Influence of Policies Guiding Pedagogy on Teacher of Business*

Studies Competency in Secondary Schools in Kajiado County; Kenya (Doctoral dissertation, University of Nairobi).

Makewa, L. N., Role, E. J., & Yegoh, E. (2011). School Climate and Academic Performance in High and Low Achieving Schools: Nandi Central District, Kenya. *International Journal of Scientific Research in Education*, 4(2), 93-104. http://www.ijsre.com.

Malik, S. I. (2019). Assessing the teaching and learning process of an introductory programming course with Bloom's taxonomy and Assurance of Learning (AOL). *International Journal of Information and Communication Technology Education (IJICTE)*, *15*(2), 130-145.

Masapanta-Carrión, S., & Velázquez-Iturbide, J. Á. (2018). A systematic review of the utilize of Bloom's taxonomy in Computer Science education. *In Proceedings of the 49th acm technical symposium on computer science education* (pp. 441-446).

Masinde, M. N. (2012). *Applying blooms taxonomy in teacher made tests in secondary schools in Kenya* (Doctoral dissertation, University of Nairobi, Kenya).

Mbugua, Z. K., Kibet, K., Muthaa G. M., & Nkonke G. R. (2012). Factors Contributing To Students' Poor Performance in Mathematics at Kenya Certificate of Secondary Education in Kenya: A Case of Baringo County, Kenya. *American International Journal of Contemporary Research* Vol. 2 No. 6, 87.

Meke, K. D. P., Wutsqa, D. U., & Alfi, H. D. (2018, September). The Effectiveness of Problem-based Learning Using Manipulative Materials Approach on Cognitive

Ability in Mathematics Learning. In *Journal of Physics: Conference Series* (Vol. 1097, No. 1, p. 012135). IOP Publishing.

Ministry of Education (2012). *A Policy Framework for Education and Training: Reforming Education and Training in Kenya.* Nairobi: Ministry of Education.

Ministry of Education, Science and Technology (2013). *Education Reforms: Recommendations.* Nairobi. Ministry of Education, Science and Technology. www.education.go.ke/ShowPage.aspx?department.

Mita, D. O., Agustinsa, R., & Susanto, E. (2021). Cognitive Level Analysis of Problems in Mathematics Textbook Class XII Revision 2018 Materials of Congress and Construction Based on the Revised Bloom Taxonomy. *Journal of Education and Learning Mathematics Research (JELMaR)*, *2*(2), 14-25.

Mitani, H. (2021). Test Score Gaps in Higher Order Thinking Skills: Exploring Instructional Practices to Improve the Skills and Narrow the Gaps. AERA Open. https://doi.org/10.1177/23328584211016470

MoEST (2015). Sessional Paper No 2 of 2015: *Reforming the Education and Training Sector in Kenya* Government Press: Nairobi

Mohajan, H. (2020). Quantitative Research: A Successful Investigation in Natural and Social Sciences. Journal of Economic Development, Environment and People, 9(4).

Mohajan, H. K. (2018). Qualitative research methodology in social sciences and related subjects. *Journal of Economic Development, Environment and People*, *7*(1), 23-48.

Morton, D. A., & Colbert-Getz, J. M. (2017). Measuring the impact of the flipped anatomy classroom: The importance of categorizing an assessment by

Bloom's taxonomy. *Anatomical sciences education*, *10*(2), 170-175.

Mueller, R. O., & Knapp, T. R. (2018). Reliability and validity. In *The reviewer's guide to quantitative methods in the social sciences* (pp. 397-401). Routledge.

Muhayimana, T., Kwizera, L., & Nyirahabimana, M. R. (2022). Using Bloom's taxonomy to evaluate the cognitive levels of Primary Leaving English Exam questions in Rwandan schools. *Curriculum Perspectives*, 1-13.

Munce, S. E. P., Guetterman, T. C. & Jaglal, S. B. (2021). Using the exploratory sequential design for complex intervention development: Example of the development of a self-management program for spinal cord injury. *Journal of Mixed Methods Research. 15*(1) 37–60. https://doi.org/10.1177/1558689820901936

Mutisya, J., Itolondo, W., & Ikinya, S. (2021). Role of Tutors' Social Reconstruction Orientation on Choice of Instructional Approaches in Public Primary Teachers' Training Colleges in Kenya. *East African Journal of Interdisciplinary Studies*, *3*(1), 12-26. https://doi.org/10.37284/eajis.3.1.268

Mwangi, F. G., & Bwire, A. M. (2020). Role of Extensive Reading Habits in Students' Acquisition of Composition Writing Skills in English in Kenya.

Nassaji, H. (2020). Good qualitative research. Language Teaching Research, 24(4), 427–431. https://doi.org/10.1177/1362168820941288

Ndlela, N. N., Pereira, L., & Oloyede, I. O. (2020). Use of instructional methods developing higher order thinking skills by business studies teachers in Eswatini. *Open Journal of Social Sciences*, *8*(8), 41-52.

Nayak, J. K., & Singh, P. (2021). *Fundamentals of Research Methodology Problems* *and Prospects*. SSDN Publishers & Distributors.

Nehring, J. H., Charner-Laird, M., & Szczesiul, S. A. (2019). Redefining Excellence: Teaching in Transition, From Test Performance to 21st Century Skills. NASSP Bulletin, 103(1), 5–31. https://doi.org/10.1177/0192636519830772

Nganga, L., & Kambutu, J. (2017). Preparing Teachers for a Globalized Era: An Examination of Teaching Practices in Kenya. *Journal of Education and Practice*, *8*(6), 200-211.

Ngala, F. B. (2018). Students Attitudes towards Active Participation in Lectures as Influenced by Instructional Factors in Teacher Education Programmes: A Comparative study of Selected Public and Private Universities in Nakuru County, Kenya. *Kabarak Journal of Research & Innovation*, *6*(1), 1-19.

Nkhoma, M. Z., Lam, T. K., Sriratanaviriyakul, N., Richardson, J., Kam, B., & Lau, K. H. (2017). Unpacking the revised Bloom's taxonomy: developing case-based learning activities. *Education+ Training*.

Nyagosia, P. O.,Waweru, S. N., & Njuguna, F. W. (2013). Factors Influencing Academic Achievement in Public Secondary Schools in Central Kenya: An Effective Schools' Perspective. *Educational Research International* Vol. 2 (2), 174-184. ISSN-L:2307-3713, ISSN: 2307-3721.

Ochieng, E. O. (2021). *Relationship between School Based Tests' validity, Reliability and Performance in Kenya Certificate of Secondary Education in Nairobi City County, Kenya* (Doctoral Dissertation, Kenyatta University).

Ongesa, C. M. M. (2020). *A Philosophical Critique of Critical Thinking Pedagogy in Kenyan Secondary Schools' Curriculum* (Doctoral dissertation, University of Nairobi).

Oyieko, J. (2017). *Examination rules and regulations and examination malpractices in secondary schools: (students' perception) a case study of Schools in Bondo, Kenya* (Doctoral dissertation, University of Nairobi).

Öztürk, G. (2021). Pre-Service Teachers' Skills in Analysing Achievements in Regard to the Revised Bloom's Taxonomy. *International Journal of Progressive Education*, *17*(1), 277-293.

Pandey, P., & Pandey, M. M. (2021). Research Methodology Tools and Techniques.

Polikoff, M. S., Rabovsky, S. J., Silver, D., & Lazar-Wolfe, R. (2021). The Equitable Distribution of Opportunity to Learn in Mathematics Textbooks. AERA Open. https://doi.org/10.1177/23328584211065712

Poth, C., & Munce, S. E. P. (2020). Commentary—Preparing today's researchers for a yet unknown tomorrow: Promising practices for a synergistic and sustainable mentoring approach to mixed methods research learning. *International Journal of Multiple Research Approaches*, *12*(1), 56-64. doi:10.29034/ijmra.v12n1commentary

Prochner, I., & Godin, D. (2022). Quality in research through design projects: Recommendations for evaluation and enhancement. *Design Studies*, *78*, 101061.

Psychological testing. (2016). In *Encyclopædia Britannica*. https://www.britannica.com/science/psychological-testing/Primar characteristics-of-methods-or-instruments.

Rachmawati, D. L., & Purwati, O. (2021). EFL teachers' attitudes and competence in developing HOTS-based formative assessment. *JEES (Journal of English Educators Society)*, *6*(2).

Radmehr, F., & Drake, M. (2019). Revised Bloom’s taxonomy and major theories and frameworks that influence the teaching, learning, and assessment of mathematics: a comparison. *International Journal of Mathematical Education in Science and Technology*, *50*(6), 895-920.

Radmehr, F., & Drake, M. (2018). An assessment-based model for exploring the solving of mathematical problems: Utilizing revised bloom’s taxonomy and facets of metacognition. *Studies in Educational Evaluation*, *59*, 41-51.

Rahayu, A., Syah, A., & Najib, A. (2021, June). Higher order thinking skills students in mathematical statistics course base on revised bloom taxonomy in factual and conceptual knowledge dimension. In *Journal of Physics: Conference Series* (Vol. 1918, No. 4, p. 042076). IOP Publishing.

Rahida Aini, M. I. (2019). *The relationship between teacher efficacy and teacher's delivery effectiveness in the presence of hots training program* (Doctoral dissertation, Universiti Utara malaysia).

Rasyidi, D. A., & Winarso, W. (2020). The Proportion of Cognitive Aspects of Question in Mathematics Textbook Based on Marzano's Taxonomy: An Indonesian Case in Implementing New Curriculum. *EduMa: Mathematics Education Learning and Teaching*, *9*(2), 79-89.

Reeves, T. D., & Marbach-Ad, G. (2016). Contemporary test validity in theory and practice: A primer for discipline-based education researchers. *CBE—Life Sciences Education*, *15*(1), rm1.

Republic of Kenya (2012). *Sessional Paper No. 14 of 2012 on Reforming Education and Training Sectors in Kenya.* Nairobi: Ministry of Education & Ministry of Higher Education, Science and Technology.

Republic of Kenya (2010). *The Constitution of Kenya.*

Saido, G., Siraj, S., Bin Nordin, A., & Al_Amedy, O. (2018). Higher Order Thinking Skills among Secondary School Students in Science Learning. *MOJES: Malaysian Online Journal Of Educational Sciences, 3*(3), 13-20. https://mojes.um.edu.my/article/view/12778

Sarah, K. O. U. I. D. E. R. (2019). *The Role of Extensive Reading in Raising L2 Students' Awareness about Developing their Higher-Order Thinking Skills* (Doctoral dissertation, Abdelhafid Boussouf University centre-Mila).

Saravanan, T. (2021). Teaching Colon Classification Using Revised Bloom's Taxonomy: Teachers' Strategy. *Library Philosophy and Practice*, 1-24.

Sassenberg, K., & Ditrich, L. (2019). Research in social psychology changed between 2011 and 2016: Larger sample sizes, more self-report measures, and more online studies. *Advances in Methods and Practices in Psychological Science*, *2*(2), 107-114.

Scully, D. (2017). Constructing multiple-choice items to measure higher-order thinking. *Practical Assessment, Research, and Evaluation*, *22*(1), 4.

Seeram, E. (2019). An overview of correlational research. *Radiologic technology*, *91*(2), 176-179.

Setiyana, R., & Muna, H. (2019). Evaluating Bloom's Taxonomy in Test Items. *Proceedings of EEIC*, *2*, 79-83.

Setyowati, Y., Heriyawati, D. F., & Kuswahono, D. (2020). The Implementation of"Test of Evaluating" and" Test of Creating" in the Assessment of Learning by EFL Lecturers in Pandemic Era. *IDEAS: Journal on English Language Teaching and Learning, Linguistics and Literature*, *8*(2), 578-

587.

Senthilkumar, S., & Kumar, B. (2017). Teacher educators & teacher trainees awarness and applicaiton towards bloom's taxonomy in thiruvannamali district. *International Jounral of Environmental & Science Education*, *12*(7), 1605-1615.

Shaheen, R. (2010). Creativity and education. *Creative Education*, *1*(3), 166-169. http://dx.doi.org/10.4236/ce.2010.13026.

Shah, S. S., Shah, A. A., & Khaskhelly, N. (2019). Pragmatism research paradigm: a philosophical framework of advocating methodological pluralism in social science research. *Grassroots*, *52*(1).

Shorten A., & Smith J. (2017). Mixed methods research: Expanding the evidence base. *Evid Based Nurs*, 20, 74–5. http://dx.doi.org/10.1136/eb-2017-102699

Shuaibu, Z. M. (2016, April). Strengthening Mathematics and Science Education (SMASE) for improving the quality of teachers in Nigeria. In *EGU General Assembly Conference Abstracts* (pp. EPSC2016-5116).

Shuhaimi, A. N., Ismail, M. H., Sahar, N., Jabar, N. H. A., Yaakob, N. F., & Razi, N. F. M. (2020). Exploring the Relationship between Level of Cognitive Ability in Mathematics within Two Different Schools in Tapah. *Mathematical Sciences and Informatics Journal*, *1*(2), 43-50.

Shuttleworth M. (2015). *Internal Consistency Reliability*, https://explorable.com/internal-consistency-reliability.

Sikolia, F. M., Toili, W. W., Sikolia, S. F., & Owiti, D. S. (2016). The Extent use of Instructional Strategies in Teaching Biology in Public Secondary Schools, Kakamega North Sub County, Kenya.

Silver, R. E., Kogut, G., & Huynh, T. C. D. (2019). Learning “New” Instructional Strategies: Pedagogical Innovation, Teacher Professional Development, Understanding and Concerns. Journal of Teacher Education, 70(5), 552–566. https://doi.org/10.1177/0022487119844712

Singh, A. S. (2017). Common procedures for development, validity and reliability of a questionnaire. *International Journal of Economics, Commerce and Management*, *5*(5), 790-801.

Singh P, Allen J, & Rowan L, (2019). Quality teaching: standards, professionalism, practices, Asia-Pacific Journal of Teacher Education, 47:1, 1-4, DOI: 10.1080/1359866X.2019.1557925

Singh, P. (2018). Performativity, affectivity and pedagogic identities. *European Educational Research Journal*, *17*(4), 489–506.

Sivaraman, S. I., & Krishna, D. (2015). Blooms Taxonomy–application in exam papers assessment. *Chemical Engineering (VITU)*, *12*(12), 32.

Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, *104*, 333-339.

Sobral, S. R. (2021). Bloom's Taxonomy to improve teaching-learning in introduction to programming.

Stahl, N. A., & King, J. R. (2020). Expanding approaches for research: Understanding and using trustworthiness in qualitative research. *Journal of Developmental Education*, *44*(1), 26-29

Stenfors, T., Kajamaa, A., & Bennett, D. (2020). How to… assess the quality of qualitative research. *The clinical teacher*, *17*(6), 596-599.

Stronge, J. H. (2018). *Qualities of effective teachers*. ASCD.

Subia, G., Marcos, M., Valdez, A., Pascual, L., & Liangco, M. (2020). Cognitive Levels as Measure of Higher-Order Thinking Skills in Senior High School Mathematics of Science, Technology, Engineering and Mathematics (STEM) Graduates. *Technology Reports of Kansai University*, *62*(3), 261-268.

Suhendi, A. (2018). Constructivist learning theory: The contribution to foreign language learning and teaching. *KnE Social Sciences*, 87-95.

Suri, H. (2020). Ethical considerations of conducting systematic reviews in educational research. *Systematic Reviews in Educational Research*, 41-54.

Suud, F. M., Chaer, M. T., & Setiawan, W. (2020). Implementation educational psychology theories at traditional boarding school in Aceh. *Journal of Critical Reviews*, *7*(9), 371-377.

Tak, C. C. (2021). Analysis Validity and Reliability of Self-Efficacy and Metacognitive Awareness Instrument Toward Mathematical Reasoning. *Turkish Journal of Computer and Mathematics Education (TURCOMAT)*, *12*(9), 3332-3344.

Tanalola, H. S., Fattahb, S., Sulong, S. R., & Mamat, M. (2017). Mining Exam Question based on Bloom's Taxonomy. *School of Engineering and Information Technology, University Malaysia*, 424-427.

The National Council for Law Reporting. (2010). *The constitution of Kenya*, *2010*, Revised Edition, 2010.

Tuzlukova, V., & Heckadon, P. (2020). Teaching social entrepreneurship through problem-based learning: Pedagogy and practice in the Business English classroom. *Journal of Teaching English for Specific and Academic Purposes*, 071-082.

Tuzlukova, V., & Singh, V. (2018). Twenty first century skills through problem based learning: An ESP perspective. Journal of Teaching English for Specific and Academic Purposes, 6(3), 413-423.

Ullah, Z., Lajis, A., Jamjoom, M., Altalhi, A., & Saleem, F. (2020). Bloom's taxonomy: A beneficial tool for learning and assessing students' competency levels in computer programming using empirical analysis. *Computer Applications in Engineering Education*, *28*(6), 1628-1640.

Upahi, J. E., Issa, G. B., & Oyelekan, O. S. (2015). Analysis of Senior School Certificate Examination Chemistry Questions for Higher-Order Cognitive Skills. *Cypriot Journal of Educational Sciences*, *10*(3), 218-227.

Van Khuc, Q., Pham, P., & Tran, D. T. (2021). Questionnaire design.

Virranmäki, E., Valta-Hulkkonen, K., & Pellikka, A. (2020). Geography tests in the Finnish matriculation examination in paper and digital forms–an analysis of questions based on revised Bloom's taxonomy. *Studies in Educational Evaluation*, *66*, 100896.

Wang, F., Wang, J., Cai, L., Su, R., Ding, W., & Xu, Z. (2021). Leader-chasing behavior in negative artificial triggered lightning flashes. *Scientific Reports*, *11*(1), 1-8.

Wei, B., & Ou, Y. (2019). A comparative analysis of junior high school science curriculum standards in Mainland China, Taiwan, Hong Kong, and Macao: Based on revised Bloom's taxonomy. *International Journal of Science and Mathematics Education*, *17*(8), 1459-1474.

Widana, I. W., Parwata, I., Parmithi, N. N., Jayantika, I. G. A. T., Sukendra, I. K., & Sumandya, I. W. (2018). Higher order thinking skills assessment towards critical thinking on mathematics lesson. *International journal of social sciences and humanities*, *2*(1), 24-32.

Wijaya Mulya, T., & Aditomo, A. (2019). Researching religious tolerance education using discourse analysis: a case study from Indonesia. *British Journal of religious education*, *41*(4), 446-457.

Wilkinson, I. A. G., & Staley, B. (2019). On the pitfalls and promises of using mixed methods in literacy research:Perceptions of reviewers. *Research Papers in Education*, *34*(1), 61-83. https://doi.org/10.1080/02671522.2017.1402081

Wilson, L. O. (2016a). Anderson and Krathwohl–Bloom's taxonomy revised. *Understanding the New Version of Bloom's Taxonomy*.

Wilson, L. O. (2016b). The second principle. *Five Basic Types of Questions*.

Wolming, S. & Wikstrom, C. (2010). The concept of validity in theory and practice. *Assessment in Education: Principles, Policy & Practice*, 17, 117-132.

Wooten, J., Al-Bahrani, A. A., Holder, K., & Patel, D. (2020). The role of relevance in economics education: A survey. *Available at SSRN 3606301*.

Xu, H. (2017). Exploring novice EFL teachers' classroom assessment literacy development: A three-year longitudinal study. *The Asia-Pacific Education Researcher*, *26*(3), 219-226.

Yamin, T. (2013). Excellence, Innovation Education, and Nurturing the Gifted. The 6th International Conference on Teacher Education. http://www.mofet.macam.ac.il/amitim/iun/International Conference2013/program/day2/Pages/1620-1720-2.aspx.

Yaşar, M. D., & Sibel, S. Y. (2020). Analysis, Evaluation, and Comparison of the

2007, 2013 and 2018 Chemistry Curriculum Learning Outcomes Based on the Revised Bloom's Taxonomy. *Bartın University Journal of Faculty of Education*, *9*(2), 264-278.

Yaz, Ö. V., & Kurnaz, M. A. (2020). Comparative Analysis of the Science Teaching Curricula in Turkey. SAGE Open. https://doi.org/10.1177/2158244019899432

Yıldırım, T. A. M. E. R. (2020). The Analysis of Chemistry Teachers Exam Questions in Regards to the Revised Bloom's Taxonomy and Their Comparison with OSYM Questions. *Pamukkale Universitesi Egitim Fakultesi Dergisi-Pamukkale University Journal Of Education*, (50)

Yuliana, F & Iwan, S. (2018). Students‟ perceptions towards National Examinations. A washback Study.

Zaidi, N. L. B., Grob, K. L., Monrad, S. M., Kurtz, J. B., Tai, A., Ahmed, A. Z., ... & Santen, S. A. (2018). Pushing critical thinking skills with multiple-choice questions: does bloom's taxonomy work?. *Academic Medicine, 93*(6), 856- 859.

Zapalska, A. M., Nowduri, S., Imbriale, P., Wroblewski, B., & Glinski, M. (2018). A Framework for Critical Thinking Skills Development Across Business Curriculum Using the st 21 Century Bloom's Taxonomy. *Interdisciplinary Education and Psychology, 2*(2), 2.

Zareian, G., Davoudi, M., Heshmatifar, Z., & Rahimi, J. (2015). An evaluation of questions in two ESP coursebooks based on Bloom's new taxonomy of cognitive learning domain. *International Journal of Education and Research*, *3*(8), 313-326.

APPENDIX I: CONSENT LETTER FOR PARTICIPANTS

CONSENT LETTER.

Department of Educational Psychology
Moi University
P. O. Box 3900,
ELDORET

Dear Participant,

Thank you very much for your willingness to listen to me. This research is meant to find out the utilization of Bloom's Cognitive Taxonomy of objectives in teaching and internal examination and its relation to academic performance in Nandi County, Kenya. Your assistance will enable the researcher to gather information on the utilization of Bloom's Cognitive Taxonomy in teaching and internal examination and its relation to academic performance. The results of the research would enable teachers and other stakeholders to understand the relationship between the use of Bloom's Cognitive Taxonomy of objectives in teaching and internal examination and its relation to academic performance, thus suggesting how learning conditions can be improved so as to improve academic performance.

Your responses will be highly appreciated. Please note that all the information you provide will be treated as confidential and will be utilized only for this research work. If you have any questions or need clarification, please contact the researcher at 0723970069.Thank you for your willingness to participate in this research.

Yours faithfully,

Yegon Bernard Kipkurui.

APPENDIX II: CONSENT LETTER FOR PRINCIPALS

This research is meant to find out the utilization of Bloom’s Cognitive Taxonomy of objectives in teaching and internal examination and its relation to academic performance in Nandi County, Kenya and therefore I understand that:

1. The choice of the school to participate in research is voluntary.
2. I may choose to withdraw my school’s participation at any time without any penalty.
3. Only teachers who consent will participate in the study.
4. All information obtained about the school will be treated with the highest level of confidence.
5. The school will not be identified in any written report about the study.
6. A report of the findings can be made available to the school upon request.
7. I may seek further information on research from Yegon Bernard on 0723970069.
8. Therefore, by signing this consent form, I freely agree that my school will participate in the study.

Principal..Sign............................. Date.....................

APPENDIX III: PERFORMANCE CHECKLIST

The performance checklist will be filled out by the researcher in the classroom.

Section I: Evaluation of Bloom's Cognitive Taxonomy in Teaching.

The researcher will check for the use of the following terms in 60 lessons in teaching; 12 teachers from 30 county schools and put a tick.

Discipline	List, define, name, arrange, outline, find	Describe, convert, explain, discuss, identify, classify	Sketch, illustrate, prepare, construct, solve	Differentiate, examine, compare, analyze, explain, criticize	Understand, evaluate, predict, determine, appraise	Compose, prepare, organize, create, formulate, design
Mathematics						
Computer study						
Business study						
C.R. E						
Chemistry						
English						
Total						

Section II: Evaluation of Bloom's Cognitive Taxonomy in Internal Examination

The researcher will fill the table below after analysing items collected from six subjects from 30 county schools selected by checking the usage of the following terms in each item. That is 720 question papers.

Item	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
1.						
2.						
3.						
4.						
5.						
n						
Total						

Section III: Academic performance of the students

The researcher will fill in the table below to show the academic performance of form three students from the 30 county public schools using the academic performance analysis of each of the six subjects collected from schools.

Subject:..

School (S)/Grade	**E**	**D-**	**D**	**D+**	**C-**	**C**	**C+**	**B-**	**B**	**B+**	**A-**	**A**
$\mathbf{S_1}$												
$\mathbf{S_2}$												
$\mathbf{S_3}$												
$\mathbf{S_{30}}$												
Total												

APPENDIX IV: THE TEACHERS' QUESTIONNAIRE

Utilization of Bloom's Cognitive Taxonomy in Teaching and Test Construction

I am a PhD student at Moi University doing a research study. The purpose of the study is to collect data on the relationship between teachers' utilization of Bloom's Cognitive Taxonomy in teaching and examination and students' academic performance in public secondary schools in Nandi County, Kenya. Your responses will be confidential. Thanks for your cooperation and time.

Please respond to each item in this questionnaire by putting a tick (√) in the box corresponding to your response.

SECTION I: PERSONAL INFORMATION

1. Please indicate your gender

a) Male ☐ b) Female ☐

2. What is your highest level of professional training?

a) Diploma ☐

b) Degree (Bachelor or Postgraduate) ☐

c) Masters degree ☐

d) PhD ☐

3. Which is your teaching subject (s)?

a) Mathematics ☐

b) Chemistry ☐

c) English ☐

d) Christian Religious Education ☐

e) Business Studies ☐

f) Computer Studies ☐

SECTION II: Test Construction

Put a tick (√) next to the response that is applicable.

1. Do you prepare tests in your teaching subject in your school?

a) Yes ☐ b) No ☐

2. How are end of term examinations prepared in your school?

i) Individual subject teachers prepare examinations for their class. ☐

ii) A group of teachers prepare the examination together. ☐

iii) The heads of departments prepare the examination ☐

iv) Utilize already externally developed examinations e.g. from excelling schools ☐

v) Any other (specify)……………………………………………………………

…………………………………………………………………………………………

SECTION III: Bloom's Cognitive Taxonomy

1. Do you in anyway use Bloom's Cognitive Taxonomy when:

i) Constructing tests for your students?

a) Yes ☐ b) No ☐

ii) Teaching in your class?

Yes ☐ No ☐

Section 1A: Bloom's statement in Examination

Please indicate your level of agreement or disagreement with the following statements regarding the examination you construct for your students, where:

SA is: Strongly Agree. **A** is: Agree. **U** is: Uncertain. **D** is: Disagree. **SD** is: Strongly disagree

In most of the test items I construct:	SA	A	U	D	SD
3) I require students to remember what I have taught them					
4) I expect students to understand information in their own words					
5) I require the students to utilize the knowledge taught to apply in new situations.					
6) I require students to break down knowledge taught into parts and show relationships.					
7) I expect students to make own evaluations based on a given criteria or standard.					
8) I expect student to createknowledge and create new relationships for new situations					

Section 1B: Bloom's Verbs in Examination

How often do you utilize the following verbs in your test items?

How often do you utilize the following verbs in your test items/questions?	**Very often**	**Often**	**Rarely**	**Very Rarely**	**Never**
9) List, define, name, arrange, outline, find					
10) Describe, convert, explain, discuss, identify, classify					
11) Sketch, illustrate, prepare, and					

demonstrate, construct, solve					
12) Differentiate, examine, compare, analyze, explain, and criticize					
13) Argue, understand, evaluate, predict, determine, appraise					
14) Compose, prepare, organize, create, formulate and design					

Section 1C: Bloom's Statements in Teaching

Please indicate your level of agreement or disagreement with the following statements regarding teaching and learning for your students, where:

SA is: Strongly Agree. **A** is: Agree. **U** is: Uncertain. **D** is: Disagree. **SD** is: Strongly disagree

During teaching in the classroom:	**SA**	**A**	**U**	**D**	**SD**
15) I require students to remember what I have taught them					
16) I expect students to understand information in their own words					
17) I require the students to utilize the knowledge taught to apply in new situations.					
18) I require students to break down knowledge taught into parts and show relationships.					
19) I expect students to make own evaluations based on a given criteria or standard.					
20) I expect student to createknowledge and create new relationships for new situations					

Section 1D: Bloom's Verbs in Teaching

How often do you utilize the following verbs in your teaching?

How often do you utilize the verbs in your teaching?	**Very often**	**Often**	**Rarely**	**Very Rarely**	**Never**
21) List, define, name, arrange, outline, find					
22) Describe, convert, explain, discuss, identify, classify					
23) Sketch, illustrate, prepare, and demonstrate, construct, solve					
24) Differentiate, examine, compare, analyze, explain, and criticize					
25) Argue, understand, evaluate, predict, determine, appraise					
26) Compose, prepare, organize, create, formulate and design					

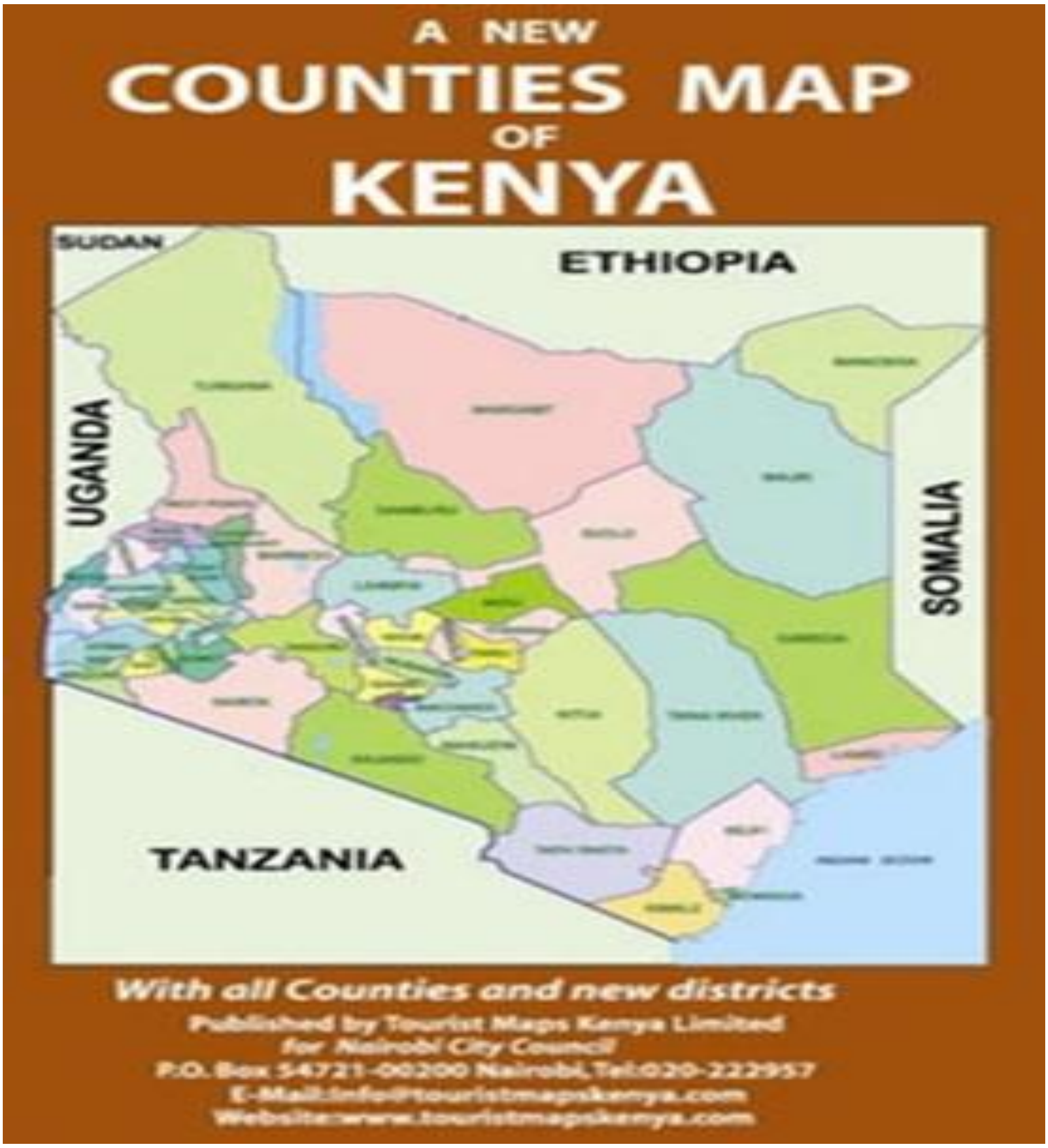
SECTION IV: Academic performance

i. Please provide a copy of the test you prepared for your form three students for the end of term in the current year to be used in this study.

ii. Kindly provide a copy of the analysis of results for your form three class for the end of term examination in the current year for use in this study.

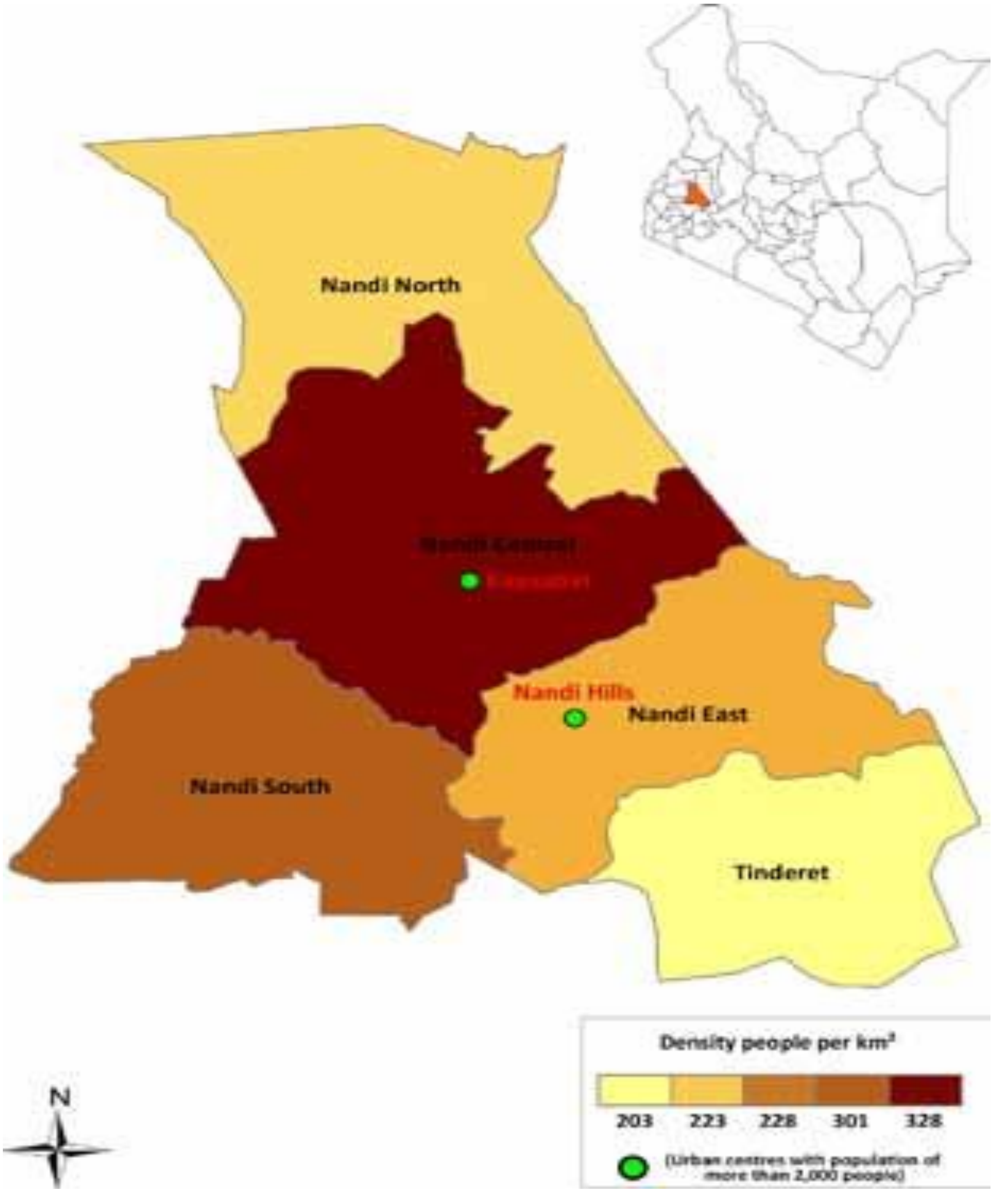
END
I thank you for your contribution to this important research.

APPENDIX V: LOCATION OF THE STUDY



Source: Kenya National Bureau of Statistics, 2013

APPENDIX VI:THE MAP OF NANDI COUNTY



Source: *Source: Kenya National Bureau of Statistics, 2013*

APPENDIX VII: NACOSTI RESEARCH PERMIT

NATIONAL COMMISSION FORSCIENCE, TECHNOLOGY ANDINNOVATION

Telephone: 020 400 7000,
0713 788787,0735404245
Fax: +254-20-318245,318249
Email: dg@nacosti.go.ke
Website: www.nacosti.go.ke
When replying please quote

NACOSTI, Upper Kabete
Off Waiyaki Way
P.O. Box 30623-00100
NAIROBI-KENYA

Ref No. **NACOSTI/P/17/43434/19476**

Date:**10th October, 2017**

Bernard Kipkurui Yegon
Moi University
P.O. Box 3900 - 30100
ELDORET.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Bloom's cognitive taxonomy in teaching and examinations and it's relation to academic performance in public secondary schools in Nandi County, Kenya"*** I am pleased to inform you that you have been authorized to undertake research in **Nandi County** for the period ending **9th October, 2018.**

You are advised to report to **the County Commissioner and the County Director of Education,Nandi County** before embarking on the research project.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit **a copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.

GODFREY P. KALERWA MSc., MBA, MKIM
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Nandi County.

The County Director of Education
Nandi County.

APPENDIX VIII: DIRECTOR OF EDUCATION, NANDI COUNTY PERMIT

REPUBLIC OF KENYA

MINISTRY OF EDUCATION
STATE DEPARTMENT FOR BASIC EDUCATION

Email: cdenandicounty@yahoo.com
Telephone: 0773044624
When replying please quote

COUNTY DIRECTOR OF EDUCATION,
NANDI
P.O BOX 36 – 30300,
KAPSABET.

Ref:NDI/CDE/RESEARCH/1/VOL.II/58

DATE: 24th October, 2017

Bernard Kipkurui Yegon
Moi University,
P.O Box 3900 - 30100,
ELDORET.

RE: RESEARCH AUTHORISATION

The above named person has been granted permission by the CDE to carry out research on ***"Bloom's cognitive taxonomy in teaching and examinations and its' relation to academic performance in public secondary schools in Nandi County, Kenya,"*** in for the period ending **9th October, 2018.**

Kindly provide him all the necessary support he requires.

For: County Director of Education NANDI COUNTY

Odongo J. O
For: County Director of Education
NANDI COUNTY

APPENDIX IX: THE NANDI COUNTY COMMISSIONER PERMIT

THE PRESIDENCY

MINISTRY OF INTERIOR AND COORDINATION OF NATIONAL GOVERNMENT

Tel: 053 52621, 52003, Kapsabet
Fax No. 053 – 52503
E-mail:
nandicountycommissioner@gmail.com
When replying, please quote

Ref: No.NC.EDU/4/1/VOL.IV/(147)

HARAMBEE

County Commissioner's Office,
Nandi County
P.O. Box 30,
KAPSABET.

12th March, 2018

Bernard Kipkurui Yegon
Moi University
P.O. Box 3900-30100,
ELDORET.

RE: RESEARCH AUTHORIZATION

This is in reference to letter No. NACOSTI/P/17/43434/19476 dated 10th October, 2017 from the Director General/CEO, National Commission for Science, Technology and Innovation on the above subject matter.

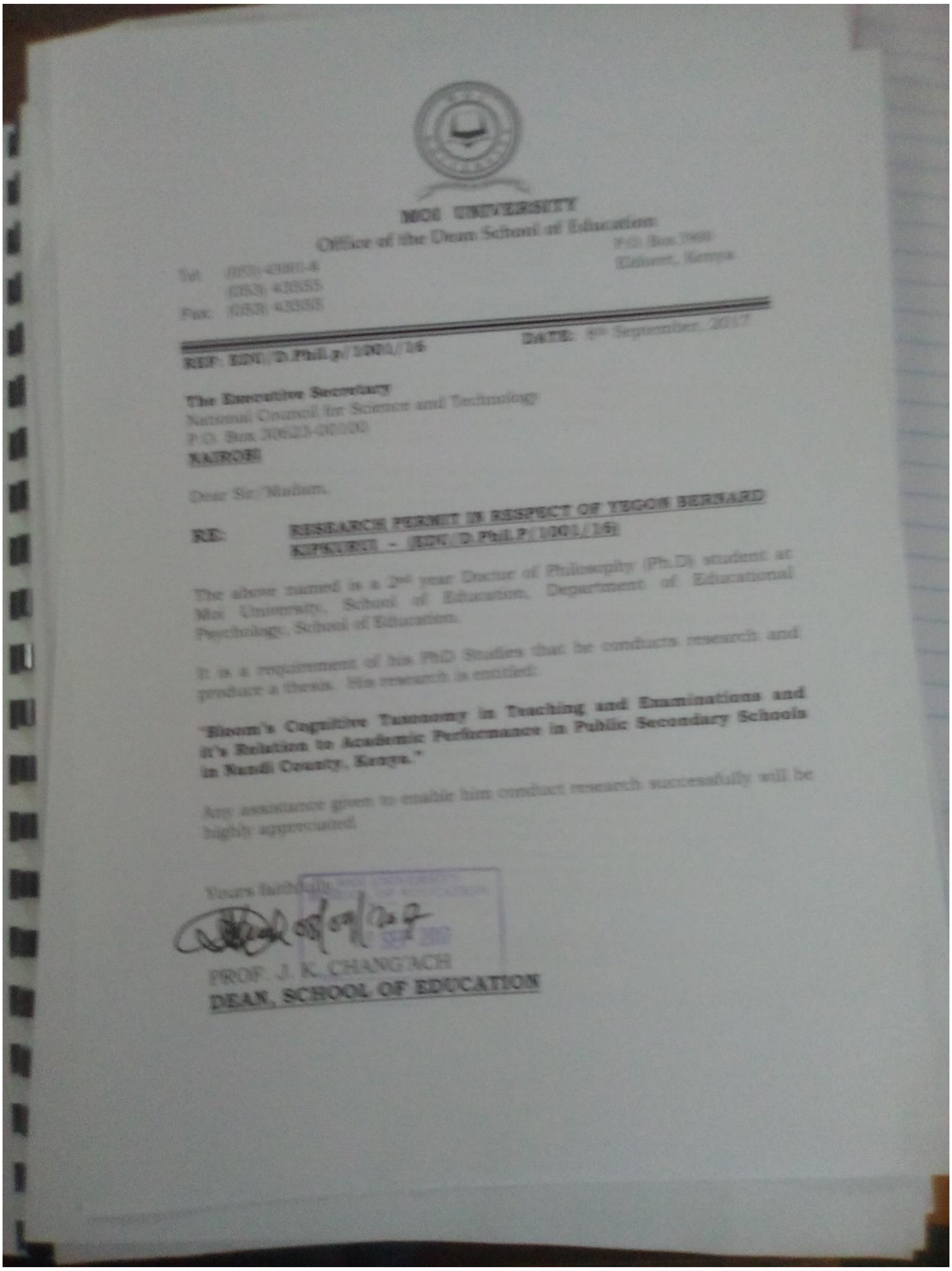
You are hereby authorized to conduct a research on **"Bloom's cognitive taxonomy in teaching and examination and it's relation to academic performance in public secondary schools in Nandi County"** for the period ending 9th October, 2018

Wishing you all the best.

THE COUNTY COMMISSIONER NANDI.

JACINTAH K. MUKHULA,
For: COUNTY COMMISSIONER
NANDI.

APPENDIX X: AN INTRODUCTORY LETTER FROM MOI UNIVERSITY



MOI UNIVERSITY
Office of the Dean School of Education

Tel: (053) 43001-8
(053) 43555
Fax: (053) 43555

P.O. Box 3900
Eldoret, Kenya

REF: EDU/D.Phil.p/1001/16

DATE: 8th September, 2017

The Executive Secretary
National Council for Science and Technology
P.O. Box 30623-00100
NAIROBI

Dear Sir/Madam,

RE: <u>RESEARCH PERMIT IN RESPECT OF YEGON BERNARD KIPKURUI - (EDU/D.Phil.P/1001/16)</u>

The above named is a 2nd year Doctor of Philosophy (Ph.D) student at Moi University, School of Education, Department of Educational Psychology, School of Education.

It is a requirement of his PhD Studies that he conducts research and produce a thesis. His research is entitled:

"Bloom's Cognitive Taxonomy in Teaching and Examinations and it's Relation to Academic Performance in Public Secondary Schools in Nandi County, Kenya."

Any assistance given to enable him conduct research successfully will be highly appreciated.

Yours faithfully,

08/09/2017

PROF. J. K. CHANG'ACH
DEAN, SCHOOL OF EDUCATION

APPENDIX XI: ANTI-PLAGIARISM CERTIFICATE

SR072

EDU 999 THESIS WRITING COURSE

PLAGIARISM AWARENESS CERTIFICATE

This certificate is awarded to

YEGON BENARD KIPUKURUI

EDU/DPHIL.PGP/1001/16

In recognition for passing the University's plagiarism

Awareness test with a similarity index of 2% and

Striving to maintain academic integrity

Awarded by:

Prof. John Changách, CERM-ESA Project Leader

23rd /05/2022