# STUDENT'S ATTITUDES IN TEACHER TRAINING COLLEGES IN THE NORTH WEST REGION TOWARDS TEACHING OF STATISTICS.

**Thesis in Curriculum and Evaluation defended on the 1st of December 2023, Faculty of Education.**

## Specialty: developer and evaluator of curriculum

*Thesis presented and defended on 1st December 2023*

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# CERTIFICATION

This is to certify that this work entitled "Student's attitudes in teacher training college in the north west region towards teaching of statistics." was written by **BAFON RICHARD MKONG (14Z3428)** of the department of curriculum and evaluation faculty of Education University of Yaoundé 1. I am solely responsible for any shortcomings that might be found in this work.

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# DEDICATION

This work is dedicated to:

My daughter Bafon Chinue Florence Yaya, my son Bafon Richy Reagan Mkong and to

My wife Ngek Ernestine Yeaseh

# ACKNOWLEDGEMENTS

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# LIST OF ABBREVIATIONS

AR          :           Attribution Retraining

ASTS        :           Attitude Scale toward Statistics

ATS         :           Attitude toward Statistics

CBM         :           curriculum-based measures

CIPP        :           Context, Input, Process, Product

CTT         :           Classical Item Theory

DV          :           Dependent variable

EFA         :           education for all

FGTTC       :           Full Gospel Mission Teacher Training College

GTTC        :           Government teachers training college

ICMS        :           Inventory of Classroom Management Style

ICOTS       :           International Conference on the Teaching of Statistics

IDV         :           Independence variable

IMS         :           Institute of Mathematical Statistics

IQs         :           Intelligent quotients

IRT         :           Item Response Theory

PTTC        :           Presbyterian Teachers' Training College),

SATS        :           Survey of Attitudes toward Statistics scale

SES         :           Socio-economic status

SJCCC       :           St. Joseph Catholic Comprehensive College

TAT         :           Thematic Apperception Test

TTC         :           Teacher Training Colleges

# ABSTRACT

The study titled "*student's attitudes in teacher training colleges in the North West region towards teaching of statistics*" was aimed at finding out how P Students Attitude act as a determinant to academic achievement in statistics in Teacher Training Colleges. The study made use of a survey design. The sample population of this study constituted 258 Students selected from teachers training colleges in Mezam Division and Donga Mantung division (private denominational and public). Data were collected by the use of questionnaires and interviews. The validity of instruments was ascertained by discussing the questionnaires with the supervisor and the reliability of the instruments used was attained through a pilot study where the researcher first tested and rested the questionnaires with at least 10 members from the main respondents. Data were collected, sorted and entered into a computer for further analysis. SPSS (Statistical Package for Social Science version 21) software was used for data analysis and interpretation. Descriptive statistics such as, mean and standard deviation were used. In addition, findings were presented in form of tables. After analyzing the data collected, using Pearson's correlation coefficient some of the hypotheses were rejected and some accepted as: With the result of this analysis hypothesis one, the null hypothesis was accepted and the alternative hypothesis rejected. This result therefore means that there is no significant relationship between students' value and students' academic achievement in statistics, hypothesis two, and the result of this analysis shows that, the null hypothesis was accepted and the alternative hypothesis rejected, meaning there is no significant relationship between students' value and students' academic achievement in statistics. Hypothesis three after analyzing the null hypothesis was rejected and the alternative hypothesis retained. This signifies that there is a significant relationship between students' cognitive competence and academic achievement in statistics. Hypothesis four, the null hypothesis was accepted and the alternative hypothesis rejected, showing that there is no significant relationship between classroom assessment practices and students' academic achievement in statistics. Hypothesis five, after analyzing, the null hypothesis was rejected and the alternative hypothesis retained. Confirming that there is a significant relationship,between students' effort and students' academic achievement in statistics. Lastly, the results of the study revealed both positive and negative relationship as seen from the hypotheses. From the conclusion drawn, the researcher recommended teachers, students, counselor, curriculum designers, and some practical ways of teaching statistics to reduce students' negative attitude towards statistics. To sum up the present study, effort and cognitive competence can be regarded as direct factor in bridging the relationship between attitude and academic achievement while classroom management, assessment practices and values might not necessary determine academic achievement.

**KEY WORDS**: *Students Attitude, classroom management, effort, assessment practice cognitive competence value and Academic Achievement.*

# RESUME

L'étude intitulée « la pédagogie statistique et l'attitude des étudiants en tant que déterminants de la réussite scolaire dans les instituts de formation des enseignants de la région du Nord-Ouest du Cameroun » visait à découvrir comment la pédagogie et l'attitude des étudiants agissent comme un déterminant de la réussite scolaire en statistiques dans les instituts de formation des enseignants. L'étude a utilisé un plan de sondage. L'échantillon de population de cette étude était constitué de 258 étudiants sélectionnés dans les écoles normales des enseignants de la département Mezam et de la département Donga Mantung (privées confessionnelles et publiques). Les données ont été recueillies à l'aide de questionnaires et d'entretiens. La validité des instruments a été vérifiée en discutant des questionnaires avec le superviseur et la fiabilité des instruments utilisés a été atteinte grâce à une étude pilote où le chercheur a d'abord testé et reposé les questionnaires avec au moins 10 membres des principaux répondants. Les données ont été collectées, triées et saisies dans un ordinateur pour une analyse plus approfondie. Le logiciel SPSS (Statistical Package for Social Science version 21) a été utilisé pour l'analyse et l'interprétation des données. Des statistiques descriptives telles que la moyenne et l'écart type ont été utilisées. De plus, les résultats ont été présentés sous forme de tableaux. Après avoir analysé les données recueillies, en utilisant le coefficient de corrélation de Pearson, certaines hypothèses ont été rejetées et d'autres acceptées comme suit : Avec le résultat de cette hypothèse d'analyse, l'hypothèse nulle a été acceptée et l'hypothèse alternative rejetée. Ce résultat signifie donc qu'il n'y a pas de relation significative entre la valeur des élèves et la réussite scolaire des élèves en statistique, hypothèse deux, et le résultat de cette analyse montre que, l'hypothèse nulle a été acceptée et l'hypothèse alternative rejetée, ce qui signifie qu'il n'y a pas de relation entre la valeur des élèves et la réussite scolaire des élèves en statistique. L'hypothèse 3 après analyse de l'hypothèse nulle a été rejetée et l'hypothèse alternative retenue. Cela signifie qu'il existe une relation significative entre la compétence cognitive des élèves et la réussite scolaire en statistique. Hypothèse quatre, l'hypothèse nulle a été acceptée et l'hypothèse alternative rejetée. Montrant qu'il n'y a pas de relation significative entre les pratiques d'évaluation en classe et la réussite scolaire des élèves en statistiques. Hypothèse cinq après analyse, l'hypothèse nulle a été rejetée et l'hypothèse alternative retenue. Confirmer qu'il existe une relation significative entre l'effort des élèves et la réussite scolaire des élèves en statistique. Enfin, les résultats de l'étude ont révélé des relations à la fois positives et négatives, comme le montrent les hypothèses. À partir de la conclusion tirée, le chercheur a recommandé des enseignants, des étudiants, des conseillers, des concepteurs de programmes et des moyens pratiques d'enseigner les statistiques pour réduire l'attitude négative des scolaires étudiants envers les statistiques. Pour résumer la présente étude, l'effort et la compétence cognitive peuvent être considérés comme un facteur direct pour établir un lien entre l'attitude et la réussite scolaire, tandis que la gestion de la classe, les pratiques d'évaluation et les valeurs pourraient ne pas nécessairement déterminer la réussite scolaire.

**Mots Clés :** *Attitude des élèves, gestion de la classe, effort, évaluation pratique valeur de la compétence cognitive et réussite*

# GENERAL INTRODUCTION

Teacher's training colleges in cameroon is under ministry of the Secondary education it is considered an important sub-sector in the educational system as well as for the development of the country's future instructors or teachers who are the pilot for literacy advancement of any society in the world and Cameroon in particular. For instance, inputs into secondary education and in the labour force in Cameroon depend on qualified outputs from secondary schools most especially the quality of training which bring forth quality teachers for future generation. The importance of teacher training education as a sub-sector is also evident in the either primary schools as well as Secondary Education in Africa Initiative report. In the report, interests in raising demand for teachers training education to accommodate the pupils completing primary education are highlighted. According to Vavrus (2009), improving the quality of teachers' education is considered important for educating the needed work force for different sectors in member countries including Cameroon.

Students attitude toward Statistics is an essential component of their background, after their college preparation and completion students may carry out academic and professional activities. He also carried out a critical review about students' attitude towards statistics and described some test utilized to measure it in several kinds of students. In the course studied, and other factors such as gender, affect the studying process in statistics. He applied a new test to measure students' attitude toward statics with three dimensions or aspects, effort, value, cognitive competence of trainees. Moreover, studies also show a relationship between the attitude toward statistic and academic achievement in training institutions taken the case of teachers training colleges in Cameroon A more noticeable issue in research into attitudes toward statistics is that these do not consist of a single unitary construct, but rather a large number of sub constructs all of which contribute in changing proportions toward an individual's attitudes technology. These include the perceptions of the statistics students and teachers; anxiety toward statistics; the value of statistics; self-esteem; motivation; enjoyment of statistics ; attitudes of peers; attitudes of parents; the nature

of the classroom environment; achievement in statistics; and Fear of failure. They are psychological constructs, and therefore they can only be detected by indirect methods. Attitudes of students towards statistics manifest themselves in different ways. Their manifestations are linked to concepts such as students' cognitive competency, effort and perceptual value. An important aspect of how we perceive objects or people has to do with what we think they are or should be Morris (1973). How technology is perceived depends on what students themselves think technology is. So, because people are limited in what they can perceive, they are highly selective in whatever they choose to perceive and that which is relevant to them. In this process of filtering, different people will react differently even when they are from the same physical environment. They would not always have the same experiences, hence attitude. Attitudes therefore relate to the way we act or react. The way we perform our thinking (cognitive) is what results in our attitudes. Our actions towards statistics therefore depend on our attitudes. Regarding this, Breakwell and Beardsell (1992) have also reported on the importance of the classroom management as an important factor on students' tendencies to engage in social or antisocial activities. Hence, students are more likely to display unselfish and good social personality traits if their teachers instill these in their classrooms. Attitudes towards statistics and the literature for some decades now, poor academic achievement in statistics results are associated more with the cognitive competence, effort with the affective domain. A number of research studies Simpson et al (1990) conducted on students' poor achievement in Statistics reveal that poor achievement in statistics is not attributable to inherent characteristic of student populations. Other researches like Schau et al (1995), investigating students' attitude toward statistics, have reported the problem to be a dissatisfying interest in these learning areas among students. What they revealed is the fact that effort, cognitive and achievement factors were influenced by non-cognitive factors. It became necessary therefore to investigate these factors in order to explain why students do or do not like Statistics courses. This study is to determine why those who eventually register never obtain good grades. Interest in this area of research has resulted in studies that have investigated students' attitudes towards statistics. As a result, a number of scales were developed to measure the attitudes.

In another sense however, as Miller et al (1993) has pointed out: Despite the recognition that Attitude toward statistics are a significant output of statistics teaching and relevant variable is students' cognitive learning of statistics. This was one of the 'driving forces' and motivating factors for the present study that is investigate students' attitudes toward statistics. The difference

here was to establish the relationship of the students' attitudes with the school environment, and their teachers.

Furthermore, an important argument concerning students' Attitude toward Statistics is that, as an essential component of their background, after their college preparation and completion students may carry out academic and professional activities. He also carried out a critical review about students' attitude towards statistics and described some test utilized to measure it in several kinds of students. In the course studied, and other factors such as gender, affect the studying process in statistics. He applied a new test to measure students' attitude toward statics with three dimensions or aspects, effort, value, cognitive competence of trainees. Moreover, studies also show a relationship between the attitude toward statistic and academic achievement in training institutions taken the case of teachers training colleges in Cameroon.

The research will examine the correlation between students' attitudes and academic achievement Other seminal works relating attitude toward statistics are the scale of Wise and the scale of Auzmendi (1992) both use to collect the most relevant characteristics of the students regarding their attitude toward statistics, and their difficulties with the statistics component and prejudice to the subject. From them, some other works have been derived. One of the scales is used to measure the affective relationship with learning and cognition, and the other one is for measuring the perception of the student to the use of statistics the empirical review of literature will based on the various indicators of attitude like effort, value and cognitive competence relation to academic achievement. Attitude According to Anderson (1985) is a moderately intense emotion that predisposes a learner to respond consistently in a favorable or unfavorable manner when confronted with a particular course. It is therefore a mental (cognitive) state used by students to structure the way they perceive their environment as well the course will guide the way in which they respond or a psychological construct comprised of cognitive, affective, and effort components.

Students attitudes on statistic also is a strongly held beliefs that reflect people's opinions and feelings and can be sometimes manifested in behavior towards a subject. According to Chambers et al (1986) have shown that students feelings and cognitive information are critical aspects in the formation of attitudes, and that these are critical components of understanding. Student's attitudes in statistics, behavior and feelings found by some researchers like Christa,

(2001), linked such that student's attitudes determine their behavior toward a course and people they meet influence even the relationships that exist among themselves. Attitudes therefore have, three elementary components: The cognitive component, effort component and the value component.

From this importance, secondary education via teacher training colleges has recently risen awareness among people in Cameroon and the demand to access this education has grown (Circular N°1418 MINESEC OF 1st August 2008). The growth in demand has created the need to build more teachers training schools in the country in order to expand access opportunities among the children in the country. To upgrade the status of our country as one of an emergent Moreover, from September 2018, Competency-Based Approach (CBA) or teaching of integration was implemented fully in both nursery and primary schools nationwide

Assessment practice is a generic term for a set of processes that measure the outcomes of students' learning, in terms of knowledge acquired, understanding developed, and skills gained. It serves many purposes. Assessment provides the means by which students are graded, passed or failed. It provides the basis for decisions on whether a student is ready to proceed, to qualify for an award or to demonstrate competence to practice. It enables students to obtain feedback on their learning and helps them improve their performance. It enables staff to evaluate the effectiveness of their teaching as in Boud and Falchikov (2007) in (Moges Logaw,(2009). Other findings demonstrates that, there is neither a single method that, would fully measure key competences and transversal skills, nor serve as a best practice for student assessment. Several methods and types of assessment need to be used to assess various skills comprehensively. The effectiveness of a method depends on its purposes and design, as well as on schools and teachers' capacity to use it. In addition, there is no universal combination of methods that serve as a recipe. Teachers can be rather flexible in their choice of methods as long as these assessment approaches serve multiple purposes and follow the principles of validity, reliability and equity (Assessment practices for 21st century learning: review of evidence).

Brown (2002), highlights classroom assessment as one of the most crucial aspect in teacher professional development needs. Consequently, understanding teachers' ideas, views, perceptions and beliefs about assessment as well as the challenges associated with classroom assessment practices, is absolutely essential in planning and implementing appropriate teacher professional

development.  Teachers work in an intricate profession in which they are compelled to alter or preserve their evolving practice in relation to a wide range of factors. They often deal with external and internal contextual factors, such as student characteristics; how well they do this mediates the effect of their actions as in Adams, (2002). The understanding portrayed here assumes that teachers, irrespective of their level of experience and competence, make what seem to them rational choices and decisions that reflect their attempts to promote students' learning (Adams, 2002). Given that, assessment practices influence whether learners adopt a deep or surface approach to learning, the routine assessment techniques the learner is subjected to need to be those that foster deep learning. Surface learning is easy to achieve, for example, through relying heavily on an examination-oriented curriculum that rewards learners for ability to reproduce knowledge Sutherland and Peckham, (1998). Deep learning, on the other hand, is achieved by constructive or alternative assessment practices (Geyser as cited in Fourie-Malherbe & Strydom, (2016). In other words, assessment should be *for* rather than *of* learning only, such that it provides an experience for learners to learn *from*, that is, promote deep learning.

According to Meyer et al (2009) there are two distinct purposes of assessment: assessment of learning, and assessment for learning. Assessment of learning involves measuring what and how much students have learned, tied to specific learning outcomes, which they derived from the graduate profile.

The illiterate of the 21st century will be those who cannot learn, unlearn, and relearn. What graduates of secondary education and training programs should know and, most important, able to do is facing an increasingly competitive global economy. There is a lot of emphasis by the stakeholders on the important of graduating students from teachers training schools with the knowledge, competences, attitudes and skills that will make them successful in the labour markets that always require the capacity to acquire new knowledge and skills, also the readiness to take initiative and the ability to contribute to innovations in products and processes. Most middle-income countries have reformed their education, and training systems, focusing on the quality and relevance of learning outcomes. It is also an indispensable tool for providing adolescents with key skills and competencies to become productive citizens, capable of living healthy lives and contributing to the development in their society. The adaptation policy in the development of post - primary education whose main objective was mass education; the advisory committee issued a

special memorandum on this aspect of the adaptation policy. They pointed out that intelligent participation of the masses in the overall development of the respective African societies was of paramount importance. "the general health of the whole community, only be secured and maintained if the whole mass of the people has a real share in education and has some understanding of its meaning and its purpose" Fonkeng, (2012).

Mass education is very important in preventing the disintegration of African society under the influence of western civilization. Westernization tended to isolate the young educated people from their families and from their communities as a whole. The young men learn new ideas, acquired new habits and customs and habits which could not be applied in the solution of the problems in the immediate environment. This was usually when emphasis was placed on academic or "bookish" education a thing decried by the Cambridge conference on Education in 1952. Adult should not be left out and isolated from the main stream of education mass.

It also recognized the importance of quality education for the political development of the people. By political development, it implies "true democracy" and the rising hope of self-government. It was recommended that "in order to progress towards self-government in the modern world, colonial peoples must learn to read and to understand, not only about their local affairs but those of wider import. This mass education was to prevent local government to be on a wide and democratic basis, and so could not be left in the hand of a mass of ignorant and illiterate people.

Mass education, political development and the raising of native leadership were quite compatible with one of the main aspects of British colonial policy applied in southern Cameroon and in other parts of West Africa and which was already referred to as the system of indirect rule. Providing school age children with quality education is the most important stepping stone out of poverty. Education will permit them to develop their potentials and contribute their ideas and talents to the society in which they live as well as participating in decisions on what affect their lives (Fonkeng 2010). Secondary education in Cameroon has always suffered from supply and demand of effective learning and effective teaching leading to low- or poor-quality secondary education. They have nonexistence of supply equal to demand. This secondary school is made up of first and second cycles. The suppliers of training in education were by the public, the lay private and denominational (confessional). The confessional was the first to open training schools in

Cameroon in 1844 after a long struggle by the elite and other missionaries were and with a sizeable class, easy to control than the public school which are always congested and followed in 1949 and 1959.

The teachers were from Britain and France, the teachers were just ordinary people without formal training to become the main pillars of education. The rate of demand was too low as compare to present situation even primary school demand was also low especially among the girls. The mission opened a school for boys before the girls in 1950s. The history of education in Cameroon throughout this period was exclusively the history of the activities of Europeans and Jamaicans with the native himself playing only a passive role. The lack of trained native agents was a big problem as seen in other countries were the missionaries expand their activities. They saw the training of native agents as one of their priorities. The question was whether to educate a few natives who would later be used to educate the majority. An alternative course was to strike a balance between educating a few but without, to an undesirable sacrificing the interest of the majority.

In 1876, there was a proposal for a normal college (teacher training school) and an industrial college in Cameroon. This proposal was made (32) thirty-two years after the introduction of secondary education in the territory. According to Fonkeng (2010) if the plan had materialized, it would have positively influence the history of education in Cameroon. Many conditions were lacking to justify the establishment of secondary education: They were too few primary (education schools, low enrollment and too few teachers were available Cameroon was not yet the colonial possession of any European power, which could have assisted financially in the running of such an institution. The native or Cameroonians were not in any position to make a significant financial and material contribution to the development of this institution.

The law of education of April 14, 1998 is one of the major landmarks which present quality education as of the greatest national priority. The objectives announced here made reference to quality education for all, without discrimination but this had not been possible for as most parents are unable to enrol their children into school and ensure an education adapted to needs. These objectives are a response to the fight against educational exclusion reduces inequalities and promote the professionalization of quality education. The services of quality education include basic literacy, craft skills, professional training and research and It is also the only services that

every family must have daily contact for several years. Education employed a great significant of trained manpower. There is great migration in Cameroon both internal and external that is, moving from low opportunity area to high opportunity areas. This movement is based on essentially a search for quality education, differential wage rate, and the probability of obtaining employment and improved life style. This movement is usually a barometer of quality education and training change caused by inequality desperation, deprivation or shattered dreams due to the quality of education obtained. The children of the migrants always have an impact on educational development.

Our educational system is made up of formal, non-form, and informs education. World-Bank, (2008) became involved in non-formal education in order to ameliorate the quality of education in Cameroon. All knowledge and skills acquired through any organized training outside the formal school system, is non-formal education. It is carried out for a specific purpose, for specific knowledge and skills and specific clientele. It serves more or less the immediate needs, offers equal opportunities to its beneficiaries and is less costly. To Coombs and Ahmed non formal education is anything any organized, systematic education activity carried on outside the frame-work of the formal system, to provide selected types of learning to particular subgroups in the population, adult as well as children. The examples of non-formal education are agricultural extension and farmer training programs, adults literacy programs occupational skills training given outside the formal education youth clubs with substantial educational purposes, and various community programs of instruction in health, nutrition family planning and cooperative. But here we concern with formal education especially the quality secondary education in Cameroon. Research on teaching and students' attitude is attracting many scholars today.

The general observable cry in Cameroon society today is that, most of our graduates from teacher training colleges and numeracy competencies standard are fallen. Most candidates have negative impression or attitude in subject dealing with number of factors. Primarily , instructional strategies (teaching and learning methods) adopted by the teacher in teaching and by pupils in learning; inadequacy in statistics problem solving prevailing reading and writing difficulties, inadequacy of assessment skills of teacher, inadequacy of assessment activities of teachers, classroom assessment and classroom assessment practices, etc… leaving them without any viable option for their future. Identification of statistics assessment and evaluation strategies related to

the results of statistics  in particular and the results in general is essential to rectify this problem. Filling this closing gap will ensure a potential transition of learners from primary to secondary schools with a sound mastery of problem solving and understanding basic notions in mathematics and the knowledge, skills acquired should be properly applied in real life situations in order for them to be competent so in this light teachers need to have a sound training so as to prepare learning in future as well erasing the mixed feelings towards some subjects case of statistics.

The Findings from this study will be useful to those who design curricula as well as to the various stakeholders (policies implementers, teachers, students and parents). This study will present findings of a study to be carried in 6 selected random teacher training colleges in either public, lay private or confessional with a sample population of 256 student teachers from the North West Region of Cameroon precisely in Mezam and Ndonga Mantung Divisions. A simple survey design will be adopted for the study for the final year students will be given both a questionnaire and a mathematics test that    will be filled and solved respectively. Furthermore, data will be elicited from teachers through interviews and focus group discussion. Relevant literature classroom assessment practices and classroom management will be reviewed. This is proven by the numerous scientific publications on the topic. Nevertheless, a wide range of literature was collected in order to study students and its academic achievement in statistics in general. This review made it possible to appreciate research findings concerning statistics pedagogic and students' attitude in academic achievement. The reviews are systematically arranged in different sub headings in accordance with the research hypothesis.

**Thesis Structure**

This study is organised into six chapters with chapter headings and sub divisions but presently the research project will be outlined here in three chapters only while waiting corrections and validation of the work that should be done by the faculty; the researcher could then do the two others chapters.

**Chapter 1**- introduction

Background to the study, Statement of the problem, Purpose of the study, Objectives of the study, Research questions, Assumptions of the study, Significance of the study, Delimitations of

the study, Limitations of the study, Ethical and legal considerations, Budgetary plans and implications, Operational definition of terms, Chapter Summary.

**Chapter 2**- **review of related literature:** introduction, Conceptual review and Empirical review, theoretical framework, Chapter Summary.

**Chapter 3- research methodology:**

Chapter introduction, Research design, Area of study, Population of the study, Sample and Sampling procedures, Instrumentation, Validity of the instrument, Reliability of the instrument, Administration of the instrument, Data collection procedure, Data coding schedule, Data analysis procedure, Chapter Summary.

**Chapter 4:** The presentation of data and analysis:
Chapter introduction, General Description of Data/Variables, Hypothesis-by-Hypothesis presentation of Result, Summary of Results.

**Chapter 5:** Findings, Conclusion and Recommendations**:**

Lastly, the work ends with a general conclusion. In this conclusion, summary of findings is done and suggestions proposed in an effort to support the optimist viewpoint of innovation for development. Figure 1 is a diagrammatic configuration of this research.

General Introduction

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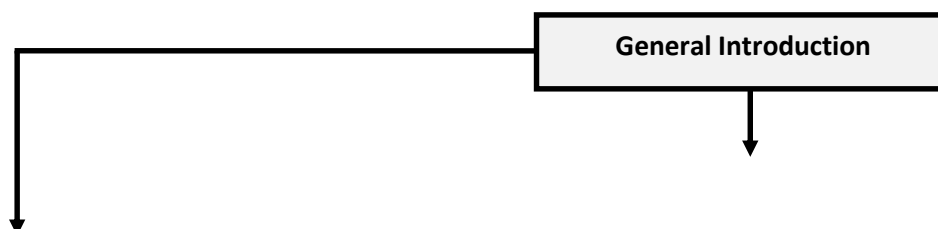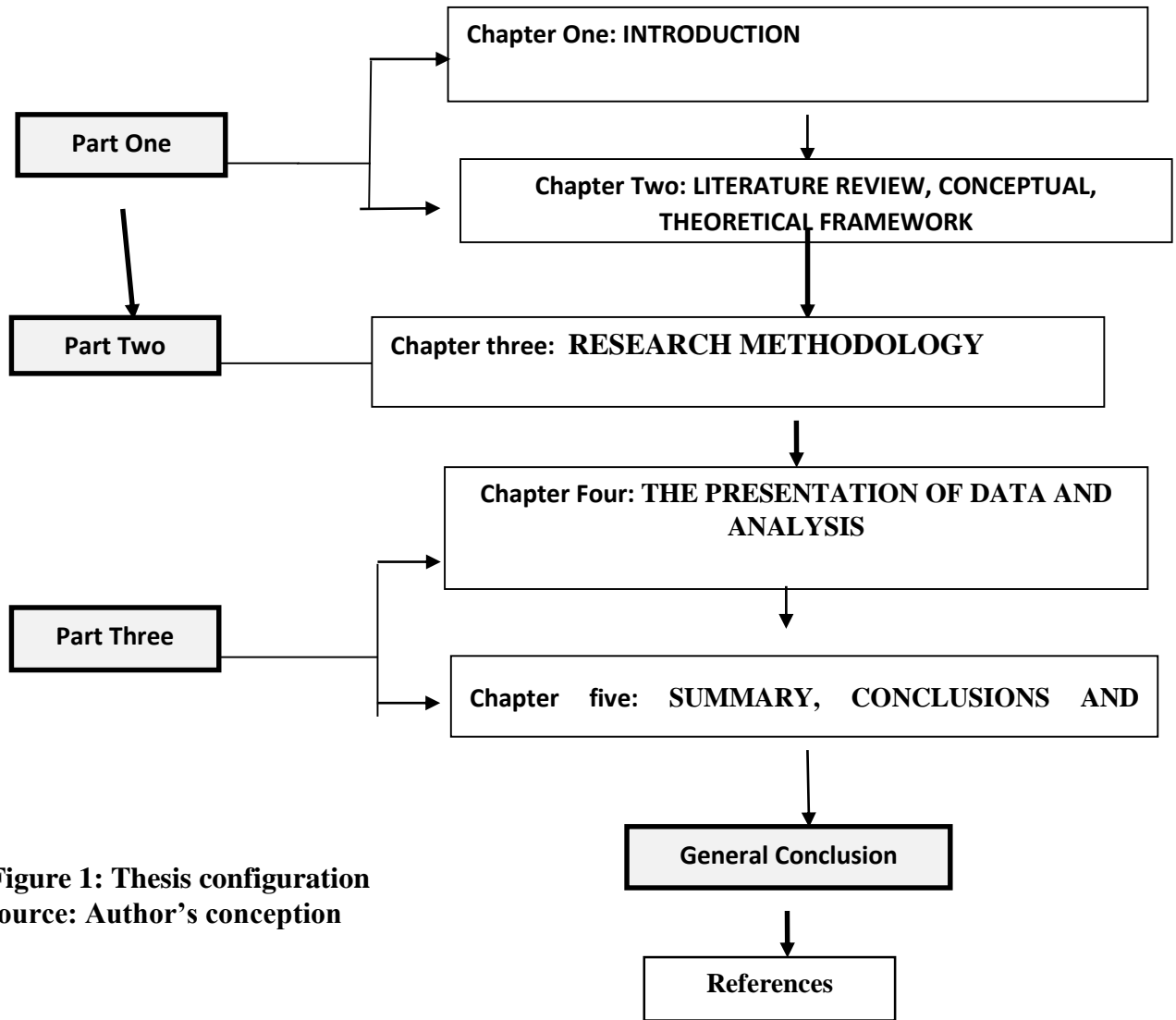
**Figure 1: Thesis configuration**
**Source: Author's conception**

# CHAPTER ONE

# INTRODUCTION

## 1.0 : Introduction

This chapter covers background of educational system in Cameroon in the first part, historical evolution of the variables in the study, contextual background, and statement of research problem followed by the research objectives, research questions and hypotheses, justification of the study, significance of the study, scope of the study, definition of key terms. This chapter gives the perceived boundaries or limitations within which the study will be focused, the content and organization of the proceeding chapters is presented to give an overview structure of the work.

*Keywords: Students Attitude, classroom management, effort, assessment practice cognitive competence value and Academic Achievement.*

## 1.1 :Background to the study

The education of an African child was the responsibility of every member of the society. Prior to the arrival of European missionaries and colonization, education in many African countries including Cameroon were informal. African children learned customs and traditions of their tribes through words, from mouth to mouth.Education in Africa, according to Akinpelu (1981), was to "reinforce the social ethnic existence of tribes in any particular country, and to prepare children and young people for their place in society". The attitude of African trainee's teachers training is a called for concerns and curriculum  designers has to designd the curriculum or programs that will  suite  the norms,  the needs and assesement  practices of  learners in any given society, so the society as well as the needs of learners will contribute to the instructional content of the curriculum ( mkong 2021).

Cameroon has recently been in demise of education failures termed from the facts trainee upon graduation are unable to give what is espected of them. If gauged through the trainee's performance in national examination like ordinary level, campiempt mock the evidence is clared throught poor performance in statistics. This problem is track far back in (O/L) for secondary school leavers in subject related to figure like statistics. The trend of the results from study seems to pose serious challenges for the future development of teachers in the country.  We appreciate the fact that education is a backbone for development of any country. Hence, the tendencies on the

achievement of the students tell a lot in relation to future generation.  For instance, while most students could not access education in 2005 and the previous years, yet from 2006 things changed. The government decided to work on the numbers through ensuring that most young people go to schools.  The drive was important, in that increment of numbers of student was noted, since more schools were built attracting thousands of students in the entire country.  The schools built are noted to have been on top record in Cameroon and has gone beyond the construction of other African countries. Moreover, the construction of these schools was done within the national budget with half of the funding originating from the people.  It was a crucial move to revamp education in Cameroon and the re-opening of teacher training colleges. More higher teachers training colleges are opened with several universities in almost all the regions in Cameroon. These Universities cannot function without secondary education progressing to high schools and into university. These movement is through academic performance like the O/L and the A/L, BEPC and the BAC, Students cannot be enrolled into training without any of the above certificates. Cameroon is not yet able to provide frees education at all level of education like in the public primary which is limited in supply due to her socio-economic status leading to poor quality outputs such as the grades at the O/L certificate examination in the Cameroon G C E.We note that while schools were built, some efforts were made to increase the number of teachers. Irrespective of the perceived concerns by various educational stakeholders, what was made was positive for ensuring a beginning of more numbers in schools.

Further, the government put in place long-term plans for ascertaining enough numbers of teachers in the end. The attempt made by the government provides a prediction to end the teachers' problem in Cameroon by the end of 2014/2015.  Currently, the ministry of education recruits about 25,000 teachers from both tertiary and universities.  Without doubt, determinants of academic achievement of students at the teachers training institutions have been subject of intensive research over the last thirty (30) years (Head, 1990). In fact, number of factors has been identified as contributing to the academic achievement of students' training schools in Cameroon. This has become a recurrent phenomenon which has militated against the smooth transition from the secondary level department of training primary school teachers to the tertiary level. The problem is so alarming that it has become necessary for students to pass certain required subjects before one will gain admission into teacher training institutions to pursue a particular programme.

Traditional forms of assessments are very efficient at measuring knowledge standards and targets, especially when there is much knowledge to be measured. Such tests are used for measuring students' knowledge, understanding, and application, which are essential skills that students need in order to succeed in their studies (MacMillan, 2008). During the last two decades alternative assessment methods were developed and implemented into educational practice as a result of new discoveries and changing theories in the field of student learning. These innovative methods in student assessment have been supported on the basis that they produce active, reflective, self-reliance and self- regulating learners. These new methods of student assessment have brought a lot of changes in the way educators perceive student learning and assessment (Elango et al 2005). Teachers in most countries were advised to change their focus and adopt alternative forms of assessments. This changing perspective was driven by the need to use classroom assessments that recognize, teach, and assess knowledge, skills, and abilities that students need beyond classroom environments. Authentic forms of assessments were therefore introduced because of their potential to test complex mental abilities like extended writing and problem-solving skills that cannot be assessed by using traditional forms of assessments (Reynolds et al (2009). Admittedly, the mass attitude of students in both literally and subjects dealing with figures can be attributed to a number of factors which include teacher factors, student factors (cognitive level, willingness (effort) value, classroom assessment practices and classroom management among others.

## 1.2:    Historical Evolution of Variables

The term attitude comes from the Latin words apto (aptitude or fitness) and acto (postures of the body), both of which have their origin in the Sanskript root ag, meaning to do or to act. The connection between attitude and action carried into the 18th century, attitude referred to a physical orientation or position in relation to a frame of reference. The term attitude was introduced by Herbert Spencer and Alexander (1860) in to educational psychology, they used it to refer to an internal state of preparation for action. Some psychologists subsequently suggested that the interpersonal attitudes (sentiments) of guests at a dinner party could be measured by gauging their bodily orientation toward one another, but according to Louis Thurstone's (1928) in a seminal paper He advocates that attitudes Can Be Measured,' that precipitated empirical research on the determinants of attitudes. Drawing allusion upon his background in psychophysics. He conceived attitude as the net affective perception of (i.e., feeling toward) a stimulus rather than as a bodily

orientation. He illustrates this during his first findings, where he advanced that feelings could be scaled by constructing a set of relevant belief statements that were ordered along a unidimensional continuum ranging from maximal positivity to maximal negativity in line with the likert scale that range from rating students and participates strength of affirmations and negations.

From that era, research on attitudes and academic achievement has relied largely on self-report measures, and the dual questions of the determinants of students' attitude , behaviour and correspondence achievement  will be the  focus of this research  drawing analogy for the past century and how attitude due influence students' academic achievement in a course undertaken .measuring students attitude in a course is not a recent phenomenon but could be stressed right from the child initial school age, cognitive competence, affective perception, value, Interest and the effort being put in the subject.

According to Papanastaasiou (2005), Student attitude can be viewed in statistics as negative attitudes and feeling, the main problems of these negative attitudes is that they have been found to serve as obstacles to learning. Students' attitude influences how they mentally approach studies including all the work related to that research. A positive attitude enables students to solve the problem quickly where as a negative attitude hampers the efforts in statistics.  The enhancement of positive attitudes towards statistics therefore, is one of the key components that impacts students' academic achievement. For this reason, investigating their attitude toward statistics is a great stride for future educational development in Cameroon teachers training colleges. Academic Achievement is influenced by a multitude of factors: attitude leads to achievement Schibeci et al (1986), and aptitude is needed for successful performance Schunk, (1991). Academic Achievement is a result of intellectual capability and motivation as well based on the findings from several studies. Academic achievement will be examined based on Actual grade acquired in the course, Confidence in dealing statistics, Knowledge statistics students obtained after completion of their study.

Effort in this present research, the focus is also based on the internal attribution effort and its' role in affecting students' academic achievement. It is assumed that when students put more effort into studying research methods and statistics, they are more likely to perform better in the subject. In contrast, when students exert less effort into studying research methods and statistics, they are less likely to achieve a satisfactory result as they Measure students' efforts as they expand

in their statistics course and their improvement on their actual grade through hard work. As earlier cited by Natriello et al (1986) and the practical note based on this study, the More time spent on homework by students is a commonly used as a parameter to measure the student effort in the course and numerous studies have indicated that it is related to higher achievement in any course they are offering.

The Second International Conference on the Teaching of Statistics held in Victoria, Canada, in August 1986, dedicated one session to the 'History of the Teaching of Statistics'. At this session, organized by Professor John Bibby, contributions were presented by some of the members of the International Working Group on the History of Teaching Statistics a new group founded and coordinated by Professor Bibby.    As is well known, the teaching of a discipline which was later to be called statistics had its origins in the second half of the seventeenth century in Germany. The teaching of statistics was obviously linked closely to developments in the discipline itself.  In the United States, the teaching of statistics began to be more mathematically oriented as it became progressively influenced by the British and Scandinavian schools.

The teaching of statistics at teacher training colleges and university level is today a reality in most countries of the world. However, this study would like to bear witness to the difficult road travelled by the teaching of statistics in teacher training education during the last century. Its success owes all to the tenacity of past scholars, and it cannot but be an inspiration for the future development of the teaching in the lower levels of education in the world and Cameroon in particular. Statistics as a course was brought into the academia in the forties of the last century, statistics degrees were widely thought of as professional degrees with emphasis on graduate rather than undergraduate study. This was at a time when statistics was acquiring the status of a separate discipline with the mathematical foundations of theoretical statistics was developed

With the coming of statistics as an academic course in education, there was then the creation of the Institute of Mathematical Statistics with the journal Annals of Mathematical Statistics in the US portrayed statistics as a branch of mathematics. Knowledge of advanced mathematics was a prerequisite for learning theories of estimation, testing of hypothesis and decision making as developed by Fisher, Neyman and Wald. (Fortunately, Annals of Mathematical Statistics is renamed as Annals of Statistics. This was at a time when computational facilities were limited to the use of a hand driven desk calculator, and exact closed form solutions to problems

were sought using simple stochastic models for data. This was also the time when creation of separate departments of statistics were considered as not viable and mathematics departments were deemed as the closest hosts.

The scope of statistics as it is understood, studied and practiced today extends to the whole gamut of natural and social sciences, education and technology, management and economic affairs, medicine and law, and arts and literature. In many of these activities, statistics is routinely used requiring many workers for collecting data and summarizing the results for decision making. In some activities such as quality control in industrial production, machine operators are required to know how to use statistical control charts to check on the quality of goods produced. There are, however, situations where experience and knowledge of advanced statistical methodology is required to solve problems. But, once a statistical system is set up in any organization and software is made available to do statistical analysis, we need workers with different levels of knowledge to manage it.

All these new demands on statistics in the information age require rethinking on the education and training of statisticians to work in academic and non-academic positions. In my opinion, the study of statistics can begin in the high school and make compulsory to all students, though not as a separate subject like mathematics, physics, chemistry and biology but as an integral part of these subjects. The possibility of introducing statistical concepts in teaching the basic subjects like physics, chemistry and biology in high schools incorporating statistical ideas is indicated in Rao (1969, 1974, 1997). The study of statistics as a separate discipline could be introduced at the undergraduate level as a compulsory subject to all students. Advanced courses in statistics to turn out practicing statisticians in special areas of statistics could be introduced at the graduate level.

Statisticians work at the interface of mathematics, computer science and real-world data analysis, and their skills can be applied to a wide range of career fields. There is great demand for statisticians in government services business, communications, marketing, banking, finance, educational setting in all levels, courts of law, survey research and in our daily life, practically statistics covers all branches of human enterprise. With the importance of statisticians and analysing the nature of tasks they are called upon to perform, from compiling data to decision making, in various activities both in private and public sectors, according to Marquardt (1987) he

asserted that: "The bottom line is that the actual content of many jobs throughout society has more to do with statistics than with any other single subject matter field." Statistics is not a basic subject like mathematics, physics, chemistry or biology. Each of these disciplines has a subject matter of its own and problems of its own which are solved by using the knowledge of the discipline. There is nothing like a statistical problem which is solved by using the knowledge of statistics. It is used to solve problems in other disciplines. The subject matter of statistics was motivated by practical problems, and it grew from isolated methods applied to problems to the consolidation of different methods under a unified theory based on the concepts of probability.

Contemporary educational statistics as viewed in an international level there is a need for improving the quality of teacher education programs to promote better school outcomes for students in statistics. Despite, the general acceptance of social constructivism by educational theorists and practitioners as a useful framework for effective teaching, current teacher education programs lack a component that focuses on pre-service teachers' diverse belief systems and perceptions (Raths et al (2004).  Most of the studied in this field reveals that the examination of educational beliefs and attitudes of future teachers is important due to at least two reasons: First, as a student teachers' beliefs and attitudes impact their academic achievement (Akey, 2006¬). According to (Pintrich, 2003) for example, students who believe in his or her capability are more motivated and more likely to engage in learning activities. secondly following the ideas of student teachers' beliefs have a major influence on their teaching process when they begin to teach Thus; understanding of motivation, efficacy beliefs and attitude toward teaching in pre-service teachers have potential importance for the improvement of educational quality. Traditional classroom assessment practices, however, focus in large part on the individual and fail to account for knowledge building and learning in context. As researchers in the field of assessment consider the cultural shifts that arise from the emergence of more participatory cultures, they will need to find new methods of applying assessments to learners.

### 1.3:    Contextual Background of the Study

During the last twenty years there has been growing attention to the teaching and learning aspects of statistics in education most especially as subject in university curriculum and teacher training institution as cited in Watson (1997) it was acknowledged that teaching statistical courses in academic institutions faces a lot of challenges because of serving students with varying

background and abilities, many of whom have had negative experiences with statistics and mathematics. They have been more emphasis on the need of reforms in the teaching of statistics with the growing body of research in that area, statistic education now takes place in the new social context. This is influenced by movement of reforms of teaching of statistical science in general. At the same time the changing nature of statistic demands revised content for introductory instruction for the course and technology strongly influences both what is to teach and how to teach. The substantial need for change in statistics instruction is to build on strong synergies between statistics teaching and methods to be used. Statisticians who teach should become more familiar with the method on teaching and learning with the changes in educational technology.

The spirit of contemporary introduction to statistics should be very different from the old traditional emphasis on the lectures and on probability and inference. teaching (what we do to help them learn), the central idea of the teaching is the abandonment of an information transfer model in favour of constructivist view of learning as students are no longer empty vessels to be filled with knowledge poured in by teachers, they inevitably construct their own knowledge by combining their present experiences with their existing conceptions. The abundance of literature on books suggest the changing nature of the introductory instruction in statistics. Teachers may retain and expository text and continue to do some presentation in the classroom while moving in the direction of more interaction and more students' activity. The purpose of this study is to review literature related teaching and current thinking (attitude) of leading educators in the field.

Teaching statistics may have regarded as a complicated endeavour because many factors in addition to pedagogic approach must be taken into consideration. The growing importance recognition of statistics in everyday life and the concern about statistical literacy have resulted in a greater focus on the statistics curriculum at school and the capacity of teachers to deal with curriculum. Therefore, statistics are being taught in schools for some reasons: it is useful for daily life as it has an instrumental role in other disciplines and is importance in developing critical thinking or reasoning.it will be wise to introduce the support of statistics in primary curricula, educational statistics role in pedagogical content knowledge in learning has received considerable attention in recent years.

Pedagogic content refers to the method needed to successfully teach a subject and requires specific appropriate pedagogic content.  This is critically seen at the following levels, thought with

critical complexities at primary level, teacher's preparation for teaching statistics might be limited (Watson 2006). Statistics is a methodological course that is required by many students as majors as well as alternative course and focuses on the conceptual ideas and tools used in many training institutions and educational oriented majors serves as a foundation for understanding how research is conducted.  Thus, there are ample evidence that among the many factors to take into consideration when teaching a course in statistics, attitude toward the courses should certainly not ignored. If an instructor is to take attitude toward statistics into consideration when teaching, there will be a psychometrically sound ways to measure those attitudes such measure is referred to as statistics attitude survey. In addition to statistics methodology cognitive and pedagogical factors, affective, and attitudinal factors among students should be taken into account by teacher teaching statistics according to Mills, 2004 et al (2004).

In fact, according to some scholars Garfield et al (2007) they suggested that teachers should focus on the value of statistics to foster more positive attitudes toward statistics and should attempt to reduce the fear of statistics as an initial step of instruction, researchers observed that most statistics questions in teacher training colleges are rarely attempted and if attempted they are badly tackled. Some students give up in taking examinations after failing, their grade is dropped drastically. Following the dogmatic and objective methods of teaching, students have developed misconception on the difficulty in the learning some concepts statistics. It is always common to hear students declare that statistics is very difficult; that it is more of a science subject and good for science students. This is often confirming by the Unsatisfactory results or poor performance in some concepts in the course, absenting from those classes. These are pointers to the difficulty's learners face to assimilate some phenomena in statistics since they have the attitude that it good for science-oriented students. Some teachers do not have enough didactic materials and the good mastering of the course to facilitate learners understanding of the phenomenon that most students shy away from learning the course. This was partly because students were expected to wait for information from their teachers and to follow the directives on what to do with that information. Emphasis was placed more on repeating information without reflecting on the outcome of such information or demonstrating an understanding of the usefulness of such information since the aim was to obtain better examination results, rather than mastery of skills and practical application of the lesson taught.  Often, these results merely reflected the reproduction of the material taught.

These results to surface processing instead of deeper learning, thus learners quickly forget the explanations after the lesson is over and upon writing their examinations.

At time Students are treated like empty vessels which should be filled with knowledge to obtained better examination results. Some teachers thought that the aim of learning is that students should be able to pass examinations. Memorization was very common amongst students who easily forgot what they learnt after writing the examination. When this happens; students often believe that they have forgotten what was taught in class because the lesson was difficult to assimilate In Cameroon. it has become a tradition that when the results come out, it is the statistics subject that receives the lowest pass rate. According to statistics from markers and even from their test in statistics, students who sat for the CAMPIEM exams majority due have a failed or better and the rest failed. The poor performance of students in statistics had been a thing of concern to mathematics educators, parents and government (Burton, 1999). It has been also observed that students shy away from the study of statistics (Betiku, 2001). This shows the negative attitude and poor performance of students in statistics.

According to Haddock (2010), the cognitive component is what individual thinks or believe about the subject , one might think that statistics is difficult .The affective aspects of attitude deals with feelings and emotion of individual associated with the statistics for instance the figures and formula in statistics might evoke fear on the students while the behaviours component is the tendency to respond in a certain way to the attitude toward a subject or object for instance a student choosing to scream or to run away when he sees a statistics formula. Formation of attitude is seen when people form attitude through their secondary school experience where they do have poor orientation towards courses dealing with calculation. The attitudes of trainee or learner toward statistics in the section could also be influenced by the attitudes of the teacher and his/her method of teaching will at time evoke mixed feelings. Studies done by Thompson (1993) had shown that the teachers' method of statistics teaching, and his/her personality greatly accounted for the students' negative or positive attitude towards statistics and that without interest and personal effort in learning statistics by the learners they can hardly perform well in the course. More this study will also be viewed based on the psychological factors toward a subject, interest in learning, study habit, attribution self-efficacy, personality, motivation, creativity, socio economics

background, family background, student's major subjects in secondary school, societies, age, as well as the value of the subject to them.

The purpose of teacher training education is to develop quality teachers which promote quality of learner that it can properly serve the society according to their role and responsibilities as a good citizen. The totality of the problem addressed in the teacher training can be examined via student's home background characteristics as attitude being prerequisite for students' academic achievement in statistics in some selected teacher training colleges in Cameroon based on English sub system of education.

Nowadays, statistics courses are compulsory for most of the students from a broad spectrum of Social, Natural Sciences and educational fields. Students of teacher training colleges most especially those who are not science inclined often hold negative attitudes regarding mathematics and science courses, including statistics courses, which many face as a compulsory part of their training course to some students Statistics is about solving real world problems Therefore, it is not only needed for conducting scientific research but also needed for being an informed citizen and for advancing in technology as a society. Statistics is in our everyday lives. It is on internet, newspapers, television, and everywhere. In this study, the researcher will focus on students' attitudes towards learning of statistics as another reason behind students' academic achievement in statistics. The reports of political elections, sports games, advertisements, census records, weather forecasts, and many situations, which we come across everyday use basic statistics knowledge. In this study, a statistics course refers to the service course offered to students who are not majoring in statistics. In statistics, students need to recognize when they should apply statistical thinking, accurate use the skills they possess, know when they require additional statistical knowledge and skills, and obtain this additional statistical understanding.

Teacher motivation and incentives are also key factors in the success and /or failure of teaching and learning. Mpokosa et al (2008), on their study on teacher training and school management in developing countries, found that the level and structure of teacher incentives greatly contribute to teaching quality and student achievement. Following the Geddes and Fortunato (1993) he put forward that students encounter difficulties and performed poorly in statistics and noted that students' attitudes about the value of learning statistics may be considered

as both an input and outcome variable because their attitudes towards the subject can be related to educational achievement in ways that reinforce higher or lower achievement.

To Onafowokan (1998) her report of two separate studies carried out by Pickens (2005) when she linked higher achievement in statistics to positive attitude on the part of the students while reporting on the state of pre-college education in Mathematics and statistics, described the situation as worrisome in the sense that students do not particularly like statistics and the dislike it's acquired early in life. More so, also propounds that conventional wisdom and some research suggest that students with negative attitudes toward Statistic have performance problems simply because of anxiety. Many students express strong negative attitudes when they enter their required introductory statistics. These students view these courses as overwhelming learning and survival tasks that cause a great deal of stress as many students, the prospect of taking an introductory statistics class is daunting.

Despite, the wide spread emphasis on reform in the teaching of statistics even, today statistics education can still be viewed as a new emerging discipline, when compared to other areas of study and inquiry (Garfield et al (2007) It is from these backdrop that prompted the research into the students' attitudes towards learning of statistics in teacher training colleges in Cameroon. The study is aimed at investigating students' attitudes towards the learning of statistics by providing answers to the following questions.

**1.4:    Statement of the Problem**.

Most of the trainees in teachers training colleges in nowadays feel statistics are for science-oriented students. This preconceived idea dated as far back in high schools where there is a common saying that those doing series like A1 are anti-statistician for they hate anything concerning figures and calculations. Numerous studies have been carried out regarding this in western countries, Africa but none in Cameroon Bandura (1986). The academic achievement of students in Cameroon teachers training colleges has been deteriorating yearly as envisage by regional mock results for about 12% of the results for the last three years. The high rate of failure is resulted into little number of students offering subjects involving figures in secondary at high school levels. Most of the students who enrolled into teacher training are mostly art oriented at the Secondary High School. For most of the series or combinations offered in secondary schools are

A1 (History French and literature), A3 (Literature, history and economics) A5 (philosophy history English) where they did nothing or little related to figures and couples with their poor background in mathematics as well as statistics. Despite the effort made Cameroon government via secondary education and General Certificate of Education board (GCE board) making mathematics compulsory to all secondary school students going in for GCE Ordinary level. With these students still have negative feelings towards any subjects dealing with figures. Grades awarded to students at the end of an academic study or course are important indicators of student's ability, level of achievement when they perform better. Another importance dimension for academic achievement is student's socio economics background of students are qualification and professional status of peer's parents, home resources and number of books. Nothing important happens without a cause or in total isolation of associated factors. The quality of instruction is one of the greatest influences on the students' acquisition of statistics knowledge in classes therefore students encounter difficulties and performed poorly in statistics above all students' attitudes about the value of learning statistics may be considered as both an input and outcome variable because their attitudes towards the subject can be related to educational achievement in ways that reinforce higher or lower achievement sense that students do not like statistics and the dislike it's acquired early in life. In north west region for example, low salaries; lack of housing near the school; lack of financial benefits and poor condition of school facilities; low professional status; lack of opportunities for professional development; and poor school management and administration are important factors contributing to low teacher motivation which as results affect students' academic achievement. Classroom assessment has received increased attention from the measurement community in recent years. Since teachers are primarily responsible for evaluating instruction and student learning, there is a widespread concern about the quality of classroom assessment.

Effective classroom management has been discussed extensively at educational seminars and workshops, with efforts aimed at bringing lasting solution to the problem of students' poor a cademic performancencountered in secondary schools.Methods are adopted by teachers to enable the classroom become conducive enough for effective teaching learning process and to facilitate higher academic performance of the students. The existing problem as regard student attitude in their academic achievement in statistics in the teacher training colleges has continuous to generate a major concern on the minds of educationist, psychologist, parent and evaluators, authors, attitude on student mastering experience, vicarious, learning. Students often consider studies related to

statistics as a difficult subject to learn since to them it involves calculation taken into consideration that student who are not science-oriented hate anything calculation of which both researches cannot go whether statistics it become a problem. It is often associated with students having negative feelings towards statistics. Statistics is often viewed by students as one of the biggest hurdles they face as graduate students. What therefore are the relationships between trainees' attitude toward statistics in teachers training colleges in North West Region on trainees achievement in statistics?

## 1.5: Objectives of the Study.

This study will have as main objectives:

1. To find out how classroom management acts as a determinant to academic achievement in statistics in teachers training colleges

2. To investigate if student's value attaches to statistics influence and their academic achievement in teacher training colleges in North West Region

3. To investigate if students' cognitive competence can be a determinant to academic achievement in statistics in teachers training colleges

4. To find out if classroom assessment practices determine academic achievement in statistics

5. It was also intended to investigate if effort can predict academic achievement in teacher training colleges

## 1.6: Research Questions

Following the background, this research is based on six main questions which are:

1. To what extent does classroom management predict students' academic achievement?

2. What is the relationship between values and their academic achievement?

3. How does cognitive competence influence students' academic achievement in statistics?

4. To what extent does a classroom assessment practice predict students' academic achievement?

5. How does student effort influence their academic achievement in statistics?

## 1.7: Research Hypotheses.

This study is based on five assumptions and the tenability of the hypotheses will be tested:

$H_{o1}$: There is no significant relationship between classroom management and students' academic achievement in statistics.

**H<sub>a1</sub>:** There is a significant relationship between classroom management and students' academic achievement in statistics.

**H<sub>o2</sub>:** There is no significant relationship between students' value and students' academic achievement in statistics.

**H<sub>a2</sub>:** There is a significant relationship between students' value and students' academic achievement in statistics.

**H<sub>o3</sub>:** There is no significant relationship between students' cognitive competence and students' academic achievement in statistics.

**H<sub>a3</sub>:** There is a significant relationship between students' cognitive competence and students' academic achievement in statistics.

**H<sub>o4</sub>:** There is no significant relationship between classroom assessment practices and students' academic achievement in statistics.

**H<sub>a4</sub>:** There is a significant relationship between classroom assessment practices and students' academic achievement in statistics.

**H<sub>a5</sub>:** There is a significant relationship between students' effort and students' academic achievement

**H<sub>o5</sub>:** There is no significant relationship between students' effort and students' academic achievement in statistics.


### 1.8:     Justification of the Study

The academic achievement of students in statistics at the end of their programs has been low as compared to other courses like educational technology, psychology, educational supervision and inspection, didactics and psychology of learning, sociology of education. Statistics course are compulsory to all the students undergoing their training in teacher training program, since at the end of the program students are supposed to do project writing which statistics have much to do with their project or research.  law n° 98/ 004 of 14th April 1998 lays down guide lines for education policy in Cameroon. In part 5, chapter 3, section 37 defines (1) the teacher shall to be the principal guarantor of the quality of education. In this capacity, he shall entitle within the limit of means available to suitable living and working conditions as well as to appropriate initial and continuing training.

Section 39 (1) teachers shall be bound to teach, educate, provide educational guidance, promote the quest for scientific knowledge carry out assessment and be of moral rectitude (Tambo, 2003).Since no educational system can rise above the quality of its teachers as mentioned in section 39 of law n°98/004 of 4 April 14th 1998 that, teacher shall be the principal guarantor of quality education. It is therefore imperative to give adequate training that will enhance the quality of teachers especially in statistics education. The performance of students in statistics in the Teacher Training Colleges (TTC) most especially those having a back-ground knowledge in arts subjects back in high school and offering as major courses Art based courses like history, literature in English French, economics is lowly achieved as compared to other compulsory courses that does not involve calculations.

This proposed study intends to study the influence of students' attitude as a determining factor on academic achievement in statistics. The relevance of learning statistics to develop problem-solving, research and analytical skills is apparent to teacher trainee, it is acquiring knowledge of statistics, ability to use appropriate statistical software to run the data, interpreting and presenting the findings effectively. Statistics continues to be a course much dreaded by business students, its importance to research skills. The findings of this proposed study can inform students' attitude, will contribute to the body of knowledge in educational research and to counsellors. In North West Region Student learning which is directly related to academic achievement is categorized into three major factors: family, institutional, and personal factors. Family factors relate to socio-economic status including parents' qualifications and occupation, family size, income and social standing in society and home environment. Institutional factors include educational environment, curriculum, extent of physical amenities and teachers' competencies and behavior with students. Students' personal factors may include intelligence, attitude, motivation, interests, and aptitude and study habits. Out of the above-mentioned factors, the effect of socio-economic status, school climate and study habits need to be researched thoroughly to investigate their impact upon student learning and academic achievement.

## 1.9:    Significance of the Study

The study on attitude,  as a determinant to student's achievement in statistics or overall school performance has been used as a tool for improvement in teacher training education in Cameroon. This research will concentrate on the various factors that play on the end results on

students' academic achievement in teacher training colleges using the English sub system of education. Improving the efficiency of the outcome of teacher training is essential for most governments as a foundation for a universal primary education as stipulated by the millennium development goals especially goal 2 (MDGS 2000) and sustainable development on education of course equipped manpower to improve on education in Cameroon. Strong national policies that make teaching quality and learning a high priority are essential to ensure that all students in training institution obtain the skills and knowledge they are meant to acquire. The United Republic of Cameroon include improving quality and learning outcomes as an explicit priority alongside expanding access. Cameroon plan goes into more detail than most, highlighting recruitment of new teachers as key in reaching required learning standards. National policies should address teacher quality. Cameroon aims to use mentors in every school to support teacher development. Governments need to get incentives right to retain the best teachers.

The education sector strategy of the United Republic of Cameroon makes increased pay a high priority, acknowledging that if teachers lack sustained increases in real pay, this may hinder the development of an environment conducive to teaching and learning. In line with (Education For All) EFA goals and MDG 2 cannot be realized unless needs of all learners are met and this is highly dependent on teaching quality in our training institutions. This study considers teaching quality and teachers inputs to be a combination of both student competence characteristics, students' interest in learning. The value of the subject, effort put in, teacher's training development and aspiration, student's attitude, teacher/student relationships etc.) and what the teacher 'does' and demonstrates in the classroom (practices, attitudes, content knowledge).While numerous studies exist on the influence of attitude as an attribute on students' academic achievement.

The study of student achievement is captured by the increase in repetition rates within the schools. This effect is beneficial to the individual families. Studies of achievement as already mentioned above increases success rate which directly implies a reduction in the repetition rate within the schools. Repeating a program entails another cost in paying the tuition fees and other school related cost. The effect of this extra cost is greatly felt in countries where poverty is prevalent and limited resources must be spread over competing vital needs as well as many children. Repetition comes with an indirect effect associated with psychological stress impacted on the trainee because of being separated from his/her friends and mates. Provision of education has been decentralized unlike in the past when it was solely the responsibility of the government.

In many countries, the private as well as religious groups have created schools. Despite, the fact that these schools typically follow the state established curriculum, their teaching approach and other factors may not follow the conventional approaches in the public schools. Finding these common grounds as well as deviations will be interesting.

The above reasons justify the importance for a study of what factors are more influential in ensuring success and within the different schools. The study has come about during a relatively unstable period in the history of the education system in Cameroon because of the many changes that took place with the 1995 national forum of educational addressing reforms issues in Cameroon educational context for the socio political and economy   needs and interests of the country. The application was enacted into the Cameroon 1998 law laying down the educational guidelines.

**1.10:  Scope of the Study**

This study is limited to all the final years' students of teachers training colleges in Mezam and Donga Mantung divisions, North West region of Cameroon especially in Bamenda. The study of student's attitude as determinants in academic achievement is very large in scope but base on attitude the researcher will look at Students Cognitive competence, Students effort and value of the course, teaching method, strategies and skills. The study has come about during a relatively unstable period in the history of the education system in Cameroon because of the many changes that took place with the 1995 national forum of educational addressing reforms issues in Cameroon educational context for the socio political and economy   needs and interests of the country. Which application was enacted into the Cameroon 1998 law laying down the educational guidelines? The assessment marking guidelines   including marks allocations for statistics evaluations relies on three forms, which are oral, written and attitudes in Cameroon enacted curriculum in secondary education specifically under the department of teacher training in that set ministry within the three levels. The researcher would constantly refer to Ministry circulars and stakeholders' views in order for the study to remain relevant and significant.

The above variables are considered as indicators for the independent variables (statistics teaching and attitude) of the study.

**Thematic aspect**

The Thematic delimitation is based on statistics teaching and attitude as determinants of academic achievement in teacher training colleges North West region Cameroon. The research topic will use four variables to conceptualize the study.

**VARIABLE**: A variable according to Amin (2005) refers to anything that can be differing or varying value. This implies that values can differ at various times for same objects are divided into type's dependence variable, independence variable and mediated variable.

**Dependent variable (DV)**:

According to Kumar (2011) dependence variable is variable which receives the effect of the course. To Kan (2008) it refers to as criterion variable, it is variable of primary interest of the researcher, so the researcher sets out to understand and describe the variable. In this study the dependent variable is academic achievement and the indicators are actual final examinational grade, confidence and knowledge as well as statistic competence test administer to students (dependent variable)

**Independence variable (IDV)**:

Kumar (2011) defines independence variable as predictor variable. It is that variable that influences the dependence variable. The purpose of manipulation is to confirm and determine the relationship of the items in the research. In this study independence variables are attitude and statistics teaching and the indicators of attitude variable will be on Students Cognitive competence, Students effort, value of the course, statistics teaching or teaching will based on two main pedagogic aspect ie classroom assessment practices and classroom management the above variables are considered as indicators for the independent variable (attitude) and statistic teaching of the study.

The first indicator or component for this study on student attitude is the cognitive competence, which is student's attitude towards the knowledge and intellectual skill in using the statistics knowledge. The items used to measure this attitude are statements showing students do not having difficulties in understanding the statistics concept based on their way of thinking, can learn statistics by making least errors in calculation and understand of the formula and statistics concept.

Value is the third component in assessing student's attitude towards a statistics course. This component assesses attitude towards the usefulness, relevance and advantage of statistics for individuals and their professional life. The items used to assess this attitude are statements showing that statistics is useful, necessary and relevant in their studies, as well as in daily lives and career.

For statistics teaching the first indicator will be based on classroom assessment practice and classroom management. Classroom management has also been defined as the action's teachers take to create a supportive environment for the academic and social emotional learning of students Özcan (2017). Assessment is defined as a systematic process of collecting and interpreting information used to inform educators, students, and stakeholders.

**Moderating variable**:

To Amin (2005), this refers to variable that compete with independent and dependent variables in this study moderating variable is effort. Student's effort is also among the components assessed. If the students showed that they have given tremendous effort, they are categorized as having a positive attitude towards statistics. This component is assessed with statements such as student's intention in completing all the assignments, studying hard and attending all lectures in the subject.

The understanding of attitude toward statistics can best be understood by looking cognitive competence of students. Achievement via attitude is best consider when trainee can, demonstrate their intellectual knowledge and skills when applied statistics this is to confirm the notion of competences-based approach of learning a course. Moreover, regarding learning interests, when learners or trainees show a high degree of interest in learning a course will surely boost a success for that this is to affirm the saying that determination and more interest is a key to success as well as achievement.

By effort here we are looking at the amount of work and the time students put in to learning a course, when more time is devoted on any activities it is likely to determine the degree of achievement in any under taken .the value that students attaches to a course will also prove their level of academic improvement while academic achievement as dependent variable will be view on the  bases  of Students actual score in assignment, quizzes and Final exam scores, Students

background characteristics, Degree of aspiration, Choice of academic major. The combination of these variables will be conceptualized to carry out this research findings.

Contextually the study is delimited in studying students' attitude as a determinant to academic achievement, this is due to limited time and space. the study will concentrate on attitude and academic achievement in relation to specific characteristics as seen above base on teacher training colleges within the English sub system of education in Cameroon. In this study, student's attitude towards a statistics subject was measured through responses given by students towards a set of statements or items in a specific attitude component. Magnitude of an attitude was measured through their level of agreement or disagreement on each item. A positive attitude is vital to encourage students to get interested in learning a certain subject. This study engages an SATS survey developed by Schau (2003) according to five attitude components which are cognitive competences, value, and effort.

**The spacious aspect**

This study as already noted is carried out in the Anglophone section of Cameroon and the focus will be on the teachers training level of education. The Anglophone section is the North West region with capital Bamenda. The North West region is considerably bigger in terms of land size (17,812 Km2). The study is carried out in Bamenda which is the capital of the north west region. This town is located in the western highland of Cameroon made up of divisions like Mezam, Menchum, Donga Mantung, Kumbo, Momo, Ngoke_ Ketunjia and Boyo. The town is the host of the only English-speaking university in the country and thus its population is made up of people from all other regions of the country. The area chosen for our study is north west region of Cameroon with the capital as Bamenda, North West is one of English speaking region in Cameroon, having about seven divisions (Mezam, Momo, Bui Boyo, Menchum ,Ngok Ketunjia, Donga Mantung). The region had thirty-four sub division. more specifically there are six government teachers training colleges all found Divisional headquarters and fifteen private and denominational teachers training colleges, the training colleges are found in each division as follows: Bui division have 4 teachers .training colleges and one is government ( Government teacher training college Kumbo, English teachers training college, Islamic teacher training college, Tatum teacher training college all in kumbo), Donga Mantung with capital Nkwambe have five teacher training colleges with one government own the rest lay private and denominational such

as Government Teacher Training college Nkambe, Christ the King teacher training college, Divine Mercy Teacher Training College, Nightigal Teacher Training College) , Mezam division six teacher training colleges and one is government own, Government Teacher Training college Bamenda, CEFED Santa Teacher Training College, ITCIG SENTTI Teacher training College, Model Inclusive Bilingual Teacher Training College, Albert teacher training college, Saint Andrew Bilingual Teachers Training College. Momo division with capital as Mbengwi has three teacher training colleges , two denominational and one government teacher training college such as Government Teacher Training College Mbengwi, Full Gospel Bilingual Teacher training college, Presbyterian Teacher Training College Mbengwi  and Ngoketunjia division with capital as  Ndop has three Teachers Training Colleges and One Government are Government Teacher Training College Ndop, Baptist Teachers Training College Ndop and kencholia Teacher training College Ndop. But this study will constitute the following teachers training colleges: Government Teachers Training College Bamenda, Government Teacher Training College (GTTC) Kumbo GTTC Mbengwi,and Government Teachers Training College Nkambe . 300 students' schools were included in the study, all located in 5 Divisions with Bamenda as regional capital of North West region Cameroon.

**1.11:   Action and Budgetary Plan**

As for the budget, the researcher sourced and set aside a minimum of 7500000 FCA to cover transport costs, stationery, food and other logistics during the study. The researcher drew a plan of action, which culminated in the draft timetable for 2017- 2021 shown below. The researcher closely adhered to this timetable but only changed it because of unforeseen situation for example, the unstable situation in study area which delayed the research process because the social instability in the study site. The first three chapters were defended in November 2018 but the researcher was recommended to reformulate the topic in order to either suit curriculum or evaluation speciality as the original first topic was more of psychology topic. The panel of experts adjusted it to suit curriculum, along the line my supervisor, modified and reformulated the topic as follows: Statistic Teaching qnd Students' Attitude as Determinants of Academic Achievement in Teacher Training Colleges North West Region Cameroon" below table show the plan or draft timetable of work.

**Table 1**: **Draft timetable for the study 2017- 2021**

| Activities | Months |
|---|---|
| Research Topic: Discussion with supervisor | December 2017 |
| Rough draft of proposal | January to April 2018 |
| Final draft of proposal | May – June 2018 |
| Write up of chapters 1, 2, 3 | September 2018- ongoing |
| Presentation/defence of proposal | November 2018 later March 2019 |
| Drafting research instruments | March _ April 2019 |
| Discussing research instruments | April - May 2019 |
| Field work: Pilot study | June 2019 |
| Fieldwork: Data collection Schools | August- November 2020 |
| Data cleaning and coding | November – December 2020 |
| Data presentation for analysis | December 2020– January 2021 |
| Data analysis and interpretation | February – March 2021 |
| Write up of chapters 4, 5 | April – July 2021 |
| Theses Defence | December 2021 |

**Source: Author conception (2017).**

## 1.12: Operational Definitions of Terms

**Attitude:** attitude according to this study refers to a positive or negative evaluation of students in statistics, objects, events, activities, and ideas. As well as in line of this study attitude refers to value students assigns to something or someone. Attitudes are born out of what we know (cognitive), feel (emotions) and do (behaviour) about someone or something.

**Achievement**: refers to something someone has succeeded in doing usually with effort or a process of finishing something successfully.

**Academic achievement**: Academic Achievement: refers to a student's success in meeting short or long-term goals in education or it is a reflected by the extent to which skills and knowledge has been imparted to him/her through good grade

**Statistics:** Statistics is a subject or a course in educational field which is studied as a broad field (introduction to educational statistics and research).

**Teacher training**: teacher training according to this study refers to an academic institution that specializes in the training of students to be future teachers being it in nursery primary secondary technical and post primary school teacher.

**Pedagogy:** For the seeks of this study teaching refer to various method and strategies use in teaching statistics

**Effort:** Effort refers to amount of work students say they expend to learn statistics.
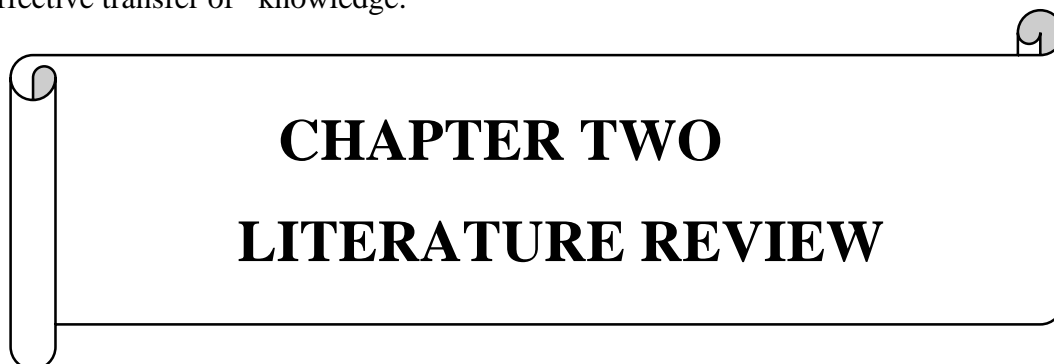
**Value:** Values reflect a person's sense of right and wrong or what "ought" to be.

**Assessment:** The process of collecting information purposefully using different methods/strategies and tools for the purposes of informing decision.

**Assessment practice:** A manner of conducting assessment for instance observation and diagnostic interviews. Classroom assessment: Any planned method or strategy used in the classroom to establish the level of students' difficulties or understanding of a particular concept or idea with the purpose of helping students to succeed in learning (Ainscow, 1988; Pophan 1999).

Classroom assessment practice according to the study refers as all tests a teacher gives at the end of a topic or term, or assessment practice as a tool that a teacher uses to inform teaching and learning. For instance, the student indicated that he monitors and assesses students' progress all the time and the students in his class are allowed to talk and share ideas during statistics lessons

**Classroom management:** Classroom management is a teacher's method of operating the classroom to help students succeed. This involves keeping them on task, focused, organized, and able to make good choices. In like manner, we can in our context define classroom management as the way in which a lecturer plan, organize, control and coordinate the classroom environment for effective transfer of knowledge.

# CHAPTER TWO
# LITERATURE REVIEW

**2.0:    Introduction**

According to Amin (2005) literature review involves location, reading and evaluation reports of observations, discussions and opinions related to an individuals' planned project. It also involves the systematic identification, location and analysis of documents containing information related to the research problem to orientate the study, identify important data relevant to the study, avoid repetition and focusing on a new trend. On this basis, an extensive review of literature will be done on this study: student attitude, academic achievement in statistic and the relationship of the variables. Literature will be reviewed based on the conceptual, empirical framework and theoretical framework.

*Keywords: Students Attitude, classroom management, effort, assessment practice cognitive competence, value and Academic Achievement*

## 2.1:     Conceptual Review

As the title of the current research is "*student's attitudes in teacher training colleges in the North West Region towards teaching of statistics*" it is therefore utterly important to illustrate the relationship between three variables: attitude, effort and academic achievement. As attitude in statistics is task specific the study will adopt Finney and Schraw (2003) to measure the academic the achievement in statistics and the survey attitude toward statistics then students' academic achievement will then be taken from the actual grade of the final examination where the overall academic achievement will be the average score of continuous assessment and exams grade and Students background characteristics, Degree of aspiration, Choice of academic major. To reveal clearly how the variables, relate the conceptualized framework proposed will illustrate to each based on the objectives of the study.
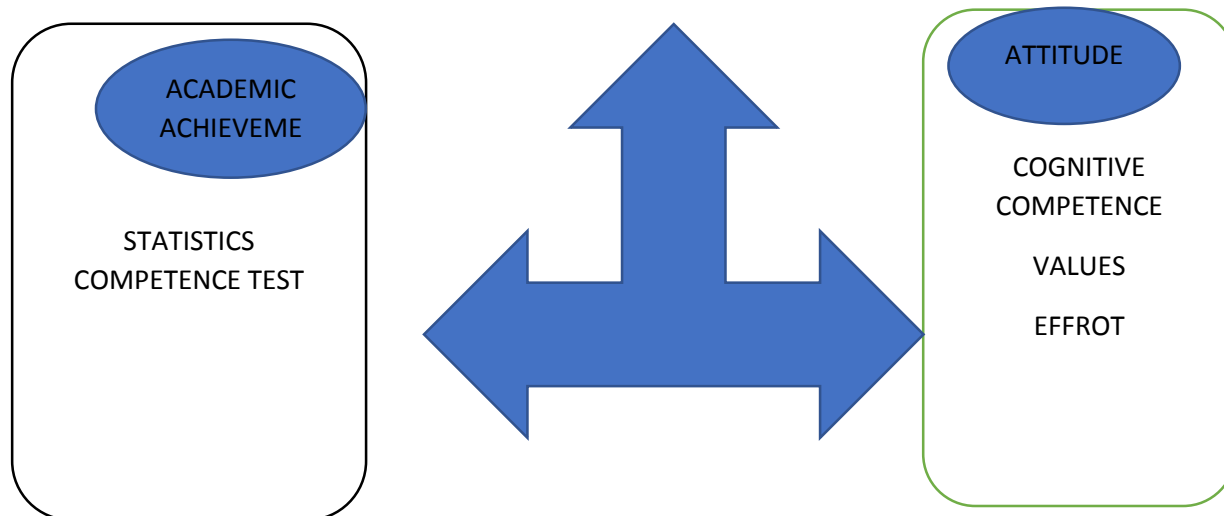
**Figure 2.1**: **source author conception (2019) Conceptual and operational framework of the present study.**

The theories discuss  for this study are modified to help construct the conceptual framework of the present study, the theories are motivational theory or need achievement theory, attribution theory and expectancy theory and of course some models like model of attitude achievement are highlighted role of the attitude and causal model of prediction of academic achievement. The kind of environment (urban or rural), socio-economic background (occupational status), parental educational level, and the school circumstance constitute the attitudinal context. The personal component of attitude towards school is made up of the individual 's intellectual (cognitive), emotional (affective) skillful (psychomotor) developmental state as well as the person 's gender and age. The theories adopted can be used for explaining the relationship between 1) attitude and effort,2) attitude and academic achievement. Teachers of statistics expect that students will come to understand the unique qualities through the course content, class activities, and assessment or examination tasks.

Traditionally, teachers have focused the development of curriculum on the content of the discipline and expect that students will come to understand it in some way as time passes. More recently, the role of assessment as a determinant of student learning has been highlighted, in teacher training colleges generally and in statistics education in particular  points out that statistics

education has only rarely investigated the basic components of attitude related to learning statistics and academic achievement in statistics ; one important exception is the work of Gal and Ginsbury 1994 Investigating the affective dimension of statistics learning adds another dimension to the development of effective teaching in statistics as postulated by Ramsden (1992), Garfied and Gal (1999) . Based on the five objectives of the study the following concepts will be reviewed

### 2.1.1: Value of statistics

A value is a conception explicit or implicit, distinctive of an individual or characteristic of a group, which influences the selection from available modes, means and ends an action. Values reflect a person's sense of right and wrong or what "ought" to be. Values tend to influence attitudes and behaviour. For the achievement of the aims, men frame certain notations and these notations are called values. Values are principles, fundamental convictions, and ideals, standards of life which act as general guide to behavior or as a reference point in decision making. Values are beliefs about what is right and what is wrong and what is important in life. Value literally means something that has a price, precious, dear and worthwhile; one is ready to sacrifice for. It is a set of principles which guide the standard of behavior. Values are desirable and held in esteem. They give strength to a person's character by occupying a central place in his life. It reflects one's attitudes, choices, decisions, judgments, relationships, dreams and vision. The guiding principle of life which are conducive to all value development. It is like the rails which keep the train on track. Without values, life will be chaotic. Values are virtues, ideals and qualities on which actions and beliefs are based. Values are guiding principles that shape our world outlook, attitudes and conduct. The moral values present a true perspective of the development of any society or nation. They tell us to what extent a society or nation has developed itself.

According to Perry (1968), "Value means the relation of an object to a valuing subject." Values, or primitive beliefs, have traditionally been regarded as core aspects of the self-concept Rokeach, (1968); Sherif et al (1947), and as such a form of 'basic truths' about the reality. Many researchers have not made a conceptual distinction between values and attitudes, yet some have recognized the importance of understanding the relations that exist between evaluation of the more abstract and the more concrete Eagly et al (1993). The term value or values is used in a great

variety of contexts and has many meanings in everyday language. Value can mean standards, beliefs, principles, moral obligations and social norms, but also desires, wants, needs or interests.

Furthermore, value can also mean the worth, importance or significance of a thing or object of interest. This abundance of different meanings is not only found in ordinary speech, it is also evident in the usage of "value" in the social sciences and humanities. The phenomenon of "value" has been a fundamental issue in philosophy from the time of Plato, although the common usage of the term "value" in philosophy extends only back to the nineteenth century. Before that time, value phenomena were discussed in terms of the good, the right, beauty, virtue, truth, obligation, moral judgement, aesthetic judgement etc. Baier, (1969): According to W. Edwards Deming (1900-1993) a Renowned statistician said, "It is important that an aim never be defined in terms of activity or methods. It must always relate directly to how life is better for everyone. The aim of the system must be clear to everyone in the system. The aim must include plans. The aim is a value judgment." As one responsible for ensuring effective governance and strong systems of internal control, you likely would agree with the importance Deming put on clarity, goals, and the future. Although He used the term value judgment, one might consider it a judgment of value.

According to Schwartz (1994), values transcendence situations, vary in importance, and function as guiding principles in life. One common measure of values is Schwartz's (1992) Value Inventory Scale, which assesses ten distinct value types representing underlying motivational structures. These value types can be described by two dimensions; openness to change vs. conservation and self-transcendence vs. self-enhancement. Openness to change vs. conservation reflects the distinction between individual's willingness to act independently and their unwillingness to change, while self-transcendence vs. self enhancement reflects the distinction between values oriented toward the pursuit of self-interest and values oriented toward the welfare of others. Self-transcendence serves collective interests, combining value types such as universalism and benevolence. Self-enhancement serves individual interests, combining value types such as power and achievement. Examples of individual values are success and pleasure and examples of collective values are loyalty, equality, and social justice (Schwartz et al, (1987, 1990). Several studies have shown that people who give priority to self-transcendent values show a higher willingness to engage in different forms of altruistic, cooperative behavior, than people who give priority to self-enhancement values (Karp, (1996) Feather, (1996). "The word value, it is to be

observed, has two different meanings, and sometimes expresses the utility of some particular object, and sometimes the power of purchasing other goods which the possession of that object conveys. The one may be called 'value in use'; the other, 'value in exchange'" (Smith, 1776, p.**21**). The object is the "usefulness", referring to an inherent quality or property of an object to produce benefits, pleasure or happiness. Its meaning gradually shifted to the purely subjective concept of "desiredness", expressing a feeling of the mind.

A restrictive definition of "value according to Williams (1968), one of the more widely used ones in the social science literature, considers values to be conceptions of the desirable, influencing selective behaviour Kluckhohn (1951). Here, a clear distinction is made between what is desirable, and what is (merely) desired; the desirable is what ought to be desired, or what is worthy of being desired. Therefore, such a definition of value restricts the domain of descriptive value inquiry by the application of a normative criterion. Evidently, this normative criterion itself is a value-as-criterion; hence, the distinction between the desirable and the desired expresses a preference for one over the other.

Values are codes or general principles guiding action, they are not the actions themselves nor are they specific checklists of what to do and when to do it. Thus, two societies can both value achievement but differ tremendously in their norms as to what to achieve, how to achieve, and when pursuing achievement is appropriate. Values underlie the sanctions for some behavioral choices and the rewards for others. A value system presents what is expected and hoped for, what is required and what is forbidden. It is not a report of actual behavior but a system of criteria by which behavior is judged and sanctions applied. Values scaffold likes and dislikes, what feels pleasant and unpleasant, and what is deemed a success or failure. Values and value systems are often evoked as rationales for action; for example, values of freedom and equality were evoked to elicit American support for the Civil Rights movements. Values differ from goals in that values provide a general rationale for more specific goals and motivate attainment of goals through methods. Values are thus at the heart of the human enterprise; embedded in social systems, they are what makes social order both possible and resistant to change. Values are not simply individual traits; they are social agreements about what is right, good, to be cherished.

A value is an enduring belief that a specific mode of conduct or end-state of existence is personally or socially preferable to an opposite or converse mode of conduct or end-state of existence" Values, as beliefs, are commonly seen as having cognitive, affective and behavioral components (Rokeach, 1973).

➢ A value is a cognition, in that it refers to perception or knowledge about a correct end state to strive for, or a correct way of behaving;
➢ A value is an affective component, in that people can feel emotional about it;
➢ A value is a behavioral component in that it is an interceding variable that leads to action when activated.

### 2.1.2: Concepts of Value in Statistics

The major features of the concept value(s) as it is used in the social and behavioral sciences can thus be summarized as follows (Schwartz et al (1987); values are: The social and behavioral sciences are predominantly interested in value-as criterion, both as an explanatory variable, as well as for purely descriptive purposes. Values" are generally understood to be beliefs or conceptions of the desirable that influence selective behavior.

➢ Concepts or beliefs, "A value is an enduring belief that a specific mode of conduct or end-state of existence is personally or socially preferable to an opposite or converse mode of conduct or end-state of existence" (Rokeach, (1973, p.5).
➢ About desirable end states or behaviors, Thus, values are a function of a person's history and of early childhood and adolescence (see e.g. Kohlberg, (1983). The way values are initially taught and learned has much to do with the comparative stability of values and value systems; values are taught and learned as absolutes and with little reference to other, possibly competing, and values. "[We] are not taught that it is desirable, for example, to be just a little bit honest or logical, or to strive for just a little bit of salvation or peace. Nor are we taught that such modes or end-states are sometimes desirable and sometimes not" that transcend specific situations,
➢ guide selection or evaluation of behavior and events, Following Perry (1926), a broad and comprehensive definition of value(s) includes anything of interest to human subjects, all kinds of desires, wants, likes, pleasures, needs, interests, preferences, duties and many other modalities of selective behavior

➤ Are ordered by relative importance.

Values are associated with what fulfils or has the capacity of fulfilling the needs of man, which might be physical, psychological or spiritual. The object that has the capacity of appeasing the hunger of man and nourishing his body is considered valuable as food. Certain objects possess the capacity to cure diseases, so they have medicinal Values. There are certain rules and regulations meant for the moral growth of man, and they are moral Values. Hence Values always refer to human needs. Values are thus inseparable from life of the individual. It permeates the whole life. Therefore, many institutes today conduct various Values education programs that meet the rising needs of modern society, code of conduct and Values. These activities concentrate on the development of the children, young adults etc. focusing on areas like happiness, humility, cooperation, honesty, simplicity, love, unity, peace etc. Once, we understand our Values in life, we can examine and control the various choices we make in our lives. It's our duty to uphold the various types of Values in life such as Cultural Values, Universal Values, Personal Values and Social Values Gupta, (2000).

"Value" classification provides the foundation for some empirical work in the social sciences, for example the classic Study of values Allport et ale (1960). A common distinction, based on the wider perception of "value", is made between the various aspects of human existence in which value phenomena are observed; this is exemplified in Perry's "realms" of value (1926, 1954). Perry lists eight realms of value: a) morality (b) the arts (c) Science (d) religion (e) economics (f) politics (g) law (h) custom or etiquette these subject act as a gate way for future study. In order to structure the inquiry into value phenomena philosophers often distinguish between different types or classes of value. Due to the complexity of the phenomenon "value", a great number of different approaches to value classification are possible; the choice of classificational principles depends on the purpose of inquiry and the underlying assumptions regarding the domain of value and the relation between value and fact (Rescher's (1969).In order to give an indication of the variety of possible classifications, the approaches of Perry, Lewis, Von Wright, and Robert S. Hartman are presented in this section. It is evident from this brief sketch of some key issues in the general theory of value that the realms of value are indeed vast; the meaning of "value" in any given context depends on a substantial number of underlying assumptions, representing fundamentally different views of the world and major philosophical schools of

thought. These different views of the world, and in particular the ethical stance that is adopted, are not only of significance to philosophers: they also provide the foundations for the social and behavioural sciences, as well as for economics.

Following the view of Roubiczek (1969), the practical context of learning, man's judgmental power endowed important characteristics on the nature of value in any activity. These evolve facets and nuances of values. These are the value implication of the negative, scale and degrees of values. According to Roubiczek as cited Baier, K. (1969), the value of the negative is lucidly brought out when explains, "we can think, for instance of pure goodness. But to experience it filly, we must have known evil." In the literary context, the depiction of the erosion of values or man's baser tendencies enhances the value perception of the positive values. Values evolving from such negative situation are referred to as negative values attach to a subject. In addition, Schonpflug (2001), in actual life, our value judgment leads to value choices and preferences which are most appropriate to the situation and our basic nature. Its moral significance is thrown into relief when man has to choose between wealth and a good conscience. The values, the human values are his priorities on what he or she desired to have or to be. More so, student values also manifest degrees and willingness they attribute a course. The degree of values varies from person to person and from situation to situation, from to subject and from environment to environment. All these characteristics are conveniently embraced in the concept of students' values. The superiority of literature is that it meaningfully demonstrates all these characteristics in its interpretation of life.

The student s value of personal capacities and learning situations which are valuable in themselves has been recognized. The attention of some Aristotelian view point in which man's rational power enables man to excel in practical activities. As such philosophers emphasize the Aristotelian view which implies "to be happy means living a whole life. Therefore, to understand the meaning of student value in the course they are carrying out, one should take a comprehensive approach of what a human life is. They conclude - "to be happy one must remain open to all our possibilities as human beings." Maslow, (1959).

Hartman (1967), formulated three basic categories of value is provided by Robert Hartman first considers the relation between fact and value by introducing the notions of the

extension of a concept, and its intension. The extension of a concept defines a class of objects by indicating features they possess in common. The intension of a concept is the set of qualities prescribed for any object that make it a "good" or "fit" member of that class of objects. For example, the objects belonging to the class "chair" share the common features of legs, a seat and a back in an arrangement and size to support a human being in a sitting position; this is the extension of the concept "chair". The intension of the concept "chair" prescribes, for example, that the legs are solid and of equal length, that the back is not broken and the seat not split; to the. Extent that a particular chair meets the requirements of the intension of the concept "chair", it is a "good" chair or a "useless" chair Wieman (1972). Thus, facts are found within the extension of a concept, while values are found within the intension of a concept. The three fundamental types, of value formulated by Hartman:

Systemic value is the extent to which the intension of a synthetic concept is fulfilled. A synthetic concept is a construct of the human mind, rather than an empirical thing; synthetic concepts have finite and denumerable properties because they come into being by definition. Systemic value is thus simply the match between a thing and the definition of its concept, because this definition is equal to the intension of the concept. For example, According to Brumbaugh (1972), He brought forth a "triangle" concept can be defined as "a closed plane figure bounded by three straight lines"; by adding another line to a particular triangle or replacing one straight line with a curve the triangle is not turned into a "better" or "worse" triangle, but it is turned into a non-triangle Systemic value is therefore of the true/false variety: either the intension of a synthetic concept is fulfilled, or it is not.

Extrinsic value is the value that empirical objects have to the extent that they fulfill the intension of an analytic concept. Because the intension of an analytic concept derives from the abstraction of common attributes of a class of objects, it can contain an infinite but denumerable number of properties. Empirical objects (chair, for example) do not need to possess all the attributes prescribed by the intension of their concept; they may possess them to a degree, and to that degree they have extrinsic value.

Intrinsic value is the value found in any uniquely individual object, fulfilling the intension of a singular concept. A singular concept is not based on common attributes of a class of objects;

rather, it defines one, and only one unique object with infinite and non-denumerable properties. In this classification, the complexity of value increases from the systemic level (for example the class of human beings) to the extrinsic (an abstract person in society) to the intrinsic (a particular, unique individual).

Most of the attempts to describe, measure, or analyze value-as-criterion face a major obstacle: these standards of evaluation are psychological properties of the mind, not directly observable objects or phenomena. The concept of value-as-criterion is nothing but a mental construct for that which makes people prefer one thing over another, choose one course of action when several are available. In contrast to many other phenomena, particularly in the natural sciences, it is extremely difficult to isolate the phenomenon value-as-criterion in operation, and thence to describe and measure it. In the absence of direct observation methods, social and behavioral scientists have to rely on several indirect lines of evidence to describe and analyze value-as-criterion (Williams, 1968). In the first instance, the research can be based on testimonial evidence by asking an individual what values or attitudes s/he holds. Depending on the particular object of inquiry, the evidence can be gathered by open or structured interviews, or through the administration of a questionnaire.

### 2.1.3: Students Cognitive Competence in Statistics

Cognitive competence is defined as critical thinking and creative thinking skills which facilitate effective problem solving, decision making, and learning for positive youth development. However, there are several conceptual and research gaps that need to be filled. First, as the narrow definition was adopted, further review is needed to elucidate the broad conception of cognitive competence. Second, although the literature showed that both critical thinking and creative thinking are interrelated thinking skills, more empirical research on their relationships is needed. Cognitive competence, it is necessary to have more vigorous research studies to evaluate and compare the effectiveness of these approaches across age groups and cultural settings. It is hoped that tailor-made curriculum or programs can be offered to cater to the unique characteristics and needs of adolescents for their cognitive advancement and positive development.

Cognitive competence also refers to the ability to perform adequately those cognitively complex task considered essential for living on one's own in this society or a processes that comprise creative thinking which include various creative thinking styles such as legislative, global, and local thinking styles as well as critical thinking which include reasoning making inferences , self-reflection and coordination multiple According to Piaget (1977), cognitive competence constitutes the cyclical processes of assimilation and accommodation, which indicates that people can manipulate their personal experiences as well as organize and adapt their thoughts to guide their behavior. There are broad definitions of cognitive competence as well as narrow definitions. According to Sun and Hui (2006), cognitive competence is defined as critical thinking and creative thinking skills which facilitate effective problem solving, decision making, and learning for positive youth development. However, there are several conceptual and research gaps that need to be filled. First, as the narrow definition was adopted, further review is needed to elucidate the broad conception of cognitive competence. Second, although the literature showed that both critical thinking and creative thinking are interrelated thinking skills, more empirical research on their relationships is needed.

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alternatives, and generating novel and practical ideas. The definitions of critical thinking and creative thinking, and the specific cognitive skills involved are reviewed in the followings.

According to Piaget (1977), one's cognitive competence becomes sophisticated throughout four developmental stages according to one's age. Children aged between 7 and 11 years are at the concrete operational stage. Their logical reasoning is developed which allows them to mentally arrange and compare things. Critical thinking starts to blossom as their thinking becomes decentered and less egocentric, which allows them to consider others' perspectives and clarify one's thoughts. This logical and critical thinking becomes advanced when they reach the formal operational stage (age 12 or above) because they can think systematically, manipulate mental objects, test hypotheses, and draw conclusions based on reasoning. It reveals that developmental age and maturation are related to the development of cognitive competence, and at the same time, adolescents' cognitive competence is changing progressively via their active manipulation of the mental processes. Hence, cognitive competence is vital in contributing to adolescent development in specific domains as well as their holistic wellbeing.

In education, critical thinking was revealed to play a crucial role in students' self-regulatory learning by influencing their mastery of learning goals and deep information processing. Some studies also found that critical thinking significantly predicted students' academic performance. Apart from the positive effects on intellectual development, health education research studies showed that strengthening adolescents' critical thinking skills was one of the important components that enabled students' autonomy in identifying their health needs and making healthy choices, developing healthy body image and preventing disordered eating patterns. Critical thinking was also found to help adolescents to be more pragmatic about media messages and thus less likely to internalize some distorted messages regarding beauty standard and had lower intention of substance use in the future.

### 2.1.4: Aspects of Cognitive Competence

**Critical Cognitive**

Critical cognitive or thinking is the ability to think clearly and rationally about what to do or what to believe. It includes the ability to engage in reflective and independent thinking Ristow (1988). Someone with critical thinking skills can do the following: Understand the logical

connections between ideas, identify, construct and evaluate arguments, detect inconsistencies and common mistakes in reasoning, solve problems systematically, identify the relevance and importance of ideas, and reflect on the justification of one's own beliefs and values. Critical thinking is not a matter of accumulating information. A person with a good memory and who knows a lot of facts is not necessarily good at critical thinking. A critical thinker is able to deduce consequences from what he knows, and he knows how to make use of information to solve problems, and to seek relevant sources of information to inform him. Critical thinking enhances language and presentation skills. Thinking clearly and systematically can improve the way we express our ideas. In learning how to analyze the logical structure of texts, critical thinking also improves comprehension abilities

According to Paul Fry (1991), "critical thinking is the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, or communication, as a guide to belief and action". Moreover, "critical thinking refers to the use of cognitive skills or strategies that increase the probability of a desirable outcome. Critical thinking is purposeful, reasoned, and goal-directed. It is the kind of thinking involved in solving problems, formulating inferences, calculating likelihoods, and making decisions" Halpern (1999). Therefore, critical thinking is a process that activates certain cognitive skills so as to make the best judgments regarding on what to believe and what to do Flage, (2004). "Reason" and "inference" are the two main cognitive skills in critical thinking, that are used when making judgments or decisions, accepting beliefs, and developing ideas and alternatives. It is important to make good and objective reasons for one's beliefs, by recognizing one's subjective point of view, gathering multiple and diverse points of view, coordinating various views (including those for and against the concerned issues), for generating sufficient reasons and reliable evidence before making a judgment Ennis (1996), Moshman (1994). Since there are no explicit guidelines for judging what sucient and reliable reasons are, it may run the risk of developing under- or overcritical judgments. Therefore, rational thinking is needed Ennis (1996).

Lipman (2003) further elaborated that when engaging in critical thinking, one should make reference to reliable, strong, and relevant criteria, such as norms, shared values, laws, rules, definitions, facts, and values, and pay attention to the situational factors, such as special

circumstances and limitations, and variations in culture, context, time, and people. One should also be reflective and self-correcting to question one's own thoughts, identify the errors in one's own thinking, and then make reasonable corrections. In other words, critical thinking means one needs to be critical to the concerned issues as well as one's thinking, so that one can proceed to make inference and deduction from the information collected for doing a rational evaluation and making a reasonable decision (Ennis 1996).

Paul (1996), added that critical thinkers like to reason about their reasoning and make inferences and conceptualization with rational justification. Their habitual inspection of the thinking is, in fact, "an action of ongoing creation" contributing to their cognitive and intellectual advancement. Critical thinking promotes creativity. To come up with a creative solution to a problem involves not just having new ideas. It must also be the case that the new ideas being generated are useful and relevant to the task at hand. Critical thinking plays a crucial role in evaluating new ideas, selecting the best ones and modifying them if necessary Critical thinking is crucial for self-reflection. In order to live a meaningful life and to structure our lives accordingly, we need to justify and reflect on our values and decisions. Critical thinking provides the tools for this process of self-evaluation. Good critical thinking is the foundation of science and democracy. Science requires the critical use of reason in experimentation and theory confirmation. The proper functioning of a liberal democracy requires citizens who can think critically about social issues to inform their judgments about proper governance and to overcome biases and prejudice. In sum, critical thinking includes the skills of reasoning and making inferences, and it is both evaluative and productive Norris (1989) that encompasses the ideas of rationality and creativity, respectively Brookfield (1986).

**Creative cognitive**

Creative cognitive refers to thinking that is novel and that produces ideas that are of value (Sternberg et al (1995). According to proponent of creative cognitivism Sternberg (2006), creative cognitive is autonomous, and people can choose to capitalize on certain "thinking styles" and "intellectual skills" to maximize their creativity. Among the thirteen thinking styles, research findings showed that five of them, including legislative, judicial, hierarchical, global, and liberal (i.e., type I intellectual styles) are related to creative reasoning Zhu and Zhang (2011). Adolescents

choose to regulate their thinking processes and behaviors accordingly can thus learn to master creative reasoning. Therefore, it is preferable that, adolescent, when performing a task, can evaluate the task (judicial reasoning style) and choose to develop their own ideas, rules, and procedures (legislative reasoning style), instead of simply following rules and instructions (executive reasoning style). When doing multiple tasks, adolescents can rank things in priority and distribute attention to the tasks in accordance with the value of the tasks (hierarchical thinking style). Besides drilling the details of a task (local thinking style), adolescents can also look at the overall picture of the task (global thinking style). Moreover, adolescents can be proactive in choosing works involving novelty and ambiguity (liberal thinking style).

All these are in parallel with the synthetic, analytic, and practical intellectual skills for solving problems (Sternberg 1988), in which creative people would interpret problems in a new way and avoid being bounded by conventional thinking (synthetic skills), identify the most valuable and novel idea (analytic skills), and make out ways to demonstrate the values of that idea (practical skills). In short, creative reasoning refers to the cognitive skills of stretching one's spectacles, generating and evaluating multiple ideas and alternatives, and generating novel and practical ideas. Similarly, creative thinking (the components of judicial reasoning style and analytic skills) entails critical thinking, because adolescents have to be skeptical enough to criticize their own ideas so as to initiate positive changes in their thinking. It is believed that after continuously practicing these reasoning styles and skills, adolescents would learn to welcome changes and innovations, to think globally and progressively rather than conservatively, and become habitual in generating novel and realistic ideas that help task completion, problem solving, and decision making.

Creativity involves selecting the relevant aspects of a problem and putting pieces together into a coherent system that integrates the new information with what a person already knows Crowl et al., (1997). In a basic sense, it involves a series of decision-making choices between two or more competing alternatives of action, each having several pros and cons associated with it Creativity overlaps with other characteristics, such as intelligence, academic ability, dependability, adaptiveness, and independence‖ and can evolve within each of the seven intelligences‖. Creativity requires many of the same conditions for learning as other higher order thinking skills. The learning processes are enhanced by supportive environments and deteriorate with fears,

insecurities, and low self-esteem. Creativity deteriorates with extrinsic motivation, restraint on choice, and the pressure of outside evaluation (Crowl et al., (1997).

### 2.1.5: How to Foster Cognitive Competence in students

To foster cognitive competence among adolescents, one of the ways is to introduce creative thinking and critical thinking skills and provide social opportunities for adolescents to master these skills. The central issues are to let students to understand "What are these practical skills?", "How can they be carried out?", and "Why do I use these skills?" so as to help students to internalize, self-regulate, and transfer the learnt skills. It can be done explicitly or implicitly, both inside and outside schools, in the following three ways Fry (1991).

### Direct Teaching Approach

Cognitive skills can be taught explicitly to students in context-free situation. For instance, the instrumental enrichment aims at developing students' generic thinking skills that enable their ability to solve problems and transfer their problem-solving skills to a wider context. de Bono (1991), As aforementioned, there are many programs targeting at training students' critical and creative reasoning skills, for example, Philosophy for Children Program, the Purdue Creative Thinking Program. In addition, thinking skills can also be directly introduced in developmental programs, like teacher training and positive youth development program, in which students' cognitive competence are fostered and sharpened leading to the forward flow of positive developmental attributes, and vice versa. In such kind of direct teaching, teachers play a crucial role in a series of structural "mediated learning experiences" to guide students to master the skills in defining problems, developing plans and strategies, and transferring the classroom learning to other life aspects. As there is a spiral of learning to reason and reasoning to learn, arranging more opportunities for students to practice, reflect and evaluate the skills is necessary for them to assimilate, accommodate, internalize, and advance and transfer the thinking strategies and processes.

### Embedded Approach

Embedded approach means that reasoning skills are taught and practiced within a subject in school formal curriculum, for example, in Social Studies, liberal studies, and Sciences. This

approach allows students to apply critical and creative reasoning skills in a meaningful subject context, and at the same time, to develop a deep understanding of the subject matters through utilizing the skills. "Inquiry teaching" (can be adopted, in which students are enabled to evaluate existing information and proceed to construct new knowledge of that subject. In the learning process, reasoning skills are emphasized, and students are guided to form hypotheses, test hypotheses, make predictions, select cases, distinguish consider alternative hypotheses, examine misconceptions in their current reasoning, ask questions, and challenge authorities. Moreover, probing questions and dialoging can stimulate and challenge students' thoughts, sharpen their skills and motivation to reason, to make inferences, and even to generate creative and valuable ideas. At the same time, "problem-based learning" can be incorporated (Piaget 1977). The problems need to be novel, ambiguous, or challenging, to generate cognitive conflicts and stimulate higher-order reasoning. In other words, the problems need to be structured with reference to the students' prior knowledge in that subject areas and existing levels of thinking skills, with the purpose to progress students' generic skills of critical thinking and creative thinking or reasoning in analyzing and solving the problems. Collins and Stevens (1991) noted that, "by turning learning into problem solving, by carefully selecting cases that optimize the abilities the teacher is trying to teach, by making students grapple with counterexamples and entrapments, teachers challenge the students more than by any other teaching method. The students come out of the experience can attack novel problems by applying these strategies themselves" (page 229). Therefore, the students can become more skillful, esteemed, and motivated to master the thinking skills inside and outside their school learning.

**Infusion Approach**

According to Cheng (2011) Infusion means having the subject matters and reasoning skills learnt together across curriculum. There is no specific lessons design to teach thinking skills, but teachers plan and deliver lessons with an emphasis on reasoning, and to let students developing the feelings of competence and autonomy via self-regulation that encourages them to transfer the mastered skills across different subject areas and life situations. The overarching goal is to let student master these generic and transferable skills, take the responsibility in self-regulatory learning, and become a person with independent thinking .An example is the project of Activating Children's reasoning Skills   for primary school children in Northern Ireland, in which

metacognitive skills of critical thinking, creative thinking, searching for meaning, problem solving, and decision making are infused across curriculum, demonstrated with significant effects on students' cognitive advancement as well as social and behavioral improvement. However, the infusion approach cannot succeed without structured pedagogy; for instance, engaging students in open-ended activities, collaborative activities, classroom dialogue, and joint meaning making are some strategies of social construction of learning. To help students to transfer thinking skills to other tasks, teachers can also give examples or ask students to generate examples, to guide them of how these forms of reasoning, inference-making and idea-generating can be applied inside the subject areas as well as outside. Paul and his colleagues have given detailed suggestions of how critical thinking and creative thinking can be incorporated into teaching and curriculum. (Dewey et al (2009)

### 2.1.6: Teaching of Statistics

' Pedagogy', derived from French and Latin adaptations of the Greek [nata, nato (boy) + aywyoa (leader)], literally means a man having oversight of a child, or an attendant leading a boy to school. This meaning is now obsolete. Moreover, the gendering, appropriate in ancient Greece where the formal education of girls was unusual is inappropriate for modern times. The limitations of the literal meaning of the term have encouraged leading contemporary writers to invent broader terms, such as 'andragogy', for adult education (Knowles, 1980). The term is used to describe an approach to schooling, learning, and teaching that includes what is taught, how teaching occurs, and how what is taught is learned. Or Teaching is the study of the methods and application of educational theory to create learning contexts and environment. Brief definitions of teaching are offered from time to time. For the purpose of this study we will use but pedagogic aspects paying more attention on classroom assessment practices and classroom management.

### 2.1.7: Classroom Assessment Practices

Classroom assessment, according to Cizek (1997), there are four definitions of assessment. The term can refer to formats for gathering information, such as using a portfolio or performance assessment. Some see assessment as referring to a new attitude toward the way students are tested away from standardized multiple choice. The term has come to represent a new ethos of empowerment to hold students and schools accountable. Finally, assessment can refer to a new

process of gathering, synthesizing, and using information, one that is similar to what doctors and psychologists use when diagnosing and treating patients. These connotations suggest a much broader definition than what is typically conveyed when using the term "test." In the context of teaching, this more general notion is represented by contemporary definitions of classroom assessments: [Classroom assessment is] the planned process of gathering and synthesizing information relevant to the purposes of (a) discovering and documenting students' strengths and weaknesses, (b) planning and enhancing instruction, or (c) evaluating progress.

According to  Abu Zeina, (1998) cited in Abed and  Awwad  (2016) ( 67) defines assessment practices  as a   group of methods and practices that enables the assessor to collect data in order to form judgments used in taking the suitable decisions and certain judgments that help in evaluation . It should serve as a form of communicating feedback to both students' learning and teachers' teaching.Such information can be elicited through any of a multitude of means or practices and other measures recommended by the educational system- involving activities of teachers, students, a written test paper, an interview schedule, a measurement task using equipment, a class quiz ,paper and pencil assessment, observation, performance, communicative, and self-review. It is a part of the educational process where teachers, instructors appraise learners' achievements by collecting, measuring, analyzing, synthesizing and interpreting relevant information about a particular object of interest in their performance under controlled conditions in relation to curricula objectives set for their levels, and according to the procedures that are systematic and substantively grounded.

The philosophy of Competencies-Based Education remains the foundation of the Cameroonian curriculum. Student assessment is an integral part of teaching and learning. Teachers play a major role in this process, for this reason, their competencies and knowledge skills in classroom assessment practices are critical. Teachers are considered as a cornerstone for bringing change and preparing students for future endeavours. It is very essential to understand their teaching practices particularly how they assess and evaluate student learning outcomes. For this reason, (Reynolds et al (2009), McMillan, (2008), Nitko, (2001) maintain the common argument that classroom assessment plays an important role in schools and as teachers spend a lot of their time engaged in assessment related activities, they should master some basic assessment competencies.  Teachers struggle as they try to improve their assessment practices and make

assessment decisions, mainly because the whole process is characterized by the tension between teachers' beliefs about assessments and the values they bring along, as well as other external forces that they have to consider along the way (McMillan, 2003). Teachers often have major constraints as they attempt to achieve their aspirations across a wide range of teaching practices. Teachers use some level of expertise to work within the challenging environment of classrooms for purposes of bringing their teaching and assessment practices in line with their values.

The competency-based method of teaching, meant to develop critical thinking skills, was adopted in 2010. Seminars to train teachers to embrace the new paradigm shift were held, though mostly limited to urban areas therefore the traditional methods of teaching are still very present. To improve its implementation, seminars were held and teachers were trained to assess students on the competencies they expect from them and the skills were meant to be life-long and transferable. This amendment of the CBA stipulates policy on curriculum and assessment in the schooling sector. The CBA requires teachers to alter their assessment practices in profound and significant ways. Teachers are expected to use both formal and informal assessments to ensure that assessment is accurate, objective and fair; to use clearly defined learning outcomes and assessment standards; to plan for formal assessment tasks; and to use a variety of appropriate assessment strategies. Furthermore, teachers are required to use continuous assessment and to identify, assess and provide learning support to learners who might experience barriers to learning and development. Continuous assessment also allows teachers to identify such learners early in the year. This assessment policy departed radically from the previous assessment regime that emphasized and relied heavily on summative tests and examinations as a final judgment of learner performance.

Assessment in Cameroon today is done following a Sequential System of Assessment (SSA). There is a ministerial circular drawing up the schedule for tests, however, no other document bearing instructions for implementation was provided. At the introduction of the Sequential System of Assessment (SSA) in Secondary Schools in Cameroon, it was presumed it would increase commitment by school administrators and teachers to the use of students' tests data in order to improve student learning and their own accountability for student learning. The 36 weeks usually allocated for instruction in an academic year is divided into six (6) sequences. Each sequence is supposed to have a week for testing only. Throughout this time, teachers are

obliged to administer test, mark and guarantee that the scores are forwarded to the School Principal who subsequently transmits a report to the Divisional Delegate for Secondary Education within a stipulated time frame. A class council is supposed to assess students' progress. As a form of Continuous Assessment (CA), the SSA practice was introduced with the hope that it was going to enhance classroom instruction and student learning (Agborbechem & Frinwie, 2013).

Monono et al (2014), however, argue that when continuous assessment timetables are imposed on teachers who are obliged to forward students' scores within a given period rather than allowing teachers to administer test at the period, they consider most appropriate in the course of the instruction, the merits of CA become disputed. Bloom suggested that, rather than waiting to assess students at the end of the unit, (common practice at the time) teachers use assessment "as an integral part of the instructional process to identify individual learning difficulties and prescribe remediation procedures" (Foncha e al, 2010).

Assessment is defined as a systematic process of collecting and interpreting information used to inform educators, students, and stakeholders. Engaging students in an ongoing system of interrelated assessments, that reveal changes in student learning over time, not only informs instructional practice but motivates and empowers students to take charge of their learning. This is the foundation for creating a balanced assessment system. Classroom assessments cover a range of purposes. The assessment of student learning might be used formatively to inform small adjustments or enhancements to ongoing instruction or used summative to help measure overall curriculum and program effectiveness. The size and scope of the classroom assessment itself can vary, as can the degree of formality of the assessment. Three examples of classroom assessment practices that differ in their formality and consequences are:

Formative assessment is defined by McManus (2008), as a process in which teachers and students provide feedback during instruction to organize the learning and teaching process in order to increase student achievement. According to Miller et al (2007), formative assessment can be viewed as a valid and vital part of the blending of teaching and assessment. Formative assessments inform teachers about whether the students have learned and they have an indicator qualification for how the teachers should plan their next lessons There are four main components of formative assessment (Black et al (2003); Centre for Educational Research and (i) Explaining learning

objectives and success criteria; (ii) increasing the quality of inquiry/dialogue; (iii) increasing the quality of marking/ feedback/record keeping; and (iv) using self and peer assessment. Formative assessment is to inform teachers and students about progress on learning intentions and to inform and direct subsequent learning and teaching.  Larger projects, such as an essay, a performance assessment, or a research project that may be used as interim or summative assessments may have significant formative components to support student learning along the way, such as regular self-assessment of progress, feedback from peers or teachers, and drafts before a final version or product is submitted. Summative assessments used to hold students accountable for demonstrating acquired knowledge or skills at the completion of a course can also be used in future planning.

The study will focus on   four types of assessment practices as used is according to time and intention namely: Diagnostic assessment, Formative assessment, Continuous assessment and Formative assessment.

**Diagnostic assessment**

The diagnostic assessment essentially identifies learners' learning difficulties, thus acting as a bridge between the teaching that precedes it and that, which succeeds it. This is less about achievement than skill. In education, diagnosis assumes different meanings and is frequently approached from different perspectives. Considerable variability exists with respect to the definition of diagnosis in education. Diagnosis may assume an instructional definition in which assessment results provide information about students' mastery of relevant prior knowledge and skills within the domain as well as preconceptions or misconceptions about the material. Teachers use this information to adjust instruction by identifying which areas students have and have not mastered. This results in varied instructional plans that are responsive to students' needs (Fuchs et al (2003).

Diagnostic assessment is often undertaken at the beginning of a unit of study to assess the skills, abilities, interests, experiences, levels of achievement or difficulties of an individual student or a whole class

✓       can involve formal measurements (e.g. IQ/aptitude tests, fitness tests) that are used to establish a starting point or baseline OR informal measurements (e.g. observation, discussions, questioning)

✓       informs programming and planning, and learning and teaching methods used, as well as assessment choices

However, the time involved in administering, interpreting, and implementing changes based on these approaches may cause many educators to avoid using diagnostic tests to guide instructional decisions. In addition to the perceived lack of efficiency of diagnostic assessment, there is general confusion over the types of assessments that can be used for diagnosis. In K-12 mathematics, two types of assessment practices are currently used to provide diagnostic information: response analyses and cognitive diagnostic assessments. Response analysis is based on students' responses to instructionally relevant item sets and provides ongoing information about students' mastery and/or application of current knowledge and skills. Analyzing students' responses to problems can be used to adjust instruction to correct students' current misunderstandings; however, limited information about students' persistent and systematic thinking errors may be tendered from these analyses. Conversely,

**Cognitive diagnostic**

Assessments have the potential to provide appraisals of specific student-level cognitive processes that are structured based on cognitive theory and statistical modeling of response patterns. This information can be used to provide valuable instructional information needed to design remedial instructional programs or supplemental interventions. To help practitioners differentiate between these assessment techniques and select the most appropriate tool for their uses, we describe each approach and discuss their relative strengths and limitations for making instructional decisions (see Table 2.1 for a summary). We highlight the value of cognitive diagnostic assessments for designing supplemental instructional interventions for students who are struggling. Cognitive Diagnostic Assessment administering, interpreting, and implementing changes based on these approaches may cause many educators to avoid using diagnostic tests to guide instructional decisions (Oosterhof, (2003).

**Table 2. 1: Comparison of diagnostic assessment approaches.**

| Diagnostic approach | Instruction al use | Content reference | Score estimation | Classification |
|---|---|---|---|---|
| Cognitive Diagnostic Assessment | Identify persistent misconceptions to design supplemental instruction/ interventions | Theory of cognitive processing in domain | Knowledge state | Mastery of multidimensional cognitive attributes |
| Skills Analysis | Identify skills that may be problematic to design review activities | Broad skills across the curriculum | Skill aggregation | Mastery of unidimensional subskills |
| Error Analysis | Identify errors students are making when solving specific problem types to design reteaching sequences | Procedural knowledge across the curriculum | Distractor analysis | Error patterns |

**Source: Practical Assessment, Research & Evaluation, Vol 14, No 16 Page 3 Ketterlin-Gellers and Yovanoff, Cognitive Diagnostic Assessment.**

**Cognitive Diagnostic Assessments**

An emerging approach to diagnosis for instructional decision-making relies on cognitive models of learning to determine students' persistent cognitive errors. Because cognitive models are based on empirical research on learning, they provide a foundation for understanding the pre-skills and knowledge involved in successfully engaging with the material Pellegrino et al (2001). This foundation is used to structure remedial instructional opportunities and supplemental interventions for students with specific cognitive errors. As an introduction to the need and design of cognitive diagnostic assessment for instructional design, it is worthwhile to note briefly some historical developments. Cognitive diagnosis is the merger of two major research fields, (a) cognitive psychology, and (b) psychometric modeling. The resulting field of cognitive diagnostic measurement is a relatively current development Role of Cognitive Psychology Cognitive diagnosis requires the identification of the cognitive attributes that can be combined to form knowledge states underlying observed performance. Cognitive attributes are domain-specific pre-

skills and knowledge that are needed to demonstrate mastery in the targeted construct. The cognitive model is a differentiating feature of this approach and is "architecture organizing the successive processes involved" in learning Gregoire, (1997).

Attributes are typically isolated through careful task analyses, expert review, verbal protocols, and other inquiry methods for analyzing student thinking processes Gorin, (2007). Once the attribute structure for the cognitive model has been determined, combinations of attributes that make up students' knowledge states can be identified. Knowledge states are well-specified combinations of attributes that form the basis of students' conceptions of domain-specific knowledge and skills. Knowledge states represent the level of mastery of a unique combination of attributes that characterize specific misconceptions or cognitive errors, ranging from competence in none to all the attributes within the cognitive model. Theoretically, it is possible to have many knowledge states depending on the number of attributes that can be combined. In practice, however, because students often approach problem solving in the domain with similar misconceptions, there are a finite number of plausible and testable combinations.

Furthermore, the cognitive model constrains the class of theoretically reasonable knowledge states. Because knowledge states underlie students' persistent (mis)conceptions within the cognitive model, these form the basis for designing supplemental instructional modules for remediating these deficits. Without this precise intersection between cognitive diagnosis and instructional design, it is the authors' opinion that students at-risk for failure in the domain may not receive the necessary instructional supports needed to remediate their deficits or misconceptions. As such, cognitive diagnostic assessments are needed to maximize the learning potential for all students. Role of Psychometric Modeling Dominant psychometric models developed over the past 50 years in educational measurement tend to provide elegant solutions for item/test development, item parameter calibration, and accurate examinee scaling on unidimensional and multidimensional traits that are useful for developing cognitive diagnostic assessments. For instance, item response theory and latent class modeling have resulted in an explosive amount of research over the past 50 years. With the advent of new estimation algorithms and desktop computing power, new and highly flexible psychometric models relating test responses to latent trait scales are routinely proposed in measurement journals. For example, Rudner et al (2007) applied Bayes' theorem of inverse probabilities Press, (1989) to make

diagnostic inferences based on response analysis procedures. Using items with known item response theory psychometrics (e.g., item difficulty, item discrimination, item guessing), the Bayesian procedure requires a priori estimates of probabilities that a randomly sampled student will be in any one of the diagnostic classification categories. Also, the procedure requires a priori estimates of item response probabilities given a mastery category. Posterior mastery classifications are made based on the (a) the observed scored response pattern, and (b) estimated priors (probability distribution of classification categories, probability of item response given mastery classification). As noted earlier, the response analysis application of diagnosis assumes a unidimensional trait structure in which items are associated with one, and only one, skill. However, when the purpose of diagnosis is to evaluate students' cognitive processing in domains that represent combinations of skills, more complex item sampling and statistical models are needed to make accurate diagnostic inferences.

In conclusion, the combination of cognitive psychology and psychometric principles in the design of cognitive diagnostic tests may promote valid diagnostic inferences about students' persistent misunderstandings and cognitive errors. Current and emerging research points to these assessment systems as valuable tools to guide instructional design and delivery decisions. These assessment practices typically involve analyzing students' responses through skills analysis or error analysis.

**Response Analyses**

Typically, response analysis involves teachers', and in some cases students' detailed evaluation of students' answers beyond simple dichotomous scoring of correct/incorrect. Two response analysis techniques are described below skills analysis and error analysis. These methods differ in their focus and intended use. Skills analysis focuses on strengths and results in an evaluation of students' level of mastery of specific subskills. Error analysis focuses on weaknesses and helps teachers classify students' mistakes. In both cases, assessments elicit responses to specific types of items designed to assist in diagnostic classification. Because of the flexibility in assessment design, these diagnostic procedures can be applied to a variety of tasks including homework, classroom-based quizzes, or standardized tests.

**Skills Analysis**

Skills analysis involves aggregating student's item-level responses to determine skill mastery associated with specific subskills. In mathematics, skills analysis is emerging as a means for diagnostic interpretation of curriculum-based measures Fuchs et al (1990).curriculum-based measures has a long history as a technically adequate measurement tool for students with special needs according to Lembke et al (2007). CBM is an efficient system for gathering reliable information about student performance using quick probes that are easy to administer and score. As a measurement system, curriculum-based measures have been widely used in the areas of reading, spelling, writing, and mathematics as screening tools to identify students who may be at risk for failure in the domain. Additionally, curriculum-based measures have been used as progress monitoring tools for evaluating students' rate of growth. Over the past three decades numerous research studies have substantiated the appropriateness of these uses of curriculum-based measures results to Fuchs, (2004). Because of the ease of use and efficiency of mathematics curriculum-based measures, researchers have recently begun to explore the diagnostic capabilities of these measures by conducting skills analyses from student performance data. Skills analysis refers to the aggregation of performance data for different subskills to create students' skills profiles Fuchs & Fuchs, (1990). Skill profiles describe students' mastery of the knowledge and skills in the tested domain. Although some studies indicate increased student achievement and better delineated instructional plans when teachers use skills analyses (Fuchs & Fuchs, (1990); Fuchs et al., (1994), several constraints in the assessment model may prohibit accurate cognitive diagnosis of student pre-skills and knowledge. From a psychometric perspective, curriculum-based measures have limited utility for making diagnostic decisions because of the domain sampling techniques used to create the measures. Curriculum-based measures are most commonly created by sampling skills and knowledge representative of the year's curriculum according to Lembke et al (2007). Subsequent alternate forms mirror these specifications. Although this procedure may be appropriate for making screening and progress monitoring decisions, in the authors' opinion, several problems arise from this sampling approach when trying to make diagnostic inferences from sub scores. First, because the year's curriculum is broadly sampled to create the test blueprint, essential knowledge and skills in the targeted construct may be under-represented. Construct under-representation occurs when the sampling plan insufficiently represents or reduces the content or cognitive complexity of the targeted construct Downing et al (2004). When behavior is sampled with only a few items per sub-skill per curriculum-based measures probe, the target skills

are likely under-represented. Furthermore, adequate sampling of student behaviors is compromised by curriculum-based measures curriculum-based measures administration procedures. Curriculum-based measures in statistics are typically administered under timed conditions ranging from 1-6 minutes. Within this time span, most students (by design) are not able to respond to all items, thereby further limiting the sampling of student ability across the subskills or knowledge and limiting the diagnostic inferences made from sub score analysis. An additional concern when making diagnostic decisions based on skill analysis of mathematics curriculum-based measures results that arises from this sampling approach is sub scores unreliability. As noted by Christ, Scullin, Tolbize et al (2008) "variability in test material decreases the dependability of measurement outcomes, because the number of items that represent specific domains is uncontrolled and inconsistent" (p. 203).

**Error analysis**

Another commonly used method for identifying students' misunderstanding in statistics is error analysis. Error analysis is the process of reviewing student's item responses to identify a pattern of misunderstanding. Errors can be classified into two categories: slips and bugs. Slips are random errors in students' declarative or procedural knowledge that are not the result of inherent misunderstandings in the domain. Bugs represent persistent misconceptions about domain specific knowledge or skills that consistently interfere with students' demonstration of their abilities. Identifying bugs, i.e., persistent errors in student thinking, is the primary interest of diagnostic assessment. As an example of error analysis in mathematics, Ashlock (1994) classified computational-skill bugs into three basic categories: (a) wrong operation, in which the student uses an inappropriate operation when attempting to solve a statistics problem, (b) computational or fact error, in which the student uses the appropriate operation but makes an error involving basic number.

**Role of diagnostic assessments in instructional decision-making**

Although some authors view diagnostic assessment separately from formative assessment, the intention is that diagnostic assessments are used for formative purposes. The purpose of a diagnostic test is not to judge success or failure, but to draw up a list of weaknesses which need to be addressed, and, equally importantly, to establish in which areas the student has been successful.

As Brown puts it, " . .. Diagnostic testing often requires detailed information about the very specific areas in which students have strengths and weaknesses." Brown (1996) for this reason the timing of diagnostic tests is usually before a course begins or at an early stage in a course, whereas achievement tests are more likely at the end.

Diagnostic assessment or pre-assessment is therefore used to collect information for planning instruction and acknowledging learners' needs. Wiggins et al (2007) assert that pre-assessments "include checks of prior knowledge and skill levels and surveys of interests or learning-style preferences" (p. 101). The authors maintain that, given the literature, a great number of students come to school with a misconception that they are not talented enough to perform a certain task, such as drawing a picture or writing an analytic memo  following Wiggins et al (2007).

Clarifying the definition of diagnosis and diagnostic assessment is underscored by the critical role diagnosis plays within an instructional decision-making model. In an integrated assessment-instruction system, all students are screened approximately three times per year to determine which students are on-track for success and which students may be at-risk for failure in the domain Ketterlin et al (2008). Once students are classified by risk status, students who have a high probability of not meeting the outcome goal are administered diagnostic assessments. . It is assumed that students identified in this category have persistent deficits in their knowledge or skills that preclude successful engagement in the core curriculum. As such, students at-risk for failure typically receive supplemental instructional interventions designed to overcome these deficits. To determine the domain-specific topics in which remediation is needed, diagnostic assessments are administered to these students Stecker et al (2000). To aid in instructional design, diagnostic tests should measure students' competencies on components embedded within the theoretical model of learning Gregoire, (1997). Such diagnostic assessments identify specific deficits or persistent misconceptions in students' requisite pre-skills or knowledge. Pre-skills or knowledge include those concepts or tasks that are required in order to complete successfully the targeted tasks within the instructional domain and are often referred to as attributes within the cognitive model cited by Tatsuoka et al  (1997).

**Formative assessment**

The concept of the formative assessment was first introduced by Scriven in 1967, latter enhanced by Bloom in 1971 to make it a keystone of Learning for Mastery. According to Perrenoud, (1991), "is formative all the assessments that help the learner to learn and improve. In other words, that participates in the regulation of learning". Although interpretations of formative assessment vary widely, according to Wiliam et al (2008), "formative assessment is used to provide information on the likely performance of students" and "to describe and feedback given to students... telling them which items they got correct" (p. 60). This oppose the way selected responses measure students' achievement, given students' scores instead of feedback. Formative assessment, according to Wiggins et al (2007), occurs during instruction, as part of instruction rather than a separate activity. It has both formal and informal formats including ungraded quizzes, oral questioning, self-reflection, peer feedback, think-aloud, etc.

Formative assessment is also referred to as Assessment for Learning (A f L), has been defined as 'activities undertaken by teachers and by their students in assessing themselves, that provide information to be used as feedback to modify teaching and learning activities' according to Black and Wiliam, (1998), they underline that an assessment is considered to be formative when the assessment information is used to improve students' performance. This view places students in the center of the assessment process and use of assessment results. Nevertheless, teachers have a key role in providing feedback, information about students' performances, and in setting a goal or learning target Brookhart, (2001); De Luca et al., (2016). The quality of the feedback is a key feature in any formative assessment process, yet the learner also becomes an important factor in the assessment process. Successful formative assessment consists of a sequence of two actions: the recognition by the learner of a gap between his or her current state and the desired goal, and, importantly, the action taken by him or her to close that gap Black and Wiliam, (1998). In this sequence, the teacher has a key role in interpreting the gap and communicating a message about it to the student, based on assessment information. Formative assessment can allow students to become 'formative decision-makers' Brookhart, (2011). In the context of formative assessment methods, students may use descriptive information (at an adequate time in the learning process) to make productive decisions about their own learning (Ibid.).

Formative assessment is a valuable tool that enables instructors to provide immediate and ongoing feedback to improve student teaching cited in Shute, (2008). Formative assessment can

involve providing feedback following an assessment, but more importantly, this feedback is delivered during instruction, allowing instructors to identify student misunderstandings and help them correct their errors. This formative feedback is crucial for improving knowledge, skills, and understanding, and is a significant factor in motivating student learning.A commonly cited definition of formative feedback states that it is "information about the gap between the actual level and reference level which is used to alter that gap" Ramaprasad,(1983).

`       The notion of assessment Brindley (1995), in which diagnostic feedback to learners is a central concern. Brindley emphasizes that assessment should be an integral part of the learning process. Assessment and reporting are closely related to events in the classroom: " what is taught is directly related to what is assessed and (in theory at least) what is assessed is, in turn, linked to the outcomes that are reported." Brindley 1998) this all sounds very desirable, but we must not lose sight of classroom realities. It is undeniable that in spite, of receiving regular updates on their progress through frequent assessment, many students fail to make progress this is explicitly stated by Sadler quoted in Torrance et al (1998)

Formative assessment is now seen as an integrated part of the teaching and learning process, rather than as a separate activity occurring after a phase of teaching. Therefore, formative assessment encompasses a variety of tools that provide feedback to teachers or students to help students learn more effectively. These methods include effective feedback; questioning techniques; comprehensive approaches to teaching and learning featuring formative assessment; and student self-and peer-assessment Looney, (2011). Although the term "assessment for learning" is used interchangeably with "formative assessment" among many writers. Black et al  (2003) make a clear distinction between the two. They argue, "assessment for learning is any assessment for which the priority in its design is to serve the purpose of promoting pupil's learning, compared to an assessment design that serves... to provide information to be used as feedback, by the teachers and pupils, in assessing themselves... to modify the teaching" Black et al. (2003). Wiliam et al (2008) observe, "an assessment is formative to the extent that information from the assessment is feedback within the system and actually used to improve the performance of the system in some way"

Classroom assessment embraces a broad spectrum of activities from constructing paper-pencil tests and performance measures, to grading, interpreting standardized test scores, communicating test results, and using assessment results in decision-making. When using paper-pencil tests and performance measures, teachers should be aware of the strengths and weaknesses of various assessment methods, and choose appropriate formats to assess different achievement targets Stiggins, (1992). Classroom assessment practices of teachers connect curriculum, instructional mechanism and students learning outcomes, which is one of the essential elements of teaching learning process. Teachers use classroom tests, presentations, questions answer sessions, projects, and group activities to enhance student's learning. These practices enable students to practice learning contents, develop thinking patterns, activate their neurons and enhance their confidence on attained skills Classroom tests and presentations provide hands-on opportunities to students to practice and reproduce the learned concepts and skills. Furthermore, it also enhances students' critical thinking as these tests ask for the implementation of learned concepts in a variety of situations. Question answer sessions, group discussion and group activities bring together the students and develop cooperation and coordination among them. According to Popham et al.,(2003) assessment practices plays a leading role in instructional decisions. Students' strengths and weakness along with their learning styles are identified through these practices which results in changing the instructional method, medium of instruction, adopting alternative channel of teaching. Moreover, it facilitates the teachers to understand their own instructional strengths and weakness and obtain relevant information which are indispensable for academic decisions. The assessment of students, understanding of subject matters with poor assessment tools may influence teacher's decisions.

To Ateh (2015), the paramount importance of classroom assessment practices sensitized the importance of teacher's competencies in assessment practices. Teacher understanding and proper implementation of assessment strategies are directly linked to assessment results and instructional decisions. Therefore, teacher's familiarity with a variety of essential assessment tools, principles, strategies and procedure are indispensable. Similarly, they need to be skillful in designing assessment tools, development of rubrics, analysis of results and using assessment results for instructional purposes. Assessment practices provide foundation for students' academic achievement in the form of scores they attained in written or oral examination. On one side it

illustrates students' academic potentials and on the other it motivates them for further studies Furtak et al., (2013). Wiliam et al., (2004), Classroom assessment practices concentrates on the improvement of students learning and teachers' teaching. The results of these practices provide evidences to teachers concerning students' level of understanding, progress towards the desired goals and areas of students' strengths and weakness and knowledge. Further, research studies also showed that formal assessment techniques which include; written weekly/monthly term tests, presentations, individual projects and experiments has close relationship with students' anxiety Hama et al (2015) . On the contrary, informal assessment techniques which includes; rubrics, portfolios, group work and classroom discussion used in classroom assessment have positive contribution to students' achievement.

Gronlund (2006) classified these tools into traditional and alternate types of tools. Traditional tools such as objective type tests (MCQs fill in the blanks, true false and matching items). These tools are traditional as it needs less time and difficulty level is low as compared to alternate tools-portfolio, observation and other performances type tests which ask for more time and are more complex in nature. Results of studies revealed that students are intrinsically more motivated for alternate tools of assessment. The results also showed that majority of teachers carried out assessment practice without understanding these practices properly which negatively influence students' achievement and teachers' performances. Therefore, experts demanded teachers for more sophisticated skills and knowledge of assessment practices Ateh &Comfort (2015), similarly, students are assessed before, during and after the instructional process aimed to assess students' learning progress. The assessment take place before the instruction helps the teacher to understand the true status and requirements of students which enable the teacher to lead the instructional plan accordingly. Assessments during instructional process focus on the improvement of instructional quality, students' interest, their involvement in the learning process and hands-on practices at classroom level.

On the other hand, the assessment practices take place at the end of the instructional process in term of written test, oral examination and performances aimed at grading students' performances, measuring student's mastery of learning contents which are used for certain instructional decisions. Keeping in view the multiple uses of assessment experts recommend classroom teachers to use multiple assessment tools to collects evidence of students' performances.

William et al, (2004): The alignments of recommended and practiced assessment tools have significantly negative relationship with students' academic achievement. Furthermore, students' familiarity regarding grading policy is imperative, as to motivate them for adjustment and overcome the gap in teacher and students' perceptions.

Experts are also of the view that in grading policy none-achievement factors such as neatness, classroom attendance and students' attitude. Keeping in view the above literature this study intended to investigate classroom assessment practices and the challenges teachers' faces during the process. Classroom assessment encompasses a wide range of approaches for the ongoing evaluation of student achievement and progress, including structured tests and quizzes; worksheets; homework assignments; and informal assessment of student participation, effort, and behavior. Judgments of student achievement based only or mostly on classroom assessment could differ considerably across teachers (e.g., one may value information from quizzes less than information from homework whereas another may assign the opposite weights to the same sources of information). Moreover, teacher conceptions about assessment and the nature of learning in general can fundamentally influence their judgments of student achievement Egan & Archer, (1985), Llosa, (2008). For example, subscribing to a view that every student should be held to the same academic standards and expectations is likely to influence the way in which a teacher judges the level of achievement of her students.

Furthermore, teachers' perceptions about the relative value of standardized tests compared with classroom assessments will naturally influence their assessment of students. A teacher who relies mostly on standardized tests could reach widely different judgments about student achievement than one who places greater value on teacher made quizzes, effort, and participation in the classroom. Direct methods of assessment ask students to demonstrate their learning while indirect methods ask students to reflect on their learning. Tests, essays, presentations, etc. are generally direct methods of assessment, and indirect methods include surveys and interviews.

### Meaningful Classroom- Assessment Practices: Examples

Formative assessments emphasize in-depth questioning and extended dialogues, self and peer-assessment, as well as feedback and guidance on improvement. In some cases, standardized assessments can support formative purposes as well (Pepper, 2013). For instance, surveys of

competences or attitudinal questionnaires can help teachers adjust their teaching approach. Assessment formats, such as performance-based assessment, teacher, peer-and self-assessments, serve formative purposes as well, especially by boosting reflective activities and empowering pupils to assess their own performance (European Commission, (2012), OECD, (2013); Pellegrino et al (2012); Pepper, (2013).

Overall, performance-based assessment is seen as an effective method to measure wide-ranging competences and higher-order skills. The main strength of the method is that it focuses on a learner-centered approach and on continuous monitoring of learners' progress. Furthermore, employing a variety of techniques, such as portfolios, holistic scoring rubrics, and feedback, enables the assessment of broader learner competences. However, in order, to use this method effectively, clear definitions and a scale for competence development need to be included in the assessment practice, and the country-specific context should be taken into account, (Hao et (2013).

➤ **Portfolio assessments**

Portfolio assessment is receiving more and more interest as an effective method for assessing learners' progress Pepper, (2013). Portfolio assessment is a systematic and longitudinal collection of student work that shows his or her learning process, progress and performances according to Frejd, (2013) Portfolios can include students' texts Burner, (2014), modelling tasks, diary notes, and written data of achievements. The collected data also help teachers monitor learners' performance in real-life contexts or tasks that represent real-life situations.

**Assessment in project-based learning**

To foster a variety of students' skills, teachers often employ project-based learning. Kokotsaki et al. (2016) define project-based learning as 'an active student-centered form of instruction which is characterized by students' autonomy, constructive investigations, goal-setting, collaboration, communication and reflection within real-world practices'. Their systematic review shows that project-based learning can effectively enhance skills such as critical thinking, problem solving, communication, collaboration, and self-management (Ibid.). Project-based learning assessment refers to a broad approach which measures a performance by encompassing rubrics, reflection, self-and peer-assessment methods Kokotsaki et al., (2016). E-portfolios can also be integrated into project-based learning assessment; however, their application requires significant

time for teachers to assess students' skills and provide constructive feedback (Spector et al., (2016). Applying assessment of project-based learning can be challenging because teachers often lack the guidance and toolkits to implement effective assessment.

**Holistic scoring rubrics**

Some authors like Panadero and Jonsson,(2013), Tchibozo, (2011), VanTassel-Baska, (2014) advocate for holistic scoring rubrics to assess students' competences. Holistic scoring rubrics are comprehensive descriptive scales that enable scoring competences in problem situations and allow mapping learning outcomes at the end of the curricula Tchibozo, (2011). Holistic scoring rubrics are more commonly used for summative purposes. For instance, specific competences can be assessed on a scale from 1 to 8 or according to degrees of 'none, little, some, adequate, good, and excellent demonstration of required ability, skills, or presentation. By employing holistic scoring rubrics, teachers can assess the competences employed for a problem-solving task. Each pupil's competence is assessed following an elaborated instruction on what elements the specific competence should encompass. The method is unique in the way that the evaluator can evaluate a pupil in more complex situations (Tchibozo, (2011). Schools also tend to use report cards for assessing learning skills and work habits (OECD, (2015). For example, in Canada these skills include six categories –responsibility, organization, independent work, collaboration, initiative and self-regulation –for each of which the teacher gives ones of the four scores: 'excellent', 'good', 'satisfactory' and 'needs improvement', which are recorded in the report cards at the end of each grade (Ibid). Besides the summative approach of the method, it can also serve for formative purposes. Based on the results of a research review on the effectiveness of holistic rubrics scores, Panadero et al (2013) describe several benefits that the use of rubrics can bring to mediate pupils' learning, including increasing transparency, reducing anxiety, aiding the feedback process, improving student self-efficacy, and supporting student self-regulation. The authors found stronger evidence for the effectiveness of the rubrics when pupils could assess their own progress.

**Peer and self-assessment**

Due to their collaborative nature, peer and self-assessments have a strong potential to enable students' deep learning Black and William, (1998); Pepper, (2013). Successful teacher, peer and self-assessments are useful in building many key competences, such as initiative and

entrepreneurship, learning to learn and social competence, as well as transversal skills such as critical thinking, creativity, initiative, problem solving, risk assessment, decision-taking, and constructive management of feelings (European Commission, (2012a). Social and emotional competences are also better assessed through multiple forms of assessment, including student self-evaluation, teacher evaluation, and parent evaluation where appropriate, and making use of various modes such as self-reports, checklists, and direct behaviour assessment (Weissberg et al., (2015). In particular, peer assessment has a strong potential to boost transversal skills and it enables giving feedback to larger number of students Topping, (2009).

### Self-assessment

According to Black and Wiliam (1998) they underline that self-assessment is essential for successful formative assessment. To improve the learning process and outcomes, learners need to understand the main purposes of their learning and reflect on the feedback provided by teachers, and potentially by peers.   Inaccurate self-assessment might also be attributed to the social environment of classrooms, where the pressure to enhance or even protect one's own self-worth can result in overestimation of one's ability, or inaccurate self-reporting of grades or test scores.

### Peer assessment

Peer assessment is considered as a powerful tool to engage students in active learning, reflection which raises their motivation as well academic achievement McMahon, (2010). Kearney et al. (2015) reveal that 'students in the early stage of their tertiary education were able to judge their own work as well as peers' work with reasonable accuracy. Also, thanks to peer assessments, students may change their perceptions of their capabilities, improve their work, and develop skills necessary for autonomous learning. Peer assessment strategies in the classroom can help learners develop critical thinking, meta-cognitive skills and deep thinking (Hou et al., (2007) Sitthiworachart et al (2008). These aspects are especially important for developing transversal skills and the competence to learn. Peer assessment constitutes an effective way to improve the effectiveness and quality of learning, which can be as useful as gains from teacher assessments Topping, (2009). Both the receiver and the giver of the feedback receive mutual benefit, since they

can improve their self-assessment skills and consequently their learning to learn skills On the one hand, peer assessments are often considered as a means to save teacher's time. On the other hand, to smoothly implement this method, teachers need to invest a substantial amount of time for organizing, training and monitoring.

**The use of technology in classroom assessment**

The use of ICT can be beneficial to generate relevant information for large-scale performance-based assessments, as well as to facilitate classroom-based formative assessment Halász, (2016); Looney, (2011). ICT-based methods can also help improve equity in assessment by being sensitive to the needs of particular groups, such as second language learners or students with special educational needs OECD, (2013). New technologies have indeed opened opportunities to provide assessment formats, which can help to comprehensively capture complex key competences (Johnson et al., (2014), Redecker, (2013). The increasing use of ICT in teaching and learning implies new models of assessment. For instance, the OECD (2016) reports that technology significantly facilitates the use of formative assessment because it allows immediate feedback for both learners and teachers and ensures the learner's participation. In turn, this can enhance better targeted teaching and engaged learning. Technology can help measure complex skills such as reasoning or problem solving through measures such as essays, blogs or virtual learning environments Ramirez-Corona et al., (2013). Computer feedback can also help continuously develop writing skills Graham, (2015). Binkley et al. (2012) describe two key strategies for the use of ICT in assessment: 1) to deliver traditional assessment more effectively and faster; and 2) a 'transformative' strategy that aims to use ICT to change the way competences are assessed and find effective solutions for assessing transversal skills, which were difficult to assess with traditional methods.

Computer-based assessment, often referred as e-assessment, offers solutions to enhance the potential of Assessment for Learning. Looney (2011) notes that 'computer-based performance assessments may potentially assess more complex performances through simulation, interactivity, collaboration and constructed response formats. Increasingly sophisticated ICT programmes that score 'open-ended performances may address concerns regarding reliability of human-scored assessments, and validity of multiple-choice assessments that do not effectively measure higher-order skills.'Bunderson et al. (1989) defined four generations of e-assessments:

**Generation 1**: Computerized testing, which helps administer standardized tests and, in this way, reduces teachers' workload;

**Generation 2**: Computerized adaptive testing, which helps adjust the difficulty of tests to learners' abilities;

**Generation 3:** Continuous measurement, which allows test performance multiple times and, in this way, integrates assessment practices into pedagogic activities; and

**Generation 4**: Intelligent measurements (automated scoring), which produces inferences. Intelligent measurements encompass several functions such as: scoring complex responses, generating interpretations based on individual profiles of profiles, and providing advice during continuous measurement to optimize learner and assessor progress.

The first two generations have been widely integrated in classroom assessments. However, 'the main challenge now lies in making the transition to the latter two, the era of Embedded Assessment, which is based on the notion of 'Learning Analytics', i.e. the interpretation of data about students' proficiency in order to assess academic progress, predict future performance, and tailor education to individual students'(Redecker and Johannessen (2013), (p.81). Based on the IPTS reconceptualization, the second and third generation assessment marks a cultural shift from efficient testing (computer-based assessment) to personalized learning (embedded assessment). Embedded assessment helps to merge formative and summative assessment within the learning process because it allows for the continuous monitoring and guidance of learners via the digital environment Redecker and Johannessen, (2013).  Assessment methods such as data mining, learning analytics and behavioural tracking encompass third-generation assessment practices. Fourth-generation assessments are associated with automated feedback and intelligent tutors. Although the third and fourth generation assessments are seen to have the potential to capture a wider range of key competences and transversal skills, these assessment practices are still under development Bennet, (2015) Redecker and Johannessen, (2013).   These basic tools for instructional support can be referred to as 'generation one e-assessments', and those supporting more complex competences as 'generation two e-assessments'. First generation e-assessments primarily serve to optimize standardized tests and multiple-choice assessments. ICT-based

multiple-choice assessments that adapt to the learners' level of knowledge are called computer adaptive tests (CAT).

**Relevance of formative assessment**

Formative assessment is carried out to make changes to the teaching methods of a course; it attends to the process of a programme in order to provide immediate feedback which could lead to improvement. Davies et al. (1999) Page (65) Assessment in general accounts for "supporting learning (formative), certifying the achievement or potential of individuals (summative), and evaluating the quality of educational institutions or programs (evaluative)" William, (2008), Black and William (2004) put more emphasis on the use of assessment to support learning; however, they also acknowledge the importance of using assessment for certification and evaluation. In addition, there is a rising consensus among educators that assessment should be used to diagnose students' achievement, measure their performance, sort students, etc.

However, others argue for the use of assessment to enhance student learning and performance Delandshere, (2002).

➢ Is the practice of building a cumulative record of student achievement?

➢ Usually takes place during day to day learning experiences and involves ongoing, informal observations throughout the term, course, semester or unit of study

➢ Us used to monitor students' ongoing progress and to provide immediate and meaningful feedback

➢ Assists teachers in modifying or extending their programmes or adapting their learning and teaching methods

➢ Is very applicable and helpful during early group work processes.

Moreover, Black and Wiliam (1998) raise the "scrutiny issue" of developing tests to collect relevant evidence of student progress: "good questions are hard to generate and teachers should collaborate, and draw critically on outside sources, to collect such questions"

**Table 2:2. (Adapted from William & Thompson, (2008), p. 63**

| Framework Relating Strategies of Formative Assessment to Instructional Processes |
| --- |

Where the learner is going? Where the learner is right now? How to get there?.

Teacher, clarifying and sharing learning intentions and criteria for success. Engineering effective classroom discussions and tasks that elicit evidence of learning. Providing feedback that moves learners forward.

Peer, understanding and sharing learning intentions and criteria for success .Enabling students as instructional resources for one another.

Learner, Understanding learning intentions and criteria for success. Activating students as the owners of their own learning.

William and Thompson (2008) presented this matrix describing the role of student and teacher in an ongoing classroom assessment model. Given the above criteria, formative assessment has facilitated a change in the practices of some instructors who are encouraged to develop their own assessment formats or to adapt the forms of assessment that help them gather helpful information about their students' progress.

**The formative evaluation** according to Scallon (2000), has as essential function the regulation of the learning during a course or a learning sequence. It is aimed at specific learning and refers to one or more pedagogical interventions. Whether formative evaluation is formal or informal, it always involves two things: the learner in his progression and the teaching envisaged in a context of teaching and learning. We can affirm that formative evaluation is part of a constructivist approach to learning and is a process of accompaniment. It is beneficial both to the learner and to the teacher and is more interested in learner approaches and / or product realization rather than learner performance criteria and/or of product success.

**Continuous assessment (CA)**

Different authors have defined continuous assessment differently based on their point of emphasis. Accordingly, Asabe (2007) cited in Abiy, (2013) defines CA as a classroom process that is integrated with instruction. Similarly, Falayalo (1986) and Juliet (2007), viewing it as an integral part of instruction, considers it as a mechanism whereby the final grading of learners on the cognitive, affective, and psychomotor domains of learning is made cited in Abiy (2013), Nitko (2004), on the other hand, described it as an information-gathering tool that helps teachers select

content and method of instruction. According to Nitko (2004), Continuous Assessment is an ongoing process of gathering and interpreting information about student learning that is used in making decisions about what to teach and how well students have learned (p.4). Another definition by Airasian (1991) describes CA as an assessment approach which should depict the full range of sources and methods teachers use to gather, interpret and synthesize information about learners.

Continuous assessment can be regards as a method of ascertaining what a student gains from schooling in terms of knowledge, industry and character development, taking into account all his/her performances in tests, assignments, projects and other educational activities during a given period of term, year, or during the entire period of an educational level Onuka, (2005), (2006). It is also a method of using the recorded performances of each pupil to help him or her improve on his or her achievement through guidance. In other words, continuous assessment should be systematic, comprehensive, and cumulative and guidance oriented. Continuous assessment is systematic in the sense that it is planned, graded to suit the age and experience of the students and is given at suitable intervals during the school year. Appropriate timing saves students from being tested to death or becoming bored with too frequent assessments. Comprehensiveness of continuous assessment means that it is not focused on academic skills alone. It embraces the cognitive, the psychomotor and the affective domains. A child is assessed as a total entity using all the psychometric devises such as test and non-test techniques.

Cumulative characteristics of continuous assessment means that all information gathered on the individual has to be pooled together before a decision can be taken. To say that continuous assessment is guidance-oriented means that the information so collected is to be used for educational, vocational and personal-social decision-making for the student. Conceptually as well as in practice, continuous assessment provides feedback to children and teachers. Such feedback provides information, which is used for purposes of improving on the child's performance or modifying the content, context and methods of teaching, as well as in making a variety of other decisions.Yoloye (1991) also pointed out that continuous assessment is only a part of the field of educational evaluation. He further argues that continuous assessment is "a method of evaluating the progress and achievement of students in educational institutions" (Yoloye 1999). However, to Kellaghan and Greany (2003), that kind of assessment is subjective, informal, immediate, ongoing, and intuitive as it interacts with learning as it occurs. Although the main argument behind the

adoption of continuous assessment is to avoid focusing all efforts, time and energy on just one exam, this is not true in primary schools. On the contrary, formative assessment comes in the form of continuous assessment (CA) and its result can be used to adjust teaching and learning. CA is more likely to be process-oriented, informal, internal, involved learner McGonigal, (2006). There are many types of continuous assessment such as essays, presentation and class participation, projects/term papers and practical work (e.g. laboratory work, fieldwork, drawing practice). CA acts as a supplement to traditional exams and tests, offering a methodology for measuring students" performance.

Similarly, Alausa (2000) regarded continuous assessment as guidance-oriented because it gathers data about the teaching/learning over a period of time and helps modify instruction. According to Alausa (2006), "this could play a vital role in diagnosing and mediating areas of learners" weakness if properly anchored in what occurs in classrooms".CA is an approach that captures the full range of learners" performance. Thus, educators and administrators are able to assess learners" progress and would have time to correct the problems encountered by the students and adjusting the teaching and learning process.

**Contemporary Thoughts of Continuous Assessment: Assessment for Learning (AfL), Assessment of Learning (AoL) and Assessment as Learning (AaL)**

**Assessment for Learning (AfL)**

Now a day, emphasis of curriculum assessment shifts from summative (assessment of learning) to formative assessment (assessment for learning) to meet the dynamic needs of learners. Thus, in assessment for learning, teachers use assessment as an investigating tool to find out as much as they can about what their students know and can do, and what confusions, preconceptions, or gaps they might have. Therefore, investigation results provide the basis for determining what teachers need to do next to move student learning forward. In this regard, Okas (n.d.:4) contend that: assessment for Learning shifts the emphasis from summative to formative assessment, from making judgments to creating descriptions that can be used in the service of the next stage of learning. [Teachers] construct assessment tasks that open a window on what students know and can do already and use the insights that come from the process to design the next steps in

observation, worksheets, questioning in class, student-teacher conferences or whatever mechanism is likely to give them information that will be useful for their planning and teaching.

Marking is not designed to make comparative judgments among the students but to highlight each students' strengths and weaknesses and provide them with feedback that will further their learning. In reality, it is through classroom assessment that attitudes, skills, knowledge and thinking are fostered, nurtured and accelerated or stifled (Hynes, 1991 cited in Okas, n.d.).

### Assessment of Learning (AoL)

Assessment of Learning is the predominant kind of CA in schools. According to Okas (n.d.), the purpose of AoL is summative, intended to certify learning and report to parents and students about students' progress in school, usually by signaling students' relative position compared to other students. AoL in classrooms is typically done at the end of something (eg, a unit, course, a grade, a program) and takes the form of tests or exams that include questions drawn from the material studied during that time. Okas also claimed that AoL is a Kind of assessment that still dominates most classroom assessment activities with teachers firmly in charge of both creating and marking the test. Thus, a strong emphasis is placed on comparing students, and feedback to students comes in the form of marks or grades with little direction or advice for improvement.

### Assessment as Learning (AaL)

AaL emphasizes the role of the student, not only as a contributor to the assessment and learning process but also as the critical connector between them. Students, as active, engaged, and critical assessors, can make sense of information, relate it to prior knowledge, and master the skills involved. It occurs when students personally monitor what they are learning and use the feedback from this monitoring to make adjustments, adaptations, and even major changes in what they understand (Okas, n.d.). AaL is an approach where students are their own best assessors.

### Pyramid of contemporary of continuous assessment

79

Of
(Summative assessment)
For

ASSESSMENT

LEARNING

**LE**
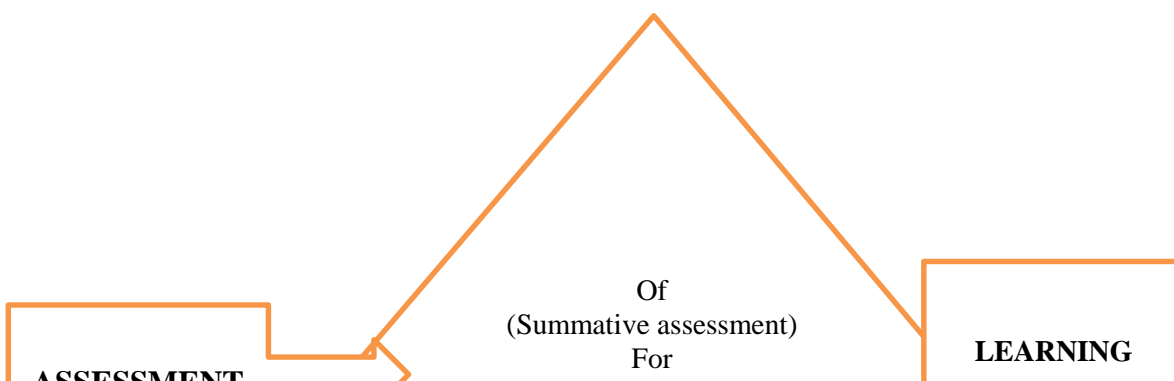
**Figure: 2.2: Pyramid of contemporary of continuous assessment source Arega (2014)**

**Merits of continuous assessment**

According to Onuka (2006), there is a need to use a variety of instruments to measure effectively the students" traits and their results are used to assist the students to improve themselves. One of the expected advantages of continuous assessment lies in its being guidance oriented. Since it will involve data gathering over a long period, it will yield more accurate data reaching the teachers early enough to modify instruction. This could play a vital role in diagnosing and remediating areas of learners" weakness if properly anchored in what occurs in classroom. Another advantage of continuous assessment is that it places learners at the Centre of all performance –assessment activities. It encourages more teacher participation in the overall assessment or grading of his/her learners. However, this approach, teachers would be able to integrate assessment and assessment results into instructional practice. Teachers will be expected to incorporate assessment into the larger learning framework and possibly to provide evidence regarding how assessment information is used to inform and guide instruction for individual learners.

✓ Continuous assessment is a regular assessment of the learning performance related to a course module and that is separate from examinations and accompanied by regular feedback.

✓ Continuous assessment can take various forms, depending on the final objectives and competencies. A few examples:

▪ Regular observation of practical skills or attitudes, e.g. nursing skills, your team's collaboration skills, collaboration during tutorials, etc

▪ Regular feedback on your portfolio, paper, etc

▪ Regular assessment of your verbal language skills

▪ Regular testing of your insight into theoretical concepts

✓ Continuous assessment can take place within various types of contact moments, e.g. practical, workshops, lectures, placements, projects, cases, etc.

✓ Continuous assessment is the result of the continuous assessment of the learning performance on a course module. The assessment task can verify which developmental process you are going through. The continuous assessment (partially) counts towards the final mark for the course module.

✓ Continuous assessment often goes hand in hand with information about: the assessment criteria, how you performed? What went smoothly? What went less smoothly, and the things you still have to work on.

**Problems with the implementation of continuous assessments**

The problems of continuous assessment that could be associated with the teachers include their skills in construction and administration, and their attitudes toward the continuous assessment approach and record keeping. One of the important aspects of continuous assessment is the availability of valid and reliable tests, which could be used in all schools. There is a need to construct these tests following established procedures and practices. To make the results comparable across all the schools, teachers need to be equipped with skills of test construction and administration. This could be done through teacher training institutions so that teachers are equipped with such skills as part of their training and certification. The Ministry of Basic Education could also organize workshops on test construction and administration as in-service training for serving teachers. Apart from the skills of test construction measuring cognitive aspects of learning, teacher should also be able to measure the learners‟ affective attributes such as attitudes, motives, interests, values and other personality characteristics. Such characteristics could be as important as others associated with intelligence. They could assist the teachers and administrators in understanding the learners better, both in the process of education and in the practical affairs of everyday life. They could help us answer questions such as why learners perceived to have high academic abilities do not do well at school. They also provide clues about the interest patterns of learners, which could be used in their placement into schools of higher learning and for employment purposes. For successful implementation of the continuous assessment approach, teachers need to give most tests, which mean more marking. They need to observe the learners

more keenly to assess their affective outcomes, and there will be more records to be kept on the learners. All these could mean more work to the teacher, more demand on his or her time and more responsibility on him or her. This means they must have a sound professional and attitudinal knowledge and skills of the system. Thus, teachers should be encouraged to form favourable attitudes toward the practice. They should be made aware of the requirements of the system, its importance and how to implement it.

Another problem with continuous assessment is the issue of record keeping. Learners‟ records have to be adequately and meticulously kept over a long period. They should be properly stored and easily retrievable. A related issue is that of collation. Scores may have to be combined from different sources using various weights. Teachers will need basic arithmetical operations of addition and multiplication; calculators may be handy here. So that scores are not misplaced, marks books or registers for learners could be used. This presentation is of the view that there are inherent problems with the derivation of continuous assessment scores and the situation deserves the focus of academics. The entire practice of continuous assessment is surrounded by Laxity. Thus, there is laxity in timing. There is also laxity in terms of the mode that the continuous assessment exercise takes. For instance, a school calendar may specify two continuous assessment tests, but because there is no enforcement, some teachers and their pupils agree on one test and one assignment, one test and two assignments, one test only. Griffiths (2005) captures another area of disparity, which relates to teacher involvement. He opines that the input of teachers/lecturers in continuous assessment may not be fair because different lecturers may understand their involvement differently. Other areas of disparities noticed across the board is that there are lecturers, who grant students the opportunity of a makeup test when they miss one, while others do not, some lecturers remark continuous assessment scripts and make corrections on them while others do not, some disclose continuous assessment marks to students while others do not. Some of the objectives for the adoption of continuous assessment have not been achieved because of some factors. Continuous assessment places much power in the hands of teachers.

This power is often abused by the teachers who award scores even when tests are not administered (Ezeudu, 2005). There is also the problem of over emphasis on the cognitive domain with total neglect of the affective and psychomotor domains of behaviour. This problem is more serious in the higher or tertiary institutions where no effort is made to assess the students‟ affective domain of behaviour. To worsen the situation, the students are awarded certificates with the

comment that they have been found worthy in character and in learning. Comparability of standards results from the variation in the quality of test and other assessment techniques in scoring and grading patterns as the inability of teachers to make reports of records to concerned persons. Large classes resulting from prerequisite skills by teachers, lack of materials and facilities necessary for acquisition of skills in the psychomotor domain and poor supervision or administration of continuous assessment practice in various schools Ezeudu, (2005), Greaney (2001).

### Summative Assessment.

Assessment in the context of education has been used primarily "in deciding, collecting and making judgments about evidence relating to the goals of the learning being assessed", which does not refer to how the information being collected and could be used Harlen, (2006). Assessment of learning, identified as summative assessment in the current literature, is deeply rooted in education and what has emerged along with it is the new paradigm, assessment for learning (formative assessment). In addition, Harlen (2006) justifies changes in assessment practices, to be used in four purposes: diagnostic, formative, summative, and evaluative. The transformation of assessment practices, according to Herrera et al. (2007), is that "assessment of achievement has become increasingly standardized, norm referenced and institutionalized".

Another change that emerged is regarding assessment of achievement (summative assessment) and its negative effect on teaching and classroom climate and assessment (Firestone et al (2000). Summative assessments are usually defined as cumulative assessments that intend to capture what a student has learned, or the quality of learning, and judge performance against some standards cited in Dixson et al (2016). Summative assessments are generally 'high stakes 'assessments and used to get a final judgment of how much learning has taken place that is, of how much a student knows and has learned Gardner, (2010).

Summative assessment methods rely on an extrinsic motivation for students, represented by marks, transcripts and diplomas. They are built on strategies to motivate students, provide information about student performance, serve to select or group students, and certify learning and award qualifications Bennett, (2011), OECD, (2013), Dixson and Worrell, 2016). Summative assessment methods, in particular standardised testing, are also often considered more reliable than the alternatives, as they tend to be easier to interpret and are not influenced by the particular

assessor or assessment (Pepper, 2013). Achievement decisions are about students' success or failure on a specific course: "about the amount of learning the students have done." Brown (1996) as a result, the content will be related very precisely to the course syllabus and the item types will be familiar to the students. Summative assessment is similar to the achievement tests above, in other words, the purpose is to determine, at suitable points in the course, and especially at the end, to what extent the aims of the course have been achieved; it is concerned with "the accountability of the product." Davies et al (1999). Herrera et al. (2007) state that while they have many uses, standardized tests nevertheless:

- Limit and negatively affect the quality of content-area instruction;
- Prompt teachers to narrow the curriculum taught in classrooms;
- Encourage "teaching to the test";
- Push students out of the system;
- Divert classroom instruction to an emphasis on low-level content and basic skills;
- Increase the redundancy of instruction Herrera et al (2007).
- assists you to make judgements about student achievement at certain relevant points in the learning process or unit of study (e.g. end of course, project, semester, unit, year)
- can be used formally to measure the level of achievement of learning outcomes (e.g. tests, labs, assignments, projects, presentations etc.)
- can also be used to judge programme, teaching and/or unit of study effectiveness (that is as a form of evaluation).

Combrinck et al (2012) have also criticized summative assessment for being Context-independent and inflexible. However, the way summative assessments are used in the classroom can present both opportunities and challenges for assessing key competences and transversal skills. On the one hand, summative assessments are often believed to have positive effects on student learning and achievement, irrespective of students' prerequisites and backgrounds such as cognitive ability, socioeconomic status and gender Thorsen, (2014); Thorsen et al (2012). International large-scale assessment tests such as the Programme of International Student Achievement and the Trends in International Mathematics and Science Study (it should be noted that neither are used as high stakes tests), as well as various national standardized tests, have shown the effectiveness of testing basic cognitive skills, and are considered reliable and valid.

Furthermore, many stakeholders believe that more frequent testing and grading has the potential to increase student performance by providing motivation to improve their grades and scores Klapp, (2015).

### Attributes or Characteristics of summative assessments

Dixson et al (2016) presented the following characteristics:

**Purpose:** Evaluation of learning outcomes; certify students' competences; placement, promotion decisions; but also can support learning.

**Time:** Cumulative, after instruction**.**

**Main actor:** Usually done by teachers; students are not directly involved in assessment processes**.**

Assessment methods are the strategies, techniques, tools and instruments for collecting Information to determine the extent to which students demonstrate desired learning outcomes.

### Assessment Terminological Delineation

**Assessment and Evaluation:** Many people in the applied linguistics make no difference, or at least no special distinction, between these two terms (**Table 2.3**). However, there are indications that are enough to distinguish assessment from evaluation.

**Table 2.3: Distinction between Assessment and Evaluation source: adapted by (Genesee, (2001)**

| Assessment | Evaluation |
|---|---|
| Assessment is a term that refers to a thorough but constant appraisal, judgment and analysis of students' performance through meticulous collection of information. | Evaluation is described as an overall but regular judgment and analysis of teaching, learning, as well as curriculum through systematic collection of data. |
| In assessment, the focus is on specific points of language | but in evaluation, the emphasis is placed on overall aspects of language |
| Assessment calls for forming a process which occurs during the learning process, | Evaluation accentuates the conclusion of a process that takes place at the end of the term. |
| Assessment looks at the individual l learners, | But evaluation checks the whole language learning program. |
| Assessment aims to inform the program evaluator(s) of the results | While evaluation seeks to report to the superior authorities. |
| | While success in evaluation indicates how effectively the program has been managed, and failure is implicitly ascribed to the ineffectiveness of instruction |

| | |
|---|---|
| In assessment, success means how well students progressed and failure implies how poorly the teacher performed | |
| Data in assessment are collected by concentrating on students' moment-by moment performance in the classrooms, "emanating from alternative activities" | While evaluation involves the gathering of data by focusing on teaching performance and learning outcomes. |
| To make decisions, assessment uses informal instruments of data collection | but in evaluation, formal instruments of data collection are employed |

**Assessment and Testing**

Assessment and tests are both forms of measuring student's learning ability but differ in many respects. Tests refer to specific instruments that measure the achievement and proficiency of students, and assessment refers to a more general concept of scrutinizing the students' learning progress. Tests are a subset of assessment. They are prepared administrative procedures that occur at identified times (Brown, 2004). Assessment is used as a broader notion for all types of measures. In the following are further instances which account for their discrepancies. While tests can be used as a 'bolt-on' procedure at end-points in learning programs, assessment is integral to the whole process of teaching and learning Hedge (2000) .(Table 2.4 show distinctions of the term**s)**

**Table 2.4: Distinction between Assessment and Testing Source Adopted From Brown, (2004).**

| ASSESSMENT | TESTING |
|---|---|
| assessment is process-oriented that focuses on how well a student has progressed | Tests are product-oriented, checking how much a student has achieved or progressed |
| assessment is criterion-referenced | Tests are carried out based on norm referencing |
| assessment uses both quantitative and qualitative criteria | Tests make use of quantitative criteria only |
| Assessment calls for an informal situation. | Tests are administered in a formal or semiformal mode |
| Students are shorn of knowing the outcomes of their tests. | Scoring in assessment is known to the students in order for them to be aware of their learning process |
| Judgments in assessment are made in a dynamic manner | but fixed judgments are characteristic of different types of tests. |

| | |
|---|---|
| assessment, only "intra-rater reliability is of constant concern to teachers" | In tests, both inter-rater and intra-rater reliability indices are made use of, |
| There are no Pass/Fail parameters in administration of assessment in the classroom | While students are doomed to either pass or fail the tests or graded as high or low proficient learners in tests. |
| Assessment requires the students to respond to both convergent and divergent questions mostly because the students' know-how is measured. | Because students are assessed in terms of what they know and what they don't know in taking the tests, they are provided with convergent types of questions |
| Students are never provided with any types of feedback during the time when they are taking the tests. | supplied with feedback in assessment whenever necessary |
| assessment views it assesses as input-takers and output-givers | Tests see their takers as candidates and examinees who are eventually risk-takers |
| The validity of an assessment is less demanding | The consequential validity of tests is more demanding |
| Assessment, the degree to which a question is responded correctly varies from student to student. | In tests, each correct response has the same value for all test-takers |
| Tests require deterministic scoring | Teachers tend to interpret what students perform in the classrooms |
| A question in assessment is capable of repetition from time to time | The questions in tests cannot be repeated |
| The questions in assessment are conducted with immediate decisions. | questions in tests are constructed in a predetermined or preplanned manner, |
| Assessment gauges performance | Tests measure competence |

### Classroom Assessment Design

Classroom assessment is how "to design accountability assessment which will provide good quality information about students' actual performances without distorting good teaching and

therefore learning practice" Gipps, (1994). In fact, the design of an effective assessment paves the way for beneficial wash back. Assessment design requires teachers to have determined the appropriate objectives as in the above, and they should also take great care that the design does not affect or distort those objectives.

Classroom assessment practices are more effective when careful attention is given to the structure and format of the assessment. For example, the instructions provided should maximize student performance. Sufficient time, space to enter answers, and when needed, technology, materials, and supplies should also be available to allow students to complete the classroom assessment tasks. Failure to attend to issues such as these will lead to incorrect interpretations of students' performance on the classroom assessment. It is of vital importance to select the right approach on the classroom assessment design as well as to know that all assessment designs have strengths and limitations. A variety of classroom assessment designs will provide a much better picture of students' learning. Therefore, assessment in the classroom should be carried out through six specific steps followed in order of function. These steps include planning, data collection, data organization, data evaluation and final reporting.



**Figure 2.3: Source: Author's conception: Classroom Assessment Practices Design**

**Planning**

Planning is the first and fundamental step in classroom assessment. It determines why a teacher should ever assess, what he/she should measure, and who he/she should evaluate. It also specifies how the assessment process should be carried out. Moreover, there should be a focus on the time of assessment administration and the degree to which a teacher can assess the students. The following should be taken into consideration for assessment Why to assess, what to assess, Who to assess, How to assess, When to assess, How much to assess
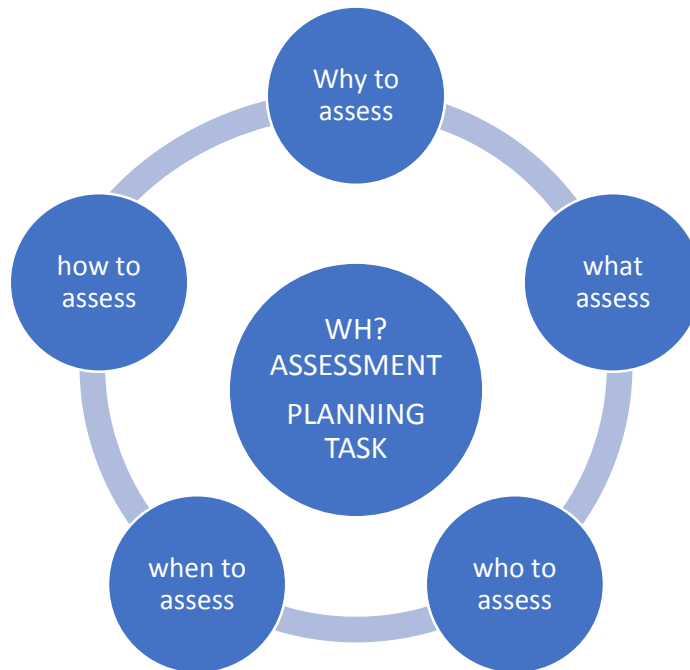


**Figure 2.4: WH Question base on assessment task Source: Author's conception.**

**Why to Assess?**

Teachers have meaningful goals for instruction and clear purposes for assessment Wolf, (1993). They assess to meet the course objectives, to check the effectiveness of ongoing instruction, and to improve the learning process. One of the great purposes of assessment is to gather information in order to modify and adapt the materials and curricula. They make decisions about students' current learning needs Genesee and Upshur, (1996). In short, teachers assess their students to accomplish the objectives discussed mostly at the local level in the above.

**What to ssess?**

Teachers cannot assess whatever they themselves like. In classroom assessment, teachers are supposed to assess students' current abilities in a given skill or task. The teacher can assess

students' oral communication ability if they need to communicate orally. If they are going to develop their academic skills, the teacher can assess how and how far they have mastered them. Teachers may also assess two or multiple abilities of their students at the same time. They may evaluate their pupils' vocabulary build-up as well as how well they have progressed in calculating some basic aspects in statistics, and also how far they have observed the suprasegmental rules in reading passages. Thus, it is urgently required that teachers should have adequate perception of what they assess in the classrooms.

**Who to Assess?**

It may seem strange to ask whom a teacher should assess in the classroom, but the issue is of great concern. Teachers should treat students as 'real learners', not as course or unit coverers. Teachers should be aware that students enjoy competence and proficiency of different levels and types or different schematic and systemic knowledge. They should also predict that some students are more active and some are less active; some are quick at learning and some are slow at it. In addition, they should expect that "students vary in how they learn by establishing different goals for learning" O'Malley et al (1996). Therefore, classroom assessment calls for a prior realistic appraisal of the individual's teachers are going to assess.

**How to Assess**

Teachers employ different instruments, formal or informal, to assess their students. Brown and Hudson (1998) reported that teachers use three sorts of assessment methods, selected-response assessments, constructed-response assessments, and personal-response assessments, to evaluate students' ability or progress in learning. They can adjust the assessment types to what they are going to assess. Because of their difficulty in construction and failure of eliciting any productive language as well as their high-stakes impact, the selected-response assessments at least are not much favored in the formative classrooms. Therefore, students are required to produce language through calculating, written and oral discourse and create and/or enhance the real-world calculation. This is not true that the other two methods are free from shortcomings, but they are more in line with the formative assessment paradigms. Here, we suggest using the convergent and divergent approaches to assessment in order not to commit mis conceptualization. As the terms imply, students are engaged into doing the higher-order thinking skills. This will cause learners to adopt the self-assessment and self-correction practices in order to achieve their autonomy. What

matters here is that the assessment should be carried out with learners, not to them because, as Harmer (2001) states, students need to know how and for what they are being assessed.

**When to assess**

Contemporary study into assessment has indicated that assessment is interwoven into instruction. Whatever teachers assess, they are actually in the process of teaching. They assess when they are going to make instructional decisions at the formative and summative levels, even if those decisions are small. For example, they assess when there is a shift in instructional units; when there is a check and recheck of the students' ability in perception and production of learning items at different intervals; when the effect of the given materials or curriculum on the improvement of learning process is examined; and when they intend to fine-tune their teaching process to the learning objectives.

**How much to assess?**

There is no touchstone to weigh the degree to which a teacher should assess students while the classroom instruction is believed to be interlocked with the formative assessment types. But it doesn't mean that teachers can evaluate their students to the extent that they prefer. It should be predicted that students differ in styles, types of competence, ability to strategy learning and use, views toward learning, background knowledge, psychological and social as well as personality factors, etc, so that assessment should be limited to every individual's needs, ability and knowledge. Although such factors are all hypothetical and to some extent economically incapable of being evaluated before or at the beginning of the course, prediction as part of planning can at least prevent teachers from over assessment or underassessment.

**Collection**

In order to make decisions about the effectiveness of assessment in different aspects of teaching, we need to gather adequate and appropriate information. In the past, final tests were the only devices used as the end-of-the-term instruments to collect data about the students' learning achievement and progress. They are still of great interest to many language institutes, teachers, administrators a well as micro- and macro-policymakers being aware of their potential drawbacks in authentically assessing students' learning. The reform in evaluation based on the process-oriented principles involved adopting diverse alternatives to classroom assessment. Genesee and

Hamayan (1991) introduced three ways which teachers use to keep assessment records in classrooms. They are student portfolios, narrative records, and checklists. But the more recent studies suggest further cases in this regard. From among the miscellaneous alternatives, teachers are supposed to gather information through such most common types as student portfolios, journals, narrative records, quizzes, checklists, drawings, student-teacher conferences, peer-editing, self-assessments, and peer assessments. They employ them because these alternatives are believed to reflect the real-world and authentic picture of the learning progress. Record keeping and collections of work samples by both teachers and students provide systematic information that facilitates communication (Tierney et (1991).

**Organization**

The collected information cannot by itself suffice to be evidences based on which decisions are made. They should be systematic and well-structured. Systematic collections need to be carefully planned, just like instruction (O'Malley et al (1996). Teachers should, therefore, organize the information they garner through various assessment types in order to make possible the evaluation and reporting processes and help the authorities to make easier decisions.

**Selection**

Although structuring, organizing and sequencing information are at the service of facilitating optimal processing, not all the collected and organized information is needed for the immediate reporting. Teachers should select those pieces of assessment data fitting the teachers' and students' immediate needs and being of use for the next classroom activities and materials designing.

**Evaluation**

Before reporting to the people in different levels, judgments should be made regarding the effectiveness of instruction and curriculum and how much the students have been able to progress toward the goals they have set. This evaluation process should preferably occur after each lesson, each instructional session, or each chapter until the end of the term. Examining student progress at the end of major units can help one decide whether the students are ready to proceed to the next unit and for planning for next unit (Genesee & Upshur, 1996). Assessment at the end of each unit of instruction can also provide information about how effective the unit.

### Reporting

The final step of designing classroom assessment is to report the assessment information to certain people. Therefore, there are five audiences in this regard, each of whom need their own share of them. Teachers, students, administrators, parents, and stakeholders/educational policy-makers are the people who receive the assessment information or results**.**

### Teachers

The main users of the information are certainly the teachers themselves. They use them to check the effectiveness of instruction and course materials. They also make decisions about students' needs for the upcoming term. What is of great note to teachers is to know how well their students could reach their stated goals. They, therefore, evaluate student progress or achievement. Teachers have a greater objective; that is, they use the information to do more careful planning for the next instructions

### Students

Because the assessment is said to be conducted with the students, they can make full use of the assessment data or results. As stated in the above, involving students into assessment can give them clear feedback as to their progress in language proficiency as well as make them more accountable for their learning. Students (can) reflect on what they have learned. They can take more active roles in making decisions about what they need for the next classroom learning. Reporting to students can also facilitate the next instruction process because they will realize what the instructional objectives are, while these objectives are set with them. In this case, students' learning awareness will increase considerably thanks to their growing assessment awareness.

### Parents

The process-oriented assessment will not put the parents out of the educational program, though they are the out-of-class audiences. Valdez et al (1994) regard the parents as at least home collaborators and contributors in the portfolio process. Information reported to them can provide the parents with clear feedback and concrete evidence of their children progress in language

proficiency. Parents can use the information to monitor and supervise their children' work and assignments at home based on the suggestive directions given by the teacher. They can also supply the teacher with information they collect about their children's learning appropriate for internal decision-making. Of course, the parents' knowledge plays a crucial role in this respect. Therefore, reporting the assessment data to parents can create a communication line between them and teachers so that they can both monitor the student learning more effectively through exchanging views. This exchange may be made in letters, phone calls, or through electronic devices. This happens when the students are young, no matter what level of proficiency they are at, because adult students, with high or low proficiency, or sometimes even young learners with high proficiency, welcome less or no support from their parents.

### Administrative authorities

Because teaching and assessment occur within the framework of educational systems, the information obtained should be reported to different administrative authorities for making their own decisions. Therefore, teachers are accountable to the educational administrators as well, although educational authorities may collect the accountability information in some cases (Genesee et al (1996). Typically, Stern (1983) classified the educational systems into two levels: local (i.e., school administration) and regional (i.e., Higher Education). The tasks of administration are varied (1983: 427).

### School administrators

School administrators are also the outside-classroom audiences who need reports to make a variety of decisions thereupon about the related issues at more global levels. Using them, they deal with more convenient and careful scheduling and curriculum planning. They focus on the curriculum which is to be articulated both horizontally and vertically, that is, setting and attaining goals at global and specific levels, respectively. They also wish to make sound decisions about different needs for different proficiency levels as well as the issue of inclusion, exclusion, or modification/revision of the given materials in line with the program policy. Placement the students into the correct levels/classes is another decision that such administrators make accordingly. Their major concern would be the administrative accountability; i.e., maintaining and enhancing the quality of institutional programs.

**Higher Educational administrators**

Part of the assessment information should finally go to the box of the people who "ensure the proper functioning of the entire system and of each institution" (Stern, (1983) page 428. In other words, they make decisions about whether the whole educational program could meet the educational policies at the global level. They also use the assessment data together with their own evaluative evidences to demonstrate to what extent they should provide the wished-for facilities as well as financial, political and managerial supports to the language schools, teachers, teacher developers, etc.

**Principles of Classroom Assessment Practices**

Principles are a set of beliefs and theories or conceptual frameworks developed by applied linguists for practical understandings. Teachers employ them in effective approaches to teaching and learning. From the testing and assessment perspectives, teachers need certain assumptions relevant to the assessment issues in order to make more effective decisions about their students' actual learning abilities. As a matter of fact, these principles should be addressed in pre-service and in-service teacher education courses which can definitely raise the learner teachers' awareness of the assessment knowledge in their future actual practice. In this study, teachers are provided with fourteen principles of classroom assessment practices as follows.

**Assessment should be formative.**

Classroom assessment should be carried out formatively in order to inform on-going teaching and learning. It should be formative because it refers to the formation of a concept or process. Should practice building a cumulative record of student achievement, usually takes place during day to day learning experiences and involves ongoing, informal observations throughout the term, course, semester or unit of study , is used to monitor students' ongoing progress and to provide immediate and meaningful feedback, assists teachers in modifying or extending their programs or adapting their learning and teaching methods, is very applicable and helpful during early group work processes. This can be done through providing learners with timely and

immediate feedback, the feedback having the feature of processibility, resulting in enhancing the learning potential of the pupils Lambert et al (2000).

Formative, assessment is concerned with the way the student develops, or forms. So it should be for learning. It is also designed to stimulate growth, change and improvement in teaching through reflective practice. In other words, it has a crucial role in "informing the teacher about how much the learners as a group, and how much individuals within that group, have understood about what has been learned or still needs learning as well as the suitability of their classroom activities, thus providing feedback on their teaching and informing planning " Rea-Dickins (2001) page 457. Teachers use it to see how far learners have mastered what they should have learned. So classroom assessment needs fully to reach its formative potential if a teacher is to be truly effective in teaching.

Formative assessment is further divided into formal and informal so teachers take into consideration Formal assessment involves: the use of specific assessment strategies to determine the degree to which students have achieved the learning outcomes, assessment strategies including: essays, exams, reports, projects, presentations, performances, laboratories or workshops, resource development, artwork, creative design tasks, quizzes and tests, journal writing, portfolio, individual and/or collaborative tasks that usually attract a mark (group work may include both an individual and group component).  Informal classroom assessment practice include; systematically observing and monitoring students during in class learning and teaching experiences, interacting with students to gain a deeper knowledge of what they know, understand and can do, circulating the classroom and posing questions, guiding investigations, motivating and quizzing students, providing opportunities for students to present or report upon their learning and teaching experiences, collecting, analysing, and providing feedback on in and out of class work samples (e.g. how their group work projects are progressing).

### Assessment Should Determine Planning.

Classroom assessment should help teachers plan for future work. First, teachers should identify the purposes for assessment that is, specify the kinds of decisions teachers want to make as a result of assessment. Second, they should gather information related to the decisions they have made. Next, they interpret the collected information that is; it must be contextualized before it is

meaningful. Finally, they should make the final, or the professional, decisions. The plans present a means for realizing instructional objectives which are put into practice as classroom assessment to achieve the actual outcomes Genesee et al (1996).

**Assessment should serve teaching.**

Classroom assessment serves teaching through providing feedback on pupils' learning that would make the next teaching event more effective, in a positive, upwards direct. Teaching and learning dictate the form and timing of assessment. It is a fact of life for teachers and part of what they do (Lambert et al (2000) p. 2). Therefore, assessment must be an integral part of instruction. Harmer (2001) thinks of teachers as assessors to fulfill the students' expectations through offering helpful feedback and correction on their performance. Assessment seems to drive teaching by forcing teachers to teach what is going to be assessed. Teaching involves assessment; that is, whenever a student responds to a question, offers a comment, or tries out a new word or structure, the teacher subconsciously makes an assessment of the student's performance (Brown, 2004). So when they are teaching, they are also assessing. A good teacher never ceases to assess students, whether those assessments are incidental or intended (2004: 4).

**Assessment should serve learning.**

Classroom assessment is an integral part of learning process as well. The ways in which learners are assessed and evaluated strongly affect the ways they study and learn. It is the process of finding out who the students are, what their abilities are, what they need to know, and how they perceive the learning will affect them (Sommer, 1989). In assessment, the learner is simply informed how well or badly he/she has performed (Ur, (1996). It can spur learners to set goals for themselves Brown, (2001). Assessment and learning, as Feuerstein et al. (1980) stated, are seen as inextricably linked and not separate processes because of their mutually-influenced features Williams et al (2000). Learning by itself has no meaning without assessment and vice-versa. Thus, assessment places the needs of the students at the center of the teacher's planning Penaflorida, (1998). The teacher designs the situation based on their assessment of the student's learning preference, interest, and needs. If learning is our central concern, then assessment should contribute to the learning process Cameron, (2001).

**Assessment should be curriculum-driven.**

Classroom assessment should be the servant, not the master, of the curriculum Lambert and Lines, (2000). Assessment specialists view it as an integral part of the entire curriculum cycle. Therefore, decisions about how to assess students must be considered from the very beginning of curriculum design or course planning. L2 teachers see assessment as an activity which is integrated into the curriculum with the aim of improving learning, rather than a 'one-off' summative event Cizek et al. (1995) cited in Brindley, (1998). "The diagnostic or formative assessment is typically curriculum-driven so that assessment shadows the curriculum and provides feedback to students and teachers" (Spolsky, 1992: 38).

**Assessment should be interactive.**

Based on constructivist perspectives of second language learning, as students' cognitive activities are the core of teaching decisions, students should be proactive in selecting the content for assessment Biggs et al (1998). It provides a context for learning as meaning and purpose for learning and engages students in social interaction to develop oral and written language O'Malley et al (1996). Feuerstein, considering assessment and learning as inextricably linked and not separate processes, maintained that "rather than viewing assessment as a process carried out by one person, such as a teacher, on another, a learner, it is seen as a two-way process involving interaction between both parties" Williams et al (2000). Assessment, then, should be viewed as an interactive process that engages both teacher and student in monitoring the student's performance Hancock, (1994).

**Assessment should be student-centered.**

Since learner-centered methods of instruction are principally concerned with language use and learner needs, students are encouraged to take more responsibility for theirown learning and to choose their own learning goals and projects. Therefore, in learner-centered assessment, they are actively involved in the process of assessment. Involving learners in aspects of classroom assessment minimizes learning anxiety and results in greater student motivation. Students in such classrooms "have input not only into what they learn, but also into how they will be assessed" O'Malley et al (1996). To make the classroom assessment possible, students should be encouraged to work on real and authentic tasks, interacting with others in class.

**Assessment should be diagnostic.**

Classroom assessment is diagnostic because teachers use it to find out learners' strengths and weaknesses during the in-progress class instruction. They also identify learning difficulties Lambertet al (2000). If the purpose of assessment is to provide diagnostic feedback, then this feedback needs to be provided in a form either verbal or written that is for learners to understand and use Brindley, (2003). Diagnostic assessment is often undertaken at the beginning of a unit of study to assess the skills, abilities, interests, experiences, levels of achievement or difficulties of an individual student or a whole class, should involve formal measurements (e.g. IQ/aptitude tests, fitness tests) that are used to establish a starting point or baseline OR informal measurements (e.g. observation, discussions, questioning), informs programming and planning, and learning and teaching methods used, as well as assessment choices.

**Assessment should be both bottoms-up and top-down.**

Learners' performance should be assessed in terms of both data-driven and conceptually-driven approaches because of the changing learning contexts. It depends on the nature of the knowledge the learners bring to the task. They don't seem to stick to one of these modes of processing in order to comprehend the language. These approaches are in constant interplay Hedge (2000), from the perspectives of interactive approaches to learning. The learners, therefore, are in a continual shift of focus between them that is, both schematic and systemic knowledge of the learners come into interaction in processing language. Thus, teachers should adapt their assessment procedures to the way learners process the language skills although the top-down approach is more prevalent in higher level skills.

**Assessment Should Be Exposed to Learners.**

Teachers are supposed to enlighten learners' accurate information about assessment. In other words, it should be transparent to learners. They must know when the assessments occur, what they cover in terms of skills and materials, how much the assessments are worth, and when they can get their results and the results are going to be used. They must also be aware of why they are assessed because they are part of the assessment process. Because the assessment is part of the learning process, it should be done with learners, not to them Brindley (2003). It is also important to provide an assessment schedule before the instruction begins.

**Assessment should be non-judgmental.**

In the classroom assessment, everything focuses on learning which results from a number of such factors as student needs, student motivation, teaching style, time on task, study intensity, background knowledge, course objectives, etc. So there is no praise or blame for a particular outcome of learning. Teachers should take no stance on determining who has done better and who has failed to perform well. Assessment should allow students to have reasonable opportunities to demonstrate their expertise without confronting barriers

**Assessment should develop a mutual understanding.**

Mutual understanding occurs when two people come to a similar feeling of reality. In second language learning, this understanding call for a linguistic environment in which the teacher and students interact with each other based on the assessment objectives. Therefore, assessment has the ability to create a new world image by having the individuals share their thoughts helpful in learning process. When learning occurs, this is certainly as a result of common understanding between the teacher and students.

**Assessment should lead to learner's autonomy.**

Autonomy is a principle in which students come to a state of making their own decisions in language learning. They assume a maximum amount of responsibility for what they learn and how they teach it Richards et al (2002). Autonomous learning occurs when students have made a transition from teacher assessment to self-assessment. This requires that teachers encourage students to reflect on their own learning, to assess their own strengths and weaknesses, and to identify their own goals for teach Genesee et al (1996). Teachers also need to help students develop their self-regulating and metacognitive strategies. Autonomy is a construct to be fostered in students, not taught, by teachers.

**Assessment should involve reflective teaching.**

Reflective teaching is an approach to classroom instruction in which teachers are supposed to develop their understanding of teaching (quality) based on data/information obtained and collected through critical reflection on their teaching experiences. This information can be gathered through formative assessment (i.e., using different methods and tools such as class quizzes, questionnaires, surveys, field notes, feedback from peers, classroom ethnographies, observation notes, etc) and summative assessment (i.e., different types of achievement tests taken

at the end of the term) assists you to make judgments about student achievement at certain relevant points in the learning process or unit of study (e.g. end of course, project, semester, unit, year) , can be used formally to measure the level of achievement of learning outcomes (e.g. tests, labs, assignments, projects, presentations etc.) , can also be used to judge program, teaching and/or unit of study effectiveness (that is as a form of evaluation).

**International guidelines of students' assessment**

According to, The OECD's Education Policy Committee launching the Review on Evaluation and Assessment Frameworks for Improving School Outcomes in 2009 to provide analysis and policy advice to countries on how different assessment and evaluation tools can be embedded within a consistent framework to bring about real gains in performance across the school system.

Student assessment relies on the following guides**:**

**Aligning educational standards and student assessment**

If the assessments do not well match the curriculum and the standards, then results have little value in judging how well students are learning and in diagnosing school or student needs. Hence, policy needs to give considerable attention to sound strategies to assess performance against standards. Part of the strategy may consist of developing large-scale standardized tests with a high degree of validity (*i.e.* the degree to which assessments and evaluations measure what they are intended to measure),  reliability (*i.e.* the consistency and stability of results across student populations) and usability (*i.e.* how policy makers, school leaders and teachers make sense of and respond to assessment and evaluation results). Another possible strategy is to develop teacher capacity in assessing against standards, provide detailed guidelines on marking assessments and strengthen moderation processes between teachers and schools.

**Balancing external assessments and teacher-based assessments in the assessment of learning**

An important policy challenge is the design of student summative assessment, which seeks to provide a summary statement of student achievement at a particular point in time. Research shows that while summative assessment is primarily conceived to measure the outcomes of learning, the approach to summative assessment can, in turn, have a strong impact on the learning

process itself. Different assessment policies and practices influence students' motivation, effort, learning styles and perceptions of self-efficacy as well as teaching practices and teacher-student relationships.

External assessment refers to standardized examinations that are designed and marked outside individual schools and normally take the form of a written test. The major advantage of external assessment is its high reliability. It ensures that all students are assessed on the same tasks and that their results are measured by the same standards. Moreover, external assessment is usually conducted in supervised conditions, which ensure that the student has actually done the work being assessed.

However, external assessment is often criticized for having lower validity than teacher-based assessment. It tends to be in the form of a written test under supervised conditions, so that only a limited range of curriculum goals can be covered. It can also have detrimental effects on teaching and learning. The risk is that teachers may end up focusing on test-taking skills, especially when high stakes for their students are attached to the test results.

Teacher-based assessment refers to continuous assessment that is designed and or marked by the students' own teachers. It is conducted internally in the classroom and counts towards a final grade or evaluation of the student. Teacher-based summative assessment may include different types of assessment such as teacher-made tests, classroom-embedded assignments, project work and portfolios.

Typically, teacher-based assessment is presented in the literature as having higher validity than external assessment. Due to its continuous nature, teacher-based assessment often allows important achievements to be measured that could not be captured in a final examination, such as extended projects, practical assignments or oral work.

However, teacher-based assessments are often perceived as unreliable. Test items and grading standards may vary widely between teachers and schools, so that the results of internal assessment will lack external confidence and cannot be compared across schools. There might also be a high risk of bias in teacher-based assessment, *i.e.* the assessment is unfair to particular groups of students.

This indicates that a combination of teacher-based and external assessments would be most suitable to ensure maximum validity and reliability. Learning outcomes that can be readily assessed in external examination should be covered this way, whereas competencies that are more complex should be assessed through continuous teacher-based assessment.

In addition, strategies to improve the reliability of teacher-based assessment include using scoring guides, negotiated scoring criteria, external benchmarks, training for teachers, multiple judgements and external moderation. Another approach is to develop on-demand assessments, where teachers can draw from a central bank of assessment tasks and ask students to take the assessment when they consider that they are ready.

**Which assessment practice should be used for assessment in the Classroom?**

Each program will select the assessment methods that will provide the most useful and relevant information for the purposes that the program and its faculty have identified. When selecting which assessment methods to use, consider what questions need to be answered, the availability of resources, and the usefulness of the results. Programs may find it valuable to identify what information currently exists in the program that can be utilized as well as what assessment methods have been used for past assessments. There are several guidelines to follow when selecting assessment methods:

- Collect information that will answer the program's questions
- Use multiple methods to assess each student-learning outcome
- Include both indirect and direct assessment methods
- Include both qualitative and quantitative methods
- Choose methods that allow the assessment of both strengths and weaknesses
- Utilize capstone courses or "second-year" projects/assignments to directly assess student learning outcomes
- Use established accreditation criteria/standards when developing the assessment plan

**Why is it important to use multiple methods?**

Relying on only one method to provide information about the program will only reflect a part of students' achievement. Additionally, SLO may be difficult to assess using only one method. For each SLO, a combination of direct and indirect assessment methods should be used. For

example, responses from student surveys may be informative, however, when combined with students' test results they will be more meaningful, valid, and reliable.

**What are direct and indirect methods of assessment?**

Direct methods of assessment ask students to demonstrate their learning while indirect methods ask students to reflect on their learning. Tests, essays, presentations, etc. are generally direct methods of assessment, and indirect methods include surveys and interviews.

In developing an actual assessment instrument to be used across schools, Klieme et al. mention the need to utilize several technical aspects of test development:

- Determining whether the performance will be judged in terms of norm referencing or criterion referencing;
- Determining whether competence will be reported in terms of a single level or across different components of overall competence;
- Determining whether test takers all complete the same items or completely different samples of items;
- Determining whether one test is used for all competence levels or whether test items might be individualized in some way (Klieme et al. (2004)adapted from p. 76).

Others have raised additional technical issues in the design of assessments. For instance, Vos et al  (*2003)* observed that the order of test items influences results, showing that items that are more difficult negatively affect achievement on subsequent items. Thus, studies on the design of a large-scale assessment are often conducted to ensure that the effects of the order of test items are minimized. For example, researchers develop different test booklets with varied difficulties within test booklets and the same test item occupies different positions in different versions of the test .

In reference to *standards, one* of the keys to successful learning is the aligned curriculum this means that learning outcomes are clear, learning experiences are designed to assist student achievement of those outcomes, and carefully designed assessment tasks allow students to demonstrate achievement of those outcomes. One of the challenges of effective assessment is to ensure that there is a close alignment between the learning goals, the teaching and learning activities aimed at meeting learning goals and the assessment tasks used to assess whether learning

goals have been met. Current best practice includes assessment, which is aligned to learning goals, which focus not only on content knowledge but also on process and capabilities.

There are different assessment tasks you can use to assess your students.

**a)** **Short form test:** Short form tests are also known as objective tests. They include multiple choice, completion (or cloze), true-false and matching types, of which multiple choice is the most commonly used.

**b)** **Short answer test:** Short answer questions require a brief answer consisting of a phrase, sentence or short paragraph

**c)** **Essay:** Essays require students to select, organise and integrate material on a given topic. They also test writing skill and the ability to develop an argument and use evidence to support it

**d)** **Performance test:** Performance tests involve either a hands-on activity, such as using microscope correctly or taking a patient history, or the development of products, such as developing a building design or software package.

**e)** **Written report:** The report is a common way of presenting information and recommendations or conclusions related to a specific purpose

**f)** **Project:** Projects are an extended piece of work involving inquiry-based activities. Project may be small or large, undertaken by individuals or in groups and have outcomes such as a report, design, art work, working product

**g)** **Presentation:** Presentations are usually made orally to a class on a prepared topic and may include the use of presentation aids such as PowerPoint, handouts or audio-visuals

**h)** **Poster:** A poster is a visual representation of a topic or the outcomes of learning activity. They can use different media, including online technology, and can be created individually or in groups.

**i)** **Journal:** Journals (also called learning logs or learning diaries) are written by students over a period of time, such as a semester, in order to record and reflect on their personal learning experiences and outcomes

**j)** **Portfolio: A** portfolio is "a purposeful collection of student work that exhibits the student's efforts, progress and achievements in one or more areas. The collection must include student participation in selecting contents, the criteria for judging merit and evidence of student self-reflection" Paulson et al (1991).

### 2.1.8: Classroom Management

According to Sabanci, (2008) Classroom management can be defined as the skills required organizing the instruction in the classroom effective. Ming-Taket al (2008)     classroom management is the art of establishing a good climate and managing instruction effectively. The concept of classroom management a classroom is very important because it facilitate teaching and learning. A conducive, classroom environment increases the desire for knowledge and heightens creativity in learners, Agabi et al., (2013). The classroom protects learners from the erratic weather condition such as rain, wind, and extreme weather conditions (Agabi et al., 2013).  The classroom, with the aid of its facilities such as: the writing board, classroom seats and instructional materials, enhances teaching and learning. A classroom is a space provided in a school where students gather and the teacher meets them for lectures. It is a room designated for teaching and learning. Classroom is a room set aside and specifically designed and furnish for the purpose of teaching and learning (Akinwumiju et al (2008) in (Agabi, et al., (2013). A classroom is one of the facilities a school must have. Agabi, Onyake and Wali succinctly put: a school is not complete without at least one block of classroom to facilitate organized teaching and learning.

The concept of classroom management has been widely defined, and every author explains it from a different perspective. Classroom management has also been defined as the action's teachers take to create a supportive environment for the academic and social emotional learning of students (Özcan, 2017). Therefore, classroom management can be seen as all the actions that a teacher performs inside a school in order to enable learning. Classroom management can be thus conceived as the entire educational decisions teachers make (Marzano et al (2003). According to Evertson et al (2006) classroom management refers to the action's teachers take to create a supportive environment for the academic and social emotional learning of students.

Classroom management is one of the most important roles played by teachers because it determines teaching success. Classroom management refers to preventing disruptive behavior so as to improve academic performance. Academic achievement refers to the ability of students to study, remember facts and be able to communicate their knowledge verbally or through writing.

Classroom management is a matter of concern among teachers everywhere. Consequently, the concept can be understood as all the actions performed by the teacher to create and maintain a learning environment that enables successful instruction. This includes a variety of techniques, like arranging the physical environment, establishing rules and procedures, maintaining students' attention to lessons, and engagement in activities Özcan, (2017). Classroom management has also been defined as the action's teachers take to create a supportive environment for the academic and social emotional learning of students.

Therefore, classroom management can be seen as all the actions that a teacher performs inside a school in order to enable learning. Erasmus, (2009) on his part observes that improved teacher training in classroom management is a critical part in improving academic achievement in a particular subject. Factors contributing to efficient classroom management include: teaching methodology, lesson planning and preparation, interpersonal relationships and student motivation Gaston et al (2010). Erasmus, (2009); observed that structuring a classroom so that it supports positive student behavior requires prior planning. The structure of the classroom environment should decrease the likelihood of inappropriate student behavior and increases desirable student interactions and consequently improves academic performance. A classroom environment would enable learners to study in a way that is interesting, enjoyable and purposeful. Among models to restructure a good classroom environment include: use of a variety of teaching methods and involving students to numerous learning activities, physical class arrangement that allows a teacher to access students, efficient use of class time and ensuring that students interact positively during cooperative learning activities Emmer et al (2001). 'Teachers in the classroom are the managers of the classroom activities. He is concerned with maintaining order, regulating the sequence of events and directing his own attention towards achieving educational goals. Classroom management plays a very important role in the teaching and learning process. Marzono (2003), said a classroom that is well managed will provide an environment in which teaching, and learning can flourish. The success of any educational system depends largely on the effectiveness of classroom management. Classroom management techniques have been divided into two major compon ents, behavioral management and instructional management Martin et al (2010).

Bloom (1971), observes that improved teacher training in classroom management is a critical part in improving academic performance in a particular subject. Factors contributing to

effective classroom management include: teaching methodology, lesson planning and preparation, interpersonal relationships and student motivation Gaston et al (2010). Oliver et al (2007) observed that structuring a classroom so that it supports positive student behavior requires prior planning. The structure of the classroom environment should decrease the likelihood of inappropriate student behavior and increases desirable student interactions and consequently improves academic performance. A classroom environment would enable learners to study in a way that is interesting, enjoyable and purposeful. Among models to restructure a good classroom environment include: use of a variety of teaching methods and involving students to numerous learning activities, physical class arrangement that allows a teacher to access students, efficient use of class time and ensuring that students interact positively during cooperative learning activities Emmer et al (2001), Oliver and Reschly (2007) that the use of rules is a "powerful, preventive component of classroom organization and management plans." Rules are aimed at establishing the expected behaviors, what to be reinforced and the consequences for inappropriate behavior. Thus emphasis of effective class discipline helps to cut down on discipline problems and leave the classroom with fewer interruptions and disruptions. Wong (2007) believes that student performance is influenced by how well the procedures are laid out and taught to them.

For the classroom to be useful for the purpose it was meant to serve, teaching and learning, it has to be organized and maintained. This brings about the concept of classroom management. Classroom management refer to the sum total of plan of actions taken by the teacher in the classroom to bring about a conducive classroom environment that supports teaching and learning leading to success and achievement. Mercenary (2010) in Agabi et al, (2013) defined classroom management as the process and strategies an educator uses to maintain a classroom environment that is conducive to students learning and success. Similarly, Dollad and Christensen (1996) defined classroom management as the action a teacher takes to bring about an environment that support and make easy instructions, academic, social and emotional learning. Kerr et al (2002) assert that the use of rules is a "powerful, preventive component of classroom organization and management plans." Rules are aimed at establishing the expected behaviors, what to be reinforced and the consequences for inappropriate behavior. Thus, emphasis of effective class discipline helps to cut down on discipline problems and leave the classroom with fewer interruptions and disruptions. Wong (2007) believes that student performance is influenced by how well the procedures are laid out and taught to them.

**Quality Classroom Management**

According to Everton et al (2006) in order, to attain a high quality of classroom management, teachers must take the following into considerations

➢ Develop caring, supportive relationships with and among students.

➢ Organize and implement instruction in ways that optimize students' access to learning. The importance of developing favorable teacher-student relationships is also expressed by Marzano et al. (2003).

➢ Additionally, state that teachers should encourage students' engagement in academic tasks, which can be done by using group management methods (e.g., by establishing rules and classroom procedures.

➢ Teachers must promote the development of students' social skills and self-regulation. Marzano et al. (2003) refer to this as making students responsible for their behavior.

➢ Finally, He states that teachers should be able to use appropriate interventions to assist students with behavior problems.

The last two actions proposed by Evertson and Weinstein (2006) indicate that effective classroom management improves student behavior. Hence, classroom management is an ongoing interaction between teachers and their students.

Brophy (2006) presents a similar definition: "Classroom management refers to actions taken to create and maintain a learning environment conducive to successful instruction (arranging the physical environment, establishing rules and procedures, maintaining students' attention to lessons and engagement in activities)"

**Classroom Management and Its Significance**

Managing student behavior has always been a primary concern of teachers for student misbehaviors have interfered with a positive learning environment Shin et al (2007). From the beginning of teaching experience, teachers commonly express their concern about controlling the students and creating a disciplined environment in order to create a proper atmosphere for learning; and classroom management is commonly mentioned as the most intricate aspect of teaching.

Doyle (1980) also states that maintaining order in a classroom is a basic task of teaching as management activities lead to the establishment and maintenance of those conditions in which instruction can take place effectively and efficiently. There is accumulating evidence from meta-analyses of variables that influence school learning and that classroom management has been identified as one of the variables that has greatest influence on school learning Freiberg (1999). Today, classroom management is becoming an increasing problem for teachers and administrators in primary schools because of changes in educational environments. Once again, Brophy and Good (2003) states that classroom management is different from a discipline plan; it includes the teachers' beliefs and values, as they relate to discipline, but also how they intervened with various other underlying aspects of the class' structure. He suggests that there are mainly three aspects- the physical environment of the classroom, the amount of teacher preparation and ways in which the lesson is presented- which influence classroom management; and the classroom management is organization of all these aspects in a classroom.

Marzano et al (2003) also stated that classroom management is a key to high student achievement. In their research, they found out that teachers' actions in their classrooms have twice the impact on student achievement as do school policies regarding curriculum, assessment, staff collegiality, and community involvement. Effective classroom manager provides effective instruction, so management is an integral part of learning process.

Like many educators, Martin et al (1997) supported that classroom management is a powerful dimension of teacher effectiveness. Effective student behavior management has always been an essential issue in the mind of most educators. Thus, effective classroom management plays a significant role for constructive educational environments for both learners and educators. To provide clarity about what classroom management is and is not Martin et al (1998) offered that although often used in the same meaning, the terms classroom management and discipline are not synonymous. Discipline classically refers to the structures and rules for student behavior and attempts to guarantee that students obey those rules. "Classroom management, on the other hand, is a broader, umbrella term describing teacher efforts to watch over a multitude of activities in the classroom including learning, social interaction, and student behavior" Martin et al (1998). They defined classroom management as a comprehensive concept that consists of three independent dimensions: instructional management, people management, and behavior management.

The use of portfolios is another method of alternative assessment that is used to assess student attainments over a period of time. Often referred to as a "process folio", portfolios contain full process-tracing records of a student's involvement in one or more works of a particular subject. Students collect their best work over a period of time, select (by himself or with the collaboration of the teacher) a sample of the collection that they think best represents their capabilities, and submit this portfolio of works for evaluation Jalbert (1997), Goupil et al (1998) Aubin-Lussier,(2000). Portfolios allow for the collection of information related to growth of a student over time, and permits teachers and other educators to obtain a record relatively complete of student growth. Portfolios might consist partially of tests and partly of naturally occurring records. A number of different models of portfolio assessment have been advocated, with differing views on what constitutes a portfolio. Examples of portfolios include: initial plans, drafts, early evaluations, self-evaluations, feedback from teachers and peers, collections of works which the student likes/dislikes, reasons for reactions, and records of final work, relevant comments, and plans for subsequent work (Pandey, (1990), Gardner, (1992), Ysseldyke et al (1999). Teachers may choose to assess a variety of dimensions including: number of entries, richness of entry, degree of reflection shown, improvement in skill, achievement of one's goals, interplay of production, perception, reflections, responsiveness to internal and external feedback, and development of themes ,Portfolios use has become quite popular in today's classroom Henke et al (1999).

A recent American study found that forty-nine percent (49%) of teachers felt that portfolios were very important Henke et al (1999). The teachers in the study included a variety of items in these portfolios, namely: homework, tests, quizzes, worksheets, projects, and self-evaluations. Primary school teachers were almost thirty percent (30%) more likely than secondary teachers to consider portfolio items as possible grades. General features of alternative assessment the literature appears to highlight several common features of alternative assessments independent of their format. These main features are: emphasis on performance rather than selection of a response; the use of contextualized, authentic problems to assess student competencies; and the assessment of critical thinking and problem-solving abilities.

### 2.1.9: Students Effort

Effort is defined as the use of physical or mental energy, the act or result of trying to do something. Effort (Mediated variable) According to Opareet al (2002), they defined effort as the "amount of time and energy that students expend in meeting the formal academic requirements established by their teacher and/or school" Carbonaro (2005) It is goal specific and different students may exert the same level of effort in meeting some goals but different levels of effort in meeting others. Often these goals are hierarchical, and some require little more than tacit compliance, while others demand greater commitments of time and/or thought. Effort refers to the overall amount of energy expended in the process of studying Zimmerman et al (1992). it is also known as effort management or effort regulation means the continuous investment of energy in learning even when obstacles are encountered. Carbonaro (2005) defines school effort as the amount of time and energy that students put in meeting the formal academic requirements established by their teachers and/or school.

He identified three different types of school effort: The rule oriented effort (showing up in and behaving in class),Procedural effort (meeting specific class demands such as completing assignments on time) Intellectual effort (critically thinking about and understanding) .Most researchers have come out with findings that students' effort is related to academic achievement, Studies of "engagement" has typically relied heavily on measures of effort, such as the completion of homework, attentiveness, and preparedness. Generally, the findings of such studies have indicated that students who are more engaged learn more in school Johnson et al. (2001); Marks (2000) found that students' "work habits," as measured by teachers' reports of homework, class participation, effort, and organization, were positively related to students' mastery of courses and grade point averages (GPAs). Rosenbaum (2001) also found that students'" preparedness "and absenteeism was related to their GPAs according to her students' academic achievement in statistics depends on how regular the student attend classes the move you attend classes the more you achieved academically and vice versa. More time spent on homework by students is a commonly used as a parameter to measure the student effort in the course Natriello et al (1986). In short, although the labels and measures used have varied across studies, effort has been found to be positively related to academic achievement in statistics. Effort as early defined refers to the overall amount of energy expended in the process of studying whereas persistence, also known as effort management or effort regulation Pint rich, et al (1993) means the continuous investment of energy in learning even when obstacles are encountered. When this entire are put in place students

are bound to achievement highly in statistics. In this light school effort as the amount of time and energy that students expend in meeting the formal academic requirements established by their teachers and/or school thus affirming the facts that effort play a key role of act as a mediating factor in student academic achievement in statistics. As early identified above these researchers come out with three different types of school effort that is (rule-oriented effort, procedural effort and intellectual effort. Intellectual effort in this sense refers to critically thinking about and understanding the curriculum put in place, therefore, effort is that students base their judgments of ability, in part, on their perceptions of the amount of effort people expends attempting to complete academic tasks. However, not all students conceptualize the relation between levels of effort and ability in the same way. Some students tend to think of these factors as inversely related, such that the harder an individual works on a task, the less intellectual ability he or she must have. In contrast, others tend to perceive them as being positively related, such that high levels of effort indicate that the students have a relatively high level of ability Muenks et al (2017). William Carbonaro defines school effort as "the amount of time and energy that students expend in meeting the formal academic requirements established by their teacher and/or school".

Effort has been measured in a variety of ways ranging from time spent on homework to attentiveness in class and all have been positively linked with school performance Carbonaro (2005). Effort according to this study refers to the amount of time and engagement that students expend in statistics.

### 2.1.10: Individual Differences in Students Effort

Students' perceptions of their own and others' academic abilities are among the most important determinants of their academic involvement and motivation. With respect to self-judgments of ability, highly influential theories of student motivation (such as expectancy-value theory and self-efficacy theory) and numerous supporting studies suggest that students with high levels of confidence in their academic abilities are more likely than students with low levels of confidence to engage in challenging academic tasks, persist on these tasks, and perform well on them (for reviews, see Schunk et al (2016); Wigfield ett al (2016). Following research carried out by Cimpian, 2017; Muenks et al (2017), has shown that students are aware of both the positive and inverse relations between effort and ability research has shown that students are aware of both the positive and inverse relations between effort and ability as a result, motivation researchers have

attempted to explain why some students are more inclined to think in terms of a positive relation, while other students tend to think in terms of an inverse relation. Understanding how students reason about the relation between effort and ability is important for predicting their motivation in educational contexts, as numerous studies have shown an association between participants' perceptions of competence and their desire or willingness to engage in academic tasks/courses. As a result, motivation researchers have attempted to explain why some students are more inclined to think in terms of a positive relation, while other students tend to think in terms of an inverse relation. Understanding how students' reason about the relation between effort and ability is important for predicting their motivation in educational contexts, as numerous studies have shown an association between participants' perceptions of competence and their desire or willingness to engage in academic tasks/courses.

Muenks et al (2016), have argued that students' interpretations of someone's effort depend in part on whether they perceive this effort to be an automatic response to the basic demands of the task (i.e., the minimal demands that must be met to successfully complete the task or as resulting from the motivation (and intention) to engage more deeply in the task. When students perceive effort as an automatic response, they view it as having been elicited by the subjective difficulty of the task (i.e., as task-elicited effort). This, in turn, leads them to interpret high levels of effort as a sign that the individual had to work hard in order to compensate for low levels of ability. In contrast, when students perceive effort as resulting from one's desire to work hard (i.e., as self-initiated effort), they associate it with present or future mastery and, therefore, do not view it as a sign of low ability. In fact, to the extent that students believe that intelligent and high achieving students are motivated to work hard or that hard work leads to intellectual growth, they may even interpret self-initiated effort as a sign of high ability.

The distinction between task-elicited and self-initiated effort is based, in part, on prior research in the metacognition literature by Koriat and colleagues according to them they proposed that the association between the amount of effort that students spend memorizing content (e.g., particular word pairs) and how confident they are about being able to later recall this content (operationalized as "judgments of learning") depends on whether the effort is part of data-driven versus goal-driven regulation. When engaged in data-driven regulation, individuals monitor how much effort they had to expend to memorize or encode something, with high levels of effort

indicating that the material was difficult to learn. In other words, effort is perceived as being task-elicited. And, to the extent that these individuals also believe that difficult material is less likely to be remembered, they should interpret high effort as a sign of poor learning and exhibit an inverse relation between their processing effort and their metacognitive judgments. Consistent with this proposal, Koriat and colleagues (2006) demonstrated that the amount of time (and presumably effort) participants spent studying word pairs was negatively associated with their judgments of learning in statistics.

Some students are putting in more effort than the others, and the source of this effort framed as being either self-initiated or task-elicited. Thus, indicated that when effort was framed as task-elicited (e.g., when one character was said to put in more effort because she found the task more difficult than the other character did), and performance information was not included, student were more likely to rate the high-effort characters as having less ability than the characters who put in less effort (i.e., an inverse relationship between effort and ability). By contrast, when effort was described as self-initiated (e.g., when one character was said to put in more effort because she was more motivated to engage in the task), students are less likely to perceive an inverse relation and, in some cases, even perceived a positive relation between them in the course.

According to Dweck (2001), students who believe that intelligence is fixed after a certain point in development and cannot be changed exhibit a fixed mindset, whereas students who believe that intelligence is malleable and can be improved over time exhibit a growth mindset. Importantly, studies suggest that students with a fixed mindset may be more likely than students with a growth mindset to perceive high levels of effort as indicating low levels of achievement and as such the students are generally sensitive to the negative and positive relations that exist between effort and achievement. Thus, to more fully understand how students think about the relation between levels of effort and ability (achievement), Dweck also explore their effort conceptions. He begun to explore how students' conceptions of effort (and, their perceptions of the source from which effort is derived) influence whether they perceive ability level to be positively or negatively related to effort level.

**Types of Effort**

**Low Effort**

Taking the Easy Road, when we see students working on tasks that are too easy for them, often in ways that require only basic skills, we are seeing Low Effort. Because the work is easy, the quality is likely to be high, with few errors. The student might be "concentrating" or otherwise "busy", but they aren't learning anything new, and they aren't being challenged in any way either in the content or the process of learning. Answering the easiest questions, where the answer is already known or easily produced, is an example of Low Effort. Low effort can also be seen when learning new things that are simply well within the student's current capacities. For example, asking an adult to learn their times tables would be an "easy thing they haven't done yet", and would require low effort. While students engaging in low effort might be "on task" they are not likely to be experiencing growth. Mistakes made when applying Low Effort are likely to be "sloppy mistakes1" and therefore have low learning potential. Praise of this sort of effort will simply lead to further under performance

**Performance Effort: Doing Your Best**

Students applying Performance Effort are doing their best, reliable, reproducible work, and are inside their comfort zone. Energy and skill levels are high. This is the sort of effort that is appropriate in performance situations (e.g. exams and exhibitions). Students engaged in Performance effort are not in their zone of proximal development, so are not experiencing the stretch required to grow. Mistakes in this context are generally avoided. As a result, learners effort tends not to lead to growth. The problem appreciating this type of effort is that it is a de facto way of praising the product. Students only receive praise for performance effort if the performance or product is of a high standard. So if a teacher is frequently praising this type of effort, the student focuses on the standard, not growth and learning. While there are times when we want students to demonstrate mastery, in most classroom situations growth is the goal. So, when we see students retreating to the safety of Performance Effort our response generally has three components: Recognize the prior effective effort that has led to the current mastery. Value the back-story of hard work and effective learning and ensure they associate this effective effort with their current achievements.

Recognize that while mastery or standard achieved is a good thing, it is just one more step in their ongoing learning and growth. Now it's time to look to "What's next?" in their learning.

Help them identify where future learning might take place by setting appropriate learning goals. For example: "It's great to see that all that hard work has paid off and you've mastered this level of work. Now it's time to work on something harder so you can learn and grow. School is about learning, not simply demonstrating what you know."

**Ineffective Effort**

Working Hard, But Getting Nowhere: Students applying this type of effort are being challenged, spending lots of energy, but lack the skills to meet that challenge. Students are "working hard", but to little effect. Students applying this kind of effort can become frustrated with their learning, if they have been surrounded with growth Mindset messages in the classroom, they may start saying things like "I can't do this yet". However, if teachers aren't helping students develop more effective learning strategies and Habits of Mind,"I can't do this, yet" may become "i still can't do this yet!" "I can't do this, yet" may become "i still can't do this yet!" Unfortunately, this sort of effort is often praised as a "consolation prize". When we can't praise students for achievement, at least we can be tempted to praise them for "trying their best". Teachers need to resist praising this sort of effort, and instead direct students to more effective effort.When we recognize students applying ineffective effort the type of praise we give should have the following qualities:

Recognize the energy the student is expending and the fact that they are challenging themselves. These are aspects of their effort that should be encouraged. Recognize that the strategies they are currently using are being ineffective, so they need to either try other existing strategies, or learn new ones.

For example: "It's great to see you working so hard on that task. That's a really difficult task and you'll need to work hard at it! I can see you've tried several strategies to help you solve it, which is great, but they don't seem to be working for you. What other strategies do you think you could try? We want to see you progressing, not just working hard."It's possible that a student engaged in this sort of effort is too far outside their zone of proximal development and needs to come backs a few steps to master prior learning before moving on. In this case the skill that needs to be developed or supported is identifying the zone of proximal development problems that are just slightly beyond their current ability. There are no short cuts.

**Effective Effort**

Growth and Learning this is the kind of effort according to Dweck (2017) was referring to when teachers are encouraged with effort put in by the learner. Effective Effort is the sort of effort that is targeted just beyond a student's current level of performance in both behaviour and understanding. It is designed to lead to the growth that underpins the Growth Mindset. Mistakes made when engaged in Effective Effort are "stretch mistakes1" so have high learning potential. They help identify learning needs at a point where we are capable of making the small adjustments required for incremental growth they act as signpost on a pathway towards future growth. Students engaged in this type of effort are seeing regular, incremental growth in learning and due achieved highly. They are able to recognize that their behaviors (efforts) lead to growth, and as a result, are more likely to develop the understanding that they are capable of change and responsible for their own growth. Effective Effort is the kind of effort that is truly worthy of the praise "Great Effort!" This would help them identify the sort of effort that they are engaging in, and what's expected in the classroom.

**Key Elements of Effort**

**The Learning Zone**

Students need to become good at identifying their Learning Zone the point just beyond their current abilities where they are stretched and challenged. When talking to students about effort, we should question how freely they enter their Learning Zone, how effectively they can identify this zone for themselves and how often they seek it out.

**Learning behaviours (Habits of Mind)**

To succeed in the Learning Zone, students need powerful Habits of Mind. This means they must be able to recognize, apply, improve and become increasingly self-directed and self-assessing in relation to their Habits of Mind

**Mistakes**

Learning is almost always accompanied by mistakes. Helping students become more efficacious learners involves nurturing their relationship with mistakes. How prepared students are to make mistakes, how they respond to mistakes and how they use them as part of the learning process is critical.

**Feedback**

We can offer students feedback, but how they use it is another matter. Learning to accept, identify, respond to and use different types and sources of feedback is an essential aspect of becoming a more efficacious learner. As we support students to develop their effort, we need to engage them in reflection about how they not only use feedback, but learn to request and tailor feedback to their specific learning needs.

## 2.2:    Empirical Review of literature

### 2.2.0: Introduction

Taylor (2005) views a review of related literature as an account of what has been published on a topic by accredited scholars and researchers. It is a process of reading, analyzing, evaluating, and summarizing scholar's materials about a specific topic. As Colin Comber (2014) points out, "the term literature review can be applied to both the process of reviewing the literature, as well as the label given to the output of such a process the empirical review  section(s) in a document such as: coursework, project, dissertation, or thesis. Recently most research have noted that almost in every study (training institutions, degree and post-degree), statistics courses were present in the curricula of the training institution as academic courses. Within educational research, students' performance in statistics has justified the need to observe the students' attitude, mainly because it has a significant influence on the process of teaching and learning.

Furthermore, an important argument concerning students' Attitude toward Statistics  is that, as an essential component of their background, after their college preparation and completion students may carry out academic and professional activities. He also carried out a critical review about students' attitude towards statistics and described some test utilized to measure it in several kinds of students. In another research, Mondéjar et al (2008) developed a test upon the methodological principles of attitude towards statistics and Attitude Scale toward Statistics their main objectives were to develop a test on students' attitude towards statistics and to analyze the

influence over the way they study. Mondéjar et al. characterize the psychometric properties of this new scale to measure the attitude towards statistics; they obtained an effective tool to measure or quantify students' affective factors. The result may show that the level of nervousness-anxiety, in the course studied, and other factors such as gender, affect the studying process in statistics. As verify by Mondejare in his research findings Mexico shows that student's attitudes can suppose an obstacle or be an advantage for his learning. He applied a new test to measure students' attitude towards statistics with four dimensions: interest, anxiety, perceived usefulness for the professional career and usefulness of the statistical for their professional future. Results show that, when students adopt a more detailed study and focus in the lesson, they tend to find the course more attractive and easier for them to study. Moreover, they perceive better usefulness in their professional future, and they have less anxiety in the subject.

Moreover, studies also show a relationship between the attitude towards statistics and academic outcomes or the professional use of statistics. They have confirmed the existence of a definite correlation between students' attitudes and their performance in this area. Other studies, conducted in Spain, also have validated a positive correlation between students' attitudes and their performance at statistics. One of the scales is used to measure the affective relationship with learning and cognition, and the other one is for measuring the perception of the student to the use of statistics the empirical review of literature will based on the various indicators of attitude in relation to academic achievement. Attitude definition According to Anderson (1985) an attitude is a moderately intense emotion that prepares or predisposes an individual to respond consistently in a favorable or unfavorable manner when confronted with a particular object. It is therefore a mental state used by individuals to structure the way they perceive their environment and to guide the way in which they respond or a psychological construct comprised of cognitive, affective, and intention components.

Attitudes are also defined as strongly held beliefs that reflect people's opinions and feelings and can be sometimes manifested in behavior. Chambers et al  (1986) have shown that both feelings and information are critical factors in the formation of attitudes, and that these are critical components of understanding. Attitudes, behavior and feelings are found by some researchers e.g. Christa,(2001) to be linked such that people's attitudes determine their behaviour toward objects and people they meet and influence even the relationships that exist among these with themselves.

Frankfort-Nachmias (1992) defines attitudes as: 20 A mental or neural state of readiness represented by cognition, feelings and behaviour; organized through experience, deliberate learning and heredity. This exerts a directive or a dynamic influence upon an individual's response to all objects and situations with which it is related. Attitudes therefore have, according to three elementary components: The cognitive component, the feeling or affective component and, the actions or behavioral component.

The three are interrelated; they are always present whenever a person holds an attitude. A more noticeable issue in research into attitudes toward science is that these do not consist of a single unitary construct, but rather a large number of sub constructs all of which contribute in changing proportions toward an individual's attitudes technology. Studies e.g., Breakwell et al (1992); Oliver et al (1988); Crawleyet al (1992) have incorporated a range of components in their measures of attitudes to science. These include the perceptions of the science students and teachers; anxiety toward science; the value of science; self-esteem; motivation; enjoyment of science; attitudes of peers; attitudes of parents; the nature of the classroom environment; achievement in science; and Fear of failure. Attitude manifestation from the foregoing definitions, it appears that attitudes are not quantifiable. They are psychological constructs, and therefore they can only be detected by indirect methods. Attitudes manifest themselves in different ways. Their manifestations are linked to concepts such as perceptions, personality and perceptual selectivity.

Perception Cognitive psychologists hold that, as we move about in the world, we create a model of how the world works. That is, we sense the objective world, but our sensations map to percepts, and these percepts are provisional, in the same sense that scientific hypotheses are provisional. As we acquire new information, our percepts shift. Beliefs and perceptions are not in action. Beliefs are the roots or foundations of our way of thinking. In normal life we do not question or filter our own beliefs. We take them as they are. They include the values that we have. Perceptions however, relate to a method or way of thinking or point of view. It is the filter of any input based on our beliefs. An important aspect of how we perceive objects or people has to do with what we think they are or should be Morris (1973). How technology is perceived depends on what students themselves think technology is. So, because people are limited in what they can perceive, they are highly selective in whatever they choose to perceive and that which is relevant to them. In this process of filtering, different people will react differently even when they are from

the same physical environment. They would not always have the same experiences, hence perceptions. Attitudes therefore relate to the way we act or react. The way we perform our thinking (perceptions) is what results in our attitudes. Our actions therefore depend on our attitudes.

Personality refers to the characteristic behaviour patterns, emotions, thoughts and attitudes with which individuals consistently react to, in their environment Morris, (1973). Some characteristics can be so grounded in an individual that they form an individual's personality. For example, a technologically inclined student is expected to demonstrate characteristics such as apprehensiveness, creativity and determination. A study in the UK showed that highly successful students, studying design, were more apprehensive, more experimenting, and more tense than the unsuccessful group who were self-assured and relaxed. In fact, students in particular, display tendencies to engage in various behaviours. These tendencies are what are regarded as personality traits. For example, the tendency to engage in social behaviours is a personality characteristic that is relevant to learning situations. These behaviours (social) are those that are likely to contribute to the well-being of others. Students are often industrious and cooperative. They generally help their peers and refrain from negative disciplinary actions. Regarding this, Breakwell and Beardsell (1992) have also reported on the importance of the classroom management as an important factor on students' tendencies to engage in social or antisocial activities. Hence, students are more likely to display unselfish and good social personality traits if their teachers instill these in their classrooms.

Perceptual selectivity the competencies to filter sensory experience are called perceptual cognitive ability. Perceptual selectivity is influenced by both external and internal factors. External factors relate to stimuli and contexts in which people find themselves interacting while internal factors relate to for example, learning, personality and motivation. It involves active engagement with the environment "such that the perceiver constructs it in the most appropriately informative manner" Sometimes, out of necessity perceptual selectivity takes over and individuals see only what they expect and want to see. In a sense the individual pays attention only to a small part of the sensory stimuli and therefore remains uninformed of those things he doesn't expect. To influence technology students' attitudes toward technology, their perceptual selectivity should be manifested. The Perceptual selectivity of statistics students can therefore be increased by advocating technology, which means there should be follow ups, feedback and reports on the situation in schools by the media and other influential sources.

Attitudes towards statistics and the literature for some decades now, poor performance or achievement in statistics results are associated more with the cognitive than with the affective domain. A number of research studies (e.g., Simpson et al (1990) conducted on students' poor achievement in Statistics and mathematics, reveals that poor achievement in statistics is not attributable to inherent characteristic of student populations. other researches e. g .Schau et al (1995), investigating students' perceptions and attitude, have reported the problem to be a dissatisfying interest in these learning areas among students. What these researchers revealed is the fact that effort, cognitive and achievement factors were influenced by non-cognitive factors. It became necessary therefore to investigate these factors in order to explain why students do or do not like Statistics courses. Also, to determine why those who eventually register, never obtain good grades. Interest in this area of research has resulted in studies that have investigated students' attitudes towards statistics. As a result, a number of scales were developed to measure the attitudes.

In another sense however, as Miller et al (1993) has pointed out: Despite the recognition that Attitude toward science are a significant outcome of science teaching and relevant variable in students' cognitive learning of science, little has been made toward specifying and determining the conditions that affect their dynamics and influence their development. This argument was one of the 'driving forces' and motivating factors for the researcher of the present study to investigate students' attitudes toward statistics. The difference here was to establish the relationship of the students' attitudes with the school environment, and their teachers.

### 2.2.1: Students' Effort and Academic Achievement

According to, Zimmerman &Rosenberg (1992), Effort refers to the overall amount of energy expended in the process of studying It is also known as effort management or effort regulation which means the continuous investment of energy in learning or studying a course undermining the obstacles or difficulties they are encountered. Furthermore, Carbonaro (2005), defines school effort as the amount of time and energy that students put in meeting the formal academic requirements established by their teachers and/or school. He identified three different types of school effort: The rule oriented effort (showing up in and behaving in class), Procedural effort (meeting specific class demands such as completing assignments on time) Intellectual effort critically thinking about and understanding.

Most researchers have come out with findings that students' effort is related to academic achievement, Studies of "engagement" has typically relied heavily on measures of effort, such as the completion of homework, attentiveness, and preparedness. Generally, the findings of such studies have indicated that students who are more engaged learn more in school found that students' "work habits," as measured by teachers' reports of homework, class participation, effort, and organization, were positively related to students' mastery of courses and grade point averages (GPAs). According to Carbonaro (2005) the three different types of school or student's effort like rule-oriented effort (showing up to and behaving in class), procedural effort (meeting specific class demands such as completing assignments on time), and intellectual effort (critically thinking about and understanding the curriculum). It is expected that a student who puts forward significant effort in all three categories will perform the best Carbonaro (2005). And studies have shown that school effort is an indicator of academic achievement Ceballo et al (2004), Carbonaro (2005).
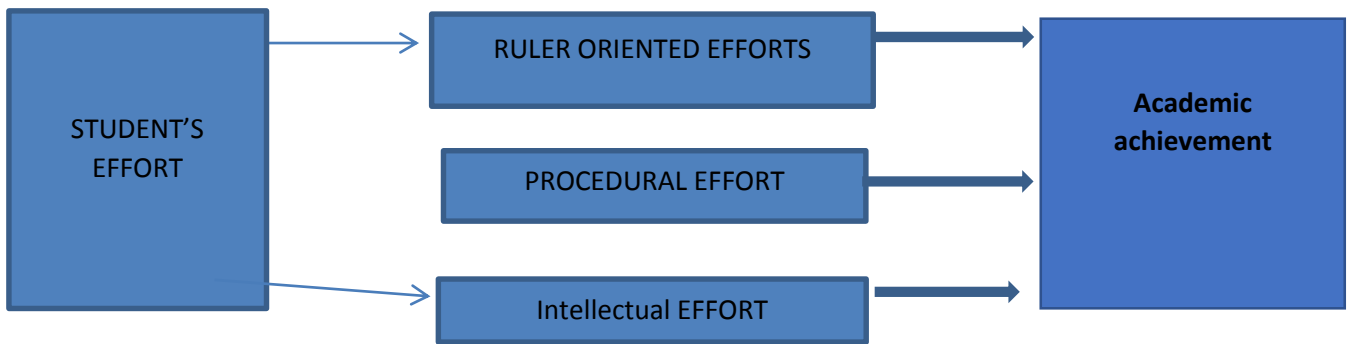


**Figure 2.4.1: Processes of Effort Source**: **Author's Conception**.

Typically, effort has been positively linked with test scores and academic achievement in both direct and indirect ways. Some studies have shown that high student effort leads to greater educational values, which in turn indirectly affects student performance Ceballo et al (2004), Carbonaro (2005). Effort has also been linked to higher student grade point averages (GPA). Rosenbaum (2001) as cited in Tellaet al (2010) also found that students'" preparedness "and absenteeism was related to their GPAs according to her students' academic achievement in statistics depends on how regular the student attend classes the move you attend classes the more you achieved academically and vice versa. More time spent on homework by students is a commonly used as a parameter to measure the student effort in the course and numerous studies have indicated that it is related to higher achievement as spelt out by Natriell et al (1986) In short, although the labels and measures used have varied across studies, effort has been found to be

positively related to academic achievement in statistics. It is without doubt that the academic achievement of students depends on number of basic factors of which effort is paramount Tella et al (2010). Effort as early defined refers to the overall amount of energy expended in the process of studying whereas persistence, also known as effort management or effort regulation Pint rich, et al (1993) means the continuous investment of energy in learning even when obstacles are encountered. When this entire are put in place students are bound to achievement highly in statistics. In this light school effort as the amount of time and energy that students expend in meeting the formal academic requirements established by their teachers and/or school thus affirming the facts that effort play a key role of act as a mediating factor in student academic achievement in statistics. As early identified above these researchers come out with three different types of school effort that is (rule-oriented effort, procedural effort and intellectual effort. Intellectual effort in this sense refers to critically thinking about and understanding the curriculum put in place.

The more learners are engaging more effort the major stakeholders (students, teachers, parents and the community), the greater the extent to which students 'positive attainment to their courses and to learning is aroused Rumberger, (2001). Working in peer groups and parental encouragement level have also been found to influence or correlate meaningfully with students achievement in statistics as well as competence beliefs and academic achievement Linnehan (2008;). According to the study by Linnehan (2008) divulged that except for Asian group, parental educational level is significantly related with more favorable attitudes toward college. Other results showed that students 'attitude towards statistic is influenced by three broad factors; attitudinal contents, attitudinal context and personal components. Learning, competence beliefs and motivation constitute attitudinal contents. The kind of environment (urban or rural), socio-economic background (occupational status), parental educational level, and the school circumstance constitute the attitudinal context. The personal component of attitude towards school is made up of the individual 's intellectual (cognitive), emotional (affective) skillful (psychomotor) developmental state as well as the person 's gender and age. In their investigation, Candeias et al (2013) adopted exploratory models of factors that tend to affect students 'attitude towards school and learning in Portugal with a sample of adolescent students, using regression trees algorithm; and found that students 'gender, contextual background, age, school failures and students 'attitude of their leaning competence are potent factors that interfere with students 'attitude towards learning

and school. They concluded that certain socio-demographics factors, personal attributes and some specific school characteristics are significant correlates of students 'attitude towards school and statistics learning. They provided data-based recommendation that the improvement of students 'attitudes and motivation toward a course should involve the students, parents, teachers, the school, and the community. In another investigation done earlier by Candeias et al (2012) that examined secondary student's attitudes to school, similar findings and conclusions were also made.

Refreshingly, when students attribute their academic success to effort and receive feedback that attributes their success to effort, they develop a higher self-efficacy and expectations for future skill development Sorge, (2001). Indeed, most of the researchers have in the context of achievement goals explored the contribution of effort and persistence on students' academic performance.

Other research result shows that effort makes a positive contribution to the prediction of academic achievement, in truth, in analysis, effort is found to relate positively to academic performance Opare et al (2002); Phan, (2008). Pintrich (2004), for instance, finds effort to be the only direct predictor of learning outcomes amongst all general strategies. Achievement is regarded as action of completing or attaining by exertion. It subsumes anything won by exertion, a feat, a distinguished and successful action. According to Simpson and Weiner (1989) contended that achievement test intends to measure systematic education and training in school occupation towards a conventionally accepted pattern of skills or knowledge. Several subjects may be combined into an achievement battery for measuring general school proficiency either in point score or achievement age and perhaps achievement quotient. Studies have shown that outcome is a generic word which can be used for both achievement and attitude or achievement and attitude. In other words, outcome measures the general statement which provides for both academic achievement and attitude Learning outcome also provides for measurement of specific actions designed to achieve some future behavior which is seen at the level of student's attitude. However, learning and achievement outcome is more of curriculum content than measurement if the content of the curriculum is well defined and objectives spelt out students' academic achievement will have a remarkable improvement.

Individuals high in self-efficacy attempt challenging tasks more often, persist longer at them, and exert more effort. If there are failures, highly efficacious individuals attribute it to a lack

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of effort or an adverse environment. When they succeed, they credit their achievement to their abilities. The perception that their abilities caused the achievement affects the outcome rather than their actual abilities. "Those who regard themselves as inefficacious shy away from difficult tasks, slacken their efforts and give up readily in the face of difficulties, dwell on their personal deficiencies, lower their aspirations, and suffer much anxiety and stress. Such self-misgivings undermine performance. Conversely, individuals with high self-efficacy frequently persevere despite difficult tasks or challenging odds and often succeed because perseverance usually results in a successful outcome and achievement in statistics. Within the framework of Social Cognitive Theory by Bandura (1997) self-efficacy is viewed as a core construct and defined as "belief in one's capabilities to organize and execute the courses of action required to produce given attainments" (p.3). Research on self-efficacy suggests that people with higher levels of self-efficacy tend to pursue challenging goals and to have strong commitment even when they encounter with difficulties. On the contrary, people with lower levels of self-efficacy are more likely to avoid difficult tasks, have less commitment and effort to pursue their personal goals, and are more vulnerable to stress and depression Bandura (1993) Within educational research, in addition to studies dealing with general self-efficacy beliefs, specific self-efficacy domains such as teacher self-efficacy and academic self-efficacy have been conceptualized and measured. Skaalvik et al (2007) define teacher-self efficacy as "individual teachers' beliefs in their own abilities to plan, organize, and carry out activities required to attain given educational goals.

Effort in this present research, the focus is also based on the internal attribution effort and its' role in affecting students' academic achievement. It is assumed that when students put more effort into studying research methods and statistics, they are more likely to perform better in the subject. In contrast, when students exert less effort into studying research methods and statistics, they are less likely to achieve a satisfactory result as they Measure students' efforts as they expand in their statistics course and their improvement on their actual grade through hard work. As earlier cited by Natriello et al (1986) and the practical note based on this study, the More time spent on homework by students is a commonly used as a parameter to measure the student effort in the course and numerous studies have indicated that it is related to higher achievement in any course they are offering.

### 2.2.2: Cognitive Competence and Academic Achievement

Individual characteristics such as intelligence, cognitive styles, and personality play an important role in learning and instruction as does the context of learning. Some research findings have shown that individual students' characteristics variables such as motivational orientations, self-esteem and learning approaches are important factors influencing academic achievements. In the effort to improve student's cognition and affective outcomes in statistics and/or school learning, educational psychologist statistics educators, have continued to search for variables (personal and environmental) that could be manipulated in favor of academic gains. Of all the personal and psychological variables that have attracted researchers in this area of academic achievement, motivation seems to be gaining more popularity and leading other variables Lilian (2016) and Tella (2013) The reasons above show persistent failure in statistics, which have been realized, bear relevant in one way or the other to the poor academic achievement of students in statistics. These confirm the fact that when students express lack of interest in the course, it affects the way they react or listen to the teacher. And when many of the pupils believe that they cannot pass, the teacher is also affected. This is because aside of this negative response from the students, He/she as well is already being confronted by a lot of other factors like low income, low status in society, large teacher-student's ratio) and so on. These may cause him or her to resorts to the easiest way of disseminating knowledge that is 'chalk and talk' without the use of instructional materials. He may not also bother to vary his teaching styles to suit individuals; therefore, the chain goes on (Aremu 1998). One unfortunate outcome of this is that, the negative attitude towards the subject is passed down from one generation of students to another and therefore the cycle keeps enlarging. What then could be done to break such a cycle of failure? This has been the question by many statistics educators and teachers. Instructional materials have also been designed and developed to aid statistic teaching and learning.

In fact, psychologists believe that motivation is a necessary ingredient for learning Biehler and Snowman, (1986). They believe that satisfactory school learning is unlikely to take place in the absence of sufficient motivation to learn Fontana (1981). The issue as relating to introduction of statistics education would then be, is it possible to motivate students to learn statistics. And how could it be done? One needs to therefore look at the effect of motivation on learning. The issues of motivation of students in education and the impact on academic performance are considered as an important aspect of effective learning. However, a learner's reaction to education determines the extent to which he or she will go in education. The impact of motivation on

education of statistics of a child cannot be undermined. That is why Hall (1989) believes that there is a need to motivate pupils to arouse and sustain their interest in learning mathematics. "Motivation raises question on why people behave in the way they do it". An individual could therefore, from psychologists' point of view, be politically, socially and academically motivated depending on the motive behind his or her activities. Based on the foregoing, research on statistics academic achievement should be considered a continuous process until there is evidence of improvement in interest and achievement of the learners in the subject particularly the secondary school students.

Academic achievement is commonly measured by examinations or continuous assessment but there is no general agreement on how it is best tested or which aspects are most important - procedural knowledge such as skills or declarative knowledge. Bentley (1996) page 269 argues that "certain abilities might contribute to certain kinds of 'achievement' thereby allowing the creative but less bright students to equal 'performance' of less creative but more intelligent students" Although this does not define academic performance or achievement, indirectly we learn that these two concepts are treated interchangeably. In addition to the above two scholars, Rivkin, Hanushek and Kain (2005) page 418 suggest that performance and achievement may be substitutable. academic performance relates to how learners deal with their studies and cope with or accomplish tasks given to them. It also refers to the progress or the retardation of a child at school, it as a set of factors that may influence learners' success in a school, such as cognitive skills and attitudes, academic behaviour and achievement. In contrast, academic achievement is a component within academic performance. This confirms that these concepts are different but they are related. Academic achievement may include learner motivation, positive academic behaviour and attitude, self-regulation, self-concept, one's ability to manipulate the learning context for better academic achievement, and planning. The study thus creates a distinction between the two concepts whilst acknowledging that they are inseparable. Academic achievement in this study is further conceptualized as the end-product of students learning, which if positive is assumed to be relevant in driving learners towards better academic achievement.

According to Fisher and Richards (1998), in their studied-on attitude they found that students' attitude towards statistics tended to be more positive in classroom where students perceived greater leadership and helping/friendly behaviors in their teachers, and more negative in

their classrooms where students perceived their teachers as admonishing and enforcing strict behaviors. Other researchers have compared the effect of separate and coeducational classrooms upon students' attitude Norton and Rennie, (1998).   Studies that compared attitude differences in statistics among students' self-confidence have mostly reported that girls had lower self-confidence in statistics than boys Case et al, (1997); Norton et al  (1998). In some cases, boys were more confident than girls even when their statistics achievement was like that of girls Casey et al, (1997).

Vermeer et al (2000) have further shown that the attitude differences in self-confidence were more marked for application problems than computation problems, with students showing significantly lower confidence for application problem. Despite such consistent findings of student' low confidence in statistics, studies of classroom environment have shown that some students' confidence in statistics improved greatly in classes which actively involved in the learning of statistics Boaler, (2000). Current teacher training in Cameroon according to the educational law of 1998 requires a significant and substantial input from schools and not all school leaders are convinced that there is an overall gain. For new schools to be recruited and for schools currently involved in teacher training colleges to be retained the case for being involved in training needs to be made and supported with evidence. This study reviews the literature currently available on this matter and attempts to identify what is missing. The research reviewed cover both nursery and primary training, as well as undergraduate and Graduate Training Program. Whether or not having trainees makes schools better or worse is a genuine issue and one that matters to school leaders, teachers, parents and teacher trainers and above all to pupils. On the face of it there are aspects that would seem to make them better. Trainees increase the number of adult helpers in a school. They open up additional opportunities for differentiated group work, learning away from school premises and other teacher-intensive styles of learning. Trainees enrich schools with the knowledge and skills they bring from a wide diversity of educational and work experiences. Mentor interaction with trainees stimulates reflection and improvements in their own classroom practice. Teacher training colleges' involvement also helps staff recruitment by providing an opportunity to vet potential new recruits, especially in shortage areas

On the other hand, there are aspects of competence-based approach that might support school achievement and improvement in statistics and other courses in teacher training colleges.

Supporting trainees may increase staff workloads and divert effort away from the needs of students. The problems are courses in when schools receive a weak trainee, but even good trainees can make mistakes that adversely affect the climate of learning. There can also be benefits achieved in the course they are doing that take more than one trainee, as there are opportunities for shared preparation, teaching and mutual 'trainee to trainee' support and evaluation of teacher trainee and trainers achievement n there are area of study. This can relieve pressure on the teacher-mentor and facilitate livelier mentor tutorials.

Bono (1991), in his study shows learners would enjoy statistics, when they increase their time on statistics tasks, and have positive emotional reactions to statistics if the course were taught in a cooperative setting. The study explored the impact of cooperative learning on sixth grade girls. The results showed that girls had more positive attitudes towards math when it was taught in cooperative settings. As far as differences in attitude development are concerned, students' positive attitudes towards statistics decline as they grow older. Initially some students have more positive attitudes towards statistics than others but as they continue in school,' attitudes become more negative. To improve students' performance in statistics, teachers need to facilitate positive attitude in girls towards statistics. Usual indications about the students reveal that they are weak in statistic as compared to those who does not show interest.

Many studies done on the topic in the foreign countries but in Cameroon, the studies are very few. In fact, teachers and parents may be responsible for low achievement of students' in statistics. Many teachers, especially female, actively encourage males to persist in statistics than girls. Parents also feel that girls have less inclination for this subject because of its difficulty and complexity. It requires also extra attention, stamina and intelligence in which girls never come up to the standard. Since learners engaging in mathematics activities (including participating in mathematics competitions are affected by external and internal influences on their perceptions and attitudes towards statistics, it was felt that an investigation into the relationship between attitude toward math and performance in statistics was important. As trainees move further into practicing school, they take on greater responsibility for whole-class teaching, which progressively frees up teachers' time for other activities, including devoting more time to examination classes pupil's achievements.

In Cameroon Statistics used to be taught seriously at university level, with little basic measures of averages for secondary schools. Now many school-leaving examinations contain a statistics option, even at the advanced levels. But the greatest changes have been in the primary school, where pupils now gather data, display it in various ways and draw inferences. In Cameroon, statistics are being taught in the first years of teacher training colleges right to final years. In seeking explanations, some ideas in about the course are developed. The present research in Cameroon teacher training colleges programs. The study would develop base on student's critical attitude to the introduction to statistics presented in the media, an appreciation of the basic ideas of randomness and variability, an awareness of the relevance of probability to occurrences in everyday life, and an understanding of the difference between and purpose the of various measures of average. Increasingly other courses in teacher training colleges are using probabilistic measures; hence statistics is coming into the school curriculum in these subjects.

The advent of scientific pocket calculators which easily perform statistical calculations has resulted in school subjects in addition to mathematics to apply more statistics. This trend will increase with the wider availability of calculators that not only make the usual statistical tests and calculate the coefficients for the regression line or curve, but also generate and best-fit' in our daily life experience. Calculators as basic of manipulation of number- crunchers' have made possible the use of data from real-life situations, allowing students to collect and analyses their own data rather than textbook data which always 'come out even'. Simulation and random experiments (like random walks), data analysis and calculating probability distributions are all more easily carried out, indeed possible, with a calculator. Teaching statistics is now seen in training institutions including teaching training schools as a subject. Many lessons in statistics stresses the importance of examining data and drawing inferences rather than emphasizing the application of statistical techniques. Some claim statistics is too important a part of general education for its teaching to be left to mathematics departments and with all this mixed feeling the achievements kept on drops as well as it increases depending on student's attitude towards the course.

More so, Because of the desirability of co-operation between all those who make use of statistics in their teaching, Cockcroft (1982) suggests that in each school a staff member, not necessarily a mathematics teacher, be nominated to co-ordinate teacher method of handling the course for some students develop phobia toward the course are also viewed at teacher's knowledge

and competence on statistics. The teaching of statistics is not uniformly distributed across all countries but differed from some depending on the educational policies of said countries. We have seen that some countries offer their students a general introduction of statistics beginning in primary school, continuing into secondary education as part of their general education, with possibilities given for more in-depth studies in the teachers training colleges' right up to tertiary sector and other professional training institutions. Some other countries offer almost no statistics. An international study which is reported in Barnett (1982) has been carried out by the international institute of statistics propose that to determine students' performance and achievement in statistics takes in to consideration of the status of the teacher teaching statistics. Programs of statistics teaching so they will not be repeated in this volume. But, as is customary in Studies in statistics Education, a more detailed national case-study is presented, in this case Italy. Cutillo, D'Argenzio and Pesarin have presented the new primary and secondary-school statistics and probability program and the accompanying teacher-education schemes. Student learning, positive student attitudes have become an important course outcome for many introductory statistics instructors.

To adequately assess changes in mean attitudes across introductory statistics courses, the attitude instruments used should be invariant by administration time. Attitudes toward statistics from students enrolled in an introductory statistics course were measured using the Survey of Attitudes Toward Statistics both at the beginning and at the end of the academic year Confirmatory factor analysis on the covariance structure was used to determine the gender and time invariance properties of the students attitude toward statistic test. Their Results indicate that the SATS is gender, time, and Gender× Time invariant with respect to factor loadings and factor correlations. Gender was invariant with respect to 3 of the 4 factor variances; variances from these same 3 factors were larger at the end than at the beginning of the course. Having established that the SATS is factorial invariant with respect to gender, time, and Gender $\times$ Time, its component scores can be used appropriately to examine mean attitude differences for these 2 variables and their interaction. Blanco (2008) provides a comprehensive and updated overview of the empirical research on the Spanish undergraduate students' ATS. For their part Baloğlu, Koçak (2007) investigated the relation between attitudes (toward the actual course and toward the field of study) and anxiety toward statistics (the value of the statistics, anxiety toward the course of statistics and examinations, the belief they have about computers, the fear to seek help, and fear of teachers) of 95 seniors and 55 undergraduate students in social sciences. Canonical correlation analysis

techniques were used to process the data. The results show that both had a negative attitude toward statistics, i.e. anxiety of seniors and undergraduate students toward statistics' courses and field of application. The attitude toward statistcs was created to improve on the student's attitude on statistics by focusing on items measuring attitudes, rather than student success.

The most recent assessment instrument is the Survey of Attitudes toward Statistics scale ( Schau (1992); Dauphine et al (1995) which initially reported four subscales consisting of affect, cognitive competence, value, and difficulty. The scale was later expanded to include two more dimensions of effort and interest Schau (2003). Both versions of the Students attitude toward statistic have solid theoretical underpinnings as they are based on many popular theories including expectancy value, attribution, social cognition, and goal theories (e.g., Atkinson, (1957); Bandura, (1977); Weiner, (1979). All the scales have made valuable contributions in providing a better understanding of students' attitudes toward statistics. The development and use of these inventories have mostly used quantitative methodologies.

The measurement of attitudes toward statistics has evolved since it was first investigated. There have been three primary inventories used in most of investigations examining this topic. The first instrument was developed by Roberts et al (1980) which was a 33-item one-dimensional measure referred to as the Statistics Attitude Survey (SAS). The development of the SAS was largely based on the work of Aiken (1970); Aiken (1976) who suggested that there were affective instruments that were capable of augmenting cognitive measures of mathematics achievement. The second assessment was the Attitudes toward Statistics (ATS) scale developed by Wise (1985) which had two subscales consisting of the attitude toward the field of statistics and the attitude toward the course. In other research Vargas et al (2008) developed another test founded on the methodological principles of ATS of Wise (1985) and the attitude scale toward statistics (EAE) of Auzmendi (1992). Their aim was to develop a test on the students' ATS and analyze the influence in the way they study. Mondéjar et al. (2008) described the psychometric properties of this new scale to measure attitude toward statistics; they obtained an effective tool to measure or quantify students' affective factors. In another study, Pierce (2006) applies the pre-test and post-test to 36 students from Ball University in three introductory courses: algebra, calculus, and statistics. In the pre-test, students in all courses were sure that they could learn, even if the course was tough; however, they perceived that interest and affection were not necessary for a better attitude toward

the subject. Student's attitude in all courses was confident about their cognitive competence in mathematics and statistics. In the post-test, the differences shown in students were very small; however, 60% of the students gave more value to the statistics in the post-test. The results may show the level of nervousness-anxiety and in what way other factors, such as gender and the university course selected, affect the study process. Other authors have attempted to measure the work underlying this issue.

The attitude toward statistics  scale of Wise (1985) and the scale of Auzmendi (1992) approach such a measure by gathering the most pertinent characteristics of students regarding their attitude toward statistics, their difficulty with the mathematical component and their prejudice before the subject. From these studies, other works have derived such as Elmore et al (1991) and Schau, Stevens et (1995). The attitude toward statistics scale is composed of 29 items forming two scales, one that measures the affective relationship with learning and cognitive, and the second one that measures the perception of the student with the use of statistics. Mondéjar, Vargas and Bayot (2008) refer that the initial validation was based on a small sample, and subsequent studies Mondéjar et al  (2010); Woehlke, (1991) verified this structure. Regarding it, the work of Gil (1999) chooses to use a structure with five factors, one emotional factor, and four factors related to the cognitive component.

Statistics Attitudes Survey (SAS). It is considered the first measure of a construct called Attitude toward Statistics, which was made for providing a focused test in the statistical field, to measure this subject from the traditional and professional work of the students. Blanco (2008) Venegas (2013) carried out a critical review about students' ATS and describes some tests utilized to measure precisely the attitudes toward statistic in several kinds of students. That study refers to the research of Glencross et al (1992) who cited the most significant research in the Anglo-Saxon context such as: SAS (Roberts et al( 1982) which adds prior knowledge to the attitudinal components toward statistics, ATS (Wise 1985), Statistics Attitude Scale, Statistics Attitude Inventory, Students' Attitudes toward Statistics (Sutarso, 1992). Likewise, Attitude toward Statistics (Miller et al (1993) which adds the dimensions value of statistics, aims of orientation and perceived ability, Survey of Attitudes toward Statistics Schau et al (1995),and the Quantitative Attitudes Questionnaire Chang, (1996). In another study, Estrada (2002) evaluated the attitudes of teachers and identified their relationship with personal variables like gender, previous training,

specialty and the level of statistical knowledge. These results suggest that teachers have a positive attitude toward statistics. The attitude of men and women toward statistics is the same; there is no significant difference between them, and even there is no difference between students of different specialties. In contrast, various levels of statistics' previous knowledge are associated with distinct attitudes, so those who have never studied the subject have a more favorable average attitude toward it.

### 2.2.3: Statistics Teaching and Student's Academic Achievement

Statistics is a methodological course that is required by many undergraduate majors and focuses on the conceptual ideas and tools used to work with data. The statistics course often represents one of the few required courses in many social science and education-oriented majors and serves as a foundation for understanding how research is conducted. Ridgway, Nicholson, and McCusker (2007) noted that statistics is the one central science used in social science and education. In fact, it is challenging to consider a discipline in which some level of statistics is not used.

However, most students view a required statistics course as a formidable obstacle Dunn, (2000); Laher et al (2007). Students are ultimately concerned with the successful completion of the statistics course as they aim to fulfill the necessary requirements of their major. Prior research has identified cognitive and demographic factors related to student performance in statistics courses including gender, prior knowledge, mathematical ability, spatial ability, and pedagogical approaches. Student's attitude has a significant influence in teaching and learning process, and scholar performance (such as variable input and processing); this justified the need to study it. Furthermore, there is a relevant argument exposed by Auzmendi (1991), Gal and Ginsburg (1994) and Gal et al (1997) about students' attitude toward statistics. They refer to an essential component of the background of students with which they can perform academic and professional activities after their university training cited in Blanco (2008). Student attitudes toward statistics are important because they may be related to the learning process.

In fact, studies have reported that attitudes toward statistics were related to the development of statistical thinking skills, the degree to which statistics will be used outside of the classroom, the likelihood of enrolling in future statistics related courses, persistence, achievement, and the

general climate in class Gal et al (1997),Hilton, Schau, & Olsen, (2004). There is additional research supporting the notion that negative attitudes toward statistics are related to worse performance in class e.g., Waters et al (1988). Teaching statistics may be regarded as a complicated endeavor because many factors in addition to the pedagogical approach must be taken into consideration. Thus, there is ample evidence that among the many factors to take into consideration when teaching a course in statistics, attitudes toward the course should certainly not be ignored. If an instructor is to take attitudes toward statistics into consideration when teaching, there must be psychometrically sound ways to measure those attitudes.

### 2.2.4: Classroom Management

To parents and society at large, the school is being held liable for every aspect of students' performance. So, classroom management plays a very significant role in students' academic achievement. Effective classroom management put the teacher in firm control of the classroom and provide orderliness and safety needed for instruction and learning. Yet, the various reforms in education, like, the National Policy on Education of 1977, revised in 1981, 1998 and 2004 in Wali (2007), failed to mention or address classroom management and the connectivity between students' academic achievement and classroom management.

Classroom Management is one of the neglected areas in our secondary schools, despite the fact that the success or failure of any teaching and learning process depends on the way classroom are managed. Failure to effectively manage the classroom can have an overall negative influence on the entire school, especially in terms of sound academic performance of the school. When this happens, other negative consequences follow such as the depletion of the student population of the school because parent/guardians prefer to enroll their children and ward in schools that are preforming well academically.

Another worrisome issue in the schools is that of teacher's quality. Non- professional teachers are been recruited into the system. A qualified and professional teacher is more likely to change the life of the students by planting the seed of aspiration, noble goals and dreams in the heart of students and be a role model and show the way to greatness to students. A qualified and professional teacher is more likely to resolve and prevent conflict in the classroom, thus, bring

about a better classroom environment conducive for teaching and learning, leading to better academic performance. Poor classroom management may influence the academic performance of students negatively. It is therefore important that teachers learn to effectively manage their classrooms for a greater output. The academic performance of students these days have given many people serious concern. Our teacher training graduates cannot defend their certificates. This could be as a result of indiscipline exhibited by students in classroom such as lateness to classroom, noise making, and so on. Hence the need for classroom management that encompasses teachers' efforts to oversee the activities of the classroom including student's behavior, interaction and learning.

In a study on the impact of teachers' experience levels on classroom management practices, Martin and Baldwin (1994) investigated the classroom management approaches of 238 teachers by using Inventory of Classroom Management Style. As a result, they found that novice teachers were significantly more interventionist than were experienced teachers. In another study, examining gender differences, Martin et al (1997) discovered that females were significantly less interventionist than were males regarding instructional management and regarding student management. However, in a different study, Martin et al (1997) found no gender differences related to any of the classroom management approaches. Martin, Yin et al (1998) investigated the relationship between classroom management attitudes and classroom management training, class size and graduate study. Data were collected from 281 certified teachers, who were primarily working in urban schools, and were female. Most of the teachers were Caucasian (69.9%) and they had an overall average of 14.35 years of teaching experience. A one-way analysis of variance did not yield significant differences between the teachers who had enrolled in graduate courses in the last 6 months and those who did not. Although class size has likely a direct impact on the nature of instruction as well as teacher-student instruction, the results of this study showed no significant difference in teachers' classroom management styles regarding to class size.

**Classroom Management and Student Academic achievement**

Classroom Management is the action and direction a teacher takes to create a successful learning environment, having a positive impact on students' performance, given learning requirement and goals. A well-managed classroom gives the teacher a firm control over the class whereas the teacher loses control over the class if it is not well managed. Robert Digiulio see positive classroom management as the result of four factors: How teachers regard their students,

how they set up the classroom environment, how skillful they teach the content and how well they address student's behavior. Positive (well managed) classroom environment is consistent with expectation (better performance). It then implies that classroom management involves two aspects, instructional management and behavioral management.

Student's behavior, if not well managed, it can affect instructions, learning and performance. In his own observation Walker (2009) noted that the best teachers don't simply teach content, they teach people. A well-managed classroom that enhances effective teaching and learning shore-up student's academic performance Moore, (2008), assessed two hundred and seventy students and nineteen grammar school teachers and concluded that the findings of his research study suggest that relationship exist between some classroom management strategies and higher student's performance scores in diverse elementary setting. Academic performance is a concept used to qualify the observable manifestation of knowledge, skill, understanding and ideas. It is the application of a learned product that at the end of the process provided mastery of the subject. It is the measured ability and achievement level of a learner in a school, subject or a particular skill. According to Fadipe (2000), academic achievement takes into cognizance both quality and quantity of internal and external results accomplished. Academic Performance also indicates how relevant and competent the graduates are in meeting the societal needs and aspiration. The academic acquisition of a particular grade in examination indicates candidate's ability and mastery of the content and skill in applying learned knowledge to a particular situation. A student's success is generally judged on examination performance, that is, success is a crucial indicator that a student has benefited from a course of study. To this end, the success of any educational system depends largely on the effectiveness of classroom management.

**Classroom Discipline and Academic achievement of Students**

Management in the classroom will involves controlling maintaining discipline in the classroom when pupils fight, defies order or break classroom rules: Weber and Sloan (1986) assert that discipline in the classroom is more than handling problems and misbehaviour in the classroom such as talking. According to Edmond et al (1987), discipline indicates the degree to which student or pupils behave properly, are involved inactivates or are task-oriented and do not cause disruption. Discipline he continuous involves something more than punishing pupils for misbehaviour. It

involves providing an atmosphere that is conducive to learning and preventing problem from arising. Konute et al (1986) assert that discipline involves helping pupils to develop internal control that allows them to monitor their own behaviour. Thereby improving on their own performance at school

Brophy (1983), summarizing aspect of classroom discipline asserts that, He has never been impressed with the idea that, each teacher can be or should be a therapist or an expert in complex psychological techniques, that every successful teacher has his/her own method that do work, and some cognitive and behavioural techniques can be used successfully by the teacher.However, research on classroom management focused on advanced planning of the teacher's work, formulating and teaching student's classroom rules, communicating to students, the consequences for breaking rules. Using the first few days of school effectively, consistent monitoring of students in the classroom, will prevent discipline problems in schools.

Doyle (1985) asserts that classroom management is aimed at achieving order through gaining the co-operation of pupils in reaching the goals of learning. When pupils learn, they improve on their performances. Some aspects of classroom management can be taken before the class begins. Some during the first few class sessions monitoring the classroom by the teacher is a constant procedure and every day. Classroom management will involve: -

**The physical layout of the classroom:**
This will involve the arrangement of desk, the sitting position of each child. The condition of the room, the windows, lighting good.The choice of room arrangement, where to place the teachers' table students' desk, are there to be in rows columns or cluster the traffic pattern in the classroom, is there enough space in between for the teacher to circulate and pupils. Is the desk placed so closed to the windows making it difficult to circulate? Emmer (1987), assumes that, the teacher must be able to monitor the student from every area of the classroom. Another important need is the case of pupils with special needs. A child in a wheelchair will require sufficient use space. A deaf child with an interpreter will require an unobstructed view of the person signally to him or her.

**Planning rules and consequences**
Classroom rules can be roughly divided into two areas: -

### Rules for decorum

Decorum rules cover having respect for people and property, it also includes picking up litters no calling of names in the classroom.

### Classroom procedures

Procedural rules cover bringing all needed materials in class, being in one's seat, being ready to work in class. Along with the rules, in the classroom every teacher must enforce school policy in the classroom. The consequences of breaking rules, such as throwing papers in the classroom might be an apology, written or oral, or picking up the paper. If it continuous it might be harder punishment now, such as cleaning the classroom, alone and during break, etc. The teacher should keep accurate record of students' misbehaviour in class and pupils who break the rules

Discipline, according to Galabawa, (2001) is an activity of subjecting someone to a code of behavior, that there is wide spread agreement that an orderly atmosphere is necessary in school for effective teaching and learning to take place. The most effective classroom managers don't simply impose rules and procedures on students. Rather, they engage students in the design of the rules and procedures. A group discussion will produce a compromise rule or procedure that all can live with. If not, you, the teacher, should have the final word in the deliberations. Well-articulated rules and procedures that are negotiated with students are a critical aspect of classroom management, affecting not only the behavior of students but also their academic achievement.

Discipline involves the preparation of an individual to be a complete and efficient member of a community; and a disciplined member of a community is one that knows his/her rights and obligation to the community. That is, the individual must be trained to have self- control, respect, obedience and good manners. Webster's New encyclopedic dictionary define discipline among others as a training that corrects, mold or perfects the mental faculties or moral character. It is a control gained by enforcing obedience or order. Okumbe (1998) connects positive discipline with preventive discipline, providing gratification in order to remain committed to a set of values and control individual responsibility in the management of time, respect for school property, school rules and authority and good relation between students and teacher. Punishment in schools are considered as a disciplinary measure and therefore used as a means to maintain good discipline, referring to conformity and order in schools. Punishment as a social institution is intended to

control, correct or bring into desired line, the individual or group of individuals behavior. In line with this opinion, Okumbe (1998), said punishment in school is meant to instill discipline and is meted on students who violates the school rules and regulations and that it is administered to bring about the desired change in behavior and improve school discipline if commensurate with the offence committed.

Cotton (2006) opined that punishment in the school system is expected to teach students accountability for their mistakes, that is, to teach them the relationship between their behaviors and the outcome. This discipline, the positive discipline, also referred to as self-discipline, boost academic achievement. Time management not only an element of discipline but an indicator of self-discipline is an essential ingredient in goal attainment, academic outcome inclusive. In their view, Eilam et al (2003) stressed that time management can be viewed as a way of monitoring and regulating self as regards the performance of multiple tasks within a certain time period and, therefore, for a better academic outcome, the students' self -attitude and participation is required as a principle of time management practice. Success can only be achieved when students discipline themselves and show a good management of time. Kelly (2004) expresses similar view and argued that efficient use of time on the part of the students and school administrators directly associated with increased academic performance. However, some disciplinary actions are counter academic achievement.

Canter, (2006) argues that although discipline is one of the most common problems for teachers, some punishment such as corporal punishment should not be used because no evidence suggests that they have produced better result academically, morally or that it improves school discipline. Corporal punishment may instill fear in the mind of the student or it may lead to physical injury if not well administered by the teacher. Both situations may lead to absconding or absence from school and consequently reducing the academic performance of the student. Hence, it is important that teachers need always realize the appropriateness of a punishment before meting out on the student. It is important to ensure that the best behavior and conditions are established, inculcated and maintained for effective learning to take place in our secondary schools. This could be achieved through the teacher's effective classroom management and advanced planning by the school administrator and the teacher. Effective teaching and learning is correlated with higher academic outcome and this is better achieved in a disciplined school environment in which the

student and teachers know that they are on the same side working together to achieve higher academic outcome.

However, Omari (2006) argued that punishment does not teach the correct behavior, that it destroys even the opportunity to demonstrate the acceptable behavior. He asserts that from the age of eighteen years onwards, there is a growing opposition to any use of physical force in disciplining the individual. To instill class discipline, teachers should introduce class rules early enough when the year is beginning and make sure they are understood by all. The teacher should be fair and impartial across all the students. In case of disruption within a lesson, the teacher should deal with the interruption with as little distraction as possible. Teachers should consider over planning as a recipe to avoid giving students free-time within the lesson. Collins (2007); advocates for "cooperative discipline" where the teacher and students work together to make decisions. To him teachers should come up with a code of conduct that shows how students should behave and not how' they should not behave. This instills discipline in a child as they know what is expected of them. Glenn et al (2003) emphasized the need for teachers to hold class meetings severally. Class meetings encourage respect among teacher and students. According to Barbara Coloroso theory of Inner self control, students should be given an opportunity to develop their self-control and that classrooms are the ideal places for these opportunities.

The teacher should be consistent in that they cannot afford to ignore negative behavior. Evertson and Weinstein's (2006) definition of classroom management (we consider their work to provide the most exhaustive description of what classroom management entails). Improving student behavior (e.g., self-control) is an important goal in many classroom managements programs nowadays, while this student component is underrepresented in the different classifications mentioned above. Moreover, in many interventions, both preventive and reactive strategies are used. Therefore, we propose the following classification ("types") of classroom management interventions, based on their primary focus:

**Teachers' behaviour-focused interventions**

The focus of the intervention is on improving teachers' classroom management (e.g., keeping order, introducing rules and procedures, disciplinary interventions) and thus on changing the teachers' behaviour. This type is a representation of the group management methods referred

to by Evertson and Weinstein (2006). Both preventive and reactive interventions are included in this category.

Traditional classrooms can be called as teacher-centered classrooms that are directly affected by the principles of behaviorist approach emerged from the work of Skinner. The child is often viewed as the recipient of knowledge and teacher has the control over the students and subject matter. As a result of behavioral approach to instruction, teachers prefer behavioral classroom management techniques consistent with their way of instruction.

The behavioral model requires strong intrusion and management techniques on the part of the teacher (Garrett, 2005). Traditionally, student behavior management has heavily depended on behaviorism theory, which is primarily based on rewards and punishments as reinforcement. Behaviorism mainly focuses on modifying individual behavior to lead the student to build positive behavior in the classroom. Behaviorism essentially forces external controls over the student to shape his or her behaviors in a desirable way (Lerner, 2003). Teacher is the dominant person in the classroom and has the responsibility of all ongoing issues in the classroom; from students' motivation to misbehaviors.

### Teacher-student relationship-focused interventions.

The focus of the intervention is on improving the interaction between teachers and students (teacher-student interactions), thus on developing caring, supportive relationships. Only preventive interventions are included in this category. This type is a representation of the supportive teacher-student relation referred to by Evertson and Weinstein (2006). Interventions focusing on relations between students only (and not the relation between the teacher and the students) are not included here; these are classified as type.

### Students' behaviour-focused interventions

The focus of the intervention is on improving student behaviour, for example, via group contingencies or by improving self-control among all students. Both preventive and reactive interventions are included in this category. This type is a representation of the students' self-regulation referred to by Evertson and Weinstein (2006), as well as Marzano et al. (2003), who refer to students' responsibility for their own behaviour. According to Rogers and Freiberg (1994),

the child-centered classroom management model started from criticizing the perspective of behaviorism, a teacher-centered classroom discipline strategy. The child-centered theory places the learner at the center of classroom management models. This approach is derived from cognitive learning theory that emphasizes a child's capacity to lead his or her own learning and thinking, developing self-automaticity (Lerner, 2003). Cognitive learning theorists perceive the learning as process. Thus, they are concerned more about individual differences than individual academic outcomes. Current classrooms are more student-centered (learning-centered) since educators recently have been affected by the principles of cognitive theory and constructivism which emphasize the importance of learners' construction of knowledge. According to new principles, student learning is most effective in student-centered classrooms where students are encouraged to develop their own meaning:

Leinhardt (1992), asserts that interactive instructional approaches bring about "powerful changes in the dynamics of the classroom. While students' role changes from passive recipient of knowledge to active participant in construction of the knowledge; for teachers, the role is to facilitate rather than to directly control all aspects of the learning process, to serve as a resource person, to coach, to give feedback, to provide the needed assistance Brophy, (1999); Larrivee, (1999). Willower et al (2005), page 56 described two kinds of teachers as a custodial and a humanistic educator. While the educator with custodial orientation is likely to be high controlling, employing highly impersonal relationships with students and has a major focus on the maintenance of order, the educator with more humanistic orientation is likely to maintain a classroom climate that supports active interaction and communication, close personal relationships, mutual respect, positive attitudes, as well as student self-discipline. When these two teacher models are considered in terms of learning environments, a humanistic teacher is needed in new classrooms since a custodial teacher will display behaviors contradictory to the principles of social constructivist learning environment.

### Students' social-emotional development-focused interventions

The focus of the intervention is on improving students' social-emotional development, such as enhancing their feelings of empathy for other children. Both preventive and reactive interventions are included in this category. This type is a representation of the students' social

skills referred to by Evertson and Weinstein (2006). Evidently, some classroom management programs may fit into more than one of these categories; the types are not considered to be mutually exclusive. The proposed classification was used in the meta-analysis to identify the differential effects of different types of interventions. One particular type of intervention might be more effective than other types. Moreover, it is possible that broader interventions which have multiple foci may establish stronger effects than interventions that have one primary focus, or that a particular combination of foci may be more effective than other combinations. The purpose of classroom management in student-centered classrooms is for teachers to actively engage students in learning, encourage self-regulation, and build community. Evertson & Neal, (2006). Teachers release their over-control on the students and learning environment in order for creating democratic learning communities where the students feel themselves safe and improve their social skills. Teachers share their leadership with the students and students are responsible for their behaviors in classes that student-centered classroom management is present. Classroom management can and should do more than elicit predictable obedience; indeed, it can and should be one vehicle for the enhancement of student self-understanding, self-evaluation, and the internalization of self-control McCaslin et al (1992).

### 2.2.5: Classroom Assessment Practices

The main objective of this section of the study is to explore  statistics assessment practices of the selected countries and if possible, for which Cameroon as an emerging African country by 2035, it educational policy makers could acquire experience. From the analysis of the textual data, the researcher realizes that the assessment system has been implementing to assess the students achievement is determined by the deep-rooted thoughts or worldviews of education adopted by the authorities and nation at large. Teachers have been prompted by educational policy, teacher journals, and professional development initiatives to incorporate new assessment practices in their classrooms in order to develop a better understanding of student thinking and to provide appropriate feedback (Wiliam 2015).  In order to build the scope and experiences on assessment practices in mathematics education the researcher therefore, focused on some selected countries around the globe: China, Finland, USA, UK and France purposively. The first is an emerging country for its economical, scientific and technological development and some of its provinces stood in the significant position in an international achievement tests. Similarly, USA continuously

improves its position in latest versions of PISA and TIMSS and the Finland is one of the countries that would be able to draw an attention of research communities as it secures the remarkable position in an international comparative assessment tests. UK and France are the two colonial masters' countries which Cameroon inherited the English subsystem education for the English speaking Cameroonians and the Francophone subsystem education for the French speaking Cameroonians today, adopted by educational policies markers. Moreover, each of the countries represents the different cultural traditions.

Generally, China and USA represent the East-Asian and western cultural traditions respectively whereas Finland, France and UK are from European region. For the purpose of generating and exploring the textual data, the researcher reviewed the latest articles, policy documents, mathematics curricula freely available from the internet. The researcher deployed the procedures of combination of descriptions, analysis and interpretation of the textual data Wolcott (1994), as cited in Creswell, (2012).Two broad categories: post/positivist/traditional perspective and integral perspectives of assessment in mathematics have been practicing in the selected countries. A description of some key features, attributes, aims and procedures of assessment system under these paradigms will be highlighted.

Classroom assessment practices require adequate preparation to obtain accurate information about student learning. This preparation includes sufficient time and opportunities for students to learn and prepare for classroom assessment and sufficient time and resources for teachers to develop/select and administer assessments. Consideration should also be given to the time and resources teachers need in order to complete such activities as evaluating student responses, recording results, developing feedback comments, preparing reports, reviewing student work collaboratively with colleagues, and using the results to inform instruction. Regardless of the activity, the preparation required should reflect the complexity, type, or method of the classroom assessment. For example, the preparation required for the evaluation of a portfolio assessment or a collection of student work may be extensive, while the preparation for a start-of-lesson or oral discussion to determine the base-line knowledge of a class before beginning a new topic may require less extensive preparation. In summary, the resources necessary for effective classroom assessments may include, but are not limited to, the following: time, assessment

materials, software, computer access, administration instructions, and evaluation materials (e.g., rubrics, guides, keys).

According to Stiggins (1992), classroom assessment practice are activities constructed from paper-pencil tests and performance measures, to grading, interpreting standardized test scores, communicating test results, and using assessment results in decision-making. When using paper-pencil tests and performance measures, teachers should be aware of the strengths and weaknesses of various assessment methods and choose appropriate formats to assess different achievement targets. Classroom assessment practices are an integral part of teaching and learning. Without sound assessment practices, we may not know if students are progressing as planned. Further, we may not be able to effectively plan for students' future learning opportunities.

The Classroom Assessment Standards contains a set of standards and related guidelines accepted by professional organizations as indicative of consistent and accurate classroom assessment practices according to Chappuis et al (2012) The assessment of student learning might be used formatively to inform small adjustments or enhancements to ongoing instruction or used summative to help measure overall curriculum and program effectiveness. The size and scope of the classroom assessment itself can vary, as can the degree of formality of the assessment. Three examples of classroom assessment practices that differ in their formality and consequences are: Formative assessment to inform teachers and students about progress on learning intentions and to inform and direct subsequent learning and teaching. Larger projects, such as an essay, a performance assessment, or a research project that may be used as interim or summative assessments may have significant formative components to support student learning along the way, such as regular self-assessment of progress, feedback from peers or teachers, and drafts before a final version or product is submitted Fisher & Frey (2014).

Summative assessments used to hold students accountable for demonstrating acquired knowledge or skills at the completion of a course can also be used in future planning. When conducting an assessment, consideration should be given to the consequences of the decisions to be made. The outcomes of some assessments may be more critical than others. For example, misinterpretation of the level of performance on an end-of-unit test may result in incorrectly holding a student from proceeding to the next instructional unit in a continuous progress situation.

In such "high-stakes" situations, every effort should be made to ensure that the assessment method will yield consistent and accurate results. Low-stakes assessments such as question/answer during class or homework designed to determine current understanding of an ongoing unit of study may be less stringent.  Regardless of the purpose of the classroom assessment, adherence to the standards and guidelines presented in the Classroom Assessment Standards will help ensure that the information obtained from the classroom assessment and the interpretation of the information are accurate, allowing for follow-up activities designed to support continuous evidence-based learning.  Black et al (2010).

This current revision of the standards is the product of a comprehensive effort to reach consensus on what constitutes sound principles that guide the fair assessment of students and foster learning in PK–12 classrooms. The standards should be considered neither exhaustive nor mandatory. Howeverdevelopment of a vast number of specific instruments for the description of attitudes and values. Robinson & Shaver (1973) list over 100 established instruments in their compilation of Measures of social psychological attitudes; similar source books are provided by Chun et al. (1975), Lake et al. (1973) and Straus (1969). In addition to established and repeatedly used survey instruments, there are of course the familiar ad hoc attitude surveys covering a wide range of subjects in political life, market research, media studies etc. Even a cursory inspection of these instruments would be well beyond the scope of this study; thus, the present section is restricted to a brief description of three highly influential study formats that were designed to reveal fundamental values. In addition, a recent international value survey is briefly introduced Bageshwar (1977)**.**

Following the findings of Taraba (2011), research in this area also showed that values were related to different approaches to learning. Matthews (2004), for example, found that sojourner students in Australia who had low integrity values also showed higher preference for surface learning  with strong positive correlation to the achieving motive. Students who were low in values associated with the Confucian ethos, on the other hand, showed a positive preference for the deep strategy and achieving motive subscales in their approach to learning.

Specific associations between values and learning approaches were also empirically confirmed by Matthews et al  (2007), who related the ten values as postulated by Schwartz et al.

(2001) to Biggs' (1987a) six subscales that formed three learning approaches by means of the canonical correlation analysis. Such personal values as achievement and power were related to the achieving approach, security and tradition values to the surface approach, and self-direction and universalism to the deep learning approach. In addition to exploring the link between values and learning approaches, other studies Picou, Gatlin-Watts and Packer (1998) examined the relationships between learning approaches and achievement including the effect of gender and academic discipline on these relationships. With respect to gender, found that female students preferred factual rather than abstract concepts. They also tended to break down problems into logical steps to a greater extent in comparison to male students. In addition, Rouse and Austin (2002) reported that high-achieving female students had higher scores than high-achieving male students across the academic domains measuring learning, homework effort, and information seeking behaviour. According to Cano (2005) his findings showed that older female students tended to score higher on the deep and the achieving approaches to learning in comparison to younger male students. However, he noted that these results may have been tempered by academic demands such as dense curriculum and time. A substantial amount of the empirical value research within the social and behavioural sciences concerns itself with the values-as-criteria of groups or societies. The standard (implicit) assumption is that social standards of evaluation are a reflection of the evaluative standards of the individual members of the group or society. Note that social values-as-criteria, revealed through empirical value research as discussed above, are not, strictly speaking, combinations or aggregates of individual values-as-criteria: they are merely descriptions of the distribution of individual values-as-criteria within the group that is of interest. These descriptions may be highly condensed through the use of statistical measures such as means, medians, and standard deviations, but they will always represent statements about the underlying individual phenomena. In order to arrive at the combined values-as criteria of some society, i.e., getting from the statement "the average member of society believes (x)" to "society believes (x)", a particular aggregation rule is needed as cited in Feather, (1985).

According to views Kukreti, (1993), educational institutions a teacher can play a significant role in modifying the Values of students towards a constructive and right direction. But to inculcate appropriate Values among students the teacher should also have an ideal Values pattern. For this it is necessary that such Values pattern should be developed among the teachers since the initial

teacher-training period to inculcate Values among students, we need effective teachers who themselves are Values oriented. It is our everyday experience to observe that children imitate their teachers not in words but in their behaviour. Another significant aspect of the Values is that Values can never be inserted from outside, but these could be imbibed only when any individual feels convinced towards them. The influence of an individual's needs and desires both have a strong impact on the direction of their behaviour and achievement.

Tuckman and Trimble (1997) conducted a study on the relationship between achievement motivation and level of aspiration and academic achievement. The level of aspiration provided to the students through frequent quizzing help in manifesting higher achievement. In five different studies they provided students with an incentive for studying and it was observed that there existed a significant interaction between aspiration and achievement. Srivastava (1999) examined the relations between values and personality traits and self – concept. Result revealed the absence of a significant relationship between values and personality traits. It was also observed that different types of values did not play a significant role in self-concept. Kobal and Musek (2001) found self-concept and academic achievement are mutually interdependent. Some investigations also found national difference concerning the relationship between academic success and self-concept. Sinha and Tripati (2002) concluded moral values occupy a very high place in Indian life but in actual behaviour, Indians do not appear to operate in abstract and absolute ethical terms, rather action are conditioned by the exigencies of the situation. Rani (2009) stated that urban girls have high moral Values than rural girls. Government school students have high moral Values than private school students. Swati Pant (2009) stated that Uttaranchal teachers have more religious Values than U.P. teachers. U.P. teachers have more moral Values than Uttaranchal teachers.

### 2.2.6: Review of Related Literature on Attitude toward Statistics

Attitude could be defined as a consistent tendency to react in a way often positively or negatively toward a given matter or social object as measured by the first section of the instrument for data collection in this investigation. Everyone has an attitude towards learning, but not everyone has the same attitude towards it. Some individuals 'attitudes propel them along, helping them to deal with challenges, overcoming obstacles, and accomplishing their learning objectives. Others have attitudes that are anchors, slowing them down or stopping them altogether from

learning Harrell, (2005), Loftus (1982) viewed attitude as a relatively, enduring organization of feelings, beliefs, behaviors and tendencies towards persons, groups, ideas or objects. It implies that individuals are not born with attitudes but learn them. From early childhood, the individual begins forming his attitudes through direct experience and indirect observation. Through social contacts, a person could acquire an attitude by watching and imitating one 's parents, siblings, friends and teachers or peers. A person could also develop attitudes through operant conditioning, that is, adult rewarding an individual for expressing the correct views with appropriate responses. It is based on such operant conditioning that the relationship between students 'attitude to statistics and academic achievement could be explained by Lassen et al (2006). If students with positive attitude towards statistics make significantly better academic achievement than their counterparts with negative attitude towards statistics, then good attitude towards statistics is reinforced in line with specifications in operant conditioning theory of learning, Shah (2009).

According to Candeias et al(2013), attitude towards statistics is a psychological construct that depicts an individual's behaviors, feelings, expression of favorable or unfavorable affection and judgments for school and school experiences. Attitude towards statistics, like other constructs, is intrinsically related to some number other psychological traits such as students 'perceptions of and interest in learning, their competence (often seen because of previous academic achievement) and motivation. For instance, attitude towards statistics has been found to have gender influence among students in Hongkong. While girls tend to have more positive school attitudes and its related subjects, boys are less motivated and have more negative attitudes toward school and its related courses Houtte, (2004) Candeias et al(2010). Results of their investigations further showed that girls do not require more time to study, engage less in cases of misconduct and disruptive behavior, have less absenteeism, and have more expectations about future and are more enthusiastic about further studies. On the contrary, boys are less committed to studies, less commitment to learn, and give up more easily, particularly when their popular teen or peer role model does not necessarily require to have good grades and total dedication to school as automatic preconditions for success. In relation to parental socio-economic level for only male students, those from families with high socio-economic status are more satisfied with school and accord better attitude to schooling that tends to guarantee them significantly better academic achievement than their counterparts from families with low socio-economic status that is closely associated with less access to school resources, computers and demonstrate negative attitude towards training institutions and courses

offered, and consequently perform poorly academically  according to Linnehan, (2008).    There is also empirical evidence that cognitive variables such as ability-related and expectancy beliefs, motivation, competency beliefs, goal structures, and social relationships, general attitudes toward statistics, and attitudes toward specific academic subjects are related to academic performance and that these can equally differ across gender, racial groups, and socio-economic backgrounds Akey, (2006). The extent to which families actively take part in their student 's academic life also tends to influence students 'attitude to statistics as well as the students' academic achievement.

Statistics education is to a nation what protein is to a young human organism. As a vital tool for the understanding and application of educational and evaluation sciences. The choice of this topic is an indicator on the current world trends and research emphasis on student's attitude differences in learning of statistics in professional and teacher training institutions.  According to Reid (2006), attitudes express our evaluation of something or someone. They are based on our knowledge, feelings and behavior and they may influence future achievement in a course. A target is essential for attitude. Our attitude is always directed towards something or someone. Attitudes are highly composite, and they can affect learning comprehensively. Attitudes influence achievement and achievement in turn influences attitudes including attitudes.  Attitude will affect achievement, influencing what the learner selects from the environment, how he will react towards teachers, towards the material being used and towards the other students. This selection and the processing of the input of information, which follow it, are strongly influenced among other things on attitudes. Attitudes towards statistics are the important determinants of academic success and achievement. In order, to succeed in a subject, positive attitude towards a subject is a prerequisite. In general, statistics was highly regarded by students in Cameroon education; most of them thought it not interesting and took it as a less favorite subject.  They showed a general less interest in statistics lessons but seldom participated in statistics extracurricular activities.  When met with difficulty, most of them would care to discuss with their classmates, and only a minority would consult their teachers.  They hoped that others would teach them how to do it rather than copying the solution from others.  Most students thought that statistics was a subject that requires thinking. Most of them found difficulty in understanding the statistics lessons and in tackling statistical problems.  More found difficulty in word problems than in numerical problems Wong et al (1991). A study by Kuperminc et al(2008) showed that family contexts that are less exciting and less involved in their children's education are manifested in less positive attitudes toward school, less

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resilience levels and have higher probability of dropping out of school Rumberger (2001). Students from families with inactive participation in their school have statistically greater probability of believing that having rigorous studies and completing school courses with good grade are not important to have a job or maintaining a career in life.  When students can provide interesting activities for their studies and the way those activities are engaged, and even the participation of students and their families in school decisions have influenced on how students feel about their courses and statistics, how they react to school life, and their overall attitude toward school subjects that later tends to reflect their academic performance Urdan (2006); Candeias, (1997); Kpolovie, (2013) Students' self-concept of learning statistics dropped as they advanced through the grade levels.  The mean score for "longing for a statistics lesson" dropped from good to fail. Degree of fondness of statistics also dropped as students moved up the grade levels, and many students found statistics lessons boring. Though most students liked statistics, regarded it as an important subject and were willing to pay effort to learn statistics outside school, many of them did not have confidence in learning statistics.  As found in many other studies, hard-working was perceived as the most important factor contributing to success in statistics, and the most important motive for doing well in statistics was for getting into a favorite school or getting a desirable job Bafon (2017) Significant gender differences were found in attitudes towards statistics  More boys than girls read statistics "outside readers", took part in statistics extracurricular activities and consulted reference books when encountering difficulty in statistics.  More girls hoped that the teacher would tell them everything and there was no need to do too much thinking Cheng & Wong, (1991).

The study of attitude has gained momentum during World War Il, when the mass media played an important role in recruiting and indoctrinating troops, maintaining the morale of the Allied forces and residents, and assaulting the morale of the Axis troops. This early research, headed by Carl Hovland, was organized by the question "who said what to whom, how and with what effect." Thus, research on the determinants of learning and persuasion was organized in terms of the effects of source factors (e.g., expertise, trustworthiness), message factors (e.g., one-sided, two-sided), recipient factors (e.g. sex, intelligence), and modality or channel factors (e.g., print, auditory). Moreover, the attention to, comprehension of, and retention of the arguments contained in a persuasive message were thought to be the information processing stages underlying attitude change. Experiments were designed initially to assess the simple (e.g., main) effects of source, message, recipient, and channel factors on recall and attitude change, but a disarray of results

across experiments led to the use of more complex designs and the discovery of interactive effects on attitude change. The effects of source, message, recipient, and channel factors on attention, comprehension, retention, and attitudes were also often quite discrepant, further calling into question the heuristic value of the processing stages outlined by Hovland and his colleagues.

The ATS is more favorable because they see its usefulness in their development area, although it is always considered as difficult. However, with an emphasis on gender, there is a slight difference between men and women; women get more negative ATS than men. They also obtained significant differences depending on the specialty, because ATS vary as some specialties demand more analytical skills than others. Regarding the variables that influence attitudes, the results of their studies show that the number of years of education has a statistically significant impact on the attitude, as it increases the knowledge of the subject.

Vanhoof, Castro, Onghena and Verschaffel (2006) studied the relationship between attitudes toward statistics and tested results in the short and long term of university students who took statistics courses over five years in educational sciences. They also verified that students, who see the implementation of this subject in their field of study, appreciate its importance and make a better thesis work. Furthermore, they indicate that there is not a statistically significant relationship between attitudes and performance in the course. The attitude was evaluated with the ATS scale of Wise (1985) which includes two subscales: attitude toward the current course and attitude toward the field of study. The questionnaires were applied at the beginning and the end of college. Results show that during the first years (short term), students' attitudes were more favorable to the course, more than toward study area. However, in the long term when the students begin to write their thesis (fifth year) ATS are more favorable.

According to the authors, it is because their early years the students may ignore the applications of the statistics' course Instructors in statistics courses usually face huge challenges in dealing with students with lack of interest. These students show signs of negative attitude such as feel tired to follow the course, incapable to appreciate the benefits of statistics, unable to focus in class, tend to interfere during class progress and absent. It has become increasingly common to find students who have written their teacher grade one for some years according to publication of CAMPIEMP results could neither fit into the tertiary institutions of learning by ministry of secondary education nor the labor market in Cameroon because their academic achievement was

poor, not up to the minimum required five credit passes that will merit them a passed in CAMPIEMP in teacher training college in Cameroon,;. Such unsatisfactory academic performance might have been occasioned by a combination of several psychological and sociological such environmental factors. As a way of seeking better understanding of and combating the phenomenon of academic achievement, this investigation is not only centered on ascertaining the actual magnitude of relationship between some psychological factors (students 'interest and attitude towards learning some courses) and academic achievement, but the extent to which the psychological factors individually and mutually predict students 'academic achievement. The researchers suspect that if these psychological correlates happen to overwhelmingly predict students 'academic performance, then exploring ways of improving students 'attitude to school and interest in learning might help in the amelioration of their academic performance.

Beyond students 'perception and attitude of how well statistics will prepare them for life, their overall attitude to school and to all the school-related activities could be important and viewed it positively. For some students, statistics is central to their daily life. They view schooling as essential to their long-term well-being, and this attitude is reflected in their participation in academic and non-academic pursuits.

The students tend to have good relations with school staff and with other students when their attitude to school and subjects are positive. However, many trainees express negative attitude to s and statistics and some other school activities as they do not tend to believe that the school and success in it will have a strong bearing on their future. Such negative feelings and attitudes may result in their becoming disaffected with some subjects (Williams, 2000). They may withdraw from school activities, and in some cases, participate in disruptive behavior and display negative attitudes towards teachers and other students. Students 'attitude to statistics be a disposition towards learning, working with others and functioning in a school institution. It is partly for this reason that success in education can only be gotten through an emphasized that attitude towards school, also referred to as the sense of belonging is the first and most crucial. It also shows self-worth, engaged learning and sense of purpose. Students attitude is an important condition for a student's feeling of well-being, educational engagement, and competence. Highly positive attitude towards school and some courses increases intrinsic motivation as students learn and achieved more in a course when they themselves are motivated internally, for it fosters self-confidence and

investment in the community. It is only with positive attitude towards learning statistics that a student can develop good sense of belonging and engagement in school and after their training. The condition of belonging means that a student is a valued member of the school community while still maintaining his or her uniqueness. It is a relationship between two or more persons characterized by a sense of connection and support for individual achievement of self-actualization and advancement. Attitude to school can be, for some students, indicative of educational success and well-being. As such, this perception deserves to be treated alongside academic performance, an important outcome of schooling. The academic performance of students may partly depend on the kind of attitude they put up towards school and the level of success they wish to attain. It is for this reason that this investigation is necessarily embarked on to critically study the relationship and the extent to which students 'attitude towards statistics can predict their academic achievement.

Interest in learning statistics, could most probably be a very powerful affective psychological trait and a very strong knowledge emotion as well as an overwhelming magnetic positive feeling, a sense of being captivated, enthralled, invigorated and energized to cognitively process information much faster and more accurately in addition to most effective application of psychomotor traits like self-regulatory skills, self-discipline, working harder and smarter with optimum persistence (Kpolovie, 2010a). He recommended the need for psychologists to execute research works for ascertaining the actual role that attitude in learning plays in students 'academic attainment at all levels of the educational system. The nature and strength of one 's attitude in learning may represent an important aspect of personality (Anastasi & Urbina 2007). The characteristic, interest, may substantially influence educational and occupational achievement, interpersonal relations, the enjoyment one derives from leisure activities, and other major phases of daily living. Values are clearly related to life choices and are often discussed in conjunction with interests and preference. From the view point of the student and what he intends to achieve educationally, a consideration of his interest might be of practical significance.

### 2.2.7: Review of literature on Academic Achievement

Academic achievement is therefore a yard stick for ascertaining the capabilities of a student from which his overt, covert and inherent or unrevealed abilities could be inferred. Academic performance is generally used to determine how well an individual is able to assimilate, retain,

recall and communicate his knowledge of what has been learnt. Academic achievement in this investigation is defined as the aggregate of each student 's demonstrated learning, knowledge, skills, ability, and indeed cognitive, affective and psychomotor domains in statistics as measured by the student's grade in the 2015 to 2018 that was reliably and validly conducted by the ministry of secondary education in the training of basic educational teachers of which statistics is one of their subject. This is a subject that all the respondents wrote in the in the teaching training education.

Academic achievement can also be viewed as excellence in all academic disciplines, in class as well as extracurricular activities. Academic achievement is the outcome of education as it indicates the extent to which the student, teacher, curricular and indeed the educational institution has achieved the predetermined educational goals. Academic achievement is commonly measured with examinations that assess important procedural knowledge such as skills, and declarative knowledge such as facts which student have learnt Engel, (2002); Bennett, (2003); Bishin, (1973). Academic achievement, used interchangeably with academic performance, is indispensable in every formal educational institution. It pertains to scholarly human activities conducted in a formal educational environment. Academic achievement is a measurable index that depicts a student's cognitive, affective and psychomotor domains in an educational setting.

Students 'academic achievement is ascertained by testing which has and will continue to play significant role in any educational system world-over. In fact, it would be irrational to think of teaching without test, measurement and evaluation. Evaluation of educational achievement is indispensable for effective formal and even non-formal education‖. Academic achievement which is usually measured with test refers to what is done under existing circumstances that subsumes the process of accessing and utilizing the structure of knowledge and abilities and a host of affective, motivational and stylistic factors that influence the ultimate responses Murphy et al (1989); Kaplan et al (2005).

Knowles (1978) asserts that academic performance is the demonstrated achievement of learning as opposed to the potential for learning. It is knowledge attained or skills developed in school subjects usually designated by scores in formal tests or examinations. Academic achievement refers to the observed and measured aspect of a student's mastery of skills and subject contents as measured with valid and reliable tests Joe, Kpolovie, Osonwa & Iderima (2014). It

suggests that academic performance is different from the academic potentials of an individual. It is the measured relatively permanent changes in an individual 's behavior due to experiences acquired. A student 's academic performance is usually measured by teacher-made tests or standardized tests which in most cases are referred to as external examinations like the training of nursery and primary school teachers conducted in ministry of secondary education and the ministry of basic education (Tambo 2011).

Academic achievement in this work is in the context of learning and being able to express what has been learnt in a written or practical form without examination malpractice of any sort. It is on this note that Ashton (1990) stated that academic attainment as measured by the examinations of the traditional kind involves most of the capacity to express oneself in a written form. It requires the capacity to retain propositional knowledge, to select from such knowledge appropriately in response to a specified request and to do so without reference to possible sources of information. In the same vein, Lawton and Gordon further commented that academic achievement is the present attainment or learning of a skill or knowledge demonstrated by evidence of some kind, including performance in test. Academic performance is the achievement of a student in terms of aggregate obtained in a test or examination in specific subjects that cover a given academic program.

Researchers have confusedly used the term academic achievement for it become very difficult to determine the level of achievement on learners not restricted to any group. This is since literature has not provided a definite clarification on the difference levels of students' academic achievement. For instance, Richard (2000) and Tony (2000) used the three terms: academic performance, academic achievement and outcomes interchangeably in their studies. However, they were careful in the use of the terms. They distinguished among academic achievement and outcomes in their words. In fact, academic achievement and labor market outcome were clearly differentiated They observed that achieving well in school had significant influence on academic ladder and learning outcome for young people many years after leaving school What this suggests is that academic achievement improves or brings about outcome.

In the United States of America (USA for a student to qualify for recognition of academic achievement in any training program, a student must have completed successfully certain courses achieve certain grade-point average for given semesters. In other words, it is not just one-point

observation of measurable behavior and attitude of a person that constitutes his academic achievement.

To evaluate students' academic achievement, there should be an assessment of how well he accomplishes the program's goals; a summary of his cumulative academic program performance up to the point of graduation. For instance, students' academic achievement includes their accomplishment during the program among others. It is also observed that people often refer to school academic achievement as students' graduation rate Probably that is why it is rare to see school academic achievement in relation to national education norms.

According to Theodore (1995) in his findings he distinguished achievement academically from academic performance when he stated that academic is a long-term ('end") while academic performance is measurable at any point in time (continual). In other words, achievement can be measured as stagnating, falling or improving over a long period. He further classified activities that occur in performance as academic. For instance, students' achievement varies based on reading, selection of one or more schools within each division and difference from rural to urban areas and it also differed from state own schools, lay private, denominational schools among others.

According to him, satisfactory academic achievement award is given to those students who maintains satisfactory academic achievement and progress towards, the attainment of a certificate in line with the United States Department of Education Regulations This is to suggest that academic achievement is cumulative and progressive It means that academic achievement cannot be attained within a short period or at a slot. What this indicates is that academic performance culminates and influences academic achievement. in addition, we can talk of academic achievement in a subject. Stevenson et al (2001) while comparing Chinese, Japanese and American children academic achievement in mathematics' measured performance in perceptual speed, coding skill, spatial abilities vocabulary, verbal memory and general information discovered that Japanese and Chinese performed than their American counterpart. The results in these different aspects of performance affect academic achievement in Mathematics. The reason for the low student academic achievement in educational statistics is within the confine of this study. it should be noted that performance of a small school number of students can substantially affect school's academic achievement results. Thus, changes from one level to the next may be due to changes in

the performance of a small group of students. Eventually.   students' academic performance influences students' academic achievement

According to Bote (2010), Achievement is a broad concept that incorporates many factors. Achievement in education typically entails a positive outcome from the educational endeavor; this could be a job, move to a higher level of education or even a pass in an in-class test or quiz. These goals can be classified under the long and short-term goals. The long-term goals include getting a job and getting a better life from the fruits of the educational endeavor (human capital theory). The short-term goal on the other hand concentrates on the immediate results from the educational endeavor. To her academic achievement Determinants of student can be classified under four main groups: School resources, family or home background, student specific characteristics and the school external factors. These distinctions are not clear cut but are prone to some overlapping. From the point of view of Midgleya et al (1998) identified three main components of the short-term achievement theory: goal to develop ability or task goal orientation, goal to demonstrate ability or ability approach goal orientation and the goal to avoid the demonstration of the lack of ability or the ability avoid goal orientation which according to them students in the course of studying should be known the short and long term goals of the achievement in subject there are doing or offering in any academic institution. The task goal orientation has been found to have the most outcomes in academic achievement as it orients students based on their attitude to focus on the learning of the task at hand they intended to achieve academically. The task at hand in most schools is usually guided by the given curriculum or syllabus in place. The students are tested on how well they have mastered the contents and or task set within the limits of the syllabus. Task goal orientation has also been found to be associated to many positive outcomes like high level efficiency, use of more cognitive strategies, persistence, (Pintrich, 2000).

The academic achievement of students may also dependent to an extent on many environmental factors which include education funding teacher, cultural and educational policy Kpolovie,(2013) Kpolovie, (2012) that can easily be studied experimentally, and conclusive conclusions drawn. Since learning is an integral aspect and a major determinant of academic achievement, it logically follows that the factors influencing learning in an individual may have overt or covert effects on the individual 's academic performance. The economic or financial aspect of the school environment may largely determine academic performance. This is true

because it influences the acquisition of instructional or teaching/learning aids as well as the provision of infrastructural facilities and basic amenities in the school environment. Though education funding determines both the quality and quantity of both human and material resources to enhance learning,the average percentage of total annual budgetary allocation to education in Nigeria from 1960 to date is self-destructively low as 5.72 as revealed by Kpolovie (2014) in a study that he ex-rayed quality assurance in the Nigerian Educational system.

Unfortunate however, unlike the environmental factors that can easily be studied experimentally to determine their effects on students 'academic achievement; psychological factor that tend to influence academic achievement could at best only be studied as correlates or predictor of academic achievement. While negative behaviors have been associated with negative academic outcomes, research has shown that positive and socially appropriate student behaviors such as independence, appropriate classroom conduct, compliance with school rules, and socially appropriate interactions with peers, contribute to positive academic outcomes Lassen, Steele & Sailor, (2006). These positive interactions can create a more pleasurable environment conducive to positive student and teacher communications. Positive behaviors have been associated with an increased ability and willingness to complete classroom works through motivation from students. It is suggested that these positive behaviors contribute to positive academic outcomes because they promote academically oriented behavior, such as intellectual curiosity, active listening and an interest in schoolwork (Lassen et al (2006).

Academic achievement of student is the ability of the student to study and remember facts and being able to communicate his knowledge orally or in written form even in an examination condition. Secondary education choice of subjects plays a crucial role in laying the foundation for the further education of students and their academic achievement in statistics, those with good background in mathematics back in secondary school due perform well in courses related to figures in any level of education they found themselves. If a good foundation is laid at the secondary school level, students can better cope with the challenges of life and profession with great ease and that is why in training colleges in Cameroon the performance and academic achievement is mixed either highly or lowly achieved.

However, different people have explained different factors responsible for the academic achievement of students. Factors that influence students' academic achievement at the teacher training colleges are not conclusively known and could be multivariate in nature. They might include students 'attitude towards school, interest in learning, study habit, attribution, self-efficacy, intelligence, and motivation. Udoh (2005) maintained that academic performance of students is phenomenon that has educational, psychological and sociological connotation. Thus, students 'academic achievement cannot be completely accounted for by only one or two variables but a number of them. Since students 'academic performance depends on many variables, performance could be enhanced through identifying and manipulating each of such variables. Attitude towards statistics denotes a positive or negative predisposition towards academic achievement and every activity in the school environment, which could be cognitive, emotional, or behavioral this is according to Bernstein, Penner, Clarke-Steward & Roy, 2006). Fazio and Roskes (1994, said, "attitudes are important to educational psychology because they strongly influence social thought, the way some individual thinks about and social information". It is evident that, when so defined, attitudes cannot be directly observed but must be inferred from overt behavior, both verbal and nonverbal. Most students in training institutions come to school ready and willing to learn and obtain their certificate at the end of the day.

However, training colleges can best foster and strengthen their predisposition and ensure that they leave training colleges with the motivation and capacity to continue learning throughout life has remained a matter of great concern and to pass the knowledge to the future generation this is in accordance with the millennium development goals and confirmation of sustainable educational goals. Without development of the right attitudes, students may not be well prepared to acquire the new knowledge and skills necessary for successful adaptation to changing circumstances and the necessary situation to achieve in their academic pursuit as cited by (Kuusinen et al (1988) page 30. In training institutions teachers manage much of students 'learning so as to influence their academic achievement.

More over, learning might be enhanced if students can manage it themselves and be ready to learn; moreover, once they leave school, individuals must manage most of their own learning. To do this, they need to be able to establish goals, to persevere, to monitor their learning progress, to adjust their learning strategies as necessary and to overcome difficulties in learning. Students

who leave school with the autonomy to set their own learning goals and with a sense that they can reach those goals tend to be better equipped to learn throughout their lives Candeias et al (2012) and become good and future teachers in our primary education.

Academic achievement is the extent to which a student, teacher or institution have achieved their short- or long-term educational goals. It is commonly measured through examination or continuous assessment for instance; Number of credits obtained at a sitting for examination represents academic achievement of the candidate. Students' academic achievement is contingent upon a number of factors including: previous educational outcome, socio economic status of the parents, parent educational background, self- effort and self -motivation of students, learning preferences, standard and type of educational institution in which student get their education and the school in which they study, amongst others.

Durden and Ellis (1995) observe that, the measurement of student's previous educational outcomes are the most important indicators of student future achievement, that is, the higher previous appearances, the better the students' academic performance in future endeavors. However, Roddy and Talcott (2006) disagree with the assumptions that future academic achievement is determined by preceding performance. In their research on the relationship between previous academic and subsequent achievement at university level; they found that student learning or studying at graduate level and the score secured did not predict any academic achievement at university level. Graetz (1995) conducted a study on socio economic status of the parent of students and concluded that the socio-economic background has a great impact on student academic achievement. Main source of educational imbalance among students and students' academic success hinged very strongly on parent's socio-economic status.

Having the same view as Graetz (1995), Considine et al(2002) in their study on the influence of socio economic disadvantages in academic performance of schools, in addition, noticed that these parents make available sufficient psychological and emotional shore up to their children by providing good education and learning environment that produce confidence and the improvement of skill needed for success. Standard and type of education institution in which students get their education, strongly affect student learning outcome and educational performance. The education environment of the school one attends sets the parameters of students learning outcomes. Sparkles (1999) in Considine et al (2000) showed that schools environment

and teachers expectation from their students also have strong influence on students' academic performance. Teachers, teaching in poor schools or schools having poor basic facilities often have low performance expectation from their students and when students know that their teacher have low performance expectations from them, it leads to poor achievement by the students.

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Kwesiga (2002) asserts that students' performance is also influenced by the school in which they study and that the number of the facilities in school offers usually determine the quality of the school which in turn affect the performance and accomplishment of its students. In his own argument, he also asserts that schools influence educational process in content organization, teacher and teaching and learning and in the end evaluation of all. It is generally agreed that schools put strong effect on academic performance and educational attainment of students. Students from elite schools perform better because these elite schools are usually very rich in resources and facilities. Hence the ownership of school and the fund available indeed influence the performance of the students. These additional funding resources and facilities available in private schools enhance academic performance and educational attainment of their student achievement is also influenced by the school in which they study and that the number of the facilities in school offers usually determine the quality of the school which in turn affect the performance and accomplishment of its students. In his own argument, he also asserts that schools influence educational process in content organization, teacher and teaching and learning and in the end evaluation of all. It is generally agreed that schools put strong effect on academic performance and educational attainment of students. Students from elite schools perform better because these elite schools are usually very rich in resources and facilities. Hence the ownership of school and the fund available indeed influence the Academic achievement is the extent to which a student, teacher or institution have achieved their short- or long-term educational goals. It is commonly measured through examination or continuous assessment for instance; Number of credits obtained at a sitting in examination represents academic achievement of the candidate. Students' academic performance is contingent upon a number of factors including: previous educational outcome, socio economic status of the parents, parent educational background, self- effort and self - motivation of students, learning preferences, standard and type of educational institution in which student get their education and the school in which they study, amongst others.

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the ownership of school and the fund available indeed influence the performance of the students. Adetayo, (2008) confirms this position when they noticed that school ownership, provision of facilities and availability of resources in school is an important structural component of the school. Private school due to better funding, small size, serious ownership, motivated faculty and access to resources such as computers perform better than public schools. These additional funding resources and facilities available in private schools enhance academic achievement and educational attainment of their student achievement of the students. Adetayo, (2008) confirms this position when they noticed that school ownership, provision of facilities and availability of resources in school is an important structural component of the school. Private school due to better funding, small size, serious ownership, motivated faculty and access to resources such as computers perform better than public schools. These additional funding resources and facilities available in private schools enhance academic performance and educational attainment of their student.

### 2.2.8: Relationship between Attitude and Academic Achievement

According to research, carried by researchers on the attributes of attitude and it influence on academic achievement it was founded by some scholars developed a theory that could be used to explain the relationship between attitude and academic achievement. According to Kazemi, F., Fatemi. A, and Ghoraishi, M (2010) in their study  constructed the value-expectancy model to test the relationship that do exist between attitude and it academic achievement according to them construct and they realized that a person's attitude determined his/her intended behavior, which could ultimately affect the outcome of the results be its positive or negative. Based on the model, he stated that a person would hold certain attitudes towards an object by evaluating it. After passing through this process, the person then chooses whether to hold a favorable or unfavorable view towards a course or not. In fact, such a positive or negative attitude could further determine the person's behavior or attitudes to engage in various activities about that object (Kazemi, F., Fatemi. A, and Ghoraishi, M (2010). Judging, on the        person's intended behavior, this could be regarded as a significant determinant of the outcome.  Adding to his theoretical arguments, there were indeed numerous researches conducted on testing the relationship between attitude and academic achievement.

From the past literature, there was a general agreement that attitude could be regarded as some significant determinants of one's academic achievement. Most of these researches illustrated the more positive one's attitude towards an academic subject, the higher the possibility for him/her to perform well academically for such learners are being motivated internally. Moreover, according to a research conducted in the U.S., the researchers studied the relationship between students' attitudes and academic achievement in college statistics by inviting 218 freshmen to complete a set of questionnaires. The result indicated that students' attitudes were highly correlated with their achievement in college calculus House (1995) page 112. In another study also conducted in the U.S., the researchers assessed the relationship between attitude towards statistics and achievement in educational statistics.

It was found that attitude had a powerful prerequisite on students' academic achievement (Walker, D.A., 2010). Even though most of the studies suggested that there was a positive relationship between attitude and academic achievement, there were other researchers arguing that students' attitude might not be a significant determinant of their academic achievement this confirms a research conducted by Mickelson (1990), where he realized that whether attitude could significantly determines one's academic achievement depended on a number of variables, particularly the ethnic background and social class . Correspondingly, Ma and Kishor (1997) also argued that the statement "attitude was a significant predictor of academic achievement" was indeed a paradox. Attitude might not necessarily predict one's academic achievement as it also depended on differ factors, like race, sample selection and sample size as results finding others. All in all, although there were countless researches studying the relationship between attitude and academic achievement, a unanimous result could not be obtained. Therefore, further investigation is needed to confirm the relationship between attitude and academic achievement so the relationship between attitude and academic achievement has been a topic of interest in social sciences researches. Based on past literature, there was a general agreement that student's attitude strongly related to one's academic achievement. For example, according to Moghni and Riaz (1994), Hamachak (1998), cited Bakar (2010) they assessed the influence of parenting styles, achievement motivation and motivation on college students' academic achievement (p. 338). The results indicated that attitude was a significant predictor of one's academic achievement. Also, Hemmings, B. and Kay, R., (2010) in their research, they also supported that attitude is a reliable predictor of one's educational achievement .  Although most of the existing literature supported

the notion that there was a significant relationship between attitude and academic achievement, there were also few researches did not support such an argument.

In a study conducted by Ma, X. and Kishor, N., (2000) they found that whether attitude could influence one's academic achievement depended on some external factors, like gender and socio-economic status (p. 13). After analyzing the data collected, the researchers found that attitude could only successfully predict females' academic achievement while it failed to accurately foresee males' educational performance in relation to their attitude. Apart from this finding, it was also shown that attitude could only predict the academic achievement of students with higher socio-economic status and According to McCoach et al. (2010), many malleable school, teacher, and parent characteristics factors have been associated with student achievement. It also mentioned by Farooq et al, (2011) that parental education and family socio-economic status (SES) level or family characteristics have positive correlations with the student's quality of achievement based on the results of his study about statistics mathematics and English.

According to Diaz (2003) as stated in Mlambo (2011) mentioned that most of their studies focus on the three elements that associate with academic achievement are parents (family causal factors), teachers (academic causal factors) and students (personal causal factors). As reflected in the above research findings, it could be seen that there were inconsistencies in contemporary understanding on the relationship between attitude and academic achievement as there are different ideologies brought forward by cross section of researchers. Even though most of the existing studies supported there was a strong correlation between the two variables, there were still researches arguing the opposite. Therefore, further investigation is required to demonstrate a clearer understanding between the two constructs and the current researcher will investigate Following a study conducted by Heyneman et al (1983) as cited in Pangeni (2014) they found that the overall proportion of variance in student achievement was largely associated with school characteristics and the predominant influence on student learning. In addition, from the viewpoints of Mersha et al (2013), university-related factors consist of accommodations and faculty characteristics as it will encourage disclosure and requests for accommodations or other supports. A building design combining social locale and workspaces will permit to more interactive gathering, motivating students in generating creative ideas, and discovery new way of learning.

These features projected to ignite celebrating student achievements and promoting excellence (Melissa, 2014)

### 2.2.9: Assessment of Students   Academic Achievement.

As part of their instructional practice, teachers periodically gather information on learner's progress through many ways. This can be done through: observation checklists; learner's self-assessment; daily practical assignments; samples of learner's work; learner's willingness to participate and contribute in projects/conferencing; tests, oral and written quizzes; portfolios; willingness to be involved in class and school activities. These may be organized immediately after or even during a lecture, at the end of a week, term or the end of the school year. Before the 2018, Cameroon Primary School Curriculum, these periodic assessments did not count towards the final assessment of the pupils; the innovation adopted now is to change the practice. This change in practice actually makes it possible for teachers to adopt a variety of approaches to the assessment of students. In principle, teachers should be able to assess those very important aspects of educational outcomes that are not easily assessed under rigid timed examination conditions.

Teachers are free to use any method of evaluation as this a formative type of assessment, which carried during the teaching and learning process. Teacher can evaluate students even by observing their activities in class. A student who care the cleanliness of classroom, help other students in studies can score good marks too as this is holistic approach to assess students. Besides observing, a teacher can has activities such as question and answering, presentation, project, creating products, practical, worksheet, quizzes, scrap book, portfolio and peer evaluation. Therefore, approaches to curriculum and instruction are more apt to be integrally linked with, or even driven by, assessment practices and the forms that they take (e.g., Angelo & Cross, 1993; Huba & Freed, 2000; Wiggins et al (1998).  Increasingly, practitioners in all educational levels, including teachers, administrators, policymakers, as well as system evaluators, are expected to understand the principles of assessment (and be certified in them via assessment) and to engage in sound assessment practices within and beyond the classroom (e.g., Elliot, 2003; NCATE, 2002; Schafer et al ).

## 2.3:    Theoritical Framework

### 2.3.0: Introduction

In this section, theories related to this study will be treated. Luma (1983) defines a theory as a related assumption or conception tied in some way to the real world of unknown properties, or behavior which can be subjected to experimentation and revision as well as the search for more truth hitherto unknown. Using a theory to analyze a work is very important as it goes as far as describing the work accurately and comprehensibly to ease understanding. We allow the facts speak for themselves and our interpretations are based on the fact revealed by the data collected. Theories are based on assumptions and specify relations among variables. They guide research by generating hypotheses that can be tested. This research is based on three theories: achievement motivation theory of David McClelland, Vroom's Expectancy Theory, Attribution Theory and constructivism theory of John Dewey's pragmatism as well as two models such as teaching content model by Shuman (1986) and model for statistics pedagogy.

### 2.3.1: Achievement Motivation or Need Theory

According to one definition Steers & Porter, (1991), motivation is a force that serves three functions: it energizes, or cause people to act; it directs behavior toward attainment of specific goals; and it sustains the effort expended in reaching those goals. Work motivation is a set of energetic force that originate both within as well as beyond an individual's being, to initiate work-related behavior, and to determine its form, direction, intensity, and duration. Understanding what motivates an organization's employees is central to the study of I–O psychology. Motivation is a person's internal disposition to be concerned with and approach positive incentives and avoid negative incentives. David McClelland and his associates (Notably John Atkinson), focused on needs like the higher order (social and esteem) needs identified by Maslow. McClelland's needs theory, also called Achievement motivation theory is concerned with how individual needs and environmental factors combine to form three basic human motives. according to McClelland achievement motivation students who want to take responsibility for finding solutions to problems, who seek challenge, who is willing to work hard and who has the mental vigor to reach the goal are considered to have a high need for achievement. While motivation can often be used as a tool to help predict behavior, it varies greatly among individuals and must often be combined with ability and environmental factors to influence behavior or attitude and performance. Students during studying educational statistics sometimes encounter problems where students who think

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that there is a stable cause for failing an exam (e.g., statistics is a difficult subject). These students may no longer expect to benefit from studying statistics; they may start to dislike it and will not spend much study time on this subject. Other students may think that they have no control over the outcomes of their actions. For example, "no matter how hard I study, I will not be able to understand it." These students may in advance expect to fail on the exam, will also start to dislike statistics, and will not spend much time studying the material. These examples show the influence of causal attributions (stability of causes, non-controllability of causes) on cognitions such as outcome expectancies (no benefit from studying statistics, expectancy to fail on the exam) and consequently on emotions (affective reactions of starting to dislike statistics) and behaviour (disregarding statistics), which will finally influence achievement.

value → expectancy out come → Cognitive competence → achievement → effort → value
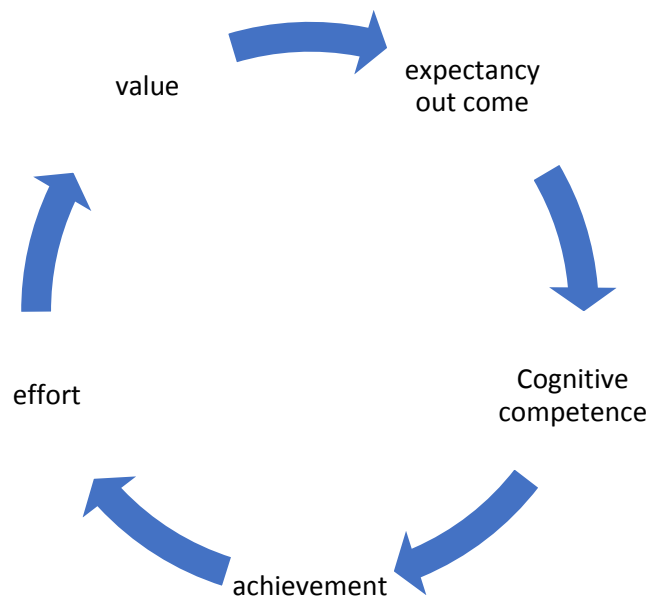
**Figure 2.4.2: Statistics motivational model based on the achievement motivation or need theory. Source adapted from McClelland (1999).**

According to Peterson, Maier, and Seligman (1993),in their findings the present motivational theory, which originally marked from the learned helplessness paradigm. In their paradigm, students are thought to become passive and to develop affective deficits if they cannot control and avoid the causes of passive stimuli that might cause failure in their task. Their claims or views contrasted with Pintrich and Schunk (1996), that controllability is the major factor

contributing to a negative outcome expectancy. Uncontrollable events will, according to Peterson et al., lead to a perceived non-contingency between people's actions and the outcomes of their actions. To assess an individual's motivational needs, McClelland (1999) used variation of the Thematic Apperception Test (TAT). Respondents are instructed to study ambiguous picture for a few minutes and then write a story it suggests. The brief stories are then scored using a standardized procedure that measure the presence of the three needs to obtain a motivational profile for each respondent. The TAT is known as a projective test; that is, respondents project their inner motivational needs into the content of the method create to study the statistics course. David' McClelland's achievement motivation theory is a comprehensive need theory of motivation that deals specifically with work motivation. This theory states that three needs are central to work motivation: the needs for achievement, power, and affiliation. According to McClelland, people are motivated by different patterns of needs or motives. Individuals with a very high need for achievement are those who love the challenge of work.

This negative outcome expectancy will lead to pessimistic thoughts, negative emotions (affect), and passivity (behavior or attitude). This is what is called learned helplessness. We integrated control influencing outcome expectation as a separate construct in our model. Control is defined as the ability to avoid the causes of unpleasant or unwanted stimuli. These theories slightly differ in the emphasis of the causal dimensions control and stability, they both reflect the way these properties of negative causal explanations contribute to a negative outcome expectancy, and how this will act upon affect and on behavior, such as effort and persistence, which will finally result in an effect on achievement. This model was examined within the domain of statistics education. This means that all the constructs were measured with respect to statistical events and phenomena. It is known that perceived causal explanations via expectancy, affect, and behavior determine future achievements statistics cited in Seegers & Boekaerts, 1993, the question is whether this is also true for statistics education and if yes, the results would provide useful information for the reformation of statistics education.

This study makes use McClelland's achievement motivation theory was adopted to assess the motivational needs among students of teacher training College in Cameroon. McClelland's model of motivation emphasizes the importance of three needs: achievement, power (effort) and affiliation in determining student motivation. They are motivated by a desire to get ahead in the

job, to solve problems, and to be outstanding work performers. Need for achievement is also associated with being task oriented, preferring situations offering moderate level of risk or difficulty, and desiring feedback about goal attainment. According to McClelland, everyone possesses of each of these motives, although in everyone a particular need or needs tends to predominate (Riggio, 2013). Achievement motivated students tend to get more pay raises and are promoted faster because they are constantly trying to think of better ways of doing things. They have a reason why to do something better or more efficiently than it has been done before. This drive is the achievement need. Need for power (which implies for student needs to excess in her courses taken the case of statistic) is the desire to have impact to be influential and to control others. A high need for achievement means that an individual seeks to influence or control others. Individuals with this need are concerned with acquiring, exercising and retaining more effort or influence over others. They prefer to be placed into competitive and status-oriented situations. They generally tend to seek positions of leadership. Based on this research, it can be assumed that students' attitude towards an academic subject plays a role in affecting their intrinsic motivation, like effort. Therefore, the theory can be applied in the present study: when students possess a positive attitude towards educational statistics (e.g. the subject is meaningful and relevant to their academic studies and future career), they are more likely to put in more effort into studying the subject which according to McClelland's three motives evokes a different type of feeling of satisfaction. Achievement motive tends to evoke a sense of accomplishment, effort motive tends to evoke a sense of cognitive competence and affiliation motive tends to evoke love and affection which as a result lead to greater achievement in a course it is actually confirming the domain of learning that is cognitive, psychomotor and affective domain.

On the contrary, when students possess a negative attitude towards research methods and statistics (e.g. the subject is meaningless and irrelevant to their academic studies and future career), they are less likely to exert extra effort into studying the subject. He also talks on the need For Affiliation: Need for affiliation is related to the desire for affection and establishing friendly relationships. students who have a high need for affiliation view their subject a way to form new and satisfying relationships. They are motivated by the effort that provide frequent interaction with their class mates. Students will who does know and want to know will also affiliated with those who knows and even to follow up lessons seriously and ask questions where necessary, but the revise holds true to those who doesn't want to learn. They derive pleasure from being loved by the

group. The most effective mixture of these three motives depends on the situation. Different studies indicate that most effective managers have a high need for power, a moderate need for achievement and a low need for affiliation comes in when students when possess a negative attitude towards research methods and statistics (e.g. the subject is meaningless and irrelevant to their academic studies and future career), they are less likely to exert extra effort into studying the subject. Tools like Thematic Apperception Test (TAT) are used to measure and determine the strength of these needs which is to see how ready students have put in to a course. The Thematic Apperception Test (TAT) is a projective test of personality.

Christiana Morgan and Henry Murray created the test in the 1930s at the Harvard Psychological Clinic. Douglas (1993). McClelland used the TAT as a tool to measure the individual needs of different people. The TAT is a test of imagination that presents the subject with a series of ambiguous pictures, and the subject is asked to develop a spontaneous story for each picture. The assumption is that subject will project his or her own needs into story. Psychologists have developed reliable scoring techniques for the TAT. The test determines the individuals score for each need of achievement, affiliation, and power. This score can be used to suggest the types of job for with the person might be well achieved. First and foremost, the motivational theory can be used to explain the relationship between attitude and effort. Motivation can be divided into two different theories known as Intrinsic (internal) motivation and Extrinsic (external) motivation. Intrinsic motivation is the self-desire to seek out new things and new challenges, to analyze one's capacity, to observe and to gain knowledge.

### 2.3.2 Vroom's Expectancy Theory (1989)

Expectancy Theory of Motivation which was propounded by Vroom (1989) It is one of the Process Theories of motivation. Expectancy Theory is a theory that says that the strength of a tendency to act in a certain way depends on the strength of an expectation that the act will be followed by a given outcome and on the attractiveness of that outcome to the individual. The Expectancy theory provides a sort of an instrument for finding out motivation through a certain type of calculation. The way in which the Expectancy theory works is as follows: students have personal goals which they like to achieve and for this reason they work hard. Their personal goals can be fulfilled by outcomes. Therefore, the relationship between organizational rewards or work outcomes and personal goals is important that is to what extent organizational rewards fulfil an

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employee's personal goals and how attractive are those rewards to the employee. This relationship can also be expressed as the value the employee gives to the work outcomes. Secondly, organizational rewards or work outcomes are dependent on the individual performance of the employee. The level of belief that the individual employee has that his/her performance will result in achievement of organizational rewards/work outcomes is also important. And thirdly, the perception of the chances by the individual employee that personal effort on his/her will lead to high performance is again important. Therefore, there are four variables for an employee that matter him/her in motivation.

These variables are: Individual effort, Individual performance, Organizational rewards/work outcomes, and Personal goals. One of the most widely accepted explanations of motivation is Victor room's" expectancy theory. Vroom proposed his expectancy theory in 1960's as an alternative to the content models. Vroom explains that motivation is a product of three factors, viz, Valence (how much one wants a reward), Expectancy (one's estimate of the probability that effort will result in successful performance) and Instrumentality (one's estimate that performance will result in receiving the reward). This motivational relationship is expressed in the form of a formula.

**Motivation = V X E X I**

(Valence X Expectancy X Instrumentality) Valence is the strength of a person's preference for an outcome (interest and readiness attribute to statistics). It is the personal value workers or students place on the rewards they believe they will receive for performance. When valence is high, motivation is also high. Expectancy refers to a person's perception of the probability that effort will lead to performance or achievement (cognitive competence and effort put to the statistics). Instrumentality is a person's perception of the probability that certain outcomes are attached to performance. Thus, an individual is motivated by the perceived reward available to him for accomplishing a goal (achievement or the final results). For example, a student who feels that his promotion to the next level in education relies upon his excellent performance and achievement in a course believes effort has been rewarded, then there are two outcomes, namely, first level outcome, i.e., excellent performance and the second level outcome, i.e., his or her promotion to the next level. Here his or her valence should be considered i.e interest and readiness of students in a course (statistics). Valence for a reward is unique to each student. His valence,

(i.e., strength of preference for the achievement) may be positive, neutral or negative. If his desire for promotion is high, his valence will be positive. If he is indifferent to promotion, valence will be zero and if he dislikes promotion, then it will be negative. Here students would be motivated towards excellent and high achievement because of his preference to be promoted.

The excellent performance, i.e., the first level results is being instrumental in getting his promotion, i.e., second level results or achievement. So, according to Vroom, motivation is the product of valence, expectancy and instrumentality. This theory represents a comprehensive, valid and useful approach to understanding motivation". When teacher trainee has interest and readiness to learn statistics they develop positive attitude and are motivated to learn and if they are not willing and put less interest and readiness the end outcome is to have negative feelings towards statistics, if the valence or interest is zero they become neutral in learning statistics and the course is of no use to them.

Expectancy theory is based on four assumptions (Vroom, 1964). One assumption is that students join learnining institutions with expectations about their needs, motivations, and past experiences. These influences how students, react to the organization. A second assumption is that an individual's or student's behavior or attitude is a result of conscious choice and the choices will determine their achievement. That is, students are free to choose those behaviors or attitude suggested by their own expectancy calculations. A third assumption is that students want different things from the organization (e.g., good results overcome challenges). A fourth assumption is that students will choose among alternatives to optimize outcomes for them personally. The expectancy theory based on these assumptions has three key elements:

- **Expectancy**, Expectancy is a person's estimate of the probability that success-related effort will result in each level of achievement. Expectancy is based on probabilities and ranges from 0 to 1 and when it is one it highly achieved and zero means they have achieved nothing.

- **Instrumentality**: Instrumentality is an individual's estimate of the probability that a given level of achieved task performance and achieved which will lead to various achievement. As with expectancy, instrumentality ranges from 0 to 1. For example, if a student sees that a good achievement rating will always result in a motivation increase, He or She will have studied hard to achieve, the instrumentality has a value of 1. If there is no perceived relationship between academic achievement rating and a motivational increase, then the instrumentality is 0.

- **Valence**: Valence is the strength of a learner accomplishment for a reward. Thus, when motivation increases, promotion, peer acceptance, recognition by supervisors, or any other reward might have value to individual students. Unlike expectancy and instrumentality, valences can be either positive or negative depending on the attitude and behavior of the students. If a student has a strong anxiety for attaining a reward, valence is positive. At the other extreme, valence is negative when the willingness and anxiety is not there. And if a student is different to a reward, valence is 0. The total range is from -1 to +1. Theoretically, a reward has a valence because it is related to needs of the learner Valence, then, provides a link to the need theories of motivation. Vroom suggests that motivation, expectancy, instrumentality, and valence are related to one another by the equation.

**Motivation = Expectancy x Instrumentality x Valence**.
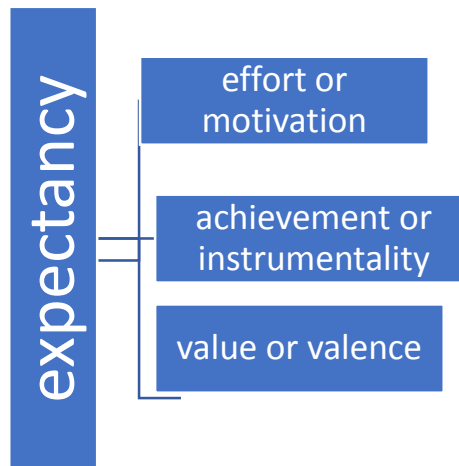


**Figure 2.4.3: Model of Expectancy Theory source adopted from vroom (1989).**

A person is motivated to the degree that He or She believes thatEffort will lead to acceptable achievement (expectancy), negative attitudes about the difficulty of statistics as a domain also affirm one of the components of attitude. Carbonaro (2005) defines school effort as the amount of time and energy that students put in meeting the formal academic requirements established by their teachers and/or school. He identified three different types of school effort: The rule oriented effort (showing up in and behaving in class),Procedural effort (meeting specific class demands such as completing assignments on time) Intellectual effort (critically thinking about and understanding .Most researchers have come out with findings that students' effort is related to academic achievement, Studies of "engagement" has typically relied heavily on measures of effort,

such as the completion of homework, attentiveness, and preparedness. Generally, the findings of such studies have indicated that students who are more engaged learn more in school (Johnson et al. (2001); Marks (2000) It is without doubt that the academic achievement of students depends on number of basic factors of which effort is paramount (Tella & Tella, 2010). Effort as Johnson et al. (2001); Marks (2000) early defined refers to the overall amount of energy expended in the process of studying whereas persistence, also known as effort management or effort regulation (Pint rich, et al 1993) means the continuous investment of energy in learning even when obstacles are encountered. When this entire are put in place students are bound to achievement highly in statistics. In this light school effort as the amount of time and energy that students expend in meeting the formal academic requirements established by their teachers and/or school thus affirming the facts that effort play a key role of act as a mediating factor in student academic achievement in statistics. As early identified above these researchers come out with three different types of school effort that is (rule-oriented effort, procedural effort and intellectual effort. Intellectual effort in this sense refers to critically thinking about and understanding the curriculum put in place Carbonaro (2005).

Performance or achievement or end result will be rewarded (instrumentality), Refreshingly, when students attribute their academic success to effort and receive feedback that attributes their success to effort, they develop a higher self-efficacy and expectations for future skill development Indeed, most of the researchers have in the context of achievement goals explored the contribution of effort and persistence on students' academic performance. Other research result shows that effort makes a positive contribution to the prediction of academic outcomes in truth, in analysis, effort is found to relate positively to academic performance Opare & Dramanu, (2002); Phan, (2008). Pintrich (2004), for instance, finds effort to be the only direct predictor of learning outcomes amongst all general strategies. Children with high expectation for success on a task usually persist at it longer and perform better than children with low expectations says Eccles, (1983), Eccles et. al, (1998). Researchers like (Carr et. al.1991) have found that students with high intelligent quotients (IQs) and high expectations of success in school do, in facts get the highest grades. Students with high IQs and students with low IQs and low expectations receive lower grades than children with low IQs and high expectations.

The value of the rewards is highly positive as well as highly negative depending on what the learner is expecting at the end of the day. Students who have high expectation or expectancy will work harder to achieve something in life, Affect: Students' positive and negative feelings about statistics. Value: Attitudes about the usefulness, relevance, and worth of statistics in personal and professional life which is corresponded to one of the components of attitude.

**Merits of the Theory**

Many experts in the field of institutional behavior hold the view that Expectancy theory is one of the most acceptable theories of motivation and there is substantial evidence to support the theory. Numerous studies have been done to test the accuracy of Expectancy Theory in predicting students' behavior and direct tests have been generally supportive. The administrators of institution can be benefitted from the expectancy theory as it helps them to understand thepsychological processes that cause motivation. The thinking, perceptions, beliefs, estimates of chances and probabilities and other such factors of staffs strongly influence their motivation, performance and behaviour. It makes the process of understanding the organizational behavior easier.

The Expectancy Theory seems to be automatically interesting and is based on common sense. It explains the range of motivation by breaking it down into separately identifiable stages. It brings forward the relations between efforts and performance, performance and rewards and rewards and personal goals. Therefore, the administrators can create a work environment, climate and culture that will increase the motivation levels of staffs by understanding the factors that motivate and demotivate individual employees.

The Expectancy Theory is more scientific than some other theories on motivation. It explains many of the wonders related to employee efforts, work performance, employee motivation etc. that are observed in organizations. If organizations actually rewarded individuals for performance rather than superiority, effort, skill level, and job difficulty, expectancy theory might be much more valid. However, rather than canceling it, this criticism can explain why a significant sections of the workforce exercises low effort on the job.

The expectancy theory recognizes the importance of various individual needs and motivations. It thus avoids some of the simplistic features of Maslow and Herzberg approaches. It does seem more realistic. It helps to harmonize individual goal with organizational objectives. And it is consistent with the system of managing by objectives.

Another important aspect of this theory is that it understands the personal differences that cause differences in motivation of different individuals. Expectancy theory does not specify exactly which rewards will motivate particular groups of workers. In this sense, the theory allows for the fact that the rewards and their link with performance are likely to be seen as quite different in different cultures.

Those who have applied this theory have generally been positive about the practical utility of this theory. it has led to improvements in work reform, where emphasis has been laid on essential job factors, such as variety independence, task identity and feedback. "It is of value in understanding organizational goal".

**Weaknesses and Limitations of the Theory**

Expectancy theory is not complete and all comprehensive. Like all other theories it also has a point of view and an angle. But it is better on many accounts and more realistic than many other theories of motivation. Administrators may not rely only on the Expectancy Theory alone and use other theories as well, yet it is one of the most important theories of motivation. We must also understand that all theories in social sciences are limited and the Expectancy Theory is no exception.

The value of a theory lies in its ability to explain with high probability what it significances to explain. It must also be understood that human nature, behavior, attitudes and of course motivation are more particular than objective and can never be completely actualized. Therefore, all theories of motivation suffer from this limitation. Again, the theory is complicated and involves many variables. Practical applicability of the theory therefore might be a little doubtful. In fact, a few experts believe that complexity of the theory makes it difficult not only to test but also to implement. All staffs may not have the time, willingness, favorable situation, resources or even the adequate ability to calculate motivation in the way this theory assumes. Similarly, the administrators also may be lacking one or more of the above limitations to take a decision of what

motivate a particular employee. Some critics suggest it has only limited use and is more valid where individuals clearly perceive effort– performance and performance–reward relations. Because few individuals do, the theory tends to be inflexible.

**Relevances of the Theory to the Work**

Despite the limitation and short coming of the theory the theory is relevant to the study in the following ways. The Expectancy Theory in an attempt to measure students expected outcome on their academic achievement and to determine the impact it has on motivation. Vroom identified that "positive attitudes toward the job are practically equivalent to statistics satisfaction and negative attitudes toward the job are equivalent to job dissatisfaction" which is equally some dissatisfaction statistics as well as classroom management and assessment method (Vroom, 1964,). By understanding effort students put in expectation of the results, instrumentality, and valence (school leaders can design recognition, compensation programs that promote and improve teacher motivation and that, in turn, impact student academic performance. There are three components upon which Vroom's Expectancy Theory is based (Redmond & Hite, 2013).

The first is expectancy. Expectancy is described as the belief that increased effort will yield better performance. This concept can be explained base on the notion hard work pays "If I put more effort, I will make it in my exams" cited by Remond & Hite (2013). Conditions that enhance expectancy are judge base on the required skill set forth by students, and having the necessary support that encourages the students to achieve their goals.

The second component is instrumentality. Instrumentality is the thought that, if an individual performs well, then a valued outcome will come to that individual. Some things that impact instrumentality are having a clear understanding about the relationship between value and achievement, having trust and respect for people who make decisions about the outcomes, and seeing transparency in the process of determining the outcomes. In education, instrumentality is often associated with school administrators and performance evaluations.

The final component is valence. Valence, that is, "value," refers to the achievement'desirability. There are individual differences in the level of value associated with specific outcomes. For example, monetary bonuses may increase the motivation of a students who have desire to learn. Valence can be thought of an importance a person puts on expected results.

In education, valence is often associated with compensation and recognition of work well done. When used in an organization, the Expectancy Theory proposal link to the fact when students are motivated, they have confident to attain or achieve their goals, when they value the outcome of their efforts, and when they believe the reward is what was promised by the institution. Then teachers should try to increase the belief that students can perform their task successfully, increase the belief that good performance will result in valued rewards, and increase the expected value of rewards resulting from the desired achievements (Lunenburg, 2011). If a students is motivated to the degree that his/her effort will lead to an acceptable outcomes (expectancy), the performance will be rewarded (instrumentality), and that the value of the reward is highly positive (valence), then the level of effort will likely be equal to the level of attainment or achievement and, in turn, that level of performance will be equal to the perceived level of rewards (Lunenburg, 2011) . It is this expectation that impacts motivation and attitudes. Vroom identified that "positive attitudes toward the job are practically equal to job satisfaction and negative attitudes toward the job are equal to job dissatisfaction" (Vroom, 1964).

The relationship between motivation and job satisfaction and performance is clearly established: positively motivated employees are more creative, motivated, and satisfied. The challenge for human resources administrators and other administrators in the school system is to find ways to optimize performance toward the attainment of system and individual goals Webb & Norton, (2013). The alignment of bonuses and compensation with goal-setting and collaboration can lead to productivity increases and improved employee motivation Blinder, (1990); Heneman III, Milanowski, & Kimball, (2007); Lawler, (1990); Markos & Sridevi, (2010).

The more the teacher sees his or her work impacting student achievement, the greater the teacher's motivation. The teachers' perceived strength of this connection between effort and student achievement is influenced by their efficacy and external factors such as the learning environment or administrative support. Teachers must value the outcome of increased student achievement and believe that their effort impacts that outcome. They must also believe that the additional effort is worth the potential reward or monetary outcome. When students have the notion that their hard work will have a positive impact on his or her achievement, they will be motivated to work harder by putting in their best or more effort. The effort that teachers put in the classroom

management and assessment will improved student learning.  Therefore, affirming the hypothesis that there exists a relationship between students' effort and academic achievement.

### 2.3.3: Attribution Theory

An investigation of attitude toward statistics cut our attention to John Dewey's theory on education experience which helped in developing student's attitude toward something. According to Lester, (2002) attitude and belief is a product of accumulated life experiences. Attribution theory was developed by psychologist, known as Bernard Weiner, He describes an individual's beliefs about how the causes of success or failure affect their emotions, motivations and achievement in life based on the attitude they attribute. Dewey (1938), He describes attribution based on three kinds of experiences that are related to student attitude in their subject that are taken; Miseducative, non-educative, and educative experiences. Miseducative experiences obstruct the educative potential of future experiences this is like the blockage students experienced during studying which might affect their achievement.  Similar issues arise with "test anxiety," or even just considering oneself to be "a bad test-taker," which may be seen diferently by different Students sometime may see it as part of their character and therefore relatively permanent, while others may see it as a psychological obstacle which can be overcome through changes in attitudes, belies, and strategies.

Thomas and Mathieu (1994) conducted a study investigating the interplay between attributions, goal processes, self-regulation, and satisfaction. The study gathered student perceptions through scales measuring these factors as well as perceived locus of control, stability, and self-efficacy. If a student's locus was internal, high goal achievement created high satisfaction; however, if their locus was external, high goal achievement raised satisfaction only barely. Likewise, if a student's stability was high, high goal achievement led to a strong rise in self-efficacy; however, if stability was low, high goal achievement led to no rise in self-efficacy. These findings make a strong case for investigating student attributions, because what may appear to be similar performances between students (demonstrated by grades) can in fact be significantly misleading students with external loci or low stability may view the same performance entirely differently than other students, which can have dramatic ramifications for future persistence and enjoyment.

According to Bernard Weiner's theory of attribution can be defined into two perspectives: intrapersonal or interpersonal. The intrapersonal perspective includes self-directed thoughts and emotions that are attributed to the self. The interpersonal perspective includes beliefs about the responsibility of others and other-directed effects of emotions; the individual would place the blame on another individual. Individuals formulate explanatory attributions to understand the events they experience and seek reasons for their failures. When individuals seek positive feedback from their failures, they use the feedback as motivation to show improved performances. For example, using the intrapersonal perspective, a student who failed in a statistics test may attribute their failure for not studying enough and would use their emotion of shame or embarrassment as motivation to study harder for the next test. A student who blames their test failure on the teacher would be using the interpersonal perspective and would use their feeling of disappointment as motivation to rely on a different study source other than the teacher for the next test on statistics. This study will also focus on the internal attribution –effort and its' role in affecting students' academic achievement. It is assumed that when students put more effort into studying statistics, they are more likely to perform better in the subject. In contrast, when students exert less effort into studying statistics, they are less likely to achieve a satisfactory result in their study.

Attributions Weiner (1986), investigated the attributions students place on success and failure. He identified three perceptual dimensions which influence attributions: stability, locus, and control. Stability refers to any situation or cause remains constant over time. Locus indicates whether a situation or cause is internal or external. Control means whether a situation or cause can be controlled or affected by one' sanctions breaks the Control dimension out into two factors: External and Personal. As an example, missing an exam because one was in an accident would generally be unstable, external, and uncontrollable; therefore, few would probably penalize this unfortunate individual. A less-extreme, more subjective case might be missing the exam due to a religious holiday. This is stable, as it was known and happens regularly; it is external, yet the person ultimately decides whether to attend; and it is uncontrollable, as it happens regardless of the person's involvement. An instructor may or may not accept this reason as an excuse for missing an exam, and there are certainly other factors to consider in this example. It is included to highlight the complexity of and interplay between the attribution dimensions.

In general, the more control one perceives over a situation, the more motivation one has to work towards success. Control, in this sense, is perceived academic control, and "refers to students' beliefs about whether they possess certain attributes, such as intellectual ability, physical such attributes make a difference to their scholastic performance" (Perry et al., 2005, p. 365).Perceived academic control has been shown to have significant The theory on this study .concerns with the relationship between effort and academic achievement, the attribution theory is adopted to attribution in the  processes by which individuals explain the causes of their behavior and events this is the view of Fritz (2008).According to this theory, it states that individuals are considered as active beings that "seek to understand and master their environment and themselves" (Elliot et al. 2005, p. 17). Based on this assumption, it is argued that the outcome of individuals' behavior can be determined by both external attributions and internal attributions. External attributions refer to those factors that individuals are unable to control (e.g. difficulty of the task) while internal attributions refer to those factors that individuals can control (e.g. effort, like the amount of time students spent on homework). According to this model, both internal attributions and external attributions play a role in affecting individuals' subsequent behavior, like task engagement and persistence (Elliot et al. 2005). However, some researchers argued that internal attributions played a more influential role than external attributions. It was found that when students considered themselves as having great effort into studying an academic subject and hardworking, they also tended to achieve better academically (Blatchford 1996, Light body et al. 1996, Gipps and Tunstall 1998, cited Elliot et al. 2005, p. 18).

Attribution Retraining (AR) refers to interventions designed to make students aware of and change their attributions about event outcome (Haynes et al., 2009). In the context of academics, AR interventions focus upon various outcomes students regularly face, such as their performance on exams, papers, presentations, or courses in general. Outcomes can be positive or negative, though in many cases, negative outcomes (and the subsequent potentially negative attributions students hold) are the focus of the retraining. Students are given strategies to take greater responsibility for their performance, such as changing attributions for negative performance from "external and uncontrollable" to "internal and controllable". In so doing, a student changes their perception of their ability to make positive changes for the next academic event, now believing that the success or failure of an event result from strategy and effort rather than ability or luck.

Social judgment theory focuses on how people's prior attitudes distort their perceptions of the positions advocated in persuasive messages, and how such perceptions mediate persuasion. In general terms, the theory assumes that a person's own attitudes serve as a judgmental standard and anchor that influences where along a continuum a persuader's advocated position is perceived to lie (Sherif & Hovland, 1961). Social judgment theory- is an attempt to apply the principles of judgment to the study of attitude change.

Non-educative experiences do not necessarily stunt growth, but they do not necessarily foster it either. Non-educative experiences are routine and automatic, like riding the bus to school or tying one's shoelaces. When statistics is presented in way that promotes rote memorization and mechanical procedures, doing statistics can become a non-educative or a miseducative experience. The kinds of experiences that Dewey believed schools should aim to provide are educative ones. Educative experiences are thought provoking experiences that arouse curiosity and illuminate connections to previous knowledge and experiences. Dewey believes that the more educative experiences one has, the more likely one is to be able to solve problems encountered in life. Dewey's (1938) philosophy of educative experience is based on the "belief that all genuine education comes through experience but does not mean that all experiences are genuinely or equally educative" (p.25). An immediately enjoyable experience may, in turn, promote a careless attitude, which could stifle subsequent experiences that might have otherwise been educative. An experience that will increase a skill, can also automate it to the point which it becomes disengaging. Thus, "the central problem of any education based upon experience is to select experiences that live fruitfully and creatively in subsequent experiences" (Dewey, 1938).

Attribution Theory shows us that people can create new attitudes or beliefs or behaviors depending upon the explanations they make. If they make external attributions ("I threw the candy wrapper in the trash can because the teacher was watching"), then they are unlikely to change their attitudes about a situation they come across which can either be positive or negative to them. But if they make an internal attribution ("I threw the candy wrapper away because I must be a neat person") then it is likely that they will come to view themselves as a different kind of person despite the attribution of attitude to them. The notion common to the theories that fall under this heading is that a person's inferences about the cause of a behavior is the proximal mediator of the resulting attitude toward statistics. These attitude-inferences might concern the communicator's attitude, or

they might concern the person's own behavior ("why did I do that?"). When a behavior is attributed to something about the person, the person 's attitude can be a convenient candidate for the cause of the behavior will definitely had some impact in academic achievement toward a course. When attitude is attributed to the situation, in contrast, the notion of an attitude is unnecessary to account for the change in academic. There are basically two attributional principles that have guided much of the attribution study in attitude as a prerequisite for academic achievement in statistics. The first is the discounting principle, which states that to the extent that a response (or effect) has several plausible causes, the viability of any single cause is discounted or weakened. The second is the augmentation principle, which states that a response or attitude that is unexpected (i.e., unique) given the contextual cues is especially likely to be attributed to something about the person, such as his or her personal attitude. Thus, sources who argue against their vested interests are more persuasive than are sources who argue for their vested interests.

**The relevance of attribution theory to the study**

Following the objectives as well as hypothesis with state there exist the relationship between effort and academic achievement, the attribution theory is adopted. According to this theory, it shows that students are considered as active beings that "seek to understand and master their is taught to them through extra effort exert in their course as well as the environment classroom management by teachers and themselves" can influence their academic achievement. other relevance of theory to the objective of the study is based on is argued that the outcome of individuals' behavior can be determined by both external attributions and internal attributions. External attributions refer to those factors that individuals are unable to control difficulty of the task while internal attributions refer to those factors that individuals use to control or influence effort that the number of time students spent on homework and effort put in to learn a task will determine their level of achievement (high achievers and low achievers) The present study, the focus is also placed on the internal attribution on effort and its' role in affecting students' academic achievement. It is assumed that when students put more effort into studying statistics, they are more likely to perform better in the subject. In contrast, when students exert less effort into studying statistics, they are less likely to achieve a satisfactory result low achiever and consequently low academic achievement in statistics.

Attribution Theory is a theory about how people explain things. The theory is quite simple despite its rather strange sounding name. A synonym for "attribution" is "explanation". The theory works like this. When we offer explanations about why things happened, we can give one of two types. One, we can make an external attribution. Two, we can make internal attribution. An external attribution assigns causality to an outside agent or force. Or as kids would say, "The devil made me do it." An external attribution claims that some outside thing motivated the event. By contrast, an internal attribution assigns causality to factors within the person. Or as the sinner would say, "I'm guilty, grant me forgiveness." An internal attribution claims that the person was directly responsible for the event, Statistics achievement and Self-determination.

To explain this clearly littering of behavior (attitude) is an obvious thing. It is also a simple behavior (attitude) that does not depend on a lot of other factors. So, it should be easier to change. But what about something like math achievement or enhancing a child's self-esteem? These things are complex. They are related to other factors (ability, persistence, training with statistics and family background, education major and experience, peer support with esteem). All these can change a trainee statistics performance or self-esteem with attribution? When considering more "fuzzy" cases, attributions can vary widely, bringing with them a host of self-judgments and expectations for future performance and academic achievement. If a student attributes poor achievement on a statistics test to an inherent lack of ability in that area, it is likely that the student will not expect to be successful on future tests, because ability is seen (by this student at least) as stable and uncontrollable, and therefore difficult or impossible to improve. However, if the poor performance is attributed to a lack of effort, the student may believe that he/she has the potential to succeed, and therefore make a more concerted effort on future statistics tests (Weiner, 1986; Dweck, 2000; Stipek, 2002). At the same time, if the lack of effort is itself attributed to a perceived inherent deficiency, such as procrastination or laziness, the student may not only fail to make the additional effort in the future, they may also feel guilt ("I could have Tried harder")or shame ("I'm lazy"). In this case, the situational attribution, though promising for future success in the subject, is overridden by the more general, personality-based attribution.

Here are the details on the second study. First, the researchers used before and after measures of statistics achievement and self-esteem with 2nd grade students. Second, the researchers developed simple, little scripts for each student. All the teacher had to do was read the

folder provided for each student, then say or write the appropriate statement. Thus, this study was highly automated. Each teacher simply followed the instructions in a preplanned, scripted way. Third, the researchers had three different kinds of treatment. trainee either got the attribution training or they got the "persuasion" training, or they got "reinforcement" training.

Here's the attribution training. The teachers would say or write to the student:

"You seem to know your statistics assignments very well." "You really work hard in statistics." "You're trying more, keep at it!" Here's the persuasion training. The teachers would say or write to the student: "You should be good at statistics." "You should be getting better grades in statistics." "You should be doing well in statistics." Here's the reinforcement training. The teachers would say to trainees "I'm proud of your work." "I'm pleased with your progress." "Excellent progress." The above statement could encourage and motivate students to improve on their study, this positive reinforcement will determine positive attitude of students toward statistics which all this is leading to academic achievement in statistics as the study is based upon. In the attribution training, the trainee is given explanations for their behavior. They are told that their statistics achievement is due to internal factors ("You are a good statistics student; you try hard in statistics"). Thus, it was assumed that these trainees will make internal attributions. Now, even if this is true and the trainee do explain their attitude with internal attributions, it will translate into higher statistics final scores? It is one thing to believe that you are good at something and of course positive attitude toward statistics which will then act as a prerequisite for achievement in statistics. Trainee attitude consider the self-esteem results.

After all the training was over, the trainee had higher self-esteem as a key to academic achievement in statistics and importance and interesting part of the study which the aftermath results from teacher training colleges. an individual's initial attitude serves as an anchor for the judgment of related attitude communications. Opinions are evaluated against this point of reference and are placed on an attitudinal continuum. Opinions that most characterized the individual's own opinion are in the latitude of acceptance. Those opinions found most objectionable are placed in the latitude of rejection. The latitude of non-commitment consists of those opinions that are neither accepted nor rejected. Communication that falls within the latitude of acceptance is assimilated, and if judged to be fair and unbiased will result in a change in attitude, within the limits of the latitude of acceptance, the greater the difference between the initial opinion

and the communicated opinion, the greater the attitude change. Though some change is possible when Opinions fall within the latitude of rejection, the greater the discrepancy the less the change in attitude. Attribution theories are also relevant. The basic assumption is that students seek to explain the causes of important events in their lives (Heider, 1958; Weiner, 1985). Students often attribute successes and failures to such factors as ability, effort, task difficulty, and luck. In turn, attributions influence expectancies of future successes. If performance conditions are not expected to change, students who attribute prior successes to stable factors (high ability, easy task) will hold higher achievement expectations than students who stress less-stable factors (high effort, good luck). Attributions are hypothesized to constitute one type of cue students use to appraise their attitude in relation to their academic achievement situations.

### 2.3.4: Albert Bandura's Social Learning Theory and Skinner (Operant Conditioning)

The theoretical framework for this study was the on-Interventionist Classroom Management. Managers of this approach seek to manage the classroom by intervening to shape student behavior with consequences. This theory in base on the works of Skinner (Operant conditioning) and Bandura (social learning theory**).** According to Skinners, behavior management beliefs focused on consequences for behavior. Skinner believed that behaviors are shaped by the consequences that follow an individual's action. According to him reinforcements can increase desired behavior or decrease unwanted behaviors. Types of reinforcement could be social, graphic, tangible or an activity (Andrew 1998). In his book, Skinner said everything we know about operant conditioning is relevant to making behavior more or less likely to occur upon a given occasion that is the traditional field of reward and punishment.

Operant conditioning of behavior is a process of behavior modification in which the likelihood of a specific behavior is increased or decreased through positive or negative reinforcement each time the behavior is exhibited, so that the subject comes to associate the pleasure or displeasure of the reinforcement with the behavior. What Skinner (1975) implied is that, a teacher can control the classroom environment through instantaneous reinforcement. This reinforcement can come in positive (special opportunities, celebrations, candy) or negative, (loss of opportunities, office referrals, in school suspension, out of school suspension), forms to create an environment where each student work productively. Skinner believes that the student's behavior can be shaped by consequences.

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Classroom management; assessment practice and student academic achievement we used skinners behaviorist theory of Skinner believed that the goal of psychology should be practical (Lieberman, 2000). As it relates to education, Skinner believed the goal of psychology should be to find ways to make education enjoyable and effective for all students. His learning theory relied on the assumption that the best way to modify behavior was to modify the environment. Skinner was a proponent for many instructional strategies that modern day progressive educational reformers advocate for: scaffold instruction, small units, repetition and review of instructions, and immediate feedback. Skinner did not approve of the use of punishments in school, or as a behavioral modification technique in general, and based these opinions on his own empirical research that found punishments to be ineffective (Lieberman, 2000). Skinner himself advocated for the frequent use of reinforcement (i.e. rewards) to modify and influence student behavior. Skinner's primary contribution to behavioral management and classroom management philosophy has been from his research on operant conditioning and reinforcement schedules. An operant is a behavior that acts on the surrounding environment (Classroom) to produce a consequence (achievement or results), Operant's likelihood of reoccurring is affected. The operant is said to be reinforced if the consequence increases the likelihood of the behavior's occurrence. For example, an example of an operant in a typical classroom is staying in one's seat. A teacher may seek to reinforce this behavior by offering a reward to reinforce student behavior (e.g. recess or food).

Three characteristics of operant conditioning are particularly important to behavior management: a) the reinforce, b) the reinforcement schedule, and c) the timing of the reinforcement. First, reinforces have been placed in three categories. Primary reinforces are reinforces that require no special training to be effective. These include food, water, and sensory stimulation. Secondary reinforces are reinforces whose reinforcing properties have been acquired through experience (typically through second order conditioning). An example of this is the use of a token economy. Many teachers use extrinsic rewards such as stamps, tickets, tokens, and play (or real) money to reinforce behavior. These rewards can be redeemed for prizes or privileges. Finally, social reinforces are reinforces whose reinforcing properties are derived from the behaviors of members of one's own species. These reinforces are typically seen as a blend of primary and secondary reinforces and include praise, affection, and attention

In addition to their type, another important characteristic of reinforces is their saliency, or degree to which an individual prefers the reinforcement. Reinforces with a high degree of saliency are expected to produce a greater response in the frequency of the operant behavior. Using this logic, David Premack developed a principle (the Premack principle), which argued that operant behaviors of low probability could be reinforced by using access to high-probability behaviors as a reinforce (1965). For example, if sitting quietly during instruction was a low-probability behavior for a student, access to playing with a preferred toy (a high-probability behavior) could be used as reinforce for the operant behavior.

Using similar logic, Timberlake and Allison (1974) developed the response deprivation hypothesis, which states that if a high-probability (or highly salient) behavior is deprived, access to that behavior will be reinforcing. In the classroom, this is often used by the introduction of a game or privilege that students highly enjoy. Access to the game is restricted, unless certain behaviors (likely low-probability behaviors) are performed first. A primary conclusion from both hypotheses is that teachers looking to find a highly salient reinforce should look for activities that students prefer to do in their free time (i.e. highly-probable behavior).

Skinner also developed the concept of the reinforcement schedule. Reinforcement schedules are divided into two categories: a) continuous reinforcement schedules (CRF), in which every desired behavior is reinforced every time it occurs, and b) partial reinforcement schedules in which behaviors are reinforced based on ratios (reinforced after so many occurrences) or intervals (a reinforcement delivered after a certain time interval). Partial reinforcement schedules may be fixed (i.e. a reinforcement after 3 behavioral occurrences (fixed ratio) or a reinforcement after 3 minutes (fixed interval), or variable (i.e. the ratio or interval at which reinforcement is given is random, but averages to a specific amount). It has been found that variable partial reinforcement schedules are more effective in improving the frequency of an operant behavior and in limiting its extinction when reinforcement is no longer delivered. The later effect is particularly true when compared to continuous reinforcement schedules. This finding suggests that teachers using reinforcements in their classroom suggests that teachers using reinforcements in their classroom should be cautious of seeking to reward students every time they perform a behavior. As many teachers using rewards have noted, students are less likely to perform desired behaviors when the rewards are not present

Finally, behavioral research has found that the timing to reinforce is very important. If there is much delay between the operant behavior and the reinforce, improving the frequency of the desired behavior is less likely to happen. For instance, if a teacher said that if students were to turn in their homework they would receive extra marks, behavioral theory would argue that the closer the time the teacher allowed the students to have their recess was to the time the students turned in their homework (the operant behavior), the more likely students would be to turn in their homework regularly. If a teacher often forgot to give the reward, or waited later in the day to grant the reward, the less likely students would be to turn in their homework.

Albert Bandura developed the social learning theory (Bandura, 1993), based on the fact that the classroom has more than one student learning at a time. He extended the behaviorist concept of learning from consequences to include learning by observing the consequences of the behaviors of others. Albert Bandura's social learning theory is built around the view that people learn appropriate and inappropriate behaviours from each other. Bandura thought that students learn through their perceptions and imitations of certain behvaiours demonstrated by parents, teachers or other students. Bandura believed that as behaviours exhibited, each person would emulate one another, (Bandura 1993). According to Bandura's (1993) social learning theory, people acquire self-efficiency which allows them to possess self-control of their thoughts, actions inspiration, drive and feeling throughout various levels of life. He characterized self-efficiency as the beliefs in one's capability to organize and execute the courses of action required to manage prospective situations (Bandura, 1993). The theory also emphasizes the importance of student perception in the learning process with an emphasis in the idea that people frequently acquire knowledge, rules, skills, strategies, beliefs and attitudes by watching others (Bandura, 1993). Bandura believed that self-efficacy convinced the choices people make because a person's experience and learning from others are the fundamental through which a person reveals his/her behavior (Bandura, 1993). Unless people believe they can produce desired results and forestall detrimental ones by their actions, they have little incentive to act or to persevere in the face of difficulties. Bandura (1993) shows how interaction between thought, influence and action work together with one's personal behavior and uniqueness along with the surrounding environment to make people both product and producers in the environment. This theory has a very important implication for classroom management. It is important for the classroom. It showed how students

can learn from the consequences of others. The interventionist classroom management approach is reactive in nature. They all faster methods to intervene with perceived consequences for student actions which may help others learn by observation (Bandura, 1993)

**Relevance of skinners theory on classroom management**

The first thing we should note about skinners' theory is the fact that the environment in which learning takes place can influence the learners' behavior or attitude towards learning. This is to say that in a classroom where teachers and students use media tools in teaching and learning, the flow of instructed from teachers to student is facilitated and this increase student's level of understanding. Skinners' theory is centered on the idea that in a classroom, teachers should make education enjoyable and effective for all students as a result they will be able to achieve their aims. This aspect of skinners' theory can be used to explain the influence of students' attitude on classroom management in that with the use of method that are connected to the media, irregular students such as workers can participate fully in class activities that are going on in the online environment even when they are on mission. In order word, the use of reliable assessment tools can help students participate in classroom activities like group discussions; forum discussion; peer groups or other social media discussions which help them acquire knowledge that can be used to enrich their course contents.

Equally, the theory assumes that the best way to modify behavior was to modify the environment (classroom) so, to manage a classroom where students' behaviors towards learning are not encouraging; lecturers can modify the classroom environment into virtual classrooms where students are computer–mediated learning. With this type, lecturers pose to for students to interact on while the lecturer comes in to mediate discussions. This can be in the form of orientating students' discussion toward a set goal, clarifying concept for student to assimilate, controlling behaviors in the virtual class and so on. This form of learning improves the student's level of understanding which eventually influences their performances.

More so, the theory assumes that in the classroom, teachers/ lecturer should scaffold instruction. The use of laptop to disseminate information can improve the degree at which classroom are being managed. This theory also assumes that in classroom management, teachers or lecturers should provide students with immediate feedback. With the help of internet-based

computer lecturers provide students with immediate feedbacks on their various preoccupations. This can be a feedback to clarify students on the way they understand a concept or feedbacks on students test marks. These feedback help in building the self-confidence of what the students know about a concept. When students are sure of what they know on a topic, it builds their confidence in the exams which eventually can improve their performance and consequently academic attainment.

More to the above, skinners' classroom management theory assumes that in classroom management, student's behaviors towards learning should be managed. The use of modern media in the classroom motive students' attitudes towards learning and this help in managing particular behaviors in class. Ensure that positive reinforcement is immediate so that it can be associated with the positive behavior. This is crucial especially when secondary teachers see students for such a small portion of each day. Recognize the unique instructional needs of individual students and individual periods and modify instructional material and methods appropriately. Provide feedback as student's work, not just after they are finished with a particular task. Ensure that students have mastered prerequisite skills before moving on, even if this puts different periods of the same class on different tracks. Reinforce positive behaviors students' exhibit, either with problem students or with whole class to refocus problem students so as encourage them.

### 2.3.5: Stufflebean's Context, Input, Process, Product (CIPP) Assessment Theory (1973) and Statistics

The model's main theme is that evaluation's most important purpose is not to prove, but to improve. The concept of evaluation  of assessment practices underlying the CIPP.Daniel Stufflebeam's Context- Input -Process- Product (CIPP) model or Michael Scriven's goal-free model) that fully assess the program's merit or worth and help evaluation personnel "make and defend decisions keyed to meeting beneficiaries' needs." (Stufflebeam, 2001, p. 57). 1. Context evaluation, whose objectives are:

- To determine the operating context
- To identify and assess needs and opportunities in the context
-  To diagnose problems underlying the needs and opportunities
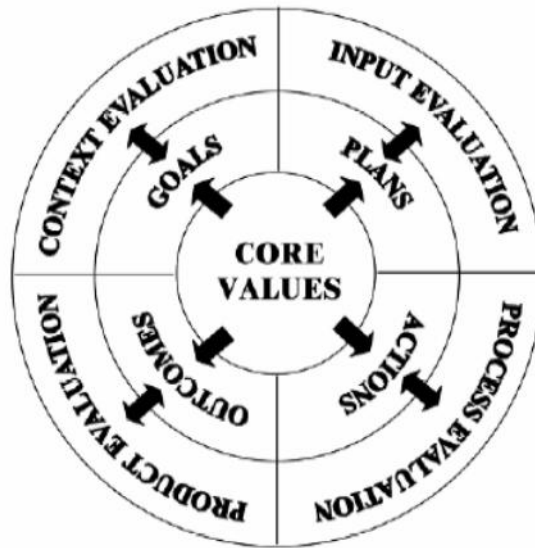
**Figure 2.4. 4: Stufflebean's Context, Input, Process, Product CIPP**

➢ Input evaluation's objective is to identify and assess system capabilities, available input strategies and designs for implementing the strategies

➢ Process evaluation's objective is to identify process defects in the procedural design or its implementation

➢ Product evaluation's objective is to relate outcome information to objectives and to context input and process information

This Model is an assessment tool which help to evaluate and report an entity's merit (i.e., its quality), worth (in meeting needs of targeted beneficiaries), probity (its integrity, honesty, and freedom from graft, fraud, and abuse), and significance (its importance beyond the entity's setting or time frame), and should also present lessons learned. It emphasized that any assessment practice taken by assessors should take into account sound evaluation information that students/stakeholders already have on statistics or can get from other sources. CIPP evaluations base in assessment practice on statistics should complement rather than supplant other defensible evaluations of an entity. Meta-assessment (evaluation of an evaluation) is to be done throughout the assessment process; teachers also should encourage and cooperate with independent assessments of their work.

At the end of the assessment, evaluators or teacher are advised to give their attestation of the extent to which applicable professional standards were met. This checklist's final component provides concrete advice for compiling the final summative assessment report, especially by

drawing together the formative assessment reports that were issued throughout the assessment practices. Smith and Ragan (2009) in Instructional design states that there is yet another kind of evaluation that is critical and essential in the design of instruction: the evaluation of the instructional materials. This evaluation occurs during two separate points in the instructional development process for two different purposes. At one point, the designer evaluates the materials to determine the weaknesses in the instruction so that revision can be made to make them more effective and efficient. Then she knows whether the instructional materials are 'there' yet, or whether she needs to continue the design process. This is called formative assessment. Later, after the materials have been implemented into the instructional context for which they were designed, designers may be involved in the process of assessing the materials in order to provide information for decision makers who may adopt or continue to use the materials in assessing learners. The researcher then sees that quality of assessment should be performance positive and positively achieved if there are distinct test procedures, levels of implementation and assessment measures relative to the analyzed data and report achievement results. Flag (1990) support this idea suggesting several indices of appeal that might be considered for assessment: attention (attitude), likableness (value), interest (effort), relevance, credibility (achievement), and excitement (arousal) as cited in Perloff, (2010). He said although a single assessment might not all of the indices, it is quite possible that the teachers might plan to examine several of them. These factors might be assessed through self-report interview and questionnaires, Evaluation that collect only attitude data are described as level-1 evaluation (Kirkpatrick, 1983) as cited in Perloff, (2010).

### 2.3.6: Classical Item Theory (CTT) and Statistics

Classical test theory is a body of psychological theory that predicts outcomes of psychological testing such as the difficulties of items or the ability of the test takers in mathematics. The aim of the CTT is to understand and improve the reliability of psychological test. CTT assumes that each person has a true score that would be obtained if there were no errors in measurement in statistics. Because instruments used for measurement are many times imperfect, the score that is observed for each person most times is different from the person's true ability or characteristics. The theory concludes that the difference between the true score and the observed score is the results of errors of measurement assessment. This theory is summarized in an equation as follows:

# X=T ± E

Where X is the observed score that is seen on the student's paper graded by the teacher which will predict the student academic achievement,

T is the error that the student should have had out of true ability and that might determine the effort measurement

E is error arising from the test conditions or that of the student will now determine the strength of the assessment practices. This theory is supported by Ferguson's (1942) Item Response Theory (IRT) as cited in Smith & Tillman (2012). Feguson stated that during the process of testing or assessing there is an encounter between the testee and the test item. The results of such an encounter, if analyzed, reveals the ability level of the testee with regard to the items in question. This ability level is an innate unobserved characteristic of the testee, which causes consistent performance on the test and influences the testee's responses to test items. Just as everybody has his/her own ability level, a test item also has inherent characteristics that affect the exhibition of the testee's ability. The psychometrical concern over the years has been to determine this testee's true ability level, and values which is not observable, using appropriate and scientifically selected test items.

According to Warm (1978), when a testee enters a testing room, He or She comes along with a certain level whose position in the ability scale is assessed by the test items that he confronts. This ability level is translated into the raw scores produce by the test. This raw score will depend not only on ability level of the testee but also on the test item parameters (characteristics). In this light, diagnostic assessment model used for providing collective prescription for students with learning difficulties to identifies or ascertains student's strength and weaknesses in a given subject area. It leads to formation of remedial measures. Here the entry behavior is used to identify the learning needs or disorder portrayed. The instruments used are achievement test, diagnostic assessment and the others such as questionnaire, interviews in assessing the students' achievement.

## 2.3.7: Conservative Teaching Model

This model was emanating from a Skinnerian behaviourist tradition of teaching called conservative pedagogic practice. Here, teaching is supposed to be organised in a traditional way and the teacher transmits knowledge to the student who is viewed as an acquirer. The teacher is the one in control of the selection, sequencing, pacing as well as of the evaluation criteria.
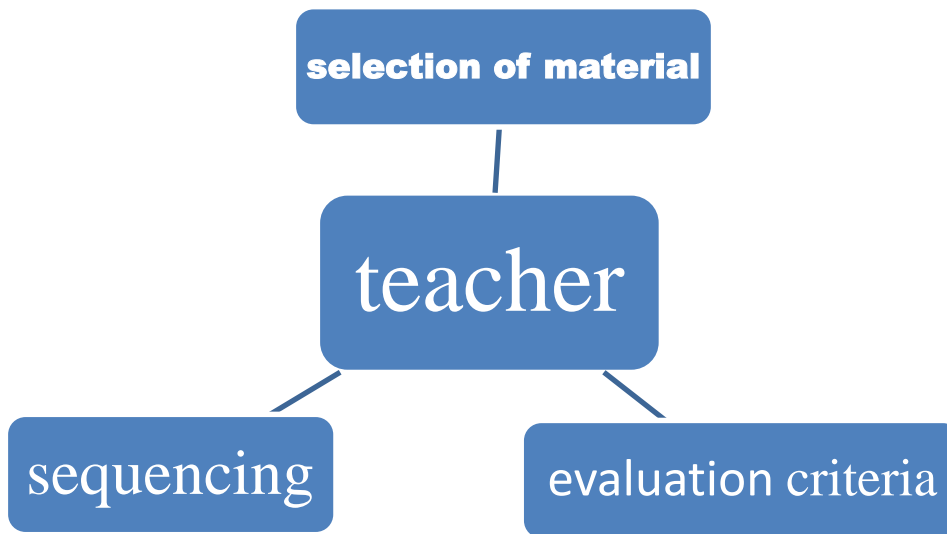
**Figure 2.4.5**: **Source Author Conception**: **Conservative Teaching Model Source Adapted from Skinnerian Behaviourist.**

The instructive material is collected from traditional subject content and the pedagogic process endorsed to take place encourages the immersion into the (national) cultural heritage and on what can be referred to as Building. Activities likely to occur emphasise the development of general skills, especially basic skills. The assessment of teaching is based on students' behaviourist foundation and is oriented towards the student's individual performance, not relying solely on diagnostic tests. These characteristics of the instructional set of knowledge are produced by regulative values a range of desired behaviour and attitude exhibited; the appreciated student is orderly, desires the (national) cultural preservation and is easily motivated by rewards. Emphasised in the conservative practices is also to produce a student identity marked by traditionalism and a belief (or disbelief) in one's innate talents.

### Limitation of conservative pedagogy

Educational Sociologists have criticised the conservative pedagogical approach for a number of reasons, that teachers who adhere to a conservative teaching may be clear about the subject matter, they will generally not let the student know what is expected of them in exams, a matter of which is unhelpful to them (Rose, 2005).

More so, the fact that student does not know; diagnostic tests usually look for what student's lack. Parenthetically mentioned, diagnostic tests have shown only low informational

value for teachers in their subsequent teaching decisions. Under the conservative approach, students are also regarded as being one of successful, unsuccessful or mediocre and such notion due influence the academic achievement high or low. Therefore, Rose (2005) claims that one of the main hidden objectives of this approach is to sort students and to present their differences as naturalised and attainment in a subject. In a nutshell, Emotional competencies, such as self-awareness, self-control, compassion, co-operation, flexibility, and the ability to make judgments on the value of information serve students well in school and throughout their lives and achievement (OECD, 2002, p. 58). Emotions also affect the student's self-esteem, motivation and ability to regulate his or her own learning and values attach to the subject. OECD, (2005).

### Neo-liberal and neo-conservative pedagogy

There are yet two pedagogical approaches that aim to promote intra individual change: neo-liberal and neo-conservative pedagogy. In the ideal neo-liberal system, the teacher primarily functions as a facilitator, consistently often titled 'coach', while the student takes responsibility for his or her own learning and works in a project-oriented organisation. The approach favours the use of assessment methods that encourage students who display a 'winner's instinct' and assessment activities urge students to individually define their own learning targets and to document their own progress. Neo-liberal teaching can be seen as a counterpart of conservative pedagogy. Central to both is their promotion of a competitive student. Their differences relate to their views on classroom organisation.

Clearly a neoliberal pedagogic modality to some extent come to resemble progressive teaching referring to its emphasis on the teacher role of 'coach', similar to 'facilitator', indicating the teaching form produced. It could be considered relevant also to discuss neo-conservative teaching in this section. A practical implementation of this approach can be identified in the Monroe doctrine pedagogy, described as both neoconservative and neo-liberal (Schwartz, 2010). It is apparent that while the teacher's skills as an instructor are considered important in this approach, student self-regulation and independence is also emphasised. The instructional discourse regarding this teaching seems to be based on national and western ideals, with a strong focus on the cultural arts. In a list of possible classroom contents and instructional material, topics. General competences are emphasised and characterised as 'higher order thinking skills' (Bullmaster-Day, 2008). Testing is a prominent feature of this doctrine, and just like in the conservative system,

there is a strong belief in the value of diagnostic tests. In addition to these elements, we find other regulatory components; a strong emphasis on the student's behaviour is prominent, including requirements for a distinct dress code and self-regulation. Another important factor is parental involvement. Bernstein describes neoconservative pedagogy, as based on a fusion of "nation, family individual responsibility and individual enterprise" (2000, p. 68). It also matches Bernstein's observation that pedagogies of this type often stem from "social

## Limitation of neo-liberal and neo-conservative teaching Neo-liberal teaching

These stem from its emphasis on self-monitoring where the student is left alone to complete complex tasks without receiving any explicit instruction. This presents a risk of creating students who have to rely on their endurance, home background and cultural capital (Dovemark (2004). Another point of criticism could readily revolve around the disadvantages experienced by students who are not comfortable with or strongly motivated by the competitive element. As implied by the promotion of information retrieval, the neo-liberal approach places great emphasis on one of the most important and complex academic skills, namely the evaluation of sources. However, this skill seems to be used only superficially in neo-liberally oriented education systems in that it is primarily based on characterising sources as being either true or false (Norlund 2009). This is problematic because genuine critical competence requires more complex approaches. Another set of problems has to do with the neo-liberal rhetoric, which is often presented in the context of entrepreneurial learning. The main criticism of this aspect is that the buzzwords of entrepreneurial learning, such as 'creativity', seem to contain very little of substance (Nylund et al 2011). The rhetoric is seductive because most educators appreciate words and phrases such as 'creativity' and 'desire to learn'. This is where Bernstein's (2000) resistance to the promotion of general competences, often connected to an idea of market-oriented trainability as it.

## Conclusion

As seen above, this chapter covers three main aspects that is; conceptual review, theoretical framework and empirical review. The next chapter on methodology will be talking about research design, area of the study, population of the study, sample and sampling technique, instruments for data collection, validity and reliability of research instruments, administration of instruments, methods of data collection and analysis and ethical consideration.

# CHAPTER THREE

# RESEARCH METHODOLOGY

## 3.0: Introduction

Kothari (2004), defines research methodology is a way to systematically solve a research problem. This chapter introduces the research strategy and the empirical methods for the general approach, and specific techniques to address the objectives for the research. It also presents the research design and the methods used in the selection of the research participants, and for data collection. Research methodology indicates the logic of development of the process used to

generate theory that is procedural framework within which the research is conducted Remenyi et al. (1998). It provides the principles for organizing, planning, designing, and conducting research. Methodological decisions are determined by the research paradigm that a researcher is following. The research paradigm not only guides the selection of data gathering and analysis methods but also the choice of competing methods of theorizing Sayer (1992). Research methodology as a theory of how an inquiry should proceed. It involves analysis of the assumptions, principles and procedures in a particular approach to inquiry  It is necessary for a researcher to design his methodology for his problem as the same way may differ from problem to problem, when we talk of research methodology we not only talk of the research method but considers the logic behind the method we use in the context of our research study and explain we are using a technique. Research methodology is the systematic, theoretical analysis of the methods applied to a field of study Amin (2005), It comprises the theoretical analysis of the body of methods and principles associated with a branch of knowledge. Methodology studies the various steps that are generally adopted by a researcher in studying his research problem along with the logic behind them. It is necessary for the researcher to know not only the research methods and techniques but also the methodology. Researchers not only need to know how to develop certain indices or tests, but also need to know the importance of the different viewpoints on methods and data analysis to ensure a clear comprehension of the research question and know which of these methods or techniques are relevant to the study in question.

This chapter deals with the method that has been used to collect and analyze data for this study. It comprises the following aspects: research design, population of the study, the study site, sampling techniques, research instruments, validity and reliability of instruments, data collection procedure, statistical technique analysis, variables of the study.

## 3.1:    Research Design

The research design is the conceptual structure within which the research is conducted; it constitutes the blueprint for the collection, measurement and analysis of data. So, the research design can be defined as a master plan for the determined methods, structure, and strategy of a research to find out alternative tools to solve the problems, and to minimize the variances Kothari (2004). Research design is a plan structure and strategy perceived to carry out the study. According to Amin (2003), research design is the approach used to collect data. This study will be carried out

using the survey research method as an appropriate research technique for data collection. This is because, this method involves collecting and analysing of data from only a few people considered to represent the entire population with the view of making statistical inferences about the general population using the sample. It is also less expensive. The researcher will proceed to collect and treat data using the quantitative method (using questionnaires). It is this research design that will guide the researcher to picture the state of affairs of social phenomenon by establishing correlation between variables, collecting data and verifying hypothesis to confirm or deny their options on the state of affairs prescribed. The researcher studied 1300 students in different TTC been it public, lay private, denominational in some Divisions in North West Region in Cameroon that is Mezam Division with Bamenda as capital and donga –mantung with Nkambe as capital. At the end of the study, findings were generalized to the entire population of the study.

**3.2:     Area of Study**

Daramola (1995) defined study sites as the place for the study followed by the reasons for carrying out the research in the geographical area. The area of study here has to do with the geographical environment in which the researcher intends to carry out her study.   This study as already noted is carried out in the Anglophone section of Cameroon and the focus will be on Government teachers training colleges, Lay Private and Denominational teachers training colleges in North West Region of Cameroon, North West Region had seven divisions as seen in **appendix 1.** The Anglophone part of Cameroon is made up of two main regions; the North West region and the South West region with capitals Bamenda and Buea respectively. The North West region is considerably bigger in terms of land size (22, 457 km2) than the south west region (17,812 Km). The study is limited to teachers training colleges in north west region of Cameroon. The area chosen for our study is North West Region of Cameroon with the capital as Bamenda, North West is one of English speaking region in Cameroon, having about seven divisions (Mezam, Momo, Bui, Boyo, Menchum, Ngok Ketunjia, Donga Mantung).  But in this region only two divisions was chosen for this study due to insecurity in others Divisions

Donga-Mantung Division  with Nkambe as  Headquarter . It is located along the ring road at 89.1km from Bamenda. The closest towns are Ako to North, Ndu to the South and Mesaje to the West. The town has a population of about 450,000 persons. The greater part of the population of Nkambe town is made up of non-indigene; this is mostly administrators, the army, the business

men and women etc. Most of the indigenes are basically engaged in agriculture in the surrounding villages in the outskirts of the town. The town is basically on a plateau with a few hills here and there with gentle slopes. Basically, three ethnic groups are present: the Wiwaar (Wimbum man), Nso, and Wiya meaning respectively people from Wat, Banso and Ndu. Donga Mantung with capital Nkwambe have five Teachers Training Colleges with one government own the rest lay private and denominational such as Government Teacher Training college Nkambe, Christ the King teacher training college, Divine Mercy Teacher Training College, Nightigal Teacher Training College)

Mezam Division is one of the 7 administrative Divisions in the North West Region of Cameroon as shown on (**appendix 6**) Mezam Division is bordered to the north by Boyo Division, to the West by Momo Division, to the east by Ngohketunjia Division (all in the Northwest Region), and to the south by Bamboutous Division in the West Region of Cameroon. Mezam Division covers an area of 1 745 Km² and a population estimated at over 600.000 Habitants. The headquarters of Mezam Division is Bamenda. Mezam division has six teacher training colleges and one is government own, Government Teacher Training college Bamenda, CEFED Santa Teacher Training College, ITCIG SENTTI Teacher training College, Model Inclusive Bilingual Teacher Training College, Albert teacher training college, Saint Andrew Bilingual Teachers Training College. This provides easy accessibility for the researcher to easily get to the students on campus, in order to distribute questionnaires.

### 3.3:    Justification of the Choice of Site

The North West was chosen especially the two Divisions because many teachers training are found in this divisions be it Public, Lay private and Denominational of which majority of them practice purely the Anglo-Saxon system of education with English being the main language of communication and couple with the fact that the researcher understands English very well. More so, teacher training services are well established in the government teachers training in this region. The researcher chose English system of education because there was need to have an in-depth data about the system. Added to this the researcher is an Anglophone; it could have been difficult to carry out research studies in purely french region. Furthermore, the researcher wanted to carry out the studies in his resident Region so that it will ease transportation difficulties and avoid language barrier. The reason why not all the Divisions in the Region was chosen is a result of security challenges in most of the division in the Region.

### 3.4: Population of the Study

According to Frankel and Wallen (2006), a population is the largest group to which a researcher hopes to apply the results obtained from a sample. Kothari (1990) defined population as "a portion of the universe to which the researcher has access". the term 'population' refers to the total of items about which information is desired. The attributes that are the object of study are referred to as characteristics and the units possessing them are called as elementary units. The aggregate of such units is generally described as population. Thus, all units in any field of inquiry constitute universe and all elementary units (on the basis of one characteristic or more) constitute population. The population of study is the total number of participants from which the sample is selected. Due to practical and financial considerations, it is rarely possible to study all the members of the population Mitchell and jolly (2004). Amin (2005) defines population as "a complete collection of all the elements (unit) that are of interest in a particular investigation". Nworgu (1991) defines population as the limits within which the research findings are applicable. A social research like this collects data on the behaviors of humans for better predictions. A population is the complete collection or universe of all the element units that are of interest in an investigation It is therefore necessary to select a sample of target population and accessible population. The population of this study comprises all teachers training colleges in North West Region of Cameroon. These colleges are made up of both males and females. These schools are suitable for this study because the Government of Cameroon has ratified laws accepting the admission of students to study in these institutions been it public, Lay Private and Denominational, all students are set to be the population and we want to examine the factors influencing the academic achievement of students in inclusive system of study.

*Table 3:1 Population distribution of teachers training colleges per division in North West Region*

| Types of schools | Total number of students |
|---|---|
| **Public schools** | 810 |
| Denominational | 560 |
| Lay private | 466 |
| Total | 1.836 |

*Source: Records office in the delegation of secondary education North West Regions*

### 3.4.1: Target Population

Fraenkel and Walleen (2006) defined the population as an aggregate or totality of all the objects, subjects or members that conform to a set of specifications. The target population is the group of elements to which the researcher wants to make inference, at least theoretically, the population is finite and can be counted. The target population for the study was all students going through the teachers training colleges in North West Region of Cameroon using the English sub system of education. The targeted population was selected from 6 teacher training colleges in North West Region particularly in two Divisions. The respondents were mainly final year students. Consent of the students sorted and they expressed willingness to respond to the questionnaire items having been assured that all information given will be kept confidentially. The researcher was also interested in seeing students' attitude in statistics improvement. The targeted students' populations were in selected Public, Denominational and Lay Private schools in Donga-Mantung Division and Mezam Division (table.3.2). In keeping with the researchers guide (2006), it is imperative to vividly determine the population size that will provide for the number of students to sample. As such, the researcher did a statistical background check of the enrolment of students to get the exact number of the population this study deals with; which can be represented in the simple tabular display in table 3.2.

**Table 3:2:  distribution of target population**

| DIVISION | TYPE OF SCHOOL | MALE | FEMALE | TOTAL |
|---|---|---|---|---|
| MEZAM DIVISION | **Public** GTTC BAMENDA | **45** | **107** | **152** |
| | **Denominational** Saint Andrew Bilingual Teachers Training College | **7** | **13** | **20** |
| | **Lay private** Model inclusive bilingual Teacher Training College Nkwen | **8** | **12** | **20** |
| **DONGA-MANTUNG DIVISION** | **Public** GTTC NKAMBE | **20** | **50** | **70** |
| | **Denominational**, Christ the King T T C teacher training college, | **6** | **13** | **19** |
| | **Lay private** Nightingale Teacher Training College | **7** | **12** | **19** |
| | **Total** | **98** | **207** | **300** |

### 3.4.2: Accessible Population

This is the population to which a researcher has effectively studied the researcher's accessible population is the students of final years students.

**Table 3.3: Source: From the Field (2019)**

| Division | Types of school | Male | Female | Total |
|---|---|---|---|---|
| | Public | 45 | 107 | 152 |
| | denominational | 7 | 12 | 19 |
| MEZAM | Lay private | 8 | 11 | 19 |
| | Public | 20 | 50 | 70 |
| | Denominational | 6 | 13 | 19 |
| DONGA MANTUNG | Lay private | 7 | 12 | 19 |
| **Total** | | **93** | **205** | **298** |

### 3.5: Sampling Techniques and Sample Size

Amin (2005), defines sampling techniques as the various strategies use by the researcher to draw sample from the parent population. It is therefore a method used by the researcher to enable him select and group the sample population. Purposeful Random sampling technique was used to choose the teachers who were to answer the questionnaires. Sampling is the process of selecting elements from a population in such a way that the sample elements selected represent the population. This is how the random sampling method took place; after arriving in the selected schools, and discussed with the principals, the principals assembled the trainees in the class rooms and exposed the purpose of the assembly of teachers. Pieces of papers were out according to the number of teachers in the school. Some were left blank and on the other was written the word "YES." The papers were folded and put in the basket and shuffled. Each of the teachers was asked to make a draw and those who picked the papers with the word "YES" were retained in the sample while those who picked blank papers were asked to leave the classroom for some minutes. Those who picked the word "YES" automatically became the accessible population. It is to this group of teachers that our questionnaires were administered. This was to avoid bias. According to Daramola (1999), as "a purposive or purposeful random sampling technique is one in which a researcher purposely selects certain groups of people or items as samples because of their relevance to the investigation under consideration all the final year students of teaching training colleges in Mezam Division and Ndonga –Mantung Division were selected. Ryan and Bernard in Bitta (ibid) define sample size as "a set of choice that a researcher makes to move from all the potential of data that are analyzed and used in the final report of investigation. The Krejcie and Morgan (1970), in a document titled "Determining sample size for research activities, Educational and psychological

measurement" were used to determine the actual simple size for the study (Appendix 1: Sample Size (S)) where the population size was 1300 students given a sample size of about 298, this was based on the number of students in each division or schools, respondents were randomly drawn by using a computer program. The sample size was based on number of students in each school. An over-sample was drawn to minimize nonresponse error. The distribution of respondents in the states covered by this study and the questionnaire returns.

### 3.5.1: Sampling Frame

Sampling frame is the set of source materials from which the sample is selected. the purpose of sampling frames, which is to provide a means for choosing the particular members of the target population that are to be involved in the study Som (2015), The elementary units or the group or cluster of such units may form the basis of sampling process in which case they are called as sampling units. A list containing all such sampling units is known as sampling frame. Thus, sampling frame consists of a list of items from which the sample is to be drawn. If the population is finite and the time frame is in the present or past, then it is possible for the frame to be identical with the population. In most cases they are not identical because it is often impossible to draw a sample directly from population. As such this frame is either constructed by a researcher for the purpose of his study or may consist of some existing list of the population. For instance, one can use telephone directory as a frame for conducting opinion survey in a city. Whatever the frame may be, it should be a good representative of the population. The sampling frame is used to identify the elements of the population.

### 3.5.2: Sampled Population

Amin (2005) defines sample population as a collection of some (sub set) of elements of a population. Mbua (2003) defines sample as a sub unit of the population or total group which the researcher composes and investigates as part of his study. There is need of sample in a social science research because the population to be studied may be too large for the researcher to effectively study and as well the cost may be too expensive to study the entire population. Thus, there was a need to select the sample population which will be a representative of the parent population. Amin insisted that in order to infer the result of the sample population on the parent population, the researcher must ensure that all characteristics of the parent population are present

in the sampled population in order to ensure validity of generalization of the sampled population to the parent. The sample population of this study constituted 1300 Students selected from some divisions of the North West of Cameroon is used in the place of English and for study reliability.

## 3.6:     Instruments of the Study

Research instruments translate attributes or traits into quantities Amin, (2005). They are tools used for collecting data and these tools must be systematically constructed to obtain accurate information needed for the study. These are the various tools used in the collection of data and information from the field for interpretation. The research instrument used to collect data in this study was the questionnaire. According to Amin (2005), a questionnaire is a self-report instrument used for gathering information about variables of interest in an investigation. It is a written list of questions that are answered by many people so that information can be collected from the answers. The data or information collected permits the researcher to verify the research hypothesis. This questionnaire was designed in line with the research questions and the hypothesis. The questionnaire was used to systematically obtain information on student's personal characteristics, attitudes and knowledge. A questionnaire used because the group targeted could read and understand the questions and provide information required by the researcher. The questionnaire was also developed to measure observed behaviors with the use of 5-point Likert scale. The questionnaires submitted to level 3 students was developed in English. The used survey approach to investigate several variables that is assumed to have influence on students' interest in the study of statistics. The survey questionnaire was a self-constructed 36 questionnaire items, some of which used the 5-points Likert scale, others were dichotomous response using both nominal and ordinal scale of measurement to measure variables that determine  teaching and attitude towards statistics in Cameroon teachers training colleges. This study was carried out on final year students taking introduction to Statistics subject for academic 2019/2020 session. The survey questionnaires were adopted from the Survey of Attitude Towards Statistics (SATS) instrument Shau (2003), which assesses both student's cognitive and non-cognitive factors  are 36 items in the survey form with 5 attitude components which are affective, cognitive ability, value, difficulty, interest and effort of students and 2 teaching components like teaching method and teaching strategies while achievement were based on their final results and academic background ,About three hundred students from both distance and regular classes were randomly selected to respond

to the questionnaire items. The questionnaires were self-administered, and the data was manipulated using SPSS version 20 to generate all the result

The Likert scale was used because it is flexible and reliable in measuring attitudes and values. Since the researcher was evaluating a program on students' needs, it was necessary to use the Likert scale. The response categories were weighted from 1-4 from disagree to agree (negative to positive) and 4 to 1 from agree to disagree positive to negative) as illustrated in table 3.4.

**Table 3.4: Response Categories in the questionnaire and their weight**

| Response category | Positive | Negative |
|---|---|---|
| Strongly Agree (SA) | 4 | 1 |
| Agree (A) | 3 | 2 |
| Disagree (D) | 2 | 3 |
| Strongly Disagree (SD) | 1 | 4 |

The questionnaire began with an introduction for the respondents or the students to know the purpose of the research. The questionnaire was made up of 40 questions. They were closed ended questions with specific responses that could be easily analyzed as shown in appendix 1 this questionnaire is divided into four sections. The first part is on the identification of the student demographic information (, level gender and age). The second part is made up of questions on parenting styles, the third part includes questions on students' career choices, and the last part if the closing remarks or expressions of gratitude. As far as the second part is concerned, it is sub-divided into four sections corresponding to various sub-variables of parenting styles. Some of the question's statistics pedagogy, attitudes and achievement. The questionnaire was developed with the aid of literature review taking into consideration the objectives and hypotheses of the study.

### 3.7: Description of Instrument

The research instruments that were used for this study were in the form of questionnaires administered to some students. For reliability and validity, Cronbach's alpha and confirmatory factor analysis (CFA) were used.

**3.8:     Validation of the Instrument**

Validity in research is alarmed with the accuracy and truthfulness of scientific findings. It is the ability of a measure to measure what is supposed to measure Robson (2011). It indicates that how well the data collection, and data analysis of the research captures the reality being studied Mohajan (2017). Validity is the accuracy and meaningfulness of inferences, which are based on the research results. The validity measures whether the results are true or not, that is, it is the extent to which an instrument measures what it is supposed to measure Mugenda, (1999). It also based on how instruments fulfil the function it is supposed to perform Kerlinger, (2003), Mohajan (2017)).  In this case validity was aimed at gauging whether the subject matter was clear and relevant in generating meaningful data. Validity would determine whether the respondents perceive questions in questionnaire the way the researcher intended. Validity also refers to the degree in which an instrument measures what it is supposed to measure. After the researcher had finished constructing the questionnaire, to ensure validity, the researcher went through the questions to determine if the questions are related to the stated objectives and to determine if there's any correspondence with the stated objectives and hypotheses. The validity of the research instrument was ascertained using a variety of methods. First, to ensure the face validity, it was enhanced with the use of expertise from colleagues, and the research supervisor. But since face validity is said to be at the lowest level of validity Amin, (2005), the study also made use of content validity and construct validity which were both ascertained by the different corrections made by the research supervisor upon design of the questionnaire. The validity of the instrument was also determined by experts in the field. The researcher presented the questionnaire to supervisor, some lectures and four researcher students. These experts went through each question and corrected some grammatical errors and sentences. More so, to ensure validity, the researcher did a pilot testing on bilingual teachers training college Melen, 20 level students of two and level three. The results from the pilot testing showed that they were some questions that were difficult for students to answer. The researcher had to modify some questions by rephrasing them and questions that were not important were removed. The results from students were tested shows that there was a question that was not really linked to the availability of resources. This question was removed by the researcher, also there was some aspect of ambiguities and some items were not very clear for easy interpretation especially the open questions. All these were corrected. The questionnaire was then presented to the supervisor of this study, who went through the questions to ascertain if the

questions are related to the objectives/hypotheses of the study stated in chapter one of this study. All these were to ensure face, construct, and content validity of the instrument.

**3.9:    Reliability of the Instrument**

Reliability is the strength of the quantitative research. It is the degree to which measures are free from error, and therefore, yield consistently the same results over repeated testing periods. It means that the operation of a study, such as, the data collection procedures, can be repeated with the same results every time. Therefore, it is concerned with the consistency, stability and repeatability of the informant's accounts as well as the researchers' ability to collect and record information accurately Seltiz et al. (1976). One of the main requirements of any research process is the reliability of the data and findings. Reliability deals with the consistency, dependability, and reliability of the results of any research. It is an important concept in research because; it can be used to reduce errors during the analysis of responses to questionnaires Neuman (2012). It indicates that the scores of an instrument are stable and consistent Creswell (2009). Reliability coefficients range from 0 to 1, with higher coefficients indicates higher levels of reliability Traub and Rowley (1991). Reliable data are dependable, genuine, trustworthy, sure, unfailing, authentic, and reputable Mohajan (2017). The reliability of the research instruments was tested in pilot study. This is a stage in development of questionnaire to assist the determination of the effectiveness of the instrument Hardy & Bryman (2009). The instruments were given to the respondents in the selected two schools that did not appear in the final study list of sampled schools. The reliability was determined through a delayed test –retest technique. The results for the first test and the second in the pilot study were computed separately. The first scores were correlated with the second scores. According to Fraenkel and Wallen (2006), Golafshani, (2003), reliability is the consistency of scores or answers from one administration of an instrument to another and from one set of items to another. They also say that a reliable instrument is one that gives consistent results.

**3.9.1: Reliability**

Reliability refers to the degree of consistency that an instrument demonstrates in measuring what it was designed to measure. To determine the reliability of the instrument constructed, a pilot test was carried out within the area of study. A test-retest reliability method was used on 10 students who were not included in the sample. After analyses, the results obtained at

administrations correlated to determine the reliability of the instrument with the score of .741. This means that the instrument is strongly reliable as shown on the table below.

**Table 3.5: Reliability statistics**

|  | N | % |
| --- | --- | --- |
| Cases valid | 243 | 74.1 |
| Excluded | 15 | 25.9 |
| **Total** | **258** | **100.0** |

| **Cronbach's Alpha** | **Cronbach's Alpha Based on Standardized items** | **N° of items** |
| --- | --- | --- |
| .910 | .761 | 61 |

An instrument is said to be reliable if it consistently measures what it is measuring. After the questionnaire was constructed and validated, to establish the reliability of the questionnaire, it was pretested twice on level two and three, students of BTTC Melen. The way they responded to the questions permitted the researcher to use Cronbach's alpha to test which gave a reliability coefficient of 0.79 which proves that the test is reliable. The purpose of piloting the research instruments was to improve on reliability.

In addition, the Cronbach's Alpha Coefficient was computerized by use of SPSS (Statistical Package for Social Sciences) Software to determine how items correlated to one another; A Cronbach Alpha (0.7) it was proved valid (Amin, 2005). The validity of instruments was ascertained by discussing the questionnaires with the supervisor.

**Table 3.6:  Reliability among all scales**

| **Reliability among the variables** | **Number of items** | **Cronbach's Alpha** |
| --- | --- | --- |
| Classroom Management | 14 | .915 |
| Students value | 10 | .810 |
| Classroom assessment practices | 17 | .920 |
| Students Effort | 10 | .610 |

| Students' Academic Achievement | 10 | .910 |
| --- | --- | --- |

After conducting the reliability tests, it was found that the modified scales were quite reliable as the Cronbach's Alpha ranged from .610 to .920. Therefore, it could be said that even though the scales had been modified, they could still sustain a satisfactory level of reliability.

## 3.10: Administration of the Research Instruments

The researcher collected an authorization from the dean of the faculty of education, university of Yaoundé 1 (appendix 3; autorisation). This authorization permitted the researcher to collect data from the level three students of selected public Denominational and Lay Private Teacher Training Colleges the researcher presented this letter to his supervisor who latter send the researcher to the field to collect data. The researcher presented the letter to the secretary of the various schools because it was difficult to have direct asses to the principals. The researcher used one month two weeks to visit the colleges to obtain permission to administer the questionnaire in two Divisions: Dong Mantung and Mezam Division. The principals gave the researcher the permission to start administering the instruments. This process permitted the researcher to create familiarity with the administrative staff who enormously helped the researcher during the data collection process. The researcher employed the services of three research assistants to assist him in the area out of the five assistances three were in Donga Mantung amongst them a security officer and in Mezam two with a security officer. This was because the sample population of the study was large and couple with the stage of insecurity in the region and in the Divisions in particular. It could have been difficult for the researcher to effectively carry out the task alone. With the help of the of the School administrators, the researcher alongside the research assistants personally moved from school to school and from level concerns to collect the data of the study.

Data refer to raw facts without any processing, organizing or analysis, and hence they have little meaning, and few benefits to the managers and decision-makers. They are un-interpreted materials on which a decision is to be based and depend on facts which may include anything known to be true or exist. They are bits of content in either text or numerical format (sequences of numbers, letters, pictures, etc.). They are normally structured, but do not bear any information to use them in a context (Mohajan 2017). During the data collection process, the researcher explained the objectives of the study and assured the students of confidentiality. The researcher also clarified

the respondents on areas that seams difficult. After data had been collected from the final level in a college, the research team moved to the next.

## 3.11:   Data Analysis Procedure

Upon completing the data collection process, the data of students was organized, and the data of each type of school was packaged in a big envelope and placed in a large bag. On each envelope, the level and the name of the schools were written on it, data was packaged in one envelope and their data was also grouped according to the colleges with the name labeled on it. All these were to ensure that there was no missing questionnaire.  After organizing the data, the questionnaires were numbered, and each question was codified (both the opened ended and closed questions). The next step, the researcher did was to build a typing mask in Excel, which was presented to the supervisor to give his opinion. After this stage, the data was entered in the excel mask.  After the researcher finished entering the data, the next step was to verify the data to avoid biases and errors. After verification process, the data was now imported from excel to SPSS software to be analyzed. Pearson coefficient of correlation Γ had been used for data analysis of the study. Correlation refers to a technique used to measure the relationship between two or more variables. When two things are correlated, it means that they vary together. Positive correlation means that high scores on one are associated with high scores on the other, and that low scores on one are associated with low scores on the other. Negative correlation, on the other hand, means that high scores on the first thing are associated with low scores on the second. Negative correlation also means that low scores on the first are associated with high scores on the second. Correlation coefficients can vary numerically between -1 and +1. The closer the correlation to 1 is stronger the positive relationship between the two variables. A correlation of 0.0 indicates the absence of a relationship and the correlation closer to -1 means stronger negative relationship between the two variables. A correlation can only indicate the presence or absence of a relationship, not the causes for the relationship. There is always the possibility that a third variable may influence the results.

## 3.12:   Coding Process

A code in qualitative inquiry is most often a word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data. The data can consist of interview transcripts, participant observation field notes, journals, documents, literature, artefacts, photographs, video, websites, e-mail correspondence,

and so on. The portion of data to be coded during First Cycle coding processes can range in magnitude from a single word to a full sentence to an entire page of text to a stream of moving images. In Second Cycle coding processes, the portions coded can be the exact same units, longer passages of text, and even a reconfiguration of the codes themselves developed thus far. Just as a title represents and captures a book or film or poem's primary content and essence, so does a code represent and capture a datum's primary content and essence.

Coding refers to application of labels or tags to allocate units of meaning to collect data. This is an importance aspect of forming typologies and facilities the organization of copious data in the form of notes, observations, transcripts documents etc. it helps to prevent data overload resulting from mountains of unprocessed data in the form of ambiguous words. Coding of qualitative data can forma part in theory binding. Codes can also be allocated to responses to fixed choice questionnaires. Coding refers to the process of assigning numerals or other symbols to answers so that responses can be put into a limited number of categories or classes. Such classes should be appropriate to the research problem under consideration. They must also possess the characteristic of exhaustiveness (i.e., there must be a class for every data item) and also that of mutual exclusively which means that a specific answer can be placed in one and only one cell in a given category set. Another rule to be observed is that of one-dimensional by which is meant that every class is defined in terms of only one concept Kothari (2004).

### 3.13: Method of Data Analysis

Both descriptive and inferential statistics were used to analyse the data. The data for descriptive statistics that is frequencies, percentages and pie charts, were used. While Pearson correlation coefficient was used to analyse inferential statistic because both the independent and dependent variable are continuous and also because the study looked at the relationship between the two concepts under study. It is calculated using the formula below

$$\Gamma_{xy} = \frac{n \sum xy - \sum x \sum y}{\sqrt{[n \sum x^2 - (\sum x)^2][n \sum y^2 - (\sum y)^2]}}$$

Where

$\Gamma$ = Pearson correlation coefficient

x= Values in first set of data

y= Values in second set of data

n= Total number of values

**3.14:   Ethical Consideration**

In research realms, ethics would refer the application of moral rules and professional codes of conduct to the collection, analysis, reporting, and publication of information about study subjects, in particular active acceptance of subjects 'right to privacy, confidentiality, and informed consent (Smith, 2003). In this respect, when carrying this study, the research strived to meet ethical responsibilities while abiding by some principles such as voluntary participation, informed consent and confidentiality. Informed consent: Informed consent is a process by which a person voluntarily confirms his or her willingness to participate in a particular trial after having been informed of all aspects that are relevant to his or her decision to participate. In attempt to respect this principle, the researcher tried to respect each participant as a person capable of making an inform decision regarding participation in the research study. He explained the nature, significance, and implications of the study to participants who were capable (mentally healthy) of giving consent. The participants were given a chance to carefully consider the risks and benefits of the study with extended opportunity to ask any pertinent questions. The researcher resorted to oral consent for participants who were illiterate. Confidentiality, With the context of research ethics, observing the principle of confidentiality means keeping information given by or about an individual in the course of  a  research  relationship  secure  and  secret  from others (Smith, 2003). This confidentiality is seen as central to the maintenance of trust between research participants and the researcher. In this respect, the researcher assured the participants the information that they gave was not available to anyone who was not directly involved in the study. Actually, the principles of anonymity were respected, Voluntary  participation. The researcher involved in the study individuals who quite accepted to participate. He did not use any coercive power to force people in participating in the study activity. Realistically, the researcher strived to handle respondents as wisely as possible to fill the questionnaire forms and participate in the interview exercise. The researcher associated with the respondents in order to induce a good cooperation which led to accurate, reliable and successful information.

**Table 3.7: Synoptic table of the study's research questions, hypotheses, variables and indicators.**

| Objective | Research questions | Variables | | Indicators | Research Hypotheses | Modalities |
|---|---|---|---|---|---|---|
| To investigate if students' cognitive competence can be a determinant to academic achievement in statistics in teachers training colleges | How does cognitive competence influence students' academic achievement in statistics | **Dependence Variable**<br><br>Attitude | **Independence variables**<br><br>Academic achievement | Cognitive competence | **H1** There is no significant relationship between student's cognitive competence and academic achievement | **Strongly Disagreed.**<br>**Disagreed**<br>**Agree**<br>**Strongly agree**<br><br>**Statistics competence test** |
| To investigate if student's value attaches to statistics influence and their academic achievement in teacher training colleges in North West Region | What is the relationship between values and their academic achievement? | Attitude | Academic achievement | Values | **H2** Students value attach to statistics significantly predict their academic achievement | |
| it was also intended to academic achievement in teacher training colleges | How does student effort influence their academic achievement in statistics? | Attitudes | Academic achievement | Effort | **H3**. Students' effort in statistics jointly predict academic achievement significantly | **Strongly Disagreed.**<br>**Disagreed**<br>**Agree**<br>**Strongly agree**<br><br>**Statistics competence test** |

**Source: Author Conception (2019)**

### 3.15: Conclusion

This chapter has presented the methodology used in collecting data for this study and they were sub-divided in various sub-heads: research design (3.1), area of study (3.2), target population (3.3), sampling techniques and size (3.4), instruments of study (3.5), description of instrument (3.6), data collected (3.7), and method of data collection (3.8),method of data treatment and analysis (3.9) Focus will now be drifted to data analysis which will be discussed in the next chapter.

# CHAPTER FOUR
# DATA PRESENTATION, ANALYSIS AND INTERPRETATION OF RESULTS

**4.0:    Introduction**

The study sets out to investigate *student's attitudes in teacher training colleges in the North West Region towards teaching of statistics* .This chapter presents the results of study from the quantitative perspective. The collected data will be presented base on three parts the first part will provides of socio demographic information; second part provides a descriptive analysis of the data while the third will base on the verification of hypothesis. The collected data was analysed with the use of Pearson correlation coefficient. Specifically, the study seeks to find out:

1. How classroom management acts as a determinant to students' academic achievement in statistics.
2. How students' value attached to statistics influence their academic achievement in statistics.
3. How students' cognitive competence affects students' academic achievement in statistics.
4. How classroom assessment practices determine students' academic achievement in statistics.
5. How students' effort can predict students' academic achievement in statistics.

The results of the statistical analyses of data gathered for this study are presented in this chapter. The presentation of the data was done following the trends of the five (5) hypotheses directing the study. The chapter is therefore presented under the following outlines:

➢    Demographic Information
➢    General Description of Data/Variables
➢    Reliability test of the scales
➢    Hypothesis-by-Hypothesis presentation of Result
➢    Summary of Results

### 4.1: Demographic Information

The sample size of this study was 260 students from both the public, private and denominational schools. A total of 260 questionnaires were administered and 253 were returned giving a 97 % return rate. Out of the 260 respondent who returned the questionnaires, 90 were males and 163 were females with ages between 16 to 32years.

**Table 4 .1: Distribution of respondent by gender**

| | Gender | Frequency | Percent |
|---|---|---|---|
| | Male | 90 | 35,6 |
| Valid | Female | 163 | 63,4 |
| | **Total** | **253** | **100,0** |
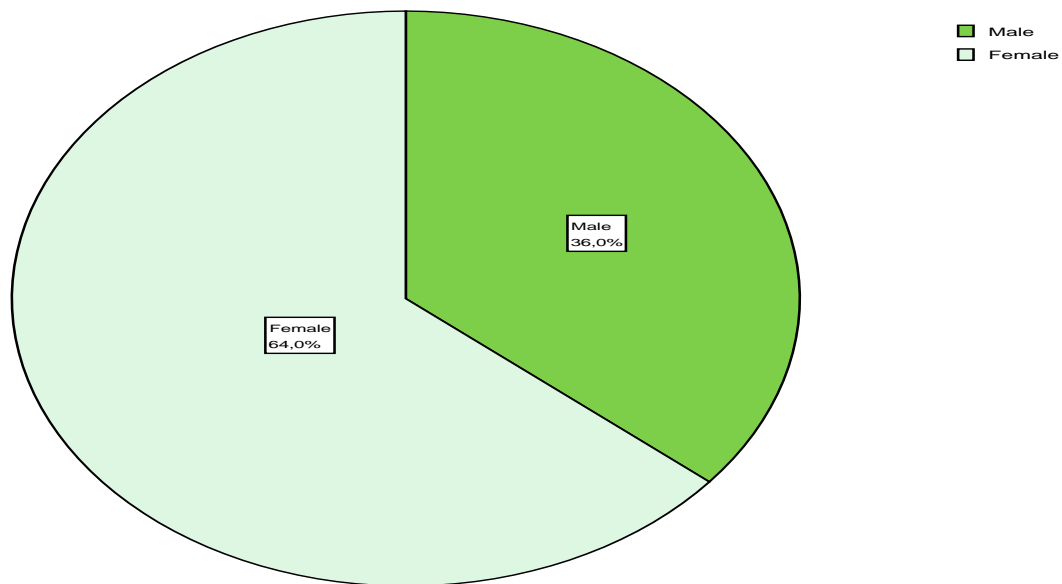


**Figure 4.1: Distribution of respondent by gender**

From the above table and pie chart, it is observed that out of the 253 respondent 90 that represents 36% are males while 163 that represent 64% are females. It means that majority of the population are females.

**Table 4.2**:  **Distribution of respondent by Age**

| | Age range | Frequency | Percent | Valid Percent |
|---|---|---|---|---|
| | 16-19 years | 101 | 39,9 | 39,9 |
| | 20-25 years | 96 | 37,7 | 37,7 |
| Valid | 26-31 years | 56 | 22,4 | 22,4 |
| | **Total** | **253** | **100,0** | **100,0** |

**Age range**
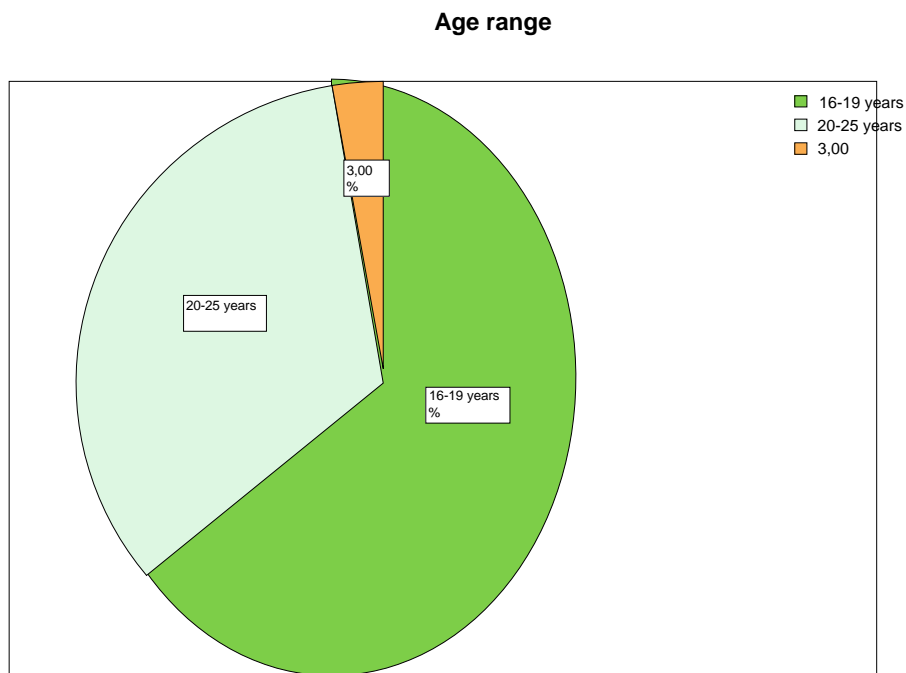


**Figure 4.2: Distribution of respondent by Age**

The above table and pie chart show that 96 of the respondents which represents 39.9 % falls between the ages of 16-19 while 37.7% which represents 50 falls between the ages of 20-25 and 56 above 22.4% indicates that there are more adult's youth in secondary schools than the adult population.

**Table 4.3**: **Distribution of respondent by Schools**

| | School | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Public | 100 | 39,0 | 39,0 | 48,6 |
| | Denominational | 95 | 37,0 | 37,0 | 62,2 |
| | Lay private | 58 | 22,0 | 22,0 | 100,0 |
| | Total | 253 | 98, | 100,0 | |
| Missing | System | 7 | 2,0 | | |
| **Total** | | **253** | **100,0** | | |
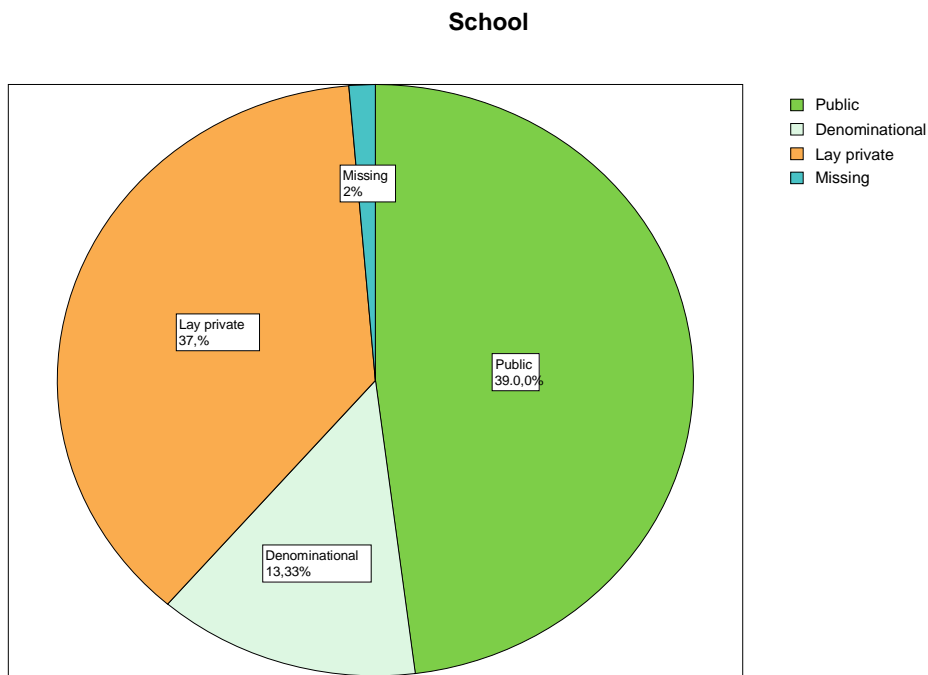
**School**



**Figure 4.3: Distribution of respondent by Schools**

From the above distribution table and pie chart, it can be observed that, out of the 253 respondents, 39% (n=100) are of the public school 37% (=95) are of the denominational schools while 22. % (n=58) are of the lay private schools. This indicates that, majority of the respondent

were from the public school and this shows the difference between number of students in public and private schools.

## 4.2: General Description of Data/Variables

This study was designed to investigate statistics teaching and attitude on students' academic achievement in statistics. Descriptive data analysis for all variables in the study is presented in Table 4.4

**Table 4.4: Descriptive data for the variables of concern**

|  | Mean | Std. Dev | Number |
|---|---|---|---|
| Classroom Management | 47.72 | 9.076 | 253 |
| Students' Value | 19.12 | 4.314 | 253 |
| Students' Cognitive Competence | 19.32 | 5.142 | 253 |
| Classroom Assessment Practices | 47.72 | 9.076 | 253 |
| Students Effort | 26.16 | 7.909 | 253 |
| Students' Academic Achievement | 3.86 | 2.002 | 253 |

The scores obtained were analyzed, presented and interpreted to accept or reject each of the three null hypotheses guiding this study.

## 4.3: Reliability test of the scales

As earlier mentioned, the scales adopted in the present study were borrowed and modified from scales used in past studies. Since modification was involved, the reliability of the scales might be affected. Therefore, it was necessary to conduct reliability tests as a means to ensure the scales were reliable enough. After conducting the reliability tests, it was found that the modified scales were quite reliable as the Cronbach's Alpha ranged from .603 to .954. Therefore, it could be said that even though the scales had been modified, they could still sustain a satisfactory level of reliability.

**Independent variable 1: statistics pedagogy**

In order, to present a clearer overview of the variable "statistics pedagogy", the variable will be sub-divided into two parts these parts are teaching aspects like classroom management and classroom assessment practices.

**Table 4.5: Classroom Management Based on Discipline**

| Reliability | Number of items | Cronbach's Alpha |
|---|---|---|
| **Classroom Management Based on Discipline** | 6 | .915 |
| **Items** | **Mean** | **SD** |
| 1. Reprimand bad behavior on the spot in a loud voice | 3.25 | 1.484 |
| 2. Send a student home for aggressive or destructive behavior. | 3.17 | 1.261 |
| 3. Send a student to Principal's Office for misbehavior. | 3.11 | 1.336 |
| 4.Use nonverbal signals to redirect child who is disengaged. | 4.17 | 1.332 |
| 5. Ignore misbehavior that is non-disruptive to class | 3.50 | 1.308 |
| 6. Single out a child or a group of children for misbehavior. | 3.54 | 1.400 |
| **Total** | **20.74** | **8.121** |

The above figure 4.5 presents respondents' opinions on Classroom Management Based 0n Discipline. It can be observed that the highest score is option that the Use nonverbal signals to redirect child who is disengaged. (M = 4.17; SD = 1.332; t (258) and the lowest is having a means of M=3.11, SD =1.336 responding to the option, Send a student to Principal's Office for misbehaviour.

**Table 4.6**: **Mean scores and standard deviation for " Classroom management based on the Teaching and Learning dimension ".**

| Reliability | Number of items | Cronbach's Alpha |
|---|---|---|
| **Classroom management based on the Teaching and Learning dimension** | **9** | **.915** |
| **Items** | **Mean** | **SD** |
| 1.Respond to the student's incorrect answers, validating student's participation. | 2.75 | 1.21 |
| 2. Offer students guidelines and suggestions to report the group about their completed work | 5.29 | 1.301 |
| 3.Use problem-solving strategy (e.g., define problem, brainstorm solutions) | 4.90 | 1.062 |
| 4.Teacher allowing students to practice writing and doing their notes | 4.35 | 1.28 |
| 5.Teacher giving students practice Exercise. | 3.60 | 1.34 |
| 6.Teacher talking and allowing students questions to ask or comment | 2.75 | 1.121 |
| 7.Teacher talking throughout and students listen | 5.29 | 1.301 |
| 8. I often use group works since they are necessary for students' social and cognitive development. | 4.90 | 1.062 |
| 9. I immediately tell students the correct answers when they cannot figure them out by themselves. | 4.82 | 1.060 |
| **Total** | **40.02** | **14.395** |

Figure 4.6, base on Classroom management based on Teaching and Learning dimension. It can be observed that the highest score is option 2 Offer student's guidelines and suggestions to report the group about their completed work. (M = (5.59; SD = 1.301; t (258) and Teacher talking throughout and students listen (M = (5.59; SD = 1.301; t (258) as well as respond to the student's incorrect answers, validating student's participation (M=2, 75 SD. 1.121) and the lowest is having

a means of M=2.75, SD =1.121 responding to the option that Teacher talking and allowing students questions to ask or comment.

**Table 4.7 : students classroom assessment practice**

| Reliability | Number of items | Cronbach's alpha |
|---|---|---|
| **Students' classroom assessment practices,** | **9** | **.924** |
| **Items** | **Mean** | **SD** |
| 1. Assessing students through rubrics | 2.96 | 1.395 |
| 2. Peer assessment practices | 2.92 | 1.460 |
| 3.Consensus between students and teachers | 3.93 | 1.419 |
| 4. Share scoring criteria with students | 3.03 | 1.333 |
| 5.Online resources in assessment | 2.81 | 1.351 |
| 6.Feedback on assessment tools | 2.88 | 1.547 |
| 7.Encourage student decision-making and problem solving skill | 5.24 | 1.302 |
| 8.Help students learn from other classmates | 4.88 | 1.124 |
| 9.Help students learn to cooperate and collaborate | 4.70 | 1.170 |
| Provide good student feedback | 2.82 | 1.363 |
| **Total** | **33.29** | **11.942** |

Figure 4.7, base on Students' classroom assessment practices. It can be observed that the highest score is option I often use group works since they are necessary. (M = 5.24; SD = 1.103; t (258) Encourage student decision-making and problem-solving skill (M=4.90 SD.1.062) and the lowest is having a means of M=2.81, SD =1.351 responding to the statement based on online resources in assessment.

**Table 4.8.  Mean scores and standard deviation for "Classroom Assessment Practices method for Teachers training college**

| Reliability | Number of items | Cronbach's alpha |
|---|---|---|
| **Classroom Assessment Practices method for Teachers training college** | **10** | **.904** |
| **Items** | **Mean** | **SD** |
| 1. Paper pencil tests | 4.25 | 1.222 |
| 2. Objective type test | 3.69 | 1.439 |
| 3. Extended response /essay test | 3.97 | 1.386 |
| 4. Question answering | 3.71 | 1.385 |
| 5. Home work/ assignments | 3.75 | 1.316 |
| 8. Group or individual project | 3.85 | 1.245 |
| 9. Portfolio assessment of student | 3.24 | 1.423 |
| 10. Written class summaries | 2.32 | 1.230 |
| **Total** | **27.76** | **6.379** |

Table 4.8, based Classroom Assessment Practices method for Teachers training college1. It shows that the highest score is option on the assessment method  the use of Paper pencil test (M = 4.25; SD = 1.222.  ; t (258) and the lowest is having a means of M=2.32 , SD =1.230 responding to the statement on written class summaries**.**

**Independent Variable 2**:  attitude on statistics will be presented in three parts that is cognitive competency, values and efforts as reflected in the following table, the total mean score for attitude via the various indicators.

**Table: 4. 9. Mean scores and standard deviation for "Students Cognitive competence".**

| Reliability Number of items | Cronbach's Alpha | |
|---|---|---|
| **Students Cognitive competence** | **14** | **.924** |
| **Items** | **Mean** | **SD** |
| 1, I can learn statistics | 2.89 | 1.624 |
| 2. I find it difficult to understand statistical concepts | 2.96 | 1.395 |
| 3. I find statistics formulas easy to understand | 2.92 | 1.460 |
| 4. I think statistics is a complicated subject | 3.93 | 1.419 |
| 5. The thought of being enrolled in a statistics course makes me nervous. | 3.03 | 1.333 |
| 6. Statistics seems very mysterious to me. | 2.81 | 1.351 |
| 7.I have difficulty seeing how statistics relates to my field of study. | 5.24 | 1.302 |
| 8. Being enrolled in a statistics course as a very unpleasant experience. | 4.88 | 1.124 |
| 9.Statistics is too math oriented to be of much use to me in the future | 4.70 | 1.170 |
| 10. Dealing with numbers makes me uneasy. | 2.82 | 1.363 |
| 11. I think statistics is worthless subject to arts students | 3.26 | 1.512 |
| 12. Statistics should be a required subject for admission in training colleges | 3.21 | 1.413 |
| 14. I feel that statistics should be required early in one's professional training. | 3.29 | 1.546 |
| **Total** | **47.52** | **13.662** |

Table 4.9, based on Students Cognitive competence. It shows that the highest score is option on *I have difficulty seeing how statistics relates to my field of study*. (M = 5.24; SD = 1. 302; t (258) and the lowest is having a means of M=2.81, SD =1.351 this is responding to a statement that statistics seems very mysterious to me.

**Table 4.10.  Mean scores and standard deviation for "the value on statistics".**

| Reliability | Number of items | Cronbach's Alpha |
|---|---|---|
| **The value of statistics** | **10** | **.915** |
| **Items** | **Mean** | **SD** |
| 1. Statistics is worthless | 3.17 | 1.261 |
| 2. Statistics should be a required part of my professional training | 3.11 | 1.336 |
| 3. Knowing statistics will help me improve my mathematics result | 4.17 | 1.332 |
| 4. Statistical skills will make me more employable | 3.50 | 1.308 |
| statistics is applicable to solving human and natural problem | 3.54 | 1.400 |
| 5. Statistics is not useful to the typical professional | 2.75 | 1.121 |
| 6. Statistical thinking is not applicable in my life outside my job | 5.29 | 1.301 |
| 7. Statistical skills will make me more employable. | 4.90 | 1.062 |
| 8. Statistics is worthless. | 4.82 | 1.060 |
| 9. Statistics is irrelevant in my life. | 4.65 | 1.456 |
| **Total** | **41.07** | **11.845** |

Table 4.10, based on "the value on statistics"... It shows that the highest score is option. I Statistical thinking is not applicable in my life outside my job (M = 5.29; SD = 1. 301; t (258) and the lowest is having a means of M=2.75, SD =1.121 this is responding to a statement Statistics is not useful to the typical professional.

**Table 4.11. Mean scores and standard deviation for "effort".**

| Reliability Effort | Number of items | Cronbach's Alpha |
|---|---|---|
| **The value of statistics** | **7** | **.788** |
| **Items** | **Mean** | **SD** |
| 1. Apart from completing the course assignments, I also completion of exercises related to research methods and statistics. | 2.78 | 1.642 |
| 2. I worked hard to complete the Statistics course | | |
| 3. I paid close attention to what the lecturer said in class. | 3.01 | 1.672 |
| 4.To get full understanding on statistics content, I read the lecture notes more than once. | 4.63 | 1.450 |
| 5. I studied hard and prepared well for every statistics test | 4.53 | 1.328 |
| 6. I constantly solve statistics questions | | |
| 7.Before coming attending statistics I make sure I solve all the exercises | 4.08 | 1.480 |
| 8. I solve and read statistics every day | 4.91 | 1.528 |
| 9.Anything taught in class that I don't.t understand I always consult another student. | 4.60 | 1.330 |
| | 3.52 | 1.302 |
| 10.I always ask questions in class whenever I don't understand a concept | 2.45 | 1.342 |
| **Total** | **46.54** | **6.942** |

Table 4.11, based on "the students' effort in statistics"... It shows that the highest score is option 8. I solve and read statistics every day (M = 4.91; SD = 1. 528; t (258) and the lowest is having a means of M=2.45, SD =1.134 this is responding to a statement I *always ask questions in class whenever I don't understand a concept*

**Dependent variable**: Academic achievement As seen in table 4.12 the total mean score for academic achievement is M = 31.84 and the item with highest mean score is "after Marking the Statistics competency achievement test.

**Table 4. 12.  Mean scores and standard deviation for "academic achievement".**

| Reliability | Number of items | Cronbach's Alpha |
|---|---|---|
| **Statistics competency achievement test.** | **10** | **.896** |
| **Items** | **Mean** | **SD** |
| 1. Mr. BAFON has determined that there is an 85% chance that the number of people visiting Prince Edward Island in the month of August will be between 3,700 and 2,200.  This is an example of | 4.57 | 1.196 |
| 2. Mildred has developed an initial coding scheme for her qualitative data.  Ideally, her next step in this analysis should be to | 4.52 | 1.113 |
| 3. Let A and B be two events. Suppose the probability that neither A or B occurs is 2/3. What is the probability that one or both occur? | 3.86 | 1.222 |
| 4. You have taken the ACT exam, an exam taken by students who wish to apply for admission to a college. You are told that you have scored at the 80th percentile. From this information you can conclude**:** | 3.90 | 1.226 |
| 5. If a clinical psychologist read in a scientific journal that sixty percent of all clinical psychologists suffer from hypertension and she believed this was too high, she would write the alternative hypothesis as: | 3.65 | 1.248 |

| | | |
|---|---|---|
| 6. As a researcher you might discover that certain events almost always precede other events, or that certain thoughts and feelings almost always precede certain actions. Keeping in mind this-happens-and-then-that happens regularities, as a researcher you must keep in the forefront that: | 2.45 | 1.124 |
| 7_____ scales are typically measuring of non-numeric concepts like satisfaction, happiness, or discomfort | 2.34 | 1.328 |
| | . | |
| 8. Here is a set of scores: 5, 8, 7, 8, 6, 2, 5, 8. The mode of this set of scores is: | | |
| 9. Tom believes that left handed persons get higher grades than right handed persons and plans to collect some data to demonstrate that. The appropriate null hypothesis would be: | 3.43 | 1.232 |
| 10.It is known that a salesperson makes a sale on 35% of customer contacts. A normal work w eek will enable the salesperson to contact 40 customers. The expected number of sales for the week is | 3.41 | 1.234 |
| | 2.34 | 1.123 |
| | 3.45 | 1.124 |
| **Total** | **31.96** | **9.659** |

## 4.4:  Data Analysis and Interpretation

The data was analyzed by the use of hypothesis by hypothesis depending on the kind of data collected for each variable in each hypothesis. The following hypotheses were analyzed at 0.05 level of significance.

**General Hypothesis**

In order to answer the above research questions, the following hypothesis are tested using the Pearson Product Moment Correlation Analysis:

$H_{o1}$: There is no significant relationship between classroom management and students' academic achievement in statistics.

$H_{a1}$: There is a significant relationship between classroom management and students' academic achievement in statistics.

$H_{o2}$: There is no significant relationship between students' value and students' academic achievement in statistics.

$H_{a2}$: There is a significant relationship between students' value and students' academic achievement in statistics.

$H_{o3}$: There is no significant relationship between students' cognitive competence and students' academic achievement in statistics.

$H_{a3}$: There is a significant relationship between students' cognitive competence and students' academic achievement in statistics.

$H_{o4}$: There is no significant relationship between classroom assessment practices and students' academic achievement in statistics.

$H_{a4}$: There is a significant relationship between classroom assessment practices and students' academic achievement in statistics.

$H_{a5}$: There is a significant relationship between students' effort and students' academic achievement

$H_{o5}$: There is no significant relationship between students' effort and students' academic achievement in statistics.

**Table 4.13: Correlation Matrix of the variables.**

|  | Academic Achievement | Classroom Management | Students' Value | Students' Cognitive Competence | Classroom Assessment Practices | Students' Effort |
|---|---|---|---|---|---|---|
| Academic Achievement | 1 | 0.076 | -0.099 | 0.183** | -0.098 | -0.151* |
| Classroom Management | 0.076 | 1 | -0.033 | -0.201** | 0.625** | 0.274** |
| Students' Value | -0.099 | -0.033 | 1 | 0.448** | 0.174** | 0.507** |
| Students' Cognitive Competence | 0.183** | -0.201** | 0.448** | 1 | 0.051 | 0.230** |
| Classroom Assessment Practices | -0.098 | 0.625** | 0.174** | 0.051 | 1 | 0.462** |
| Students' Effort | -0.151* | 0.274** | 0.507** | 0.230** | 0.462** | 1 |

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

**Hypothesis One**

$H_{o1}$: There is no significant relationship between classroom management and students' academic achievement in statistics.

$H_{a1}$: There is a significant relationship between classroom management and students' academic achievement in statistics.

The independent variable in this hypothesis is classroom management, while the dependent variable is students' academic achievement in statistics. The scores of the independent variable were gotten from the responses recorded from a fifteen (15) items of a four- point Likert scale questionnaire that measured classroom management. The scores of the dependent variable were gotten from a ten (10) item test administered to respondents that measured students' academic achievement. The statistical analysis technique used to test this hypothesis was the Pearson Product Moment Correlation analysis.

The correlation coefficient formula used is;

$$\Gamma_{xy} = \frac{n\sum xy - \sum x \sum y}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

Where $x$ is the independent variable, $y$ is the dependent variable and $\Gamma_{xy}$ is the correlation coefficient for $x$ and $y$.

The result of the analysis is presented in Table 4.14

**Table 4.14: Pearson Product Moment Correlation analysis of classroom management and students' academic achievement in statistics. (N= 253)**

| Variable | $\sum X$ | $\sum X^2$ | $\sum XY$ | $\Gamma_{xy}$ | p-value |
|---|---|---|---|---|---|
| | $\sum Y$ | $\sum Y^2$ | | | |
| Classroom Management (X) | 10321 | 437527 | 72247 | 0.076 | 0.230 |
| Students' Academic Achievement (Y) | 977 | 4783 | | | |

p*<0.05; df = 251; critical $\Gamma_{xy}$ = 0.124

The result of the analysis reveals that the calculated $\Gamma_{xy}$ -value of 0.076 is lower than the critical $\Gamma_{xy}$ -value of 0.124 at .05 level of significance with 251 degrees of freedom. Also the p-value of 0.230 is higher than 0.05. With the result of this analysis, the null hypothesis was accepted and the alternative hypothesis rejected. This result therefore means that there is no significant relationship between classroom management and students' academic achievement in statistics.

**Hypothesis Two**

**H$_{o2}$:** There is no significant relationship between students' value and students' academic achievement in statistics.

**H$_{a2}$:** There is a significant relationship between students' value and students' academic achievement in statistics.

The independent variable in this hypothesis is students' value, while the dependent variable is students' academic achievement in statistics. The scores of the independent variable were gotten from the responses recorded from a nine (9) items of a four- point Likert scale questionnaire that measured students' value. The scores of the dependent variable were gotten from a ten (10)-item tests administered to respondents that measured students' academic achievement in statistics. The statistical analysis technique used to test this hypothesis was the Pearson Product Moment Correlation analysis.

The correlation coefficient formula used is;

$$\Gamma_{xy} = \frac{n\sum xy - \sum x \sum y}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

Where $x$ is the independent variable, $y$ is the dependent variable and $\Gamma_{xy}$ is the correlation coefficient for $x$ and $y$.

The result of the analysis is presented in Table: 4.15

**Table 4.15: Pearson Product Moment Correlation Analysis of Students' Value and Students' Academic Achievement in Statistics. (N= 253)**

| Variable | $\sum X$ | $\sum X^2$ | $\sum XY$ | $\Gamma_{xy}$ | p-value |
|---|---|---|---|---|---|
| | $\sum Y$ | $\sum Y^2$ | | | |
| Students' Value (X) | 4838 | 97204 | 33866 | -0.099 | 0.118 |
| Students'Academic Achievement (Y) | 977 | 4783 | | | |

p*<0.05; df = 251; critical $\Gamma_{xy}$ = 0.124

The result of the analysis reveals that the calculated absolute $\Gamma_{xy}$ -value of 0.099 is lower than the critical $\Gamma_{xy}$ -value of 0.124 at .05 level of significance with 251 degrees of freedom. In addition, the p-value of 0.118 is higher than 0.05. With the result of this analysis, the null hypothesis was accepted and the alternative hypothesis rejected. This result therefore means that there is no significant relationship between students' value and students' academic achievement in statistics.

**Hypothesis Three**

**H$_{o3}$:** There is no significant relationship between students' cognitive competence and students' academic achievement in statistics.

**H$_{a3}$:** There is a significant relationship between students' cognitive competence and students' academic achievement in statistics.

The independent variable in this hypothesis is students' cognitive competence, while the dependent variable is students' academic achievement in statistics. The scores of the independent variable were got from the responses recorded from a ten (10) items of a four- point Likert scale questionnaire that measured students' cognitive competence. The scores of the dependent variable were got from a ten (10)-item tests administered to respondents that measured students' academic

achievement. The statistical analysis technique used to test this hypothesis was the Pearson Product Moment Correlation analysis.

The correlation coefficient formula used is;

$$\Gamma_{xy} = \frac{n\sum xy - \sum x \sum y}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

Where $x$ is the independent variable, $y$ is the dependent variable and $\Gamma_{xy}$ is the correlation coefficient for $x$ and $y$.

The result of the analysis is presented in Table 4.16

**Table 4.16: Pearson Product Moment Correlation analysis of students' cognitive competence and students' academic achievement in statistics. (N= 253)**

| Variable | $\sum X$ | $\sum X^2$ | $\sum XY$ | $\Gamma_{xy}$ | p-value |
|---|---|---|---|---|---|
| | $\sum Y$ | $\sum Y^2$ | | | |
| Students' cognitive competence (X) | 4889 | 101139 | 34223 | 0.183 | 0.004 |
| Students' Academic Achievement (Y) | 977 | 4783 | | | |

p*<0.05; df = 251; critical $\Gamma_{xy}$ = 0.124

The result of the analysis reveals that the calculated $\Gamma_{xy}$ -value of 0.183 is higher than the critical $\Gamma_{xy}$ -value of 0.124 at 05 level of significance with 251 degrees of freedom. In addition, the p-value of 0.004 is lower than 0.05. With the result of this analysis, the null hypothesis was rejected and the alternative hypothesis retained. This result therefore means that there is a significant relationship between students' cognitive competence and students' academic achievement in statistics.

Since there is a significant relationship between students' cognitive competence and students' academic achievement in statistics, a further exploration of the relationship showed that the $\Gamma_{xy}$ = 0.183 was positive. This indicates that the higher the students' cognitive competence, the better the academic achievement of students in statistics.

**Hypothesis Four**

**H$_{o4}$:** There is no significant relationship between classroom assessment practices and students' academic achievement in statistics.

**H$_{a4}$:** There is a significant relationship between classroom assessment practices and students' academic achievement in statistics.

The independent variable in this hypothesis is classroom assessment practices, while the dependent variable is students' academic achievement in statistics. The scores of the independent variable were gotten from the responses recorded from a ten (10) items of a four- point Likert scale questionnaire that measured classroom assessment practices. The scores of the dependent variable were got from a ten (10) item test administered to respondents that measured students' academic achievement. The statistical analysis technique used to test this hypothesis was the Pearson Product Moment Correlation analysis.

The correlation coefficient formula used is;

$$\Gamma_{xy} = \frac{n\sum xy - \sum x \sum y}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

Where $x$ is the independent variable, $y$ is the dependent variable and $\Gamma_{xy}$ is the correlation coefficient for $x$ and $y$.

The result of the analysis is presented in Table 4.17

**Table. 4.17: Pearson Product Moment Correlation analysis of Classroom Assessment Practices and Students' Academic Achievement in Statistics. (N= 253)**

| Variable | $\sum X$ $\sum Y$ | $\sum X^2$ $\sum Y^2$ | $\sum XY$ | $\Gamma_{xy}$ | p-value |
|---|---|---|---|---|---|
| Classroom Assessment Practices (X) | 12074 | 596970 | 84518 | 0.098 | 0.118 |
| Students' Academic Achievement (Y) | 977 | 4783 | | | |

**p*<0.05; df = 251; critical $\Gamma_{xy}$ = 0.124**

The result of the analysis reveals that the calculated $\Gamma_{xy}$ -value of 0.093 is lower than the critical $\Gamma_{xy}$ –value of 0.124 at .05 level of significance with 251 degrees of freedom. Also, the p-value of 0.118 is higher than 0.05. With the result of this analysis, the null hypothesis was accepted and the alternative hypothesis rejected. This result therefore means that there is no significant relationship between classroom assessment practices and students' academic achievement in statistics.

**Hypothesis Five**

**Ha5:** There is a significant relationship between students' effort and students' academic achievement in statistics

**Ho5:** There is no significant relationship between students' effort and students' academic achievement in statistics. The independent variable in this hypothesis is students' effort, while the dependent variable is students' academic achievement in statistics. The scores of the independent variable were got from the responses recorded from an eleven (11) items of a four- point Likert scale questionnaire that measured students' effort. The scores of the dependent variable were got from a ten (10) item test administered to respondents that measured students' academic achievement. The statistical analysis technique used to test this hypothesis was the Pearson Product Moment Correlation analysis.

The correlation coefficient formula used is;

$$\Gamma_{xy} = \frac{n \sum xy - \sum x \sum y}{\sqrt{[n \sum x^2 - (\sum x)^2][n \sum y^2 - (\sum y)^2]}}$$

Where $x$ is the independent variable, $y$ is the dependent variable and $\Gamma_{xy}$ is the correlation coefficient for $x$ and $y$.

The result of the analysis is presented in Table 4.18

**Table 4.18**: **Pearson Product Moment Correlation Analysis of Students' Effort and Students' Academic Achievement in Statistics. (N= 253)**

| Variable | $\sum X$ | $\sum X^2$ | | | |
|---|---|---|---|---|---|
| | $\sum Y$ | $\sum Y^2$ | $\sum XY$ | $\Gamma_{xy}$ | p-value |
| Students' Effort (X) | 6619 | 188929 | 46333 | -0.151* | 0.016 |
| Students' Academic Achievement (Y) | 977 | 4783 | | | |

p*<0.05; df = 251; critical $\Gamma_{xy}$ = 0.124

The result of the analysis reveals that the calculated absolute $\Gamma_{xy}$ -value of 0.151 is higher than the critical $\Gamma_{xy}$ -value of 0.124 at 05 level of significance with 251 degrees of freedom. Also, the p-value of 0.016 is lower than 0.05. With the result of this analysis, the null hypothesis was rejected and the alternative hypothesis retained. This result therefore means that there is a significant relationship between students' effort and students' academic achievement in statistics.

Since there is a significant relationship between students' effort and students' academic achievement in statistics, a further exploration of the relationship showed that the $\Gamma_{xy} = -0.151$ was negative. This indicates that the lesser the students' effort, the poorer the academic achievement of students in statistics.

# CHAPTER FIVE
# INTERPRETATION OF RESULTS, RECOMMENDATION AND CONCLUSION

## 5.0: Introduction

This chapter begins with a brief summary of the study. A discussion of the findings with regards to the research hypotheses follows. Next, the implication of the study for researchers and educators are outlined and then the limitations of the study are discussed. This discussion is followed by suggestions for future research proposed curriculum and teaching consideration, practical suggestions. Finally, closing statement about the study as a whole are provided.

## 5.1: Summary of the Finding

The study sets out to investigate *student's attitudes in teacher training colleges in the North West Region towards teaching of statistics*. The findings of this study give information on statistic teaching and attitude will influence their academic achievement in statistics in Teacher Training programs and contribute to the body of knowledge in educational research. The results of the study show that all the variables (attitude, effort and academic achievement) are positively correlated with each other. To this effect effort is regarded as a direct factor that can influence both attitude and academic achievement. As seen from other past research, the study further confirmed the direct relationship between attitude and academic achievement as suggested in past reviewed literature Lilian (2015). It is observed that effort and academic achievement has a direct effect on statistics teaching in Teachers Training Colleges in North West Region. From the responses gotten from field and the analysis actually prove that students agree with hypothesis that there is a significance relationship between effort and academic achievement

The students also confirmed or agreed that there is a significant relationship between students' effort and students' academic achievement in statistics, more so a further, exploration of

the relationship showed that the $\Gamma_{xy} = - 0.151$ was negative. This indicates that the lesser the students' effort, the poorer the academic achievement of students in statistics as seen on presentation of results. They also further agree that there is a positive correlation between students' effort and academic achievement in examination (**Table 4.18**)

## 5.2: Discussion of Findings.

The results of this research are discussed within the framework of five themes, namely, 'classroom assessment practice ', 'classroom management', 'values ', 'effort' and 'academic achievement'. From this discussion, recommendations are made

### Research Hypothesis One

As observed in this study, the relationship based on hypothesis One:

**H$_{o1}$:** There is no significant relationship between classroom management and students' academic achievement in statistics.

**H$_{a1}$:** There is a significant relationship between classroom management and students' academic achievement in statistics. Were examined and verified using simple correlation coefficients (Pearson). As it was considered, the correlation coefficient between classroom management and achievement reveals that the calculated $\Gamma_{xy}$ -value of 0.076 is lower than the critical $\Gamma_{xy}$ -value of 0.124 at 05 level of significance, with 251 degrees of freedom. Also, the p-value of 0.230 is higher than 0.05. With the result of this analysis, the null hypothesis was accepted and the alternative hypothesis rejected. This result therefore means that there is no significant relationship between classroom management and students' academic achievement in statistics. In explaining the findings of the study, it can be said that students can still do better in a poorly managed classroom what matter is for the student to know why they are in school and to work hard. So learners with high levels of self-efficacy face, high cognitive skills works extremely hard as they competite for being master and mastery, not as threats to them which cause them to stay away and avoid them. The learners or trainees with this skills set competing goals for themselves, maintain a strong commitment to these goals, despite the type of classroom management they found themselves. They develop efforts and they continue with their endeavour to achieve high despite the lapses in classroom management.

First objective was to establish how classroom management acts as a determinant to students' academic achievement in statistics. The first hypothesis established the relationship between classroom management and students' academic achievement the third objective of this study was to establish the relations between classroom management and students' academic achievement. The first objective was therefore denied as seen in **$H_{o1}$:** There is no significant relationship between classroom management and students' academic achievement in statistics was accepted using the Pearson Product Moment Correlation analysis. The findings of the study revealed that there is a negative relationship between classroom management and students' academic performance on the correlation of 0 and that is not statistically significant since the Sig. (2-tailed) p-value $p^* < 0.05$; df = 251; critical $\Gamma_{xy} = 0.124$.

Base on the results in Table 4.3, the researcher concluded that classroom management does not have any influence on students' academic achievement. This mean    s that no matter how effective  a classroom management is made is does not leads to students' good academic achievement support that issues that poor classroom management results from poor students' academic performance. The results of this study are in deny with the finding of Taila (2009), who found that High School Students' outcomes or Achievement come as a result  better teacher classroom management approach as being well prepared and well organized. Together, the findings of Little and Akin-Little (2008) and of Khatib and Ghannadi (2001) demonstrate the wide range of teacher utilization of rules, procedures, and consequences in managing the classroom. The hypothesis of this study was to establish the relationship between classroom management and students' academic achievement. The results of the findings disagreed with Özcan, (2017), idea that Classroom management is one of the most important roles played by teachers because it determines student success and achievement that is an indication of student academic achievement. His ideas were preventing disruptive behavior so as to improve academic achievement of learner. Academic achievement as seen refers to the ability of students to study, remember facts and be able to communicate their knowledge verbally or through writing at the end of the course. Classroom management is a matter of concern among teachers everywhere. Consequently, the concept can be understood as all the actions performed by the teacher to create and maintain a learning environment that enables successful instruction. This includes a variety of techniques, like arranging the physical environment, establishing rules and procedures, maintaining students' attention to lessons, and engagement in activities (Classroom management has also been defined

as the actions teachers take to create a supportive environment for the academic and social emotional learning of students according to (Özcan, 2017). Therefore, classroom management can be seen as all the actions that a teacher performs inside a school in order to enable learning.

Erasmus, (2009) on his part observes that improved teacher training in classroom management is a critical part in improving academic achievement in a particular subject. Factors contributing to efficient classroom management include: teaching methodology, lesson planning and preparation, interpersonal relationships and student motivation (Gaston, Lee and MacArthur 2010). The structure of the classroom environment should decrease the likelihood of inappropriate student behavior and increases desirable student interactions and consequently improves academic performance. A classroom environment would enable learners to study in a way that is interesting, enjoyable and purposeful. Among models to restructure a good classroom environment include: use of a variety of teaching methods and involving students to numerous learning activities, physical class arrangement that allows a teacher to access students, efficient use of class time and ensuring that students interact positively during cooperative learning activities 'Teachers in the classroom are the managers of the classroom activities. He is concerned with maintaining order, regulating the sequence of events and directing his own attention towards achieving educational goals. Classroom management plays a very important role in the teaching and learning process.

It is evident from the results that no matter how the teacher masters classroom management practices it does not affect or increase students' learning or achievement but what determines is the effort put in place and the cognive ability or readiness of the learners. The major findings revealed that Government, Lay Private and Denominational teacher's training colleges teachers as well as teachers of training Colleges that classroom management practices has no link with academic achievement of learners rather it their readiness and cognitive competence as well their effort that influence their achievement so as a trainer in teachers training institutions let us encourage hard work through motivation of trainees in North West Region. The study also identified relationship between teachers' class managerial practices and its effect on the academic achievement of students'. Findings of the study indicated a negative significant correlation between teachers' perceived classroom management practices and students' academic achievement. This shows that those teachers who have good classroom management practices, their students' academic achievement is not attained by their good mastering of management in

classroom. Teachers, who prepare quality lesson plan, organize students' behaviour, use effective teaching methods, communicate message in simple way and manage time efficiently and effectively and provide conducive environment for learning will necessary not have any influence in their achievement only their attitude via cognitive competence and effort due determine their academic achievement in statistics. Wilson et al., (2003) and Wilson and Lipsey (2007) found that teachers can reduces aggressive, violent and severely aggressive behaviour through classroom management practices.

Jennings and DiPrete (2011) said that students' social as well as emotional skills had positive effects on the academic achievement of primary school students. It was found that teachers' classroom management practices have direct relationship with students' academic achievement (Gage et al., 2018). Teachers' classroom management is clearly associated with students out comes but the findings in this study denied the fact. According to Korpershoek et al (2016) findings equally affirms that classroom management has no significant role to students academic achievement of students and their behavioural pattern (attitude) play a lot to students academic achievement. It was also identified that the students and teacher's direct relationship in academic matters not only encourage the learners in academic examinations but it also improves their general learner's cognitive capabilities and skills.

According to (Gage et al 2018) as cited in Nisar et al (2019), increasing effort in classroom management practices is vital for students' high-level achievement. Good Classroom management technique have no direct relationship with students' academic achievement Teachers' classroom management is clearly associated with students out comes. It was found that effective classroom management significantly increases academic achievement of students and decreases behavioural problems of the students Korpershoek et al (2016). Oliver, Wehby, and Reschly (2011) stated that if the climate for learners are smoother and more effective than the learners are always turn towards learning activities and they left all such tasks like taking low or poor interest in teaching learning process and the divergent of their attentions from the classes. They found significant differences in experimental and control teachers' classroom management practices. In treatment classrooms students showed less disruptive and aggressive behaviour than control classrooms. Marzano, Marzano and Packering (2003) also highlighted the scope of well managed classrooms by

characterizing favourable relationship between teacher and students and making students responsible for their behaviour.

Oliver, Wehby, and Reschly (2011) identified in their research about comparison of effective learning and poor learning environment in schools due influence the level of achievement . They found significant differences in experimental and control teachers' classroom management practices. In treatment classrooms students showed less disruptive and aggressive attitude than control classrooms. In their study they said that the results of the learning are directly associated with the climate of the classes. Wilson and Lipsey (2007) found that through positive attitude game intervention like changing cognitive skills, social problem-solving skills and controlling anger, teachers can reduce aggressive, violent and severely aggressive behaviour through classroom management practices.

According to Durlak et al, (2011) they found that social and emotional programmes of school-based initiative was primarily responsible for the enhancement of cognitive development of the learners. It also makes increase students behavioural and affective domains; and the ability of timely and correct decision making. Jennings and DiPrete (2011) stated in the study that student' social skills as well as emotional skills have positive effect on the academic achievement of primary school students. Previous research studies findings show that teachers' classroom management practices have significant relationship with students' academic achievement. But no single research study has been conducted in the local settings. Tests and examinations are the most the main sources with the help of which one can get knowledge about the learners' academic level. At this stage they need much care and attention from their teachers to go through that process successful. The study focuses on classroom management and its relationship with students' academic achievement actually negate. It is evident from the results that teachers of training schools' teachers require in master in classroom management practices to increase students' learning. The major findings revealed that government secondary school teachers have moderate to high level of classroom management practices in district Kohat.

Study also identified about relationship between teachers' classroom managerial practices and its effect on the academic achievement of students'. Findings of the study indicated a positive significant correlation between secondary school teachers' perceived classroom management

practices and students' academic achievement. This shows that those teachers who have good classroom management practices, their students' academic achievement.

For the new curriculum to be implemented properly, decrease in class sizes is a crucial step to be taken. Moreover, teachers may learn to use time more fluidly and teach students to use their time efficiently. Evertson and Neal (2005) redefined the classroom management for learner-centered classrooms since the complexity of a learning-centered classroom increases the challenge of classroom management. These new strategies for learner-centered classrooms may be presented to the teachers with in-service and pre-service training programs, as well included in management courses of education faculties will influence students' academic achievement. As well, the intensity of the curriculum may be released so that teachers would not be in concern of keeping up with the plans and to cover all the units in a term but seeing into it students understand so as to perform highly.

Since this study is one of the first studies conducted about the classroom management approaches in Teachers Training Colleges in the implementation constructivist curriculum, the results of this study will lead to further researches in this area. Because some of the variables included in this study showed noteworthy patterns, they need to be handled in the following studies again, and their relations with teachers' classroom management approaches should be more deeply investigated. Furthermore, new variables which are likely to be related to teachers' classroom management approaches, such as age level of students, school district; need to be included in the further studies.

In addition, in this study classroom management inventory showed teachers' preferences to use student-centered management approaches rather than teacher centered approach. However, the actual practices of the teachers are not known; so, self-report on students' data of teachers' classroom management approaches may be supported with other data sources such as observations and detailed interviews with teachers or students to identify ideas about teachers' management practices; to obtain detailed and more realistic information about the management practices of teachers.

An important question which arises from this study might be how students' achievement in constructivist learning environments are influenced by teachers' management approaches.

Although there are many studies relating achievement to classroom management, there is little evidence which tries to show the contribution of constructivist instruction supported by an appropriate management to the achievement of students.

### Research Hypothesis Two

**H$_{o2}$:** There is no significant relationship between students' value and students' academic achievement in statistics.

**H$_{a2}$:** There is a significant relationship between students' value and students' academic achievement in statistics. Following the Pearson product moment correlation, analysis of students' value and students' academic achievement in Statistics. (N= 253) (Table 4.4) With the result of this analysis, the null hypothesis was accepted and the alternative hypothesis rejected. This result therefore means that there is no significant relationship between students' value and students' academic achievement in statistics.

The study disagreed with the view of Perry (1968); the Values of subject are principles, fundamental convictions, and ideals, standards of life which act as general guide to behavior or as a reference point in decision making which contribute greatly to student academic achievement. Values are beliefs about what is right and what is wrong and what is important in life. Value literally means something that has a price, precious, dear and worthwhile; one is ready to sacrifice for. It is a set of principles which guide the standard of behavior and reaction toward a course. Values are desirable and held in esteem. The moral values present a true perspective of the development of any society or nation. They tell us to what extent a society or nation has developed itself. In confirmation with the findings, cited in Rokeach, (1968); Sherif & Cantril, (1947) "Value means the relation of an object to a valuing subject. Values, or primitive beliefs, have traditionally been regarded as core aspects of the self-concept and as such a form of 'basic truths' about the reality the results of his study disagree with null hypothesis of this study but instead accept the alternative hypothesis which shows a strong relationship between value and students' academic achievement but the results of this findings denies indication the values attach in statistics might not necessary influence academic achievement but rather the self-determination and effort put in will foster and guarantee students success in a course. Many researchers have not made a conceptual distinction between values and achievement in any academic continuity. In

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confirmation with Schwartz (1994), values transcendence situations, vary in importance, and function as guiding principles in academic life depending on the determination of the learners an indication that the value a student's attaché to statistics or subject will influence greatly on the performance as well as improvement in the academic achievement as confirms by other researchers but this current study denied that there is  no significant relationship between students' value and students' academic achievement in statistics.

**Research Hypothesis Three**

**Ho3**: There is no significant relationship between students' cognitive competence and students' academic achievement in statistics.

**Ha3:** There is a significant relationship between students' cognitive competence and students' academic achievement in statistics. The independent variable in this hypothesis is students' cognitive competence, while the dependent variable is students' academic achievement in statistics**.** This result therefore shows that there is a significant relationship between students' cognitive competence and students' academic achievement in statistics.

According to the result of the analysis shows that the calculated $\Gamma_{xy}$ -value of 0.183 is higher than the critical $\Gamma_{xy}$ -value of 0.124 at  05 level of significance, with 251 degrees of freedom. In addition, the p-value of 0.004 is lower than 0.05. The result of this analysis reveals that the null hypothesis was rejected and the alternative hypothesis accepted as seen in table 4.3.  This result therefore means that there is a significant relationship between students' cognitive competence and students' academic achievement in statistics. There is a significant relationship between students' cognitive competence and students' academic achievement in statistics, a further exploration of the relationship showed that the $\Gamma_{xy} = 0.183$ was positive. some scientific research has shown that general cognitive competence of students as a predicts of spectrum of important life outcomes, behaviors, and performances. These include academic achievement, health-related behaviors, social outcomes, job satisfaction, and creativity, among many others. The strong relation between cognitive ability and academic achievement suggests that schools that are particularly effective in improving academic achievement may also improve domain-independent cognitive competence of students. The study has shown strong positive relationship between cognitive competence on academic achievements. Although cognitive skills are seldom taught explicitly in schools, research indicates that schooling can promote cognitive competence. Thus, teacher might improve cognitive

abilities. Traditional schooling emphasizes on academic scores. Since, cognitive competence is a predictor of academic achievement, schools that improve cognitive competence of learners indirectly will improve academic achievement also. On the other hand, parental influence plays an important role in the development of cognitive competence of their children which play an important role on their academic attainment of the children. So, our rural and uneducated parents can be trained about all round development of children. Therefore, cognitive competence of students and Academic achievement has become a measure of self-worth and success.

Cognitive competence is one of the central purposes of intelligence testing students to predict their educational achievement (Binet & Simon, 1916) confirm as cited in Abbing (2013). Research has consistently shown that a positive correlation exists between cognitive competence, measured by various psychometric tests and academic achievement. Cognitive competence is the most important predictor of academic achievement in many subjects, including mathematics and statistics (Taub et al., 2008) as cited in Padmini (2017). As the emphasis on the measures of student academic achievement increases educational researchers and practitioners are interested in identifying factors that demonstrate effectiveness in supporting student achievement. This study will measure the academic achievement and cognitive competence of students in the teacher training colleges. From this study, it was concluded that cognitive engagement was a significant predictor of academic achievement among secondary school students. From the findings we can conclude from the statistical results obtained from the Pearson Product Moment Correlation Coefficient cognitive competence was a significant predictor of academic achievement. It was observed in this study that students enjoyed critical thinking, creative thinking analyzing ideas in depth in class, and the teachers as well emphasized serious method. Tambo (2012) confirms this result by saying that, teaching learning materials such as technology integrated lessons can help students develop their critical thinking skills. This because, when teachers employ technology in their lessons, it helps students analyze information, make evaluations and create their own work, all beneficial skills necessary in their future endeavors their cognitive abilities provide students with opportunities to learn specific skills, improve decision-making skills or problem-solving skills. This is highly recommended that teachers should encourage critical and creative thinking which helps to enhance cognitive competence. ability ` is because using assignments and assessments that require intellectual work and critical thinking is associated with increased student

achievement. These increases have been shown on a variety of achievement outcomes, including standardized test, classroom grades, and research instruments. Students cognitive Thinking also increases Student Motivation. critical thinking increases student motivation as well as achievement. It also emerged that project work, classroom assignments; homework as well as group discussions were significant in engaging the students.

### Research Hypothesis Four

$H_{o4}$: There is no significant relationship between classroom assessment practices and students' academic achievement in statistics.

$H_{a4}$: There is a significant relationship between classroom assessment practices and students' academic achievement in statistics.

The result of the analysis reveals that the calculated $\Gamma_{xy}$ -value of 0.093 is lower than the critical $\Gamma_{xy}$ -value of 0.124 at .05 level of significance with 251 degrees of freedom. Also, the p-value of 0.118 is higher than 0.05. With the result of this analysis, the null hypothesis was accepted and the alternative hypothesis rejected. This result therefore means that there is no significant relationship between classroom assessment practices and students' academic achievement in statistics. The classroom assessment practices are more reflective of the intrinsic level of the learners; assessment activities are those self-perceived assessment skills add credit or values to student's academic achievement in the future that the former is more inherently coherent than the latter.

Classroom assessment practices differ due to the nature of classroom as well as the nature of the assessment will delineate teaching levels, which will likely determine the academic achievement of students differently. Generally, differences emerge between secondary teachers and teacher trainer in terms of the assessment methods used and teachers' concerns for assessment quality. While secondary teachers rely mostly on paper–pencil tests and were concerned about the quality of assessment, teacher trainer teachers often use performance assessment as an alternative. These results confirm the previous research findings that, as grade level increases, teachers rely more on objective techniques in classroom assessment and show an increased concern for assessment quality (Adams & Hsu, 1998; Stiggins & Conklin, 1992). Whereas frequent use of objective tests at the secondary level may have occurred as a result of teachers 'needs to tailor tests to cover unique classroom objectives at higher-grade levels, the increased concern about

assessment quality at teacher training level is reflective of the fact that grades and assessment-based decisions take on more importance as students' progress in the school system.

The results of this study also support to the conclusion that teachers 'classroom assessment practices differ across content areas (Gullikson, 1984; Stiggins & Conklin, 1992; Zhang, 1995). The variations emerging from this study indicate that classroom' assessment practices are driven by the subjects they teach. The finding also implies a greater need to interweave measurement training with content areas. In-service teachers enrolled in a measurement course should be encouraged to base their assessment projects on the instructional activities taking place in their own classrooms. For preserve classroom assessment projects should be integrated with student teaching and other practical experiences. Knowledge on assessment in measurement and testing has a significant impact on teachers' self-perceived assessment practices regardless of their teaching experience. This is particularly true in terms of interpreting standardized test scores, revising teacher made tests, modifying instruction based on assessment feedback; using achievement assessment; and communicating assessment results.

It also implies that assessment of students' competencies may compensate for novices' lack of experience in the classroom. Previous research has indicated that students had trouble interpreting standardized test results (Impara et al., 1991), that they were inadequate in defining and scoring performance measures (Stiggins & Conkin, 1992), and that they were not proficient in communicating assessment results (Plake, 1993). Yet, it is in these areas of classroom assessment that measurement training enhances students' self-perceived assessment competencies.

Assessment of student learning is one of the daily classroom tasks for teachers. A significant proportion of the classroom time is devoted to educational assessment-related activities (Mertler, 2003). These assessment activities play a critical role in shaping student academic motivation and achievement (Brookhart, 2004). Educators have long recognized that teachers' knowledge and beliefs might influence their classroom practices (Calderhead, 1996; ). As might be expected, undesirable students' knowledge and beliefs about educational assessment could cripple the quality the assessment outcomes (Popham, 2009). Thus, there is a need to fully understand teachers' attitudes, competence, knowledge, and practices about educational assessment. The present study aimed at addressing this need. Results revealed that although teachers held a favorable attitude towards and perceived themselves as being competent in

educational assessment but yet students are unable to achieve highly academically, they demonstrated a low level of knowledge in educational assessment. Teachers used a variety of assessments in the classroom primarily for assigning grades and motivating students to learn, with some variations by gender, grade level, and subject area. Teaching load and teaching experience accounted for some of the variations in teachers' classroom assessment practices. Appropriate classroom assessment practices have been identified as one of the critical elements that must be considered in order to maximize student learning.

However, research has consistently reported that despite the fact the teachers, have a generally decreased in achievement shown by the hypothesis in general, with adequate knowledge about classroom assessment deemed necessary for appropriate assessment practices (Fan, Wang, & Wang, 2011; Koh, 2011; Quilter & Gallini, 2000). Tierney (2006) identified two external sources (educational policy and professional development) and an internal source (teachers' beliefs) mediating teachers' assessment practices. The present study provided evidence that in-service training in educational assessment might have a positive impact on teachers' educational assessment knowledge. Thus, it is recommended that ongoing professional development programs should be designed to strengthen teachers' classroom assessment knowledge and skills. As shown in this study, the teachers had positive views about educational assessment and perceived themselves as competent in educational assessment. Based on the literature, teachers' classroom assessment practices tend to have no influenced in students' academic achievement (Quilter & Gallini, 2000). However, the results of teaching as well as teachers' classroom assessment might have a negative impact on teachers' assessment beliefs, knowledge, and practices as well as no influence on academic achievement. These results agreed with Lyon's (2011) study who found that teaching load and other school responsibilities could cause conflicts between teachers 'classroom assessment beliefs and practices. Thus, it is recommended that the Ministry of Education pay attention to the teaching load of the teachers in relation to the classroom assessment responsibilities of the teachers. The literature has suggested that teachers' assessment practices may vary as a function of grade level and subject area (Zhang & Burry-Stock, 2003). The current findings showed some trends with respect to grade level and subject area in relation to teachers' self-perceived competence, knowledge, and practices in educational assessment. Thus, it is recommended that teacher educators should consider the specific nature of the various grade levels

and subject areas when designing and implementing professional development programs for teachers in educational assessment.

The findings of this study revealed gender differences in educational assessment competence, knowledge, and practices. In this study, female teachers were found to have on average a higher level of knowledge and self-perceived competence in educational assessment than male teachers. In addition, the current study showed that female teachers tended to use non-achievement factors such as effort and ability in grading more frequently than male teachers. These practices do not align with those recommended by educational assessment experts which state that non-achievement factors such as effort, value, interest, and motivation should not be incorporated into academic grades because they are complex to be operationally defined and measured (Stiggins 1989). However, it is not clear from the present study why do these gender differences exist. Future research using classroom observations and interviews might shed more light on gender differences in the educational assessment competence, knowledge, and practices.

Finally, the generalizability of the present study findings is limited by the use of self-report questionnaire and by the particular sample of students. Future research might consider using interviews and direct observations of teachers' assessment practices to judge the validity of the teachers' responses to the questionnaire. Also, future research should be conducted to testify the findings using a representative larger sample of student teachers selected from various educational sectors.

### Guide line for formative assessment practice

Use formative assessment practices (e.g., individual whiteboards, electronic clickers, entrance/exit slips, hand signals) to gather sufficient information from all students for an immediate sense of class knowledge and understanding.

- Provide clear instructions and when necessary, provide practice, sample questions, activities, or tasks to support students' understanding of what will be required during the assessment
- Follow the guidelines for sound analysis of student responses, such as the following:
- Well described scoring guides (analytic scales, scoring rubrics)
- Exemplar papers (sample student work representing different performance levels)

▪ Teacher moderation (collaborative scoring of student work in order to increase consistency across teacher judgments)

▪ Recognize that the conditions in which classroom assessments are administered and scored may influence consistency of the results (e.g., time of day, unexpected events, heating/cooling of classroom, noise, scorer fatigue).

▪ Consider the error bands when interpreting score reports from benchmark, interim or diagnostic assessments to determine whether significant changes in achievement have occurred over time.

▪ Consider the body of evidence available about students when making instructional or other decisions: the higher the stakes the more evidence required.

### Research Hypothesis Five

**H$_{a}$5:** There is a significant relationship between students' effort and students' academic achievement **H$_{o}$5:** There is no significant relationship between students' effort and students' academic achievement in statistics.

The independent variable in this hypothesis is students' effort, while the dependent variable is students' academic achievement in statistics. The statistical analysis technique used to test this hypothesis was the Pearson Product Moment Correlation analysis. The result of the analysis reveals that the calculated absolute $\Gamma_{xy}$ -value of 0.151 is higher than the critical $\Gamma_{xy}$ -value of 0.124 at 05 level of significance with 251 degrees of freedom. Also, the p-value of 0.016 is lower than 0.05. With the result of this analysis, the null hypothesis was rejected and the alternative hypothesis retained. This result therefore means that there is a significant relationship between students' effort and students' academic achievement in statistics. Since there is a significant relationship between students' effort and students' academic achievement in statistics, a further exploration of the relationship showed that the $\Gamma_{xy} = -0.151$ was negative. This indicates that the lesser the students' effort, the poorer the academic achievement of students in statistics. In the present study, it is found that there is a positive correlation between effort and academic achievement, in which similar findings are existent in past literature. For example, in a study conducted in the U.S., the researchers stated that Asian American students tended to exert more effort in their studies (e.g. spent more time working on assignments, attended more lessons outside

school) and they achieved better academically when compared to other minority students (Peng and Wright, 1994, p. 348).

As aforementioned, Pearson's correlation coefficient demonstrated that there was a positive relationship (ranging from moderately to strongly) between the concerned variables and that all the stated hypotheses were supported. The correlation between their effort and academic achievement of a students portrayed in a successful outcome. This showed that they greater the effort implied greater ability of achieving more in academics. However, the positive correlation between effort and academic achievement dropped. The negative correlation among students indicate a belief that less effort put into an activity as results leading to lower ability and a drop-in achievement. Focus on studying the role of "effort" In addition, in the present research, the statement that "effort" serves as a mediated factor between attitude and academic achievement is still under question. The correlation analysis proved that there was a positive relationship between effort and academic achievement. Similarly, it was found that both attitude and academic achievement could significantly predict effort. However, when the researcher conducted another multiple regression analysis to test whether all the three variables (attitude and effort) could significantly led to academic achievement, it was found that effort predict academic achievement. Therefore, the role of "effort" in serving as a mediated factor for academic achievement needs to be further studied. All in all, it is suggested that future researchers can focus on studying this area by testing whether "effort" genuinely serves as a mediated factor to bring academic achievement. Everything we need to achieve in life requires us to put more or some effort, following this study the important of effort in achieving our goals or objectives in academic achievement so the effort you put in today determines your success or academic achievement tomorrow.

According to Rory Vaden (2015), the Steps for Achieving True Success", says, "Success is never owned; it is only rented and the rent is due every day." To achieve our goals, we need to put in the effort each and every day. On days that we feel good and on days when we don't feel like doing the work. Many students will put in effort for a short time and when their effort does not immediately pay off or they become distracted by life, they stop putting in the daily effort needed to finish and succeed. One way to keep yourself motivated is to put in the effort needed for your goals to be realities and to think of other students who have the same goal. Everyone can put in the effort when they are feeling good or the circumstances are perfect, but not many persist

through the tough days. Effort is really just a habit that we need to develop if we want to be successful academically Lilian (2015). Academic achievement requires that Students are willing to do whatever is necessary, when it is necessary in order to achieve their intended objectives. Effort pays off in many ways. When trainees put in effort, they learn. Whether the effort produces results or not, they can learn and adapt based on what they learn from our efforts. If our efforts lead us further away from our goal, then we need to change our strategy. If our effort brings us closer to our goal, we can double down with our effort so the more we put in effort the more we learned. According to Michael Jordan (2017) a great basket baller said that effort eliminates fear. By putting in the effort, we know what we are capable of and do not need to be afraid. Effort teaches us that we can do more than we thought. Trainees or learners learn new skills and abilities when they take the time to put in consistent effort. Every new success that we achieve through our efforts increases our confidence in ourselves and our abilities. Effort keeps us focused on success. As your effort brings you closer to your goal, your motivation and will power increase as students are engage in teaching.

Effort is related to academic achievement following the present research, it is found that there is a positive correlation between effort and academic achievement, in which similar findings are existent in past in studied carried out Lilian K. (2012) in Hong Kong similar study conducted in city U Asia with the same results, American students tended to put more effort in their studies , spent more time working on assignments, attended more lessons outside school or having extract classes and they achieved better academic achievement. With reference to the relationship between effort and academic, similar findings are found is in Accordance with achievement motivation or need theory (McClelland (1999) thefore students of Teachers Training Colleges in Mezam Division and Ndonga Mantung Division works extremely hard or put more effort in their studies. This justified the fact that Denominational, Lay private as well as public teachers training Colleges provide good results dispite their more effective classroom management.

From the aforementioned, Pearson's correlation coefficient demonstrated that there was a positive relationship (ranging from moderately to strongly) between the concerned variables and that all the stated hypotheses were supported. For example, a research proved that students who possessed a positive study attitude via more time invested in their studies will likely have higher academic achievement than those who had a less positive attitude towards studies (less effort). In

addition, the underachievers tended to possess a less favorable attitude towards their studies and automatically low academic achievement. other studies suggested that there was a negative relationship between the two variables. In a study conducted in America, the researcher was interested in studying how both individual factors (like effort) and managerial factors (like classroom management) could affect students' academic performance (Stewart 2008 as cited in Lilian (2012). It was found that the amount of effort that students exerted in their studies was positively associated with their academic performance. Even though most studies stated that there was a positive relationship between effort and academic achievement, there were few studies arguing the opposite. For example, in a study conducted by Chassie *et al.* (2004), they studied the relationship between university students' effort (in term of the time they spent in learning) and their academic performance (in term of the grades they achieved). After controlling some external variables like learning ability and prior academic achievement, the results indicated that effort was significantly and negatively correlated with academic achievement. Cognitive competence and effort are correlated with academic achievement. The present study demonstrates that both effort, cognitive and academic achievement are positively correlated, which is found to be consistent with most of the existing literature. For example, in a study conducted in the U.S., the researchers examined the effect of effort and cognitive competence on first-year university students' academic achievement (cited in Chemers *et al.* 2001).

After analyzing the data collected, it was shown that the higher one's effort and more cognitive development, the better the academic achievement He/she could achieve. Attribution theor**y** concerning the relationship between effort and academic achievement, the attribution theory is adopted, the theory, it states that individuals are considered as active beings that "seek to understand and master the task there are carrying out and themselves" (Elliot *et al.* 2005). Based on this assumption, it equally argued that the outcome of individuals' behavior (attitude) can be determined by both external attributions (learning environment) and internal attributions which be the cognitive capability. To him External attributions refer to those factors that individuals are unable to control (difficulty of the task and cognitive competence) while internal attributions refer to those factors that individuals are able to control (effort, like the amount of time students spent on homework). According to this model, both internal attributions and external attributions play a role in affecting individuals' subsequent behavior, like task engagement and persistence. argued that internal attributions played a more influential role than external attributions. It was found that

when students considered themselves as exert great effort into studying the academic subject and hardworking, they also tended to achieve better academically (Blatchford 1996, Light body *et al.* 1996, Gipps and Tunstall (1998), cited Elliot *et al.* 2005). It is assumed that when students put more effort into studying statistics, they are more likely to perform better in the subject. In contrast, when students exert less effort into studying research methods and statistics, they are less likely to achieve a satisfactory.

**5.3:    Implication of the Study.**

The findings of this study have important implications for understanding how children learn in the classroom. Students' attitude in statistics was a critical predictor of academic achievement students, a finding that is consistent with much of the literature. In contrast to the existing literature, this study also suggests that perceived academic competence may play an even more important role than value in shaping achievement achievement. The influence of perceived academic cognitive competence in solving statistics achievement was between classroom management, classroom assessment practice, Furthermore, perceived cognitive competence appears and student's effort mediate the influence of academic achievement in statistics.

The process, it seems, hinges on students developing more value and confidence about their cognitive competence do well in their studies. Once students are confident of their ability to succeed, they become more engaged and put more effort to learn more. On the other hand, students are not likely to attempt educational tasks when they feel they cannot succeed and attach more importance on what they studied. And they are not likely to feel that they can succeed if they put more effort success, along with the support needed to achieve that success.

This study 'have important implications for understanding how students learning in the classroom. Consonant with previous research, they indicate that both attitude in subject and students' perception of their cognitive competence influence achievement statistics for students. But the study does not take consideration from earlier work in suggesting that perceived cognitive competence may be more influential than value in boosting achievement in statistics. Indeed, analyses indicate that student's effort had a stronger influence in academic achievement.

The findings also make clear that supportive classroom assessment practice by teachers will not influence high expectations about behavior are key to the development of attitude and perceived cognitive competence of learners through their critical and creative thinking

competence. This study suggests that the earlier classroom management begin to build students' confidence in their effort to do well, the better off students will be. Because students' attitude of their subject influence their capacity for success and are a key to their learning and of course academic achievement in our schools should be designed to enhance students' feelings of accomplishment in their subject area. Teachers whom students see as supportive and who set clear expectations about attitude help create an atmosphere in which students feel in control and confident about their competence to succeed in future educational endeavors. Classroom assessment is one of the tools teachers can use to inform their teaching and the learning of their students. Unfortunately, the purpose of classroom assessment in most schools seems to be confused and, therefore, not supporting learning (Ainscow, 1988; Stiggins, 2002; Swan, 1993). It recommends the training of classroom teachers in how to assess students and believes that this training would improve and enhance the quality of primary education in the future.

The training of teachers on classroom assessment is a not really a good proposal but can only be effective if the designers of the training program know what teachers are already doing and what they are not doing well. Research in this area can inform the design of the training program. The ministry of secondary Education, which is responsible for the professional development of in-service teachers, may use the results to develop an in-service course should not base on classroom assessment but rather on the measures that can improve on the learners' cognitive competences and making teaching learners centers.

Research in Teaching Regarding the prediction of students' attitudes toward statistics on academic achievement Rebelo (2008) reported students 'performance were influenced by the attitudes they showed toward school and the subjects, learning and commitment to a subject. He noted that students with lower attitudes towards course have low achievement and higher rate of failure and students who have positive attitudes towards a course feel more satisfied with course academic values and perform better.

**5.4:    Limitations of the Present Study**

Indeed, three limitations can be observed in the present study, which include limited representativeness in terms of sample size, sampling method as well as social desirability bias, and absence of a pre-test study.

Limited sample size First and foremost, there were only 253 respondents participated in the present research, which could not be regarded as a large sample size. Also, all of the respondents came from only few of Public Teacher Training Colleges, some Denominational and Lay Private Colleges in two Divisions out of Seven Divisions in North West Region due to social insecurity in this region. Therefore, the opinions collected from them could not be generalized to the large region, the data collected was considered as limited in representativeness because of its' homogeneity.

Sampling method Owing to limited resources, the researcher adopted sampling methods, which were known as convenience sampling where only secured area in the region was sampled even the few colleges were mostly in Divisional headquarters with tied security. Under non-probability sampling, not every sample had the equal chance of being selected. Therefore, the sampling method could also be regarded as another limitation, which reduced the representativeness of the present study.

There are many teacher training colleges in North West region (under Ministry of secondary Education, 2004) and yet only two Divisions taken to participate in this study with only 6 six schools involved the results of the findings can not be generalized to the whole region.

The sample size, sample frame and sampling method make it difficult to generalize the results to the whole population of students in schools at the moment of the research. However, the results are generalizable to the schools sampled and give an insight of what the picture could be like if more participants and other sampling methods were used.

Social desirability bias in the present research, the data collection method was self-completed and truth worthiness questionnaire and there was a methodological flaw for adopting this method. Since respondents filled out the questionnaire on their own, it was possible for them to give answers that are considered favorable as a means to impress the researcher.

Absence of a pre-test study since the present study only took place after the respondents had completed the statistics course based on the mock results written on unsecured atmosphere, a comparison could not be made. If a pre-test was available, the researcher could observe whether there was a change in attitude and academic achievement that students expected in studying statistics before and after taking the final a Capiemp.

The data used in the analyses were based primarily on students' self-reports (with the exception of academic achievement data). They did not involve teachers' reports or direct classroom observations, only students' perceptions of classroom conditions. Without additional data, it is difficult to determine to what extent classroom assessment practices, students' attitude and consistent academic and expectations of conduct.

The operational definitions of the constructs were based on a specific theoretical framework developed by the First reform and drawn from existing data used in its evaluation. While the findings were limited to the confines of the measures and operational definitions associated with those measures, alternative conceptions are possible. For example, a model that included items measuring more cognitive aspects of engagement might yield findings that differ from those presented here, which were based on self-reported behavioral academic achievement.

Another limitation of the present study is that hindsight revealed is the fact that a questionnaire as its main data-collecting instrument was not adequate. Perhaps a more balanced approach would have been to include a much more in-depth interview schedule with a large number of participants (focus group); this would help gather a large amount of information in a short period of time and allow the researcher to observe interaction among participants, rather than the individual interviews used in this study was not effective due to social crisis in the study area.

## 5.6:    Recommendation of the study

Based on the aforementioned discussions and conclusions the following recommendations were made.

### 5.6.1: Recommendation to Teachers

Teachers should be encouraged and motivated to further their studies in subjects that they are qualified to teach, particularly in statistics. Furthermore, the Ministry of Education should also organize workshops, in-service training and seminars to update teachers on new developments in statistics as well in methods of teaching statistics.

The study recommended that school-based teacher counsellors should utilize cognitive behavioral therapy techniques during counselling sessions with students in school in order to enhance cognitive competence. Classroom assignments are given to encourage critical thinking

and to emphasize understanding of   concepts. This is in order to ensure retention of academic content and hence lead to improved performance in examinations' after measure student attitudes toward statistics; the teachers can make efforts aimed to influence the student attitude towards statistics. Efforts to do are as follows:

❖ Encourage students who possess negative attitudes toward statistics to follow the counseling process.

❖  Bring a positive attitude in lectures statistics

❖ If faculty believe that student attitudes toward statistics is an important thing, relayed this to the student

❖ Use of activities that will help students to know and be aware of their attitudes toward statistics

❖ Tell the students that mistakes can be made by students and also by the teacher, and the error can be used as media for learning

❖ Teachers of teacher training colleges should develop caring, supportive, encouraging attitude in the classroom, so that they can maximize students' learning, develop students' social skills and maintain a good disciplinary environment in the classroom. This may be possible by adopting constructivist approach in the classroom management.

❖  Training, refresher courses and workshops may be worthwhile strategies for developing classroom management skills of teacher of training colleges Government on regular basis.

❖ Teachers develop classroom management rules to maintain discipline in the classroom. These rules should be hanged in a visible place in the classroom and should also be communicated to their parents.

❖ Teachers should take their own initiative to engage students more in the learning process so as to eliminate boredom during classroom

❖  Teachers should consider using cooperative learning and grouping students around curricular themes, so as to attract the attention of every student,

❖ Teachers should use multiple instructional methods in classroom. This ensures that the attention of different learners is captured. Consequently, multiple uses of instructional methods ensure students retention of knowledge leading to high academic performance**.**

❖ It would be advisable for supervisors, principals, teachers and parents to bear in mind that affective factors like attitudes towards statistics, values of education, achievement had significant importance on students' academic achievement by preparing some kind of experience sharing conferences, workshops and seminars as extra- curricular activities.

❖ Individuals with low attitudes, values of statistics and effort seem to be impeded in performing their academic achievement. Therefore, teachers and school practitioners should pay attention to the students' attitude towards statistics, values and effort put in their studied, since the variables are important predictors of academic performance.

❖ Students unfavorable attitudes towards statistics, misperceptions towards values of statistics and low achievement would prudently be investigated through student self- report checklist or questionnaire and early appropriate interventions could be taken by arranging special program such as persuasion, modeling and by rendering counseling services.

❖ Research in Teaching Furthermore, an investigation should be carried out how to apply in practice students' attitudes towards statistics based on effort, cognitive competence, values of education and achievement motivation to enhance secondary school students' academic achievement

## 5.6.2: Recommendations Based on Classroom Management

The following recommendations are hereby suggested to enhance further improvement about classroom management: The classroom environment has been shown to be an important variable in the present study. It is important therefore that college authorities should ensure that a good, friendly, and supportiveness atmosphere is created. Such an environment will help promote growth and development of all students. In addition, creating a good environment will provide space for students to express themselves positively in subjects, statistics Science, Social and Emotional Development, and Approaches to Learning.

The need to strengthen and refine the existing educational system to better meet the needs of the students, teachers must be provided a relevant training about classroom management.

Teachers must equip and accomplish the tasks with the help of training to overcome difficulty and stress in the class on daily basis.

Instructors are advised to utilize their full potential and to use resources with confidence like technology and teaching resources, reading and writing to make the classroom managed and effective.

To overcome management instructors are advised to encourage learners to ask questions and participate in the class this would manage and run the class in a smooth way.

The instructors attempt to teach the value of the classroom management to the students; through this way they would learn and create a strong connection about classroom management.

Teachers should consider the students as active participant in the classroom rather a mere listener this would establish a coordination among other students; additionally, they must be given little responsibility (e.g. reminding assessment sheets etc.) to achieve the sense of coordination.

### 5.6.3: Recommendation to Students

Generally, students still believed that statistics involved numbers, but the numbers were representative of something beyond just an answer to a problem. There was some inherent meaning behind the numbers and statistics is about seeking to understand that meaning. Students also believed that they could do statistics using a limited amount of mathematics. Correspondingly, students reported that they dislike statistics that involves complex mathematics, like probability, and that they are not confident about doing this kind of statistics.

Effort develops as a result of students' daily interactions with teachers and peers. Since effort is important for the promotion of a positive attitude, students should be encouraged to develop positive. Statistics teachers should, at all times, strive to convince all students that statistics is meant for them and they can learn and pass it. Such motivation and words of encouragement from teachers can develop positive cognitive ability within individuals and thus influencing their attitude toward statistics.

Students believed that doing statistics means collecting, analyzing, and interpreting data about people. Students believed that the act of doing statistics described as such is useful. Many believed they would use statistics to do more research later in life. Students also described how knowledge of statistics would be useful later for making decisions, whether financial, political, or career oriented. Students did not believe that doing statistics included writing evaluation plans.

The process of planning to do research, which involved significant amounts of reading and writing, was a foreign concept to students. Based on students' beliefs about what it means to do mathematics, it is reasonable to assume that reading and writing is not something that students associate with doing other kinds of mathematics either. Students' concept of doing classroom statistics aligned with their concept of doing statistics in real life. Furthermore, students viewed the statistics that they do to be practically the same as the statistics that statisticians do. Statisticians do the same work just on a larger scale.

To summarize, this study has local implications as well as implications for a more public audience of researchers, educators, and curriculum developers. The study contributes to the knowledge base of statistics education by identifying parallels and divergences between students' attitudes and beliefs regarding statistics. This knowledge has implications for researchers of statistical affect. It emphasizes the importance of research that takes into account the potentially confounding relationship between attitudes and beliefs in teaching statistics. It also exemplifies the need for research that clearly applies a conceptual framework of the affective domain so that synthesis of the body of literature is less difficult.

This finding also has implications for statistics educators and curriculum developers. High school statistics educators can take advantage of opportunities to boost cognitive competence, value and effort regarding statistics before students enter training colleges by structuring classroom activities anchored in real life scenarios such as teaching-learning. Educators and curriculum developers can establish personal relevance of statistics by designing classroom activities that allow students to practice applying statistics in real scenarios. According to these students, real world statistics means applications in terms of money management and career applications.

### 5.6.4: Recommendation to Curriculum Planners

Curriculum planers should keep in mind while planning for training school learners to give more emphasis on the class related activities because there should be a complete plan for teachers too, so that they teach according to the modern day need and demand.

Teachers should involved students in classroom activities; they should motivate and encourage them to be active and participative in all academic and nonacademic school activities to get success in their studies and in general life. The teachers should act according to the mental level of the learners for their mental development and active life. The current day teachers should be more vigilant to exercise according to the current day needs for the learners of the globe in the 21st century. It is the teachers who are to work hard to make a learner ready for practical life and to make them positive about further learning in practical life.

The present study has a contribution to the existing body of knowledge by identifying a condition that can explain the inconsistency about the positive effects of students' effort. The findings have significant implications for educational practice. The study can help parents and educators to capitalize on the positive way student's effort can be praise on student's motivation.

### 5.6.5: Recommendation for Educational Counselor

Decreasing willingness among students is vital to developing high levels of self-determination towards statistics. Implementing numerous opportunities for students to engage in research throughout their studies allows for opportunities to be exposed to statistics, thus increasing students' confidence when faced with taking a statistics course.

Also, inserting research and statistics into the curriculum of every graduate course exposes graduate students to the terminology and function statistics play in their development as professionals. Possible ways to decrease statistical anxiety is through language and experience. Allowing students to learn what is being said in a statistics course through weekly vocabulary assessment can be one example of decreasing their anxiety. Also, getting the students involved with their own research throughout their course of study will help in promoting statistics mastery.

Improving attitudes towards statistics can help students reframe their negative views towards the course. Helping students to choose a positive view explore origins or core of negative attitudes, and to appreciate the usefulness of statistics in their profession are good starting points for developing salient attitudes towards the subject.

Counselor or educators in a position to help students confront negative attitudes, model positive attitudes and enthusiasm for statistics, and place a high value on statistics through verbal support and high expectations of statistics for students in their training programs. The teacher teaching statistics can play a key role in positively impacting their students' attitude toward the subject. Injecting humor, displaying empathy, providing a safe space for students to talk about their challenges, and celebrating their small successes can be tools in combating negative attitudes. Anecdotal stories of statistics professors engaging in statistical rap songs have been reported to successfully alleviate attitudes towards the subject as well as provide a positive environment to engage in learning.

➢ Qualification is a crucial aspect in every sector of the economy. Teachers' qualification should be given due consideration in our educational system. Teachers must undergo a professional training and obtain a teaching qualification before they can start teaching. All those in classrooms without a professional teaching diploma should be expelled from the teaching core.

➢ The training of teachers should be more intense and serious attention be given to training on classroom assessment.

➢ Professional development for teachers should be compulsory for all teachers and the intensification of impregnation programs termly.

➢ Introduction of soft skills education plays an essential role in shaping attitudes and culture. Its impact includes increase in employability, business and economic understanding, increased confidence levels and motivation. It helps recipients to realise their existing talents and strength and develop a wider belief that they can succeed. Soft skill education leads to enhanced self-esteem, cultural values and work ethics.

➢ The need to increase and encourage motivation to teachers from both the government and private shareholders. The government should regularise the training and recruitment of teachers in the private sector.

**5.6.6: Theoritical Suggestions for Future Research.**

➢ This research has been conducted for students of teacher training colleges. It is suggested that future research be done on other sections.

- It is recommended that in future researches examine the relationship attitude with mental health, alcohol consumption, anxiety, fear, and depression and addiction treatment.
- Conducting researches in which other factors affecting academic achievement should be considered: such as the emotional motivations. Role of parents and family factors on academic achievement should be considered.
- Teachers teaching method and their effects on students' academic performance should be considered.

### 5.6.7: Practical Suggestion to Teachers

Planning a quality educational activity begins with knowledge of the students for whom it is designed. This pedagogical principle has historical roots. Dewey (1938) argued that teachers must be aware of the past experiences, needs, and capacities of students the assessment practices applicable at specific lesson as well as making good use of classroom management skills. Bruner (1966) added that student predispositions, such as cultural, motivational, and personal characteristics, are also important when planning instruction. Because students show positive and high value, effort, perseverance and desire to learn more and achieved high, it is important for teachers to know the background of student that is what they study in secondary school so as to know the approach to use in teaching a course, this is because most of what teachers do or can do can have an influence on students ' academic achievement by knowing the student cognitive competence  in the subject will enable the teacher to know the best approach to use for their high achievers and slow achiever when planning lesson take into consideration such attributes on your learners;.

System of assessment in education and curriculum must be designed in a way that based on mastery learning, all learners have the opportunities to achieve mastery levels and experience failure less and more success and lead to increase in their self-determination.
Teachers must avoid any unseasonable reproach of students that lead to decrease in their confident and lower their effort and instead try to make conditions for students to increase their cognitive competencies especially through creative thinking skills by encouragement and emphasize on their strengths.

Learning environments or classroom and teaching staff in institutes must maximize their efforts to protect intellectual background of students and the expectations they have of their new learning environment and guide them to a land with the extent of science by asking for articles and by representing and making familiar with desiderate topics, and various book in long term and not to cut such programs and always try to preserve their activity.Teachers should be responsible to their students to enhance student's self-determination and value attach to statistics.

Additional tuition should be provided for students to increase their achievement. Counselors and educators should give continuous advice and develop techniques that help lower achievers and reduce stress, to increase students' effort in their academics.

### 5.6.8: Proposed Techniques to Teach Statistics for Trainee to Understand

The general observation is that at the teacher training colleges in Cameroon, statistics lessons lack the necessary attractions to make the subject meaningful and appealing to our students. A good practice in teaching statistics at that level will be a student-center activity which involves a variety of activities to enable the learners to like and learn the subject as they do and talk statistic. Such practice relates statistics teaching and learning to our daily life activities and makes learners' learning more fun. The following aspects are helpful to the realization of such good practices in teaching statistics:
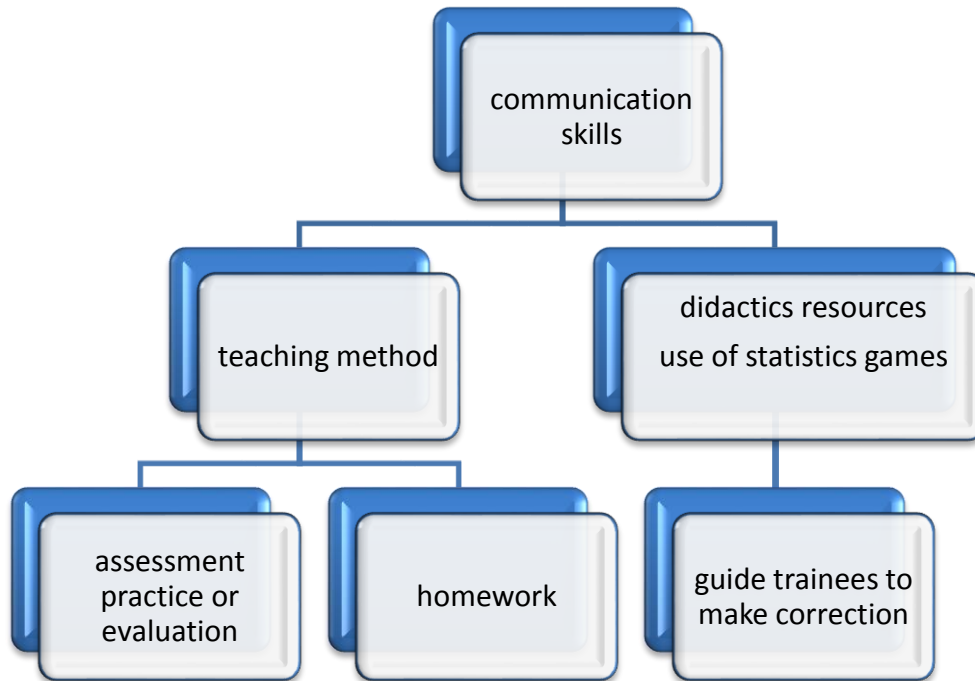
**Model for teaching of statistics authors conceptual (2021)**

➢ **Good Communication Skills**

The use of simple language is needed to help learners to understand so they can respond to whatever is being taught. For example, the product of 6 and 4 to a lower class in a training college should rather be: Multiply 6 and 4. In the case of teaching a statistical Concept of greater than **(>)** to a P1 class, it will be better to use bigger than before the concept of greater than is used. Also, the teacher's voice must be clear and loud enough.

➢ **Teaching from Concrete, through Semi-concrete to Abstract**

In teaching learners to develop a concept, start with real or concrete objects, follow up with diagrams/charts or sketches and end with symbols. In counting at the early stages, use counters such as bottle tops, then follow up with pictures of groups and end with numerals (symbols). c) Word/story Problems should be related to learner' Environment We needs to tap learner' Previous Knowledge for effective teaching and learning. It is therefore, necessary to relate word/story problems to the learner' environment. For example, a problem in a farming community could be related to foodstuffs. In sum, the pupils should be exposed to things they are familiar with.

➢ **The Use of Correct statistical Language/Terms**

Statistics is used as a means of communication and as such language/terms are associated with it. These can only be acquired through usage. Therefore, from P1 the correct statistical language/terms have to be used, e.g. as one half, 0 as zero, 10 5, i.e. five tenths, 3 2 as two thirds, 106 is read, one hundred and six.

➢ **The Use of statistical Games/Puzzles**

Statistical games portray statistical concepts. They allow teachers to employ the Play/Activity method of teaching statistics. They help to consolidate lessons taught. Examples of statistical games include: Ludo, Oware, Dominos, Fraction Game, etc. Puzzles encourage learners to reason, analyze and enjoy statistics at the same time.

➢ **Assignments for Evaluation**

The assignments are the exercises/project/homework given out to learners to do in order to find out whether or not they have understood a lesson delivered. This is also to ascertain whether the teacher's methodology was appropriate or not. Giving assignments for evaluation is an important tool for the teacher to assess the effectiveness of the lesson taught. Teachers are therefore to be cautious of how to select test items.

➢ **Guiding trainees to Make Corrections and Marking them**

It is a remedial process put in place to help the pupil overcome learning difficulties and to be on the right learning track. Through corrections, the teacher could determine whether the learner has fully understood the concept or not. When a trainee is able to solve a problem in a second attempt, he feels motivated and confident to attempt a harder task. It is important therefore for the teacher to go about correcting exercises cautiously so that the learner is able to get an exercise right, at least, on the second attempt. Teachers should use students' progress records to give remedial classes to students with weaker grades Finally, students should be exposed to numerous assessments in a single term so as to measure and evaluate their level of achievement in different topics and syllabus. This way, areas of inadequacies in retention of knowledge would be noted and addressed before summative examinations are given.

To sum up, there were multiple benefits of this study. First, this study contributed to counselor education and student support services by increasing our knowledge of effort, cognitive

competence and value to learn statistics as experienced by students. It also is significant because it documented students' experiences from assessment and classroom management, which may act as a spring board for future research, implementing support interventions to increase success in statistics courses, helping students prepare for intrapersonal challenges that might impact their success in statistics. Each of these improvements are beneficial because they may increase student's effort and success in statistics courses as well as increase the incorporation of statistics into professional work after graduation**.**

### 5.6.9: Propose Teaching Content in Statistics

The teaching content is the abandonment of an "information transfer" model in favor of a "constructivist" view of learning: Students are not empty vessels to be filled with knowledge, Higher-order thinking problem solving and flexible skills applicable to unfamiliar settings. Following the old teaching method: Students learn by absorbing information; a good teacher transfers information clearly and at the right rate. the new proposed teaching method, Students learn through their own activities; a good teacher encourages and guides their learning. What helps learning: Group work in and out of class; explaining and communicating; frequent rapid feedback; work on problem formulation and open-ended in practice, the new teaching asks us to change what students do from listening and reading to active participation. Students learned to carry out specific procedures to gain answers to well-posed questions under somewhat restrictive assumptions. A modern first course will (in my opinion) offer a more balanced introduction to data analysis, data production, and inference. Exploring data, designing data production, using diagnostic tools to ask whether a proposed method of inference is appropriate have a "back and forth flavor quite unlike the "straight ahead" nature of traditional statistical calculations will base:

**Emphasize the elements of statistical thinking:**
➢ the need for data,
➢ the importance of data production
➢ the omnipresence of variability,
➢ The measuring and modeling of variability.

**Incorporate more data and concepts, fewer recipes and derivations**.

Wherever possible, automate computations and graphics. An introductory course should

➢ rely heavily on real (not merely realistic) data,

➢ emphasize statistical concepts, e.g., causation vs. association, experimental vs. observational and longitudinal vs. cross-sectional studies,

➢ rely on computers rather than computational recipes,

➢ Treat formal derivations as secondary in importance.

**Foster active learning, through the following alternatives to lecturing**:

➢ group problem solving and discussion,

➢ laboratory exercises,

➢ demonstrations based on class-generated data

➢ written and oral presentations,

➢ Projects, either group or individual.

### 5.6.10: Proposed Way to Facilitate Changes in Statistics Education

Increase the knowledge of the statistics reform movement and improved methods of teaching statistics and current resources available. One of the ways to do this is to expand the number of workshops currently being offered for statistics instructors. Another strategy is to establish or improve communications between statistics education groups and other professional groups which include teachers of statistics (e.g., mathematics and cognitive competence). The use of cognitive approach which involved with the role of mental processes or associations, here, the student does not require an outward demonstration of learning but the student relies on the internal processes and connections that take place during the learning experience. Following Dewey (1938) states that learning involves "learning to think".

He further goes on to say that the process of learning is much more than the task or activity which also requires reflection and learning. According to Dewey, the purpose of thought is attaining a state of equilibrium which enables an individual to solve problems and to prepare them for further inquiry. The teachers employing the Pedagogic Techniques, Teaching and Learning Methods that will help develop cognitive level of students. So, this approach of Dewey plays an important role in the student's development cognitively.

**Develop observable models**. Develop ways for instructors to see models of good teaching in action, teaching that exemplifies recommended techniques and theories of learning. These methods need to appear real and transferable to other classes and settings. They also need to be convincing in their connection to positive outcomes: improved student learning and performance, positive student attitudes, and instructor satisfaction. I think one possible way to provide these demonstrations would be a multimedia CD ROM or web site for statistics teachers. In order to create this resource, examples are needed of instructors and departments who have successfully implemented aspects of the reform. These individuals and their settings would be studied to document what they have done and how well their students have learned statistics. The resulting materials would include video segments of statistics teachers who teach in a variety of settings (e.g., a large class at a public university, a small class at a liberal arts college, and a community college class). These video segments would show a composite of an instructor's classes, as well as interviews with the instructor about their teaching methods. It might also include interviews with students about their perceptions of the course and show examples of students' work, such as presentations or student projects. The teachers selected for the video would represent innovative instructors who have successfully incorporated new techniques in their classes such as computer labs or demonstrations, small group discussions, hands-on activities, journal writing, or student projects. The CD ROM or web site would include links to the resources used by these teachers such as, data gathering activities, data sets, software programs. New Teaching and New Content:

**The Case of Statistics**

The teachings based on constructivist learning theory, John Dewey and Jean Piaget explored childhood development and education, recommended that we learn by increasing our knowledge through experiences that are generated through play from infancy to adulthood which are necessary for learning. Their theories are now incorporated in the larger undertaking of progressive education. According to the theory, students learn by constructing their previous knowledge and experiences by vigorously engaging in the learning process, instead of getting knowledge passively though lectures and repetition constructivist teaching uses guided discovery, discussions on thoughts and ideas as well as activities to help students learn and develop skill ability which increase their cognitive competence. The constructivist declares that all knowledge is constructed from a base of prior knowledge. Children are not a blank slate. Knowledge cannot be communicated without the child making sense of it according to his or her current

understanding. Hence, children learn best when they are allowed to construct a personal understanding based on experiencing things and reflecting on those experiences.

Constructivist teaching nurtures critical thinking creates motivated and independent learners. The theoretical framework of constructivist embraces that learning every time builds upon knowledge that a student already knows, this prior knowledge is called a schema. The constructivist propose that learning is more effective when children actively engage themselves in the learning process rather than trying to receive passive information because all learning permeates through the pre-existing schemata. Numerous methods claim to be based on constructivist learning theory and most of them rely on some form of guided discovery where the teacher avoids direct instruction and attempts to lead the student through questions and activities to discover, debate, appreciate and verbalize the new information.

Obtain visible support from outside. Strong support from government agencies and university administrators is needed to encourage change in the faculty reward system that will allow faculty freedom to experiment with new instructional methods and revise their courses, and provide time focus on improving their teaching. Faculty should also be encouraged to collaborate in educational research related to their teaching; addressing issues such as those raised relating to the use of statistics.

**5.7:    Conclusions**

To conclude the present research proves that all the variables (cognitive competence, value, effort, classroom management, assessment practices and academic achievement) are correlated with some be regarded as an indirect factor that can influence both attitude, statistics teaching   but can influence academic achievement directly and indirectly. As seen from other past research, the study further confirmed the direct relationship between attitude, teaching and academic achievement as suggested in past reviewed literature. It is observed that attitude and effort have a direct effect on academic achievement as review by the results.   Therefore, it is for these reasons that more effort and value attaches on a subject is likely to espouse higher Academic Achievement, whereas, low academic effort is likely to diminish it.  While such   efforts may be praise worthy. The findings in this study support the point of view that value attaches on statistic appears to be a significant factor contributing to Academic Achievement. Although attitude and value as well cognitive competence were shown to positively relate with the statistics achievement GPA

improvement among the students of teachers training colleges in North West Region of Cameroon the real dollars questions might be how it causes or affects the achievement? The research posits that classroom assessment. So, in the nutshell student's cognitive competence, effort and value play a great role in their academic achievement. Lastly, a direction for future research is the possibility that student creative, critical level moderate the effect of efforts and academic achievement. Other scholars have suggested that students of different ability levels might interpret and respond differently to statistics related problem. For example, statistics assessment practices and of a student with high statistics cognitive competence might not be strongly affected by teacher classroom management technique and assessment practices, but might be strongly affected by a challenging one.

Focus on studying the role of "effort" In addition, in the present research, the statement that "effort" serves as a direct factor between attitude, pedagogic and academic achievement is still under question. The correlation analysis proved that there was a positive relationship between cognitive competence and effort. Similarly, after conducting the correlation analysis it was found that both classroom assessment practices and classroom management could not significantly predict academic achievement. However, when the researcher conducted analysis to test whether all the two variables of teaching base on pedagogic aspects like classroom management and assessment practice) could not significantly determine academic achievement, it was found that effort successfully help as an indicator for academic achievement. This is an indication no matter how a teacher is an expert on assessment practices and good in managing his or her classroom if the student doesn't work hard or put more effort in their studies, they wouldn't achieve any success. So, effort of the students is the main determinant of student's academic achievement as review by the study. This indicates that the higher the students' cognitive competence, the better the academic achievement of students in statistics. The results at the level of cognitive competence is in line with Piaget's theory of cognitive development proposes that humans cannot be "given" information which they immediately understand and use. Instead, humans must "construct" their own knowledge based on their cognitive competence. Their cognitive knowledge might be through experience. Experiences enable them to create schema that is mental models in their heads. This is done through two complimentary processes: assimilation and accommodation. Assimilation to piaget is using an existing schema (knowledge) to deal with a new situation. Accommodation on the other hand happens when the existing schema doesn't work and needs to be changed to deal

with a new situation and equilibration is the force which moves development along. To piaget, assimilation and accommodation require an active learner, not a passive one because problem-solving cannot be taught, they must be discovered.

Everything that we want to achieve requires some effort. But how important is effort in achieving our goals?

The effort you put in today determines your success tomorrow. Rory Vaden, the author of "Take the Stairs: 7 Steps for Achieving True Success", says, "Success is never owned; it is only rented – and the rent is due every day." Effort, like cognitive competences needs to be applied consistently. To achieve our goals, we need to put in the effort each and every day. On days that we feel good and on days when we don't feel like doing the work. Many people will put in effort for a short time and when their effort does not immediately pay off or they become distracted by life, they stop putting in the daily effort needed to finish and succeed. One way to keep yourself motivated to put in the effort needed for your goals is to think of all the other people who have the same goal. Knowing that most people will at some point give up and stop putting in consistent effort, you can use this to motivate you to continue to work hard and keep moving forward. I call these "Get ahead" days. These are the days that you get ahead of your competition. After all, everyone can put in the effort when they are feeling good or the circumstances are perfect, but not many persist through the tough days.

Effort is really just a habit that we need to develop if we want to be successful. Success requires that you are willing to do whatever is necessary, when it is necessary in order to succeed. Effort pays off in many ways. When we put in effort, we learn. Whether the effort produces results or not, we can learn and adapt based on what we learn from our efforts. If our efforts lead us further away from our goal, then we need to change our strategy. If our effort brings us closer to our goal, we can double down with our effort, as efforts eliminates fear. By putting in the effort, we know what we are capable of and do not need to be afraid.

Effort teaches us that we can do more than we thought. We learn new skills and abilities when we take the time to put in consistent effort. Every new success that we achieve through our efforts increases our confidence in ourselves and our abilities. Effort keeps us focused on success.

As your effort brings you closer to your goal, your motivation and willpower increase as you can taste victory.

This implies that, in a classroom situation, students should be given opportunities to construct knowledge through their own experiences. As suggested by Isidore Lauzier and alii (2007), "The teacher (to remain in uniformity with what preceded) is an adviser; it is the student that looks for the means of acquisition of his knowledge".

They should be able to use previously learned materials to build new concepts and competences based on their cognitive ability or mental mindset or maturity. It is for this reason that teachers always revise previously learned materials in order to allow students to be able to develop new outlooks, think and rethink what were once misunderstandings and evaluate what is important, ultimately altering their perceptions thereby developing their competence skills. According to Piaget, teachers can also provide a learning environment that helps expand the conceptual and experiential background of the students by allowing them to work in groups or pair and research controversial topics which they must then present to the class. Here, the teacher acts as a guide or a facilitator while the students perform the task. This is because for students to develop their own cognitive competence or skills, they must be active creative and put more effort in order to attain their objectives. Generally, parents all wants their children to be bright and successful, however they have to show that when students are praised for their effort rather than their intelligent their academic skills increase and their grades, content knowledge and understanding vastly improve.

All students have their cognitive competence to become successful and star by taking the emphasis off grade (the product) and laid more emphasis on one effort (the process), the students motivational and learning will increase.

The point is that students  wanted to drive home with results put more effort, effort multiplies your ability as well increase cognitive ability. When students put in effort and ability increases your cognitive competence, students who continued pay off from it, will likely had more interest and consequently achieve high. Setting goals can help students do better academically they should set short term; tangible goals are most effective when a student put more effort to earn high in academic is the best way to do by putting more efforts in their academic. Set their goals on the

short term, more tangible of a class committing to in doing homework, showing up to certain number of classes or dedicating a set of time for exam preparation.

Self-determination will help students believe in themselves (believe in one's capabilities to achieve a goal or outcome. Students with strong sense of efficacy or determination are more likely to challenge themselves with difficult task and to be intrinsically motivated. This could be done through high degree of effort in order to meet their goals. Effort keeps us focused on success. As your effort brings you closer to your goal, your motivation and willpower increase as you can taste victory. Another practical, way to promote effort is by providing feedback to students. In teaching, feedback refers to comments that students get dealing with their success on learning tasks either from a teacher or other persons (Richards & Schmidt, 2010) and needs to be given respectfully as cited in Gai Mali, (2017).Essentially, the teacher should emphasize low effort as the primary factor in their students under achievement in learning, so she/he can encourage them to do better in the future. It is also necessary to tell the students that they need to complement their effort with learning strategies, described as behavior and techniques those students adopt in their effort when they learn.

Encouraging Learners to Offer Effort more effort in their learning, students need to be encouraged in explaining any effort they have done to be successful in their class. Ushioda (1996) believes that "the motivational belief in the value of individual effort will have a stronger foundation if students express it using their words" (as cited in Dornyei, 2001). In that case, the teacher can ask his/her students to reflect and provide some details about challenges about the tasks they carried out. Should she find assignments like that in the future, please point it out because the teacher would like to make modifications and adjustments so that the effort that you are investing is more likely to have a payoff for you.

**Possible ways to improve students' efforts**

The use of moderately difficult tasks if the task is too easy it will be boring and embarrassing, may communicate feelings that teachers doubts their abilities, a too difficult task will re-enforce low effort. When we put in effort, we learn. Whether the effort produces results or not, we can learn and adapt based on what we learn from our efforts. If our efforts lead us further

away from our goal, then we need to change our strategy. If our effort brings us closer to our goal, we can double down with our effort so the more we put in effort the more we learned.

The use of peer modes students can learn or double their effort by watching a peer succeed at a task. Peers may be drawn from groups as defined by gender interests' achievements. Effort could be reinforced by capitalizing on students' interests. Effort is really just a habit that we need to develop if we want to be successful. Success requires that Students are willing to do whatever is necessary, when it is necessary in order to succeed.

Allow students to make their own choices, set up some areas of the course that allow students to make their own decision such as with flexible grading, assignment option or self-determination Encourage students to try by given them consistent credible and specific encouragement such as "you can do this, we.ve set up an outline for how to carry out their activities"

Encourage accurate attributions by helping students that they don't. fail because they didn't follow instruction, they didn't spend enough time effort on the task or they didn.t follow through on the learning strategy. The teacher might state, "If you worked that hard and you didn't make progress, it wasn't an appropriate assignment for me to give you. We need to find a way to communicate with each other faster. Don't go that long without being successful, without checking in with me so I can support your effort."

**For cognitive competence to be effective students need to apply the following ways:**

➢ Learning to learn" refers to the need for civil society to learn and understand the challenges to be taken (both at global and local level), as well as the potential role of educators and students may play in meeting these challenges

➢ Learning to do" looks at developing practical skills relating to education for sustainable development;

➢ Learning to live and work together highlights the need to develop cooperation and understanding the importance of interdependence, pluralism, mutual understanding and peace

➢ Learning to be" deals with developing personal approaches and the ability to act with greater autonomy, ability to judge and personal responsibility for sustainable development curriculum developer should use pedagogical approaches that are constructivist, inquiry-based, reflective,

collaborative, and integrative which will help to reinforce the development of cognitive competencies on learners in this their academic attainment will be possible. They should use the Cognitivist ideas to reinforce cognitive competences on learners which involved the role of mental processes or associations. Here, students do not require an outward (environment or extrinsic influence) demonstration of learning that students rely on the internal processes and connections that take place during the learning experience. Dewey (1938) states that learning involves "learning to think". He goes on to say that the process of learning is much more than the task or activity which also requires reflection and learning. The purpose of thought is attaining a state of equilibrium which enables an individual to solve problems and to prepare them for further inquiry which enriches their thinking capabilities. To that effect teachers should employ Pedagogic Techniques, Teaching and Learning Methods that will help develop cognitive competencies of students, this approach of Dewey play an important role in the student's development cognitive competencies which then acts a bridge to their academic achievement as affirm by the hypothesis which shows a strong relationship between students cognitive competencies and academic achievement. The teachings using constructivist ideas could also increase the learner's cognitive competence, childhood development and education, recommended that students learn by increasing their Knowledge through experiences that are generated through role in activities play from infancy to adulthood will necessary increase cognitive competences in learning and performing future tasks without any difficulties. Students who learn by constructing their knowledge and experiences engages in the learning process to improve their competences students are not completely blank slate as we think. Hence, students learn best when they are allowed to construct a personal understanding based on things experience and reflect on those experiences. Teachers should nurture critical and creative competences which creates motivated and independent learners which can improved on their achievement. The present study which investigated the factors that influence students' attitude toward statistics has never been carried out in Cameroon before. Findings from this empirical study should therefore add an important aspect to the body of knowledge that is already available. Other studies reported however, that students' attitudes toward statistics were influenced by other variables, such as students' effort and cognitive competence.

# GENERAL CONCLUSION

A common belief among many educator and stakeholder is that quality of education depends on students' attitude and teaching while teaching and learning strategies depends largely on curriculum content and the school programs that will support and enrich the curriculum implementation and the quality of teaching statistics. Many teachers are entering classroom without the in-depth knowledge of the content, poor classroom management strategies, inadequate planning and minimizes students' level of assimilation and previous academic background as a result this disruptive effort of students might impedes learning and minimizing students' academic achievement. This explains why some teachers enter teaching professions with limited or lack of confidence in their skills. To support this view point researchers have found out that many teachers admit they lack affective skills and students' motivational tactics that endorse learning of statistics in their various classroom not to talk administering a good assessment to learners which an effect will lead to high level of failure.

Some pedagogical issues can be derived from the findings suggesting that statistics competence and attitude toward statistics should be focus of planning new innovation and invention to help students increase their academic achievement, given that cognitive competences appear to be interrelated in determine academic achievement, intervention strategies should be geared at increasing both statistics knowledge and attitude toward the discipline. This is especially important because students should be supported in changing not only their competence, value, effort and assessment practice but also to perceive difficulty and utility of the course as well as their feeling towards statistics. Moreover, to help students enhance their confidence in learning statistics, it might be useful to give exercises that allows students to experience mastery of the topics and to provide feedback about their results in order to allow them monitor their progress. These exercises can help students especially if they are embedded in cooperative activities in which they interact within a group while performing specific tasks. In the same way it might be relevant to promote the importance of the discipline, showing students that statistics is not isolated subject

inside their degree programs-for example through explaining the important of statistics for research in different domain and to clarify statistical terminology and the concept using example taken from the current studies. Once problems with basic statistics are reduced, all students should benefit from these innovative strategies. In order for students to achieve their goals, teachers have to build some common criteria that students can use in making their decisions. Let students be enlightened four ways of effort that can help:

**Time**: Students can use the above ways to judge the level of their effort. First, time. It's pretty difficult to put effort into a task without expecting much time on a task.

**Perseverance**: The second item is perseverance or do-overs. The number of repetitions is an indicator of effort. The number of times a student is willing to carry out  task  will help him or her  to discover that the process using wasn't being effective  or effective or  instead of quitting or leaving a task  he or she might backed up and started it over as such showing an important indication of his or her   effort

**Patience**: Third is patience for a student to be successful and achieve his or her goals he or she need to exercise more patience, effort requires patience because the initial investment of students is the frequent effort put in. Lastly, when students initially meeting success or achievement, does the student continue to put in effort or practice?

**Repetition of success**: More repetitions after the initial success is another indicator of effort the more students carried a task over the more He continue to achieve more.

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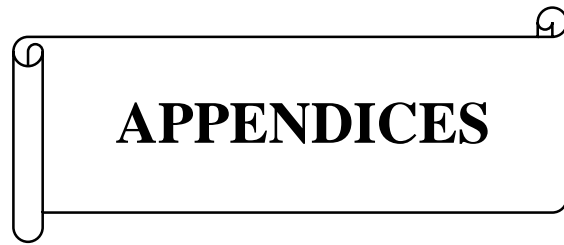Tchombe, T. (1998). Progressive transformative teacher education in Cameroon.

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# APPENDICES

# APPENDIX 1: QUESTIONNAIRE FOR THE STUDY

| | |
|---|---|
| **UNIVERSITE DE YAOUNDE I** | **UNIVERSITY OF YAOUNDE 1** |
| ************ | ************ |
| **FACULTE DES SCIENCES DE L'EDUCATION** | **FACULTY OF EDUCATION** |
| ************ | ************ |
| **DEPARTEMENT DE CURRICULA ET EVALUATION** | **DEPARTMENT OF CUURICULUM AND EVALUATION** |
| ************ | ************ |
| **République du Cameroun** | **Republic of Cameroon** |
| ************ | ************ |
| **Paix-Travail-Patric** | **Peace-Work-Fatherland** |
| ************ | ************ |

**Dear Respondents,**

I am a Doctorate student in the Faculty Education, Department Curriculum and Evaluation University of Yaoundé 1, carrying out a research on a topic: *student's attitudes in teacher training colleges in the North West Region towards teaching of statistics*. This study is strictly for academic purpose. Your responses shall be used to fulfill the purpose intended and shall be treated with confidentiality. Please place a bold tick (√) in boxes and fill the blank spaces provided. Thanks

## SECTION A: DEMOGRAPHIC INFORMATION

**1) Sex: 1) male** ☐     **2) female** ☐

**2) Age: (1) 20 -25years (2) 26 -30years  (3) 31-35**

## SECTION B

Please rate the various aspects of student's attitude and self-efficacy as a gate way for academic achievement in statistics by placing a bold tick in the boxes (√) in terms of the extent to which you agreed or disagreed with statements.

Modalities: 1. Strongly Disagree     2. Disagree     3 Agree     4. Strongly Agree

| SD | D | A | SA |
|---|---|---|---|

## I)     STATISTICS TEACHING

## 1) Classroom Management Based On Discipline

| SN | Statement on classroom base on Discipline dimension | SD | D | A | SA |
|----|------------------------------------------------------|----|---|---|-----|
| Q1 | Reprimand bad behavior on the spot in a loud voice. | | | | |
| Q2 | Send a student home for aggressive or destructive behavior. | | | | |
| Q3 | Send a student to Principal's Office for misbehavior. | | | | |
| Q4 | Use nonverbal signals to redirect child who is disengaged | | | | |
| Q5 | Ignore misbehavior that is non-disruptive to class | | | | |
| Q6 | Single out a child or a group of children for misbehavior | | | | |

## 2) Classroom management based on the Teaching and Learning dimension

| SN | Statement | SD | D | A | SA |
|----|-----------|----|---|---|-----|
| Q1 | Respond to the student's incorrect answers, validating student's participation. | | | | |
| Q2 | Offer students guidelines and suggestions to report the group about their completed work | | | | |
| Q3 | Use problem-solving strategy (e.g., define problem, brainstorm solutions) | | | | |
| Q4 | Teacher allowing students to practice writing and doing their notes | | | | |
| Q5 | Teacher giving students practice Exercise. | | | | |
| Q6 | Teacher talking and allowing students questions to ask or comment | | | | |
| Q7 | Teacher talking throughout and students listen | | | | |
| Q8 | I often use group works since they are necessary for students' social and cognitive development. | | | | |
| Q9 | I immediately tell students the correct answers when they cannot figure them out by themselves. | | | | |

**3) Students' classroom assessment practices, Teachers Training College**

| SN | Students' classroom assessment practices, | SD | D | A | SA |
|---|---|---|---|---|---|
| Q1 | Assessing students through rubrics | | | | |
| Q2 | Peer assessment practices | | | | |
| Q3 | Consensus between students and teachers | | | | |
| Q4 | Share scoring criteria with students | | | | |
| Q5 | Online resources in assessment | | | | |
| Q6 | Feedback on assessment tools | | | | |
| Q7 | Encourage student decision-making and problem solving skill | | | | |
| Q8 | Help students learn from other classmates | | | | |
| Q9 | Help students learn to cooperate and collaborate | | | | |
| Q10 | Provide good student feedback | | | | |
| | **Classroom Assessment Practices method for Teachers training college** | SD | | | |
| Q1 | Paper pencil tests | | | | |
| Q2 | Objective type test | | | | |
| Q3 | Extended response /essay test | | | | |
| Q4 | Question answering | | | | |
| Q5 | Home work/ assignments | | | | |
| Q5 | Group or individual project | | | | |
| Q6 | Portfolio assessment of student | | | | |
| Q7 | Written class summaries | | | | |

## 2) ATTITUDE TOWARDS STATISTICS

### a) Students Cognitive competence

| SN | STATEMENTS | SD | D | A | SA |
|----|-----------|----|----|----|----|
| Q2 | I can learn statistics. | | | | |
| Q3 | I find it difficult to understand statistical concepts. | | | | |
| Q4 | I find statistics formulas easy to understand. | | | | |
| Q5 | I think statistics is a complicated subject | | | | |
| Q6 | The thought of being enrolled in a statistics course makes me nervous. | | | | |
| Q7 | Statistics seems very mysterious to me. | | | | |
| Q8 | I have difficulty seeing how statistics relates to my field of study. | | | | |
| Q9 | being enrolled in a statistics course as a very unpleasant experience. | | | | |
| Q10 | Statistics is too math oriented to be of much use to me in the future | | | | |
| Q11 | Dealing with numbers makes me uneasy. | | | | |
| Q13 | I think statistics is worthless subject to arts students | | | | |
| Q14 | Statistics should be a required subject for admission in training colleges | | | | |
| Q15 | I feel that statistics should be required early in one's professional training. | | | | |

## B) STUDENTS VALUE IN STATISTICS

| SN | Statements | SD | D | A | SA |
|----|-----------|----|----|----|----|
| Q1 | Statistics is worthless | | | | |
| Q2 | Statistics should be a required part of my professional training | | | | |
| Q3 | Knowing statistics will help me improve my mathematics result | | | | |
| Q4 | Statistical skills will make me more employable | | | | |
| Q5 | statistics is applicable to solving human and natural problem | | | | |
| Q6 | Statistics is not useful to the typical professional | | | | |

| Q7 | Statistical thinking is not applicable in my life outside my job | | | | |
|-----|--------------------------------------------------------------|---|---|---|---|
| Q8 | Statistical skills will make me more employable. | | | | |
| Q9 | Statistics is worthless. | | | | |
| Q10 | Statistics is irrelevant in my life. | | | | |

## C) STUDENT'S EFFORT

| SN | STATEMENTS | SD | D | A | SA |
|-----|------------------------------------------------------------------------------------------|-----|---|---|-----|
| Q1 | Apart from completing the course assignments, I also complete | | | | |
| Q2 | I worked hard to complete the Statistics course | | | | |
| Q3 | To get full understanding on statistics content, I read the lecture notes more than once. | | | | |
| Q3 | I paid close attention to what the lecturer said in class. | | | | |
| Q4 | I studied hard and prepared well for every statistics test | | | | |
| Q5 | I constantly solve statistics questions | | | | |
| Q6 | Before coming attending statistics I make sure I solve all the exercises | | | | |
| Q7 | I solve and read statistics every day | | | | |
| Q8 | Anything taught in class that I don't.t understand I always consult another student. | | | | |
| Q9 | I always ask questions in class whenever I don't understand a concept | | | | |
| Q10 | I make sure I solve all the exercises in my textbook relating to the topic taught | | | | |

## 3)   ACADEMIC ACHIEVEMENT

**a)   Statistics competency achievement test**

**Please put a x on the right answer**

1.      Mr. BAFON has determined that there is an 85% chance that the number of people visiting Prince Edward Island in the month of August will be between 3,700 and 2,200.  This is an example of:

A)      a point estimate

B)      B an interval estimate

C)       C high percentile rank

D)      D a strong correlation

2.      Mildred has developed an initial coding scheme for her qualitative data.  Ideally, her next step in this analysis should be to:

A)      Develop a more detailed set of sub-codes that will capture the nuances of the data

B)       Apply it to a subset of the data and then re-evaluate the code.

C)      collect his data

D)       compute inter rater reliability

3. Let A and B be two events. Suppose the probability that neither A or B occurs is 2/3. What is the probability that one or both occur?

A)      1/3

B)      2/3

C)       1/4

D)      1/5

4.  You have taken the ACT exam, an exam taken by students who wish to apply for admission to a college. You are told that you have scored at the 80th percentile. From this information you can conclude:

A)      You have answered 80% of the questions correctly.

B)      You have an 80% chance of succeeding in college.

C)       You have scored as high as or higher than 80% of the persons who have taken the test.

D)       . None of the above.

5.If a clinical psychologist read in a scientific journal that sixty percent of all clinical psychologists suffer from hypertension and she believed this was too high, she would write the alternative hypothesis as:  a

A) Ha: p < .60

B) Ha: p > .60

C) Ha: p = .60

D) Ha: p ≤ .60

6. As a researcher you might discover that certain events almost always precede other events, or that certain thoughts and feelings almost always precede certain actions. Keeping in mind this-happens-and-then-that happens regularities, as a researcher you must keep in the forefront that:

A) Weak correlation indicates causation

B) Correlation does not necessarily indicate causation

C) Strong correlation always indicates causation

D) Correlation has nothing to do with causation

7. _____ scales are typically measures of non-numeric concepts like satisfaction, happiness, or discomfort.

A) Nominal

B) Ordinal

C) Interval

D) Ratio.

8. Here is a set of scores: 5, 8, 7, 8, 6, 2, 5, 8. the mode of this set of scores is:

A) 8

B) 4

C) 6.125

D) None of the above

9. Tom believes that left handed persons get higher grades than right handed persons, and plans to collect some data to demonstrate that. The appropriate null hypothesis would be:

A) Left handed persons get the same or lower grades than right handed persons.

B) Left handed persons get higher grades than right handed persons.

C) There is a difference between the grades of left and right-handed persons.

D) The standard deviation of the grades of left-handed persons is higher than that of right-handed persons.

10. It is known that a salesperson makes a sale on 35% of customer contacts. A normal work w eek will enable the salesperson to contact 40 customers. The expected number of sales for the week is

A)    14
B)    26
C)    35
D)    40

**b) interview on students based on their perception on their achievement in statistics**

1) Do you have an increased knowledge after completing statistics course?

2) Do you have confident for yourself in dealing with statistics problems?

4) Do you score high when lessons are done in groups?

5) Did your results after end of course exam Improved?

6) Are your results decreasing or increasing after the end of course exam?

*THANK YOU FOR PARTICIPATING*

**APPENDIX 2:  SAMPLE SIZE (S) REQUIRED FOR A GIVEN POPULATION**

| JJ N | S | N | S | N | S | N | S | N | S |
|------|----|-----|-----|-----|-----|------|-----|--------|-----|
| 10 | 10 | 100 | 80 | 280 | 162 | 800 | 260 | 2800 | 338 |
| 15 | 14 | 110 | 86 | 290 | 165 | 850 | 256 | 3000 | 341 |
| 20 | 19 | 120 | 92 | 300 | 169 | 900 | 269 | 3500 | 346 |
| 25 | 24 | 130 | 97 | 320 | 175 | 950 | 274 | 4000 | 351 |
| 30 | 28 | 140 | 103 | 340 | 181 | 1000 | 278 | 4500 | 354 |
| 35 | 32 | 150 | 108 | 360 | 186 | 1100 | 285 | 5000 | 357 |
| 40 | 36 | 160 | 113 | 380 | 191 | 1200 | 291 | 6000 | 361 |
| 45 | 40 | 170 | 118 | 400 | 196 | 1300 | 297 | 7000 | 364 |
| 50 | 44 | 180 | 123 | 420 | 201 | 1400 | 302 | 8000 | 367 |
| 55 | 48 | 190 | 127 | 440 | 205 | 1500 | 306 | 9000 | 368 |
| 60 | 52 | 200 | 132 | 460 | 210 | 1600 | 310 | 10000 | 370 |
| 65 | 56 | 210 | 136 | 480 | 214 | 1700 | 313 | 15000 | 375 |
| 70 | 59 | 220 | 140 | 500 | 217 | 1800 | 317 | 20000 | 377 |
| 75 | 63 | 230 | 144 | 550 | 226 | 1900 | 320 | 30000 | 379 |
| 80 | 66 | 240 | 148 | 600 | 234 | 2000 | 322 | 40000 | 380 |
| 85 | 70 | 250 | 152 | 650 | 242 | 2200 | 327 | 50000 | 381 |
| 90 | 73 | 260 | 155 | 700 | 248 | 2400 | 331 | 75000 | 382 |
| 95 | 76 | 270 | 159 | 750 | 254 | 2600 | 335 | 100000 | 384 |

Source: Amin (2005), citing R.V. Krejcie and D.W. Morgan (1970), Determining sample size for research activities. Educational and psychological measurement, 30, 608, Saga Publication.

**APPENDIX 3: AUTORISATION**

Je soussignée, Professeur **Christiane Félicité** EWANE **ESSOH,** Doyenne de la Faculté des Sciences de l'Education de l'Université de Yaoundé I, certifie que l'étudiante BAFON **Richard MKONG matricule 14Z3428** est inscrit en doctorate à la Faculté des Sciences de l'Education, Département de *CURRICULA ET EVALUATION,* filière **:** *CURRICULA ET EVALUATION.*L'intéressé(e) doit effectuer des travaux de recherche en vue de l'obtention de son diplôme de doctorate. IL travaille sous la direction du Pr AGBORBECHEM Peter TAMBI Enseignant à l'Université de Buea. « *Student's Attitudes In Teacher Training Colleges In The North West Region Towards Teaching Of Statistics* »

Je vous saurais gré de bien vouloir mettre à sa disposition toutes les informations susceptibles de l'aider.En foi de quoi, cette attestation de recherche lui est délivrée pour servir et valoir ce que de droit.
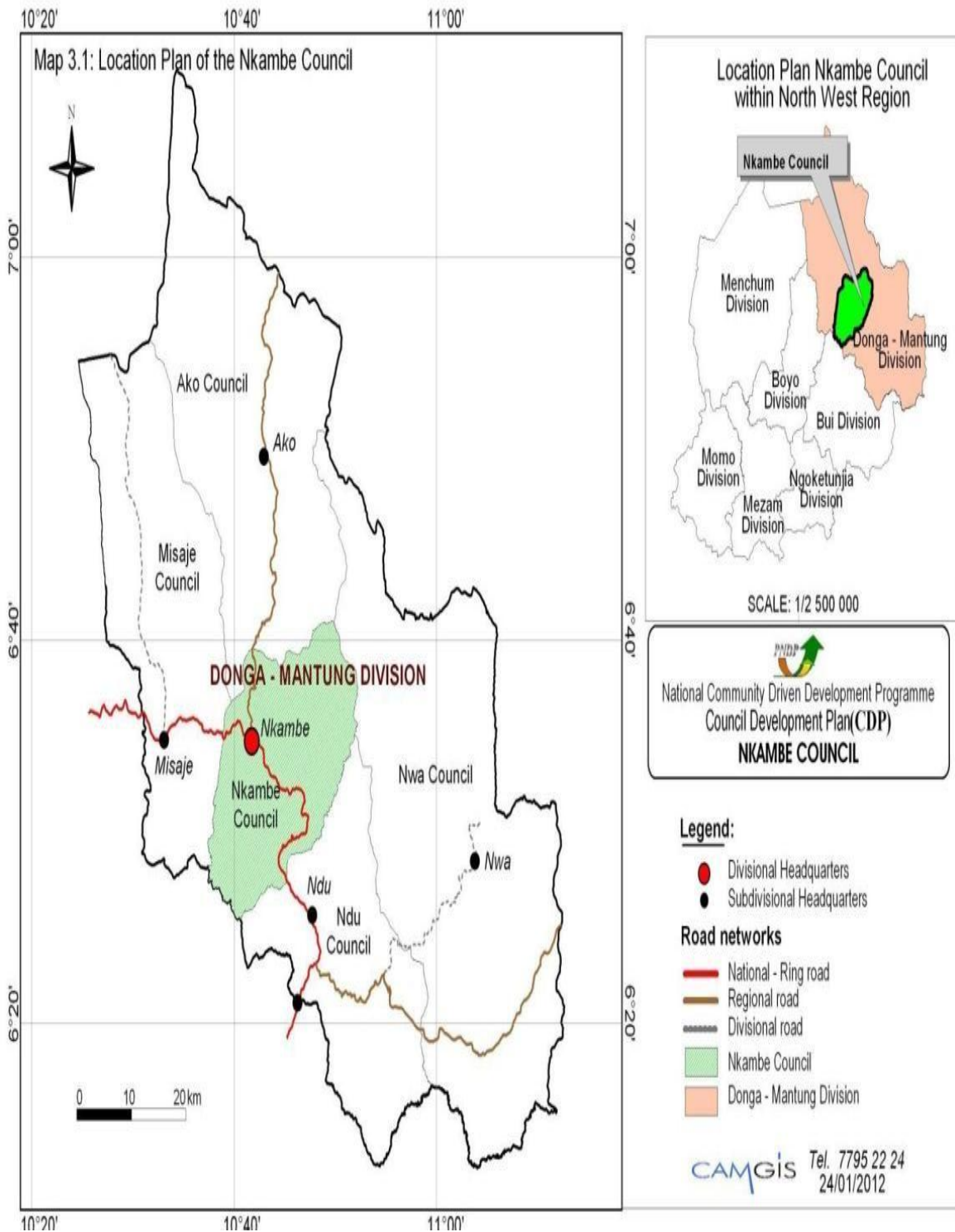
Fait à Yaoundé, le 2 4 AVR 2019

Prof. Auguste OWONO-KOUMA

**APPENDIX 4: MAP OF NORTH WEST REGION SHOWING THE VARIOUS DIVISIONS WHERE THE STUDY WILL TAKE PLACE**

**APPENDIX 5: MAP OF NKAMBE AS ONE STUDY AREA**

Map 3.1: Location Plan of the Nkambe Council

Location Plan Nkambe Council within North West Region

Nkambe Council

Menchum Division

Donga - Mantung Division

Boyo Division

Bui Division

Momo Division

Ngoketunjia Division

Mezam Division

SCALE: 1/2 500 000

National Community Driven Development Programme
Council Development Plan(CDP)
**NKAMBE COUNCIL**

Ako Council

Ako

Misaje Council

**DONGA - MANTUNG DIVISION**

Nkambe

Misaje

Nkambe Council

Nwa Council

Nwa

Ndu

Ndu Council

0    10    20km

Legend:

- Divisional Headquarters
- Subdivisional Headquarters

Road networks

- National - Ring road
- Regional road
- Divisional road
- Nkambe Council
- Donga - Mantung Division

CAMGIS    Tel. 7795 22 24
24/01/2012

**APPENDIX 6: MAP OF MEZAM IN NORTH WEST REGION SOURCE: GEO DATA BASE OF CAMEROON (2017) NATIONAL INSTITUTE OF STATISTICS.**
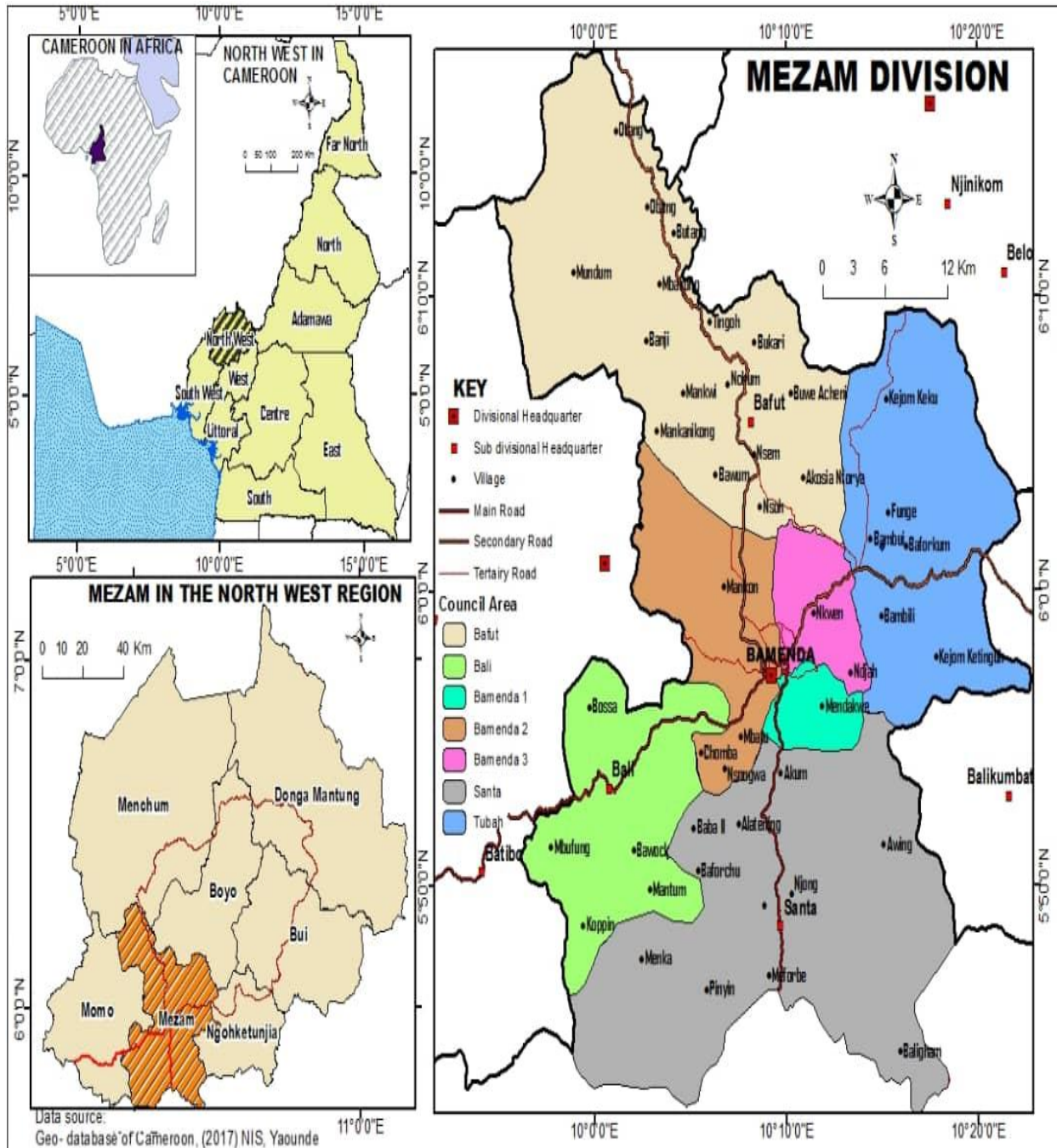
**APPENDIX 7: ANTI-PLAGIARISM CHECK REPORT**

REPUBLIC OF CAMEROON
Peace- Work-Fatherland
******
E-GOVERNANCE GLOBAL INNOVATION
SOLUTIONS
******

**GOVERNANCE**
GLOBAL INNOVATION
SOLUTIONS

RÉPUBLIQUE DU CAMEROUN
Paix-Travail- Patrie·
******
GOUVERNANCE NUMERIQUE SOLUTIONS
GLOBALES D'INNOVATION
******

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## ANTI-PLAGIARISM CHECK RAPPORT

**Introduction:**
This is to attest that the Thesis of **Mr. BAFON RICHARD MKONG** admitted in Ph.D., Postgraduate School for the Social and Educational Sciences of the University of Yaoundé I during the academic year 2017/2018, matricule 14Z3428 on the topic entitled: **STATISTICS PEDAGOGY AND STUDENT'S ATTITUDE AS DETERMINANT OF ACADEMIC ACHIEVEMENT IN TEACHER TRAINING COLLEGES IN NORTH WEST REGION CAMEROON.** The report provides an analysis of potential instances of plagiarism found within the document and offers recommendations for addressing and rectifying any identified issues.

**Plagiarism Results:**
The analysis revealed the following findings regarding potential instances of plagiarism in the Ph.D. thesis: **Plagiarism Percentage: 7%**
**Recommendations:**

In light of the plagiarism findings, the following recommendations are provided for addressing and rectifying the identified instances of plagiarism:

- Revise the plagiarized sections by rephrasing the content and ensuring proper citation and referencing.
- Consult with the thesis advisor or committee members for guidance on addressing plagiarism concerns.
- Follow the institutional guidelines and regulations to ensure academic integrity.

**Notes:**
The plagiarism report highlights the importance of upholding academic integrity and the ethical responsibility of producing original work. It is essential to address the identified instances of plagiarism in order to maintain the scholarly integrity of the Ph.D. thesis. The bibliography and preliminary pages sections were excluded from the plagiarism check.

Daniel Elambo Atonge
Chief Technology & Research Officer

Summary

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**APPENDIX 8: ARTICLE PUBLICATION CERTIFICATE**

The Board of
International Journal of Research and
Innovation in Social Science

ISSN: 2454 -6186

Is hereby awarding this certificate to

**BAFON RICHARD MKONG**

In recognition of the publication of the paper entitled

The Use of Didactic Material in Competence Base Approach to Overcome Students

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