

**MULTIPLE INTELLIGENCE AMONG SECONDARY SCHOOL LEARNERS  
IN KENYA**

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## **DECLARATION**

This research project is my original work and has not been presented to any other university for degree award.

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**Okoth George Ouma**

**E58/75471/2012**

This research project has been submitted for examination with my approval as University of Nairobi supervisor.

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## **DEDICATION**

I dedicate this project to my mother Perez Ouma, wife Lilian Jepng'eno, daughter Cheryl and son Wayne for their support throughout my education. Special tribute to my colleagues at college for their encouragement and contributions during class discussions.

Lastly, I wish to pay tribute to the lecturers who taught me and ensured that I acquired the necessary skills to make this possible and most specifically the course co-coordinator Dr. Karen T. Odhiambo.

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## ABSTRACT

This study sort to explore IQ among secondary school students as a result of new approaches that require learners to do critical thinking, problem solving and to be innovative. It was also in regards to IQ and its relationship to academic performance.

The study adopted a descriptive research design. The target population of the study comprises the third year students in secondary schools in Nairobi County giving a total of about 12000 students. 20 students per school from the eight sampled schools were used for the study, giving a sample of 160 students. The instrument used to collect data was a standardized IQ test extracted from Howard Gardner's work on multiple intelligence. It also used the 2012 and 2013 end year school exam scores records obtained from the school administration.

Data was analyzed using quantitative statistics. The level of the learners intelligence was determined, their areas of interests was also established as well as the correlation coefficient between intelligence and academic performance. All these were presented using tables and graphs with the aid of SPSS. The results show that majority of those who took the test have average IQ rating (85-115) meaning they have IQ abilities that are normal. There was none with high mental capability or genius (145-159). Of the Gifted (130-144), only 14 out of total of 110 students tested. This means that IQ attributes is lacking among students thus impeding on desired influence on education performance.

Of interest, in exploring the types of IQ, girls display more interpersonal (32%) and linguistics at (18%), while boys exhibit more of body- kinesthetic (29%) and logical-mathematical activities (18%). Both genders score low on visual spatial.

This shows that learners in general, in secondary schools in Kenya do not have what is necessary to carryout and perform learning task, especially

- Collective talent
- Ability to solve problems and develop new knowledge
- Ability to reason from concepts and solve problems using unfamiliar information.

The challenge for education is the fact that current learning perspective does require orientation towards learners having IQ skills. Recommendation is for educators to address this need and to explore IQ determinants further.

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## **LIST OF ABBREVIATIONS AND ACRONYMS**

<b>K.C.P.E</b>	Kenya Certificate of Primary Education Examination
<b>K.C.S.E</b>	Kenya Certificate of Education Examination
<b>SPSS</b>	Statistical Package of Social Sciences
<b>UPE</b>	Universal Primary Education
<b>UNESCO</b>	United National Educational Scientific and Cultural Organization

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the Study

Intelligence is a very general mental capability that among other things involves the ability to reason, plan, solve problems, think abstractly, comprehend complex ideas, learn quickly and learn from experience. It is not merely book learning, a narrow academic skill, or test taking smarts. Rather it reflects a broader and deeper capability for comprehending our surroundings “catching on”, “making sense” of things, or “figuring out” what to do (Mainstream Science on Intelligence, 1994). It is worth noticing that any education systems and examination systems should focus on developing and evaluating intelligence of students respectively (Gardner, 1983). However, most education systems are concerned with mastery of subject contents as opposed to the development of intelligence.

In the current learning dispensation, the requirement of a learner is to think critically, solve problems, be innovative and acquire technological literacy, information fluency, collaboration among other intellectual skills. This is influenced by the 21<sup>st</sup> century skills ([www.21stcenturyskills.org](http://www.21stcenturyskills.org)). The world is faced with various changes and challenges such as advanced technology, infrastructural development, natural disasters, environmental changes, terrorism just to mention but a few in the 21<sup>st</sup> century. These developments can adequately be addressed by the acquisition of the 21<sup>st</sup> century skills hence intelligence (Lisbon council 2007). These characteristics of IQ do resemble those of 21<sup>st</sup> Century skills. This study will look into IQ and if it has a bearing on academic performance.

Current assessment reflect typical pedagogical and assessment practices found in classrooms and they are also a key “determiner” to what students learn in the classroom and how it is taught. Consequently, assessment reform is key to the transformation of the education system as a whole. It is a determiner of learning in two senses. Assessment is the means by which society determines what students have learnt and what they can do next (Law, Pelgrum and Plomp, 2008).

These student assessments are often “high stakes” test scores to certify student achievement, permit advancement or graduation, and determine competitive advantage in further study. High stakes tests include the SAT, ACT and Advanced Placement exams in the U.S., the O-Level (or GCSE) and A-Level exams in most commonwealth countries, the Matura in much of Eastern Europe and the Abitur in Germany, Austria and Finland (Law, Pelgrum and Plomp, 2008) and most importantly K.C.P.E and K.C.S.E in Kenya. Unfortunately, these traditional assessments do not measure all the competencies and skills that are needed in the 21<sup>st</sup> century workplace and society (Pellegrino, et al., 2004). Learning and hence assessment need to test intelligence which compliments 21<sup>st</sup> century skills.

The productivity of any organization is a function of how well employees perform their various tasks. This productivity is very much dependent upon factors such as job analysis, job recruitment, selection, job placement, recruits intelligence and abilities among other factors. The individual performance is a function of the ability and the willingness of the worker to perform the job (Ngumi, 2003). This ability is highly dependent on individual’s intelligence not just high academic achievement.



It has been believed for a long time that students who get high scores in academic work are more intelligent than their counterparts with lower grades. In Kenya and globally today, students with high academic achievement are given opportunities to train for and pursue highly rated and sophisticated courses such as medicine, engineering, aviation etc. with a view that they are more intelligent than those with lower academic performance. While this could be true, it is worth noticing that there are other factors that have come up and are believed to high or low academic performance other than just intelligence. Such factors include; access and equality (Washington, 1990), financial resources (Woodson, 1933), personality and independence (Lavin, 1965) and self-esteem (Guggenheim, 1969).

Academic performance refers to how students deal with their studies and how they cope with or accomplish different tasks given to them by their teacher (Wikipedia). In Kenya high stake tests such as K.C.P.E and K.C.S.E have continued to be used as the sole indicator of the student's intelligence and ability to perform future tasks hence have been used to admit students to well equipped secondary schools and higher institutions of learning (universities and colleges) respectively amid criticism that the exams are biased and do not reflect the actual intelligence and abilities of the students. A lot of people have continue to call for the scrapping or reviewing of Kenya Certificate of Primary Education examination (K.C.P.E) and Kenya Certificate of Secondary Education examination (K.C.S.E) has they have been seen to discriminate against students from marginalized areas where there is lack of proper educational facilities and inadequate well exposed human resource. The exams have also been seen to discriminate along gender and religion.

Intelligence tests are widely used in education, business and military settings due to their efficacy in predicting behavior. Intelligence quotient (IQ) or level of intelligence and g are correlated with many important social outcomes. Intelligence is significantly correlated with successful training and performance outcome, and IQ/g is the single best predictor of successful job performance (Goleman, 1996).

The IQ test as an important contribution in connection with other variables in education setting for instance the curriculum, study programs, the teacher, the characteristics of the school and others in scholastic performance (Nagleire and Bonstein, 2003). It is therefore evident that intelligence among workers is the corner stone of productivity in any organization. It is against this background that the author finds it necessary to investigate intelligence development in learners and its relationship to academic performance.

## **1.2 Statement of the problem**

The literature shows that not much has been done to investigate the need for concern on intelligence now that there is interest in 21<sup>st</sup> Century skills. Most research have raised concern on learning and education that does not address such skills, or, learning that results in an academic attainment by students that reflects learning beyond a mere grade.

According to (Thomas Armstrong in his study of Academic performance Discourse), he argues that over emphasis on academic performance in high stake tests has led to students, teachers and parents alike using dubious means to attain high grades. Such unscrupulous means include cheating in exams, teaching of tests instead of intended

curriculum objectives, cramming exams content by learners among other unfair means. The behavior has led to students shifting attention from objective learning to preparing for exams hence getting grades that do not really reflect their intelligence and abilities. The high stake tests themselves have not made the situation any better. The exam items are majorly based on syllabus content rather than testing intelligence and abilities. It is worth noticing that an intelligent student who has not been exposed to the content effectively as in the case with marginalized parts of Kenya is likely to perform lowly (Earles, J.A, 1992). However this does not mean that he/she is not intelligent.

Consequently, there is need to ensure that education processes are guided by methods that will address and reflect 21<sup>st</sup> century related skills such as IQ. Further, not many studies on Africa or even Kenya have looked into IQ or related 21<sup>st</sup> century skills. This study hopes to fill in the gap and to inform those who are in education who are practitioners and policy makers the importance of IQ its relation to academic performance and its place in addressing education needs of the learner.

### **1.3 Purpose of the study**

The purpose of this study is to investigate IQ performance among students in secondary education in Kenya and its relationship with academic performance.

### **1.4 Objectives of the study**

This study will seek to:

- i. Determine the levels of intelligence among learners,
- ii. Compare the level of intelligence of students along gender,

- iii. Investigate the extent of the relationship between intelligence and academic performance among learners in secondary schools in Nairobi County.

### **1.5 Significance of the study**

The study intends to investigate whether high grades scored in national exams is a reflection of high intelligence and vice versa among students. The findings may be of importance in;

Guiding the examination bodies in developing test items and in test construction by incorporating important variables such as IQ items, special ability items, varied cognitive skills etc in the tests,

Guiding higher institutions of learning in selecting students for different courses e.g. by administering course entry aptitude tests such as the American SAT to support the K.C.S.E results and

Guiding education providers in incorporating intellectual skills and 21<sup>st</sup> century skills in the learning process in our secondary schools and reinforcing them.

The study findings will contribute to the existing knowledge on intelligence and academic performance among the secondary school learners. More so, it will compel researchers to do more research in the area of intelligence and academic performance and other related areas/ subjects.

### **1.6 Limitation of the study**

According to Best and Kahn (1998), limitations are conditions beyond the control of the researcher that may place restrictions on the conclusions of the study and their application to other situations. The study will limit itself to only the schools in Nairobi County.

### **1.7 Definition of Operational Terms**

**K.C.P.E** - refers to Kenya certificate of primary education examination, an examination done at the end of eight years of primary education and determines whether or not a student would join secondary school.

**K.C.S.E** - refers to the Kenya certificate of secondary education examination done at the end of the four years of secondary education. It is used to admit students to the universities and colleges.

**High stake tests** - refers to the exams done in large scale e.g. district exams, mock exams, national exams such as K.C.P.E and K.C.S.E, national assessment etc.

**Intelligence Quotient (IQ)** - refers to the assessment of one's ability to think and reason or generally, mental ability of an individual. IQ is a ratio obtained by dividing the mental age by chronological age.

**Academic performance** - refers to how students deal with their studies and how they cope or accomplish different tasks given to them by their teachers. It can also be defined as the ability to study and remember facts and being able to communicate your knowledge verbally or down on paper.

**21<sup>st</sup> century skills** - refers to a broad set of knowledge, skills, work habits and character traits that are believed by educators, school reformers, college professors, employers and others to be critically important to success in today's world particularly in collegiate programs and modern careers. Such skills include critical thinking, creativity, innovativeness, problem solving, ICT among other skills.

**Intelligence** - is a very general mental capability that among other things involves the ability to reason, plan, solve problems, think abstractly, comprehend complex ideas, learn quickly and learn from experience.

**KICD** – Kenya Institute of Curriculum Development is an institution in charge of developing, reviewing and changing the curriculum in Kenya when need arises.

**SAT** – Scholastic Aptitude Test is an entry test administered to students aspiring to join various courses in the universities in United States of America.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This section presents the introduction, studies on the relationship between intelligence and academic performance, definition of the terms intelligence and academic performance in high stake tests, elements of intelligence and 21<sup>st</sup> century skills, types of intelligence, theoretical perspective, relationship between intelligence and academic performance, factors affecting intelligence and factors influencing academic performance other than intelligence.

#### **2.2 Related studies**

Not so many studies have been carried out to try and investigate the levels of learner intelligence and to determine whether there exist a relationship between intelligence and academic performance. Some of the studies done include:

##### **2.2.1 A Study on teacher perceptions of the relationships between intelligence, student behavior and academic performance.**

According to Richard Berlach and Anthony Ambrosiano in their study, they argued that there exists a relationship between intelligence and school performance. They quoted (Gage and Berliner, 1992) who presented relevant research and summarized it by stating that “from the historical sketch we’ve given, you might guess that intelligence correlates with school success, and you would be right” (p. 59). Quoting (Goleman, 1996, p. 34), they said however that school grades, IQ or exam scores are not able to predict who succeeds in life although IQ contributes up to about 20% to

the factors that determine life success, leaving 80% to other forces (Epstein, 1998) and (Lewis Terman, 1925).

In their study, Richard and Anthony concluded that there is a strong relationship between IQ rank and academic performance in high social economic status (SES) at 0.636 and 0.503 in private and public school respectively. However, there was low relationship between IQ and academic performance at 0.378 and 0.226 in private and public school. This indicates that other than intelligence, social economic status and school environment also influence performance.

#### **2.2.2. A study on emotional intelligence and academic performance in first and final year medical students: a cross-sectional study**

Boon How Chew, Azhar Md Zain and Faezah Hassan in their study argues that several Studies have found that emotional intelligence (EI) is related to academic and professional success and contributes to individual cognitive-based performance over and above the level attributable to general intelligence. People and college students with higher emotional intelligence show more positive social functioning in interpersonal relationship and are regarded by peers as prosocial, less antagonistic and conflictual. These improved social competence and quality relationships could facilitate cognitive and intellectual development leading to better academic performance. In a more direct way, EI facilitates prioritizing of thoughts, behavior regulation and appropriately adapted lifestyle choices, which benefits academic performance. Emotional intelligence, one of the psycho-affective domains, in medical education, has also been related to clinical performance and higher academic achievement; and in clinical practice, has been related to improved empathy in



medical consultation, doctor-patient relationships, clinical performance and patient satisfaction. EI is defined as the ability to perceive emotions, to access and generate emotions so as to assist thought, to understand emotions and emotional meanings, and to reflectively regulate emotions so as to promote both better emotional and intellectual growth. This ability model of EI posits four related skills: perceiving emotions, using emotions to facilitate thinking, understanding emotions, and managing emotions. (B.H. Chew, 2013).

### **2.2.3 A study by J.E Ormrod (2010) on IQ and school achievement**

Modern intelligence tests have been designed with Binet's original purpose in mind: to predict how well individual students are likely to perform in the classroom and similar situations. Studies repeatedly show that performance on intelligence tests is correlated with school achievement (N. Brody, 1997; Gustafsson & Undheim, 1996; Sattler, 2001). On average, children with higher IQ scores do better on standardized achievement tests, have higher school grades, and complete more years of education. In other words, IQ scores often do predict school achievement, albeit imprecisely. As a result, intelligence tests are frequently used by school psychologists and other specialists in their efforts to identify students with special educational needs. However, three points about the relationship between intelligence test scores and school achievement are important to note:

- i. **Intelligence does not necessarily cause achievement; it is simply correlated with it.** Although students with high IQs typically perform well in school, we cannot say conclusively that their high achievement is actually the result of their intelligence. Intelligence probably does play an important role in school achievement, but many other factors—motivation, quality of

instruction, family resources, parental support, peer group expectations and so on—are also involved.

- ii. **The relationship between IQ scores and achievement is an imperfect one, with many exceptions to the rule.** For a variety of reasons, some students with high IQ scores don't perform well in the classroom, and other students achieve at higher levels than we would predict from their IQ scores alone. Furthermore, IQ tests seem to predict performance on traditional academic tasks better than they predict performance on every day, real-world tasks or on unusual, multifaceted problems (J.E. Davidson, 2003; Sternberg, Grigorenko, & Kidd, 2005; Wenke & Frensch, 2003).
- iii. **IQ scores have a limited “shelf life.”** IQ scores do a reasonable job of predicting students' school achievement for a short period—say, for the following year or two. They are less useful in predicting achievement over the long run, especially when they have been obtained in the preschool or early elementary years (Bracken & Walker, 1997).

In fact, the very nature of what intelligence *is* changes somewhat as students get older (and thus, how it is measured may also change). The longer the time interval between two measures of intelligence, the greater the fluctuation in IQ, especially when initial measures were taken in the early years (Hayslip, 1994; Sattler, 2001). IQ scores and other measures of cognitive ability often increase over time when children are highly motivated, independent learners and when adults provide stimulating activities and a variety of reading materials (Echols, West, Stanovich, & Kehr, 1996; Sameroff, Seifer, Baldwin, & Baldwin, 1993; Stanovich, West, & Harrison, 1995).

#### **2.2.4 A Study by Ian J. Deary, Steve Strand, Pauline Smith and Cres Fernandes: Intelligence-and-Educational-Achievement.**

Deary's study looked at how cognitive ability measured at age 11 predicted academic achievements at age 16. Unsurprisingly, the IQ-Achievement correlations for the Sciences are around 0.6 (math highest, chemistry lowest), with similar coefficients for Arts/Humanities and Social Studies. Surprisingly, for *practical* fields (e.g., P.E., Art) the coefficients are a little lower, but not that much, averaging around 0.5. Here is a pic of the correlation table: (the *n* is in parentheses; it obviously changes as not every student took every class)

<b>Field</b>	<b>Correlation</b>
<b><i>Science</i></b>	
Mathematics	0.77
Biology	0.51
Physics	0.50
Chemistry	0.46
<b><i>Arts and humanity</i></b>	
English	0.67
Religious studies	0.52
<b><i>Practical</i></b>	
Physical education	0.55
Art and design	0.43 etc.

## **2.3 Definition of terms intelligence and academic performance**

### **2.3.1 Intelligence**

There are as many definition of the term intelligence as there are scholars who defined it, some of these scholars and their definitions include:

Alfred Binet, defines intelligence as judgment, otherwise called “good sense”, “practical sense”, “initiative”, the faculty of adapting one’s self circumstances etc.

David Wechsler, defined intelligence as the aggregate or global capacity of the individual to act purposefully, to think rationally and to deal effectively with his environment. Lloyd Humphrey, defined intelligence as the resultant of the process of acquiring, storing in memory, retrieving, combining, comparing and using new contexts information and conceptual skills.

Cyril Bart, argues that intelligence is innate general cognitive ability. To my mind he says, a human intelligence competence entails a set of skills of problem solving-enabling individual to solve genuine problems or difficulty that he or she encounters, and when appropriate, to create an effective product. Also entails the potential for finding or creating problems and thereby laying the groundwork for the acquisition of new knowledge (Howard Gardner). Linda Gottfredson, says intelligence is the ability to deal with cognitive complexity.

From the above and many other definitions, one can define intelligence as a very general mental capability that among other things, involve the ability to reason, plan, solve problems, think abstractly, comprehend complex ideas, learn quickly and learn from experience. It is not merely book learning, a narrow academic skill or test taking smarts. Rather, it reflects a broader and deeper capability for comprehending our

surrounding. “Catching on,” “making sense” of things, or figuring out what to do (Mainstream science of intelligence).

According to Gardner’s book on multiple intelligence, intelligence is made up of different faculties such as;

- Linguistic intelligence
- Logical mathematics intelligence
- Spatial intelligence
- Bodily kinesthetic intelligence
- Interpersonal intelligence etc

From the above definitions and many others, high stake test items need to factor in these areas (faculties). So far so good the national exams are interdisciplinary i.e. are divided into several subjects hence measure different intellectual faculties, However the content of a test paper should test more on general ability of individual in a discipline area rather than just what has been learnt in class in terms of content (Bloom and Krathwohl, 1988).

### **2.3.2 Academic performance**

Academic performance on the other hand refers to how students deal with their studies and how they cope with or accomplish different tasks given to them by their teachers. According to Wikipedia, academic achievement (performance) is the outcome of education; the extent to which a student, teacher or institution has achieved their educational goals. Academic achievement is commonly measured by examinations or continuous assessment and there is no general agreement on how it is best tested on which aspects are most important; procedural knowledge such as skills

or declarative knowledge such as facts. In KCPE and KCSE, the tests measure both the aspects (skills and facts) as to whether this is enough to measure students intelligence and ability is a story of actual research.

### **2.3.3 Factors affecting students' academic performance**

There are various factors that can influence a student in their academic performance whether it is negative or positive Parent's Motivation should be there to teach their children to appreciate their hard work and guide them as they move along. A student must learn to devote their time and effort and exercise diligence and patience while studying; parents and their family has a very strong influence that affects heavily their performance. The children's personality and strength in dealing with situations like when they are facing difficulty in school in many activities gives them the strength and courage to persevere if their emotions are stable. Students are likely to develop inner discipline to handle such situations mostly if they are supported strongly by their parents or guardian will reflect in their studies. Some really good parent does not only provide them with sufficient materials they need, they even teach their children to aim high, develop their goals and objective and value their studies. On the contrary if they are neglected at home they will usually suffer such consequences of low morality and attitude that includes the sense of worthlessness to appreciate school and their studies, children in this situation are only forced to go to school but studying is not in their mind and therefore their academic performance are usually low. Teachers may even regard them as usually the problem in the class, it is a primary important to talk to children and discuss their problems in schools in order to avoid the confusions and struggles that they are facing and parents should be the one to initiate discussion and communication so that they can monitor their progress. The time and effort that

parents can give to their child is probably the most important motivating factor especially during their first few years in school. Children subconsciously need them and their attention.

## **2.4 Elements of intelligence and 21<sup>st</sup> century skills**

These elements include creativity and innovation, critical thinking, problem solving, communication, collaboration, information fluency, digital technology etc (Lennon, et al., 2003, p. 8).

## **2.5 Types of intelligence**

There are nine types of intelligence according to (Howard Gardner).

### **2.5.1 Naturalist intelligence (Nature smart)**

It designates the human ability to discriminate among human beings (plants and animals) as well as sensitive to other features of the natural world (clouds, rock configuration). This ability was clearly of value in our evolutionary past as hunters, gatherers and farmers; it continues to be central in such roles as botanist or chef. It is also speculated much of our consumer society exploits the naturalist intelligences, which can be mobilized in the discrimination among cars, sneakers, kind of makeup and the like.

### **2.5.2 Musical intelligence (Musical smart)**

Musical intelligence is the ability to discern pitch, rhythm, timbre and tone. This intelligence enables us to recognize, create, produce and reflect on music as demonstrated by composers, conductors and musicians, vocalists and sensitive

listeners. Interestingly there is often an effective connection between music and the emotions; and mathematical and musical intelligence may share common thinking processes. Young adults with this kind of intelligence are usually singing and drumming to themselves. They are usually quite aware of sounds others may miss.

### **2.5.3 Logical-mathematical intelligence (Number-reasoning smart)**

Logical-mathematical intelligence is the ability to calculate, quantify, consider propositions and hypotheses and carry out complete mathematical operations. It enables us to perceive relationships and connections and to use abstract, symbol thought, sequence reasoning skills and inductive and deductive thinking patterns. Logical intelligence is usually well developed in mathematicians, scientists and detectives. Young adults with lots of logical intelligence are interested in patterns, categories and relationships. They are drawn to arithmetic problems, strategy games and experiments.

### **2.5.4 Existential intelligence**

Sensitivity and capacity to tackle deep questions about human existence, such as meaning of life, why do we die and how did we get here.

### **2.5.5 Interpersonal intelligence (People smart)**

Interpersonal intelligence is the ability to understand and interact effectively with others. It involves effective verbal and nonverbal communication; the ability to note distinctions among others, sensitivity to the mood and temperament of others and the ability to entertain multiple perspectives. Teachers, social workers, actors and politicians all exhibit interpersonal intelligence. Young adults with this kind of



intelligence are leaders among their peers, are good at communicating and seem to understand others' feelings and emotions.

#### **2.5.6 Bodily-kinesthetic intelligence (Body smart)**

Body-kinesthetic intelligence is the capacity to manipulate objects and use a variety of physical skills. This intelligence also involves a sense of timing and the perfection of skills through mind-body union. Athletes, dancers, surgeons and crafts people exhibit well developed bodily-kinesthetic intelligence.

#### **2.5.7 Linguistic intelligence (Word smart)**

Linguistic intelligence is the ability to think in words and to use language to express and appreciate complex meanings. Linguistic intelligence allows us to understand the order and meaning of words and to apply meta-linguistic skills to reflect on our use of language. Linguistic intelligence is the widely shared human competence and is evident in poets, novelists, journalists and effective public speakers. Young adults with kind of intelligence enjoy, writing, reading, telling stories or doing crossword puzzles.

#### **2.5.8 Intra-personal intelligence (Self smart)**

Intra-personal intelligence is the ability to understand one's self and one's thoughts and feelings and to use such knowledge in planning and directing one's life. Intra-personal intelligence involves not only an appreciation of self, but also of human condition. It is evident in psychologists, spiritual leaders and philosophers. These young adults may be shy. They are very aware of their feelings and are self-motivated.

### **2.5.9 Spatial intelligence (Picture smart)**

Spatial intelligence is the ability to think in three dimensions. Core capacities include mental imagery, spatial reasoning, image manipulation, graphic and artistic skills and an active imagination. Sailors, pilots, sculptures, painters and architects all exhibit spatial intelligence (Conari, 2009) by Sandra Comblatt.

## **2.6 Standard IQ scale rates**

First of all, the concept of IQ was developed by either the German psychologist or philosopher Wilhelm Stern in 1912 or by Lewis Terman in 1916, depending on which sources you consult. Intelligence testing was first done on a large scale before either of these dates. In 1904 psychologist, Alfred Binet was commissioned by the French government to create a testing system to differentiate intellectually normal children from those who were inferior.

Thus the IQ scale called the “Binet Scale,” (and later the “Simon-Binet Scale”) was developed. Sometime later, ‘intelligence quotient,’ or “IQ,” entered our vocabulary. Lewis M. Terman revised the Simon-Binet IQ Scale, and in 1916 published the Stanford Revision of the Binet - Simon scale of Intelligence (also known as the Stanford-Binet). The following scale resulted for classifying IQ scores:

### **2.6.1 IQ Scale**

#### **Normal Distribution of IQ Scores**

50%	of	IQ	scores	fall	between	90	and	110
70%	of	IQ	scores	fall	between	85	and	115
95%	of	IQ	scores	fall	between	70	and	130
99.5% of IQ scores fall between 60 and 140								

### 2.6.2 Low IQ & mental retardation

An IQ under 70 is considered as "mental retardation" or limited mental ability. 5% of the population falls below 70 on IQ tests. The severity of the mental retardation is commonly broken into 4 levels:

50-70	-	Mild	mental	retardation	(85%)
35-50	-	Moderate	mental	retardation	(10%)
20-35	-	Severe	mental	retardation	(4%)

IQ < 20 - Profound mental retardation (1%)

### 2.6.3 High IQ & Genius IQ

Genius or near-genius IQ is considered to start around 140 to 145. Less than 1/4 of 1 percent falls into this category. Here are some common designations on the IQ scale:

115-124	-	Above average
125-134	-	Gifted
135-144	-	Very gifted
145-164	-	Genius
165-179	-	High genius
180-200	-	Highest genius

### 2.6.4 The Average on an IQ Scale

The scoring of an IQ test is not the same for everyone, because age is used in determining a score. Intelligence quotient is determined by the "intelligence age" (I A) in relation to the chronological age of the person being tested. IQ scales can differ from each other (Americans use scales with IQ values above 200), but the mean value of most scales is an IQ of 100. This represents normal intelligence. Think you are

smart? Well, if your IQ is 130, that puts nearly as much to do with success as their IQ level. In other words, your IQ score is not the only requirement for success.

### **2.6.5 IQ Test score guide**

Intelligence Interval	Cognitive Designation
40 - 54	Severely challenged (Less than 1%)
55 - 69	Challenged (2.3% )
70 - 84	Below average
85 - 114	Average (68% of test takers)
115 - 129	Above average
130 - 144	Gifted (2.3% of test takers)
145 - 159	Genius (Less than 1% of test takers)
160 - 175	Extraordinary genius

### **2.7 Relationship between intelligence and academic performance**

Is intelligence related to academic performance? Historically this question has been addressed by researchers. The relationship between measure of intelligence and achievement is significant to research, if there is a strong relation between them it might be deduced that the intelligence test has an important contribution in connection with other variables for instant curriculum, study program, the teacher, the characteristics of the school and others in scholastic performance (Nagleire and Bornstein, 2003).

In current years, several researchers have shown more interest in the relationship between intelligence and academic achievement. Researchers mentioned that there is empirical evidence for a strong association between general cognitive ability and

academic achievement, there is still anywhere from 51% to 75% of the variance in academic achievement that is unaccounted for by measures of general cognitive ability alone (Rohde and Thompson, 2007). Additionally, understanding the nature of the relationship between general cognitive ability and academic achievement has widespread implication for both practice and theory (Rohde and Thompson, 2007).

Academic achievement of students in high school strongly correlates (0.50 to 0.70) with intelligence scores (Jensen, 1998), but in another study researchers experienced the hypothesis that the relationship between general intelligence and academic achievement was in large part associated with a mental speed component. At the beginning the divided variance between general intelligence and academic achievement was nearly 30% (Luo, Thompson and Detherman, 2003). On the other hand, after controlling for the mental speed component the shared variance between general intelligence and academic performance was decreased to approximately 6% (Luo et al, 2003). These results strongly show that the items of intelligence (such as mental speed component and maybe other substances) are a significant intervener between intelligence and academic performance.

In other study (Watkins, Lei and Canivez, 2007) stated there has been considerable debate regarding the causal precedence of intelligence and academic achievement. Some researchers view intelligence and achievement as identical constructs. Others believe that relationship between intelligence and achievement is reciprocal. Still others assert that intelligence is causally related to achievement (Laidra Pullman and Allik, 2007) reported that students' achievement relies most strongly on their cognitive abilities through all grade levels.

## **2.8 Factors affecting intelligence**

There are several factors that affect intelligence. However, researchers have come up with seven main factors including:

### **2.8.1 Hereditary and environment**

Hereditary provided the physical body to be developed with inherent capabilities while environment provides for the maturation and training of the organism. In 1940 Newman concluded that variation in I.Q were determined about 68% by hereditary and 32% by environment. During an individual's life time, variation in I.Q is due to environment, since the hereditary cannot change. Improved nutrition health and stimulus situations would account for this change, Environment of children ages 2 to 4 years appears to be critical since the child normally learns language at this time. Better homes, school, medical facilities, less economic discrimination provides a means for achieving a mentally able population.

### **2.8.2 Age**

A person who is bright or dull in childhood tends to remain so throughout his life. Growth in intelligence can continue through the early twenties, a person achieve his maximum co at about 20 years and remains stable till 10 years and decreases after that. Some abilities remain constant while others decline rapidly due to decline in physical efficiency. It is that the more intelligent person has more rapid of mental growth and continues to develop longer than does the mentally less able.

### **2.8.3 Race and nationality**

All evidence indicates that there is little or no difference in inherited intellectual capacity due to race. There are differences mostly due to opportunities for training and learning in early years. The idea of inferior races due to heredity is not true.

### **2.8.4 Culture**

Answers in intelligence test questions are highly cultural. Culture will determine the degree of a person, attitude and abilities.

### **2.8.5 Health and physical development**

Physical and mental health is related to one's ability to gain desired achievement. A mental activity with delicate health one may not possess enough energy to engage in mental activity to the extent that he achieves success. Physical defects such as incomplete maturation of brain cells sensory and physical handicaps may interfere with observable intelligent behavior. Diseases also affect intelligence unfavorable health affects mental status of the individual.

### **2.8.6 Sex**

It is popular belief that boys are supposed to be more intelligent than girls. The research studies have shown that there is no significant difference between the sexes. On average girls seems slight superiority in language, memory and appreciation. Differences in intelligence are caused partly by environmental conditions.

### **2.8.7 Social and economic conditions**

Homes play a significant role in the early developmental years. Home conditions influence behavior. Financial status of parents and neighborhood has influence intelligence development of youngsters. According to the studies done by Richard Berlach, Anthony Amrosciano and Howard Gardner, factors influencing intelligence tend also to influence academic performance.

### **2.9 Theoretic perspective of IQ**

To be able to determine whether there exist a relationship between intelligence and academic performance; we look at the following theories of intelligence. Howard Gardner Theory of Intelligence, Cattell-Horn- Carrol theory, Sternberg's triarchic theory, Anderson's theory of cognitive development, Piaget's cognitive development.

#### **2.9.1 Howard Gardner theory of multiple intelligence**

Some researchers in the field of intelligence have long argued that people have a variety of different intelligences. A person may be good at learning languages and terrible at learning music--or vice versa. A single number (a score on an IQ test) cannot adequately represent the complex and diverse capabilities of a human being. Howard Gardner has proposed a theory of multiple intelligences. He originally identified seven components of intelligence (Gardner, 1983). He argues that these intelligences are relatively distinct from each other and that each person has some level of each of these seven intelligences. More recently, he has added an eighth intelligence to his list (Educational Leadership, 1997).



Many PBL-using teachers have studied the work of Howard Gardner and use some of his ideas in their teaching. For example, in creating a team of students to do a particular project, a teacher may select a team whose collective “highest” talents encompass most of the eight areas of intelligence identified by Gardner. The teacher may encourage a team to divide up specific tasks in line with specific high levels of talents found on a team. Alternatively, a teacher may encourage or require that team members not be allowed to work in their areas of highest ability in order to encourage their development of knowledge and skills in other areas.

The following table lists the eight intelligences identified by Howard Gardner. It provides some examples of the types of professionals who exhibit a high level of intelligence. The eight intelligences are listed in alphabetical order.

<b>Intelligence</b>	<b>Examples</b>	<b>Discussion</b>
Bodily-kinesthetic	Dancers, athletes, surgeons, crafts people	The ability to use one’s physical body well.
Interpersonal	Sales people, teachers, clinicians, politicians, religious leaders	The ability to sense other's feelings and be in tune with others.
Intrapersonal	People who have good insight into themselves and make effective use of their other intelligences	Self-awareness. The ability to know your own body and mind.
Linguistic	Poets, writers, orators, communicators	The ability to communicate well, perhaps both orally and in writing, perhaps in several languages.
Logical-mathematical	Mathematicians, logicians	The ability to learn higher mathematics. The ability to handle complex logical arguments.
Musical	Musicians, composers	The ability to learn, perform, and

		compose music.
Naturalistic	Biologists, naturalists	The ability to understand different species, recognize patterns in nature, classify natural objects.
Visual-Spatial	Sailors navigating without modern navigational aids, surgeons, sculptors, painters	The ability to know where you are relative to fixed locations. The ability to accomplish tasks requiring three-dimensional visualization and placement of your hands or other parts of your body.

### 2.9.2 Cattell-Horn-carroll theory of intelligence

(Raymond Cattell, 1994) argues that intelligence is made up of a hierarchy of factors with g at the top and under it are broad abilities. According to Cattell, these abilities are Fluid intelligence (Gf) which includes the ability to reason from concepts and solve problems using unfamiliar information or novel procedures. He also talked about Crystallized intelligence (Gc) which includes the breadth and depth of a person's acquired knowledge, the ability to communicate one's knowledge and the ability to reason using previously learned experiences or procedures. Quantitative Reasoning (Gq), the ability to comprehend quantitative concepts and relationships and to manipulate numerical symbols. (Cattell, 1994) also argues that reading and writing ability (Grw), Short-term memory (Gsm) which is termed as the ability to apprehend and hold information for immediate awareness and then use it within a few seconds are part and parcel of intelligence.

According to him (Raymond Cattell ) other components of intelligence were long-term storage and retrieval (Gir) Visual processing (Gv), Auditory processing (Ga), processing speed (Ga) and Decision /Reaction Time/Speed (Gt) which reflects the immediacy with which an individual can react to stimuli or a task (typically measured in seconds or fractions of seconds). Even though some of the Cattell's components have been met by the high stake tests, more components such as reaction time (Gt), visual processing (Gv) short term memory (Gs), Auditory etc need to be included if the results of the high stake tests are to be reliable and conclusive.

### **2.9.3 Sternberg's triarchic theory**

Psychologist (Robert Sternberg, 1985) has constructed a three prolonged or triarchic theory of intelligence. The three types are:

**Analytical intelligence** – is what we generally think of as academic ability. It enables us to solve problems and to acquire new knowledge. Problem solving skills he says include encoding information, combining and comparing pieces of information and generating a solution.

**Creative intelligence** – is defined by the abilities to cope with novel situations and to profit from experience. The ability to quickly relate novel situation to familiar situations (that is to perceive similarities and differences) fosters adaptation. More over as a result of experience we also become able to solve problems more rapidly.

**Practical intelligence** – or 'street smarts 'enable people to adapt to the demands of their environment, for example keeping a job by adapting one's behavior to the employer's requirements is adaptive. But if the employer is making unreasonable demands, reshaping the environment (by changing the employer's attitudes) or selecting an alternative environment (by finding a more suitable job) is also adaptive.

According to (Robert Sternberg, 1985) a person who exercises most of these characteristic is considered intelligence and therefore an academic performance that is extracted from a test inclusive of these characteristics can be conclusive.

#### **2.9.4 Thurstone's theory: primary mental abilities/Group factor theory**

Thurstone's theory states that intelligent activities are not an expression of innumerable highly specific factors, as Thorndike claimed. Nor is it the expression primarily of the general factor that pervades all mental activities. He argues that there are a number of groups of mental abilities each of which has its own primary factor, giving the group a functional unity and cohesiveness. Each of these primary factors is said to be relatively independent of the others.

Thurstone has the following six primary factors:

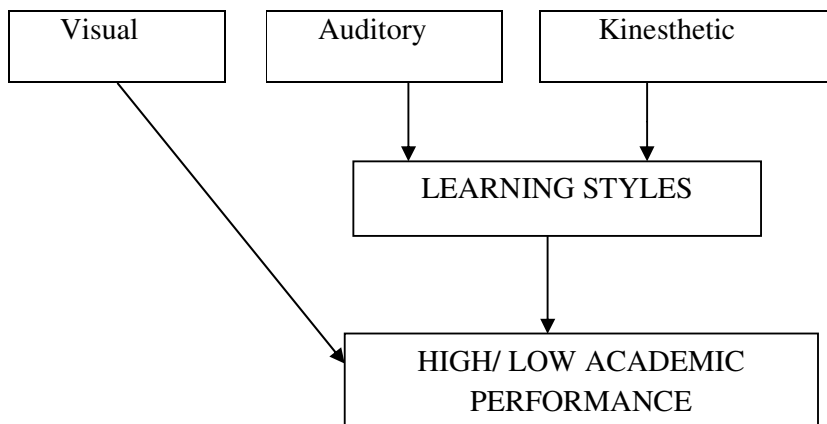
- i. The number factor (N) which he argues is the ability to do numerical calculations rapidly and accuracy.
- ii. The verbal factor (V) which he said is found in tests involving verbal comprehension.
- iii. The space factor (S), he claimed involved in any task in which the subject manipulates the imaginary objects in the space.
- iv. Memory (M) he said involves the ability to memorize.
- v. The Word Fluency Factor (W) according to Thurstone is involved whenever the subject is asked to think of isolated words at a rapid rate.
- vi. The Reasoning Factor (F) is found in the tasks that require a subject to discover a rule or principal involved in a series or groups of letters.

Based on these factors Thurstone constructed a new test of intelligence known as "Test of Primary Mental Abilities (PMA)."

## 2.10 Conceptual Framework

The conceptual framework presented in figure 1 is a diagrammatic representation of Howard's VAK-Visual-auditory, kinesthetic learning styles model. It shows the interrelationship among the variables of multiple intelligence their relationship with Academic performance.

**Figure 1: Conceptual framework**



## 2.11 Summary of the Literature

From the literature, it is clear that intelligence is the cornerstone of human operations; it determines how well one does in his/her duties academically or in ones career. The studies have also shown that intelligence correlates with academic performance to some extent. However, the literature have shown that intelligence have not been outlined and adequately addressed in most education and examination systems. This has left the academic outcomes to other forces other than intelligence.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter dealt with research methodology. It focused on the research design, target population, sample size and sampling techniques, research instruments, pilot study, instrument validity, instrument reliability, data collection procedures and data analysis techniques used in the study.

#### **3.2 Research design**

Research design is the blue print that enabled the researcher to come up with solutions to research questions. It guides the researcher in all the stages of research. It helps to structure the collection, analysis and interpretation of data for this study.

This study employed descriptive survey design. This design obtained a precise and accurate description of the characteristics of the phenomenon, or a particular social group or individuals, and to determine the frequency with which some events or characteristics occur in the population or sample under study and the associations that exist among them (Majumdar, 2005). Such a design helps to draw valid general conclusions from the facts discovered, through measurement, classification, analysis, comparison and interpretation of data (Koul, 2006). Descriptive survey method allowed the collection of quantitative data from a large number of people and relies on individual self-reports of their knowledge experiences, opinions, perceptions, values, attitudes or behavior on an existing or current phenomenon (Mertens, 1998; Mugenda and Mugenda, 1999). The design determined important principles of knowledge and solution to significant problems through collecting data of what exists with respect to

variables or conditions in a natural setting or situation (Gay, Mills and Airasian, 2006).

Consequently, descriptive survey design was deemed appropriate for this study because it enabled the researcher to collect quantitative data from the current situation in a natural setting, on the relationship between the academic performance and actual intelligence of learners in secondary schools. Descriptive design was relevant to this study because it examined the learners' IQ levels, their interests and their academic performance. The nature of this study demanded that data be collected through the Howard Gardner's MI test, observation schedules and secondary sources i.e. Form 1 and 2 ends of year school exams scores.

### **3.3 Target population**

The target population for this study consisted of all Form 3 students in all public and private secondary schools in Nairobi County. There are 60 public secondary schools and approximately 12000 form 3 students (Nairobi County Government, Education department).

### **3.4 Sample size and sampling techniques**

For a descriptive survey research, the sample size depended on specific type of descriptive research involved and the size of the population. In determining the size, Gay et al, (2006) suggested that, for descriptive research, it is common to select, 10% to 20% if the population size is around 1500, and 50% if the population is 500. In qualitative research, determining sample size depends on the extent to which the

selected participants represent the range of potential participants in the setting (Gay et al, 2006).

The second indicator for determining sample size depended on the redundancy of the information gathered from the participants, for instance, when a research begins to hear the same thought perspectives and responses from most or all of the participants, the researcher will know that little more is being learnt and additional participants are not needed, at least for the particular study under study, due to data saturation (Gay et al, 2006). In determining the sample size for this study, 10% - 20% rules were applied. Sampling refers to taking a portion of a population or universe as representative of that population or universe (Kerlinger, 2006). The sampling techniques are the methods that are employed in selecting a representative portion from each of the population relevant to the study. The sampling technique that was employed in this study was two-stage stratified systematic sampling.

In stage 1 sampling, the first set of strata was a collection of schools depending on gender of students, boys' school formed the first set, girls' school the second and mixed schools were the third strata. Each stratus had 20 schools out of which one school was randomly picked and another two private schools were also included giving a total of 8 schools. At stage 2, candidates of the selected schools were also stratified according to their streams and one of the streams will be randomly chosen. An approximate of about 120 students was sampled. Stratification leads to accuracy in precision especially when the strata are internally homogeneous (Gay et al, 2006).



### **3.5 Research instrument**

Two sets of instruments namely Howard Gardener MI test and a secondary source of data were used for this study.

#### **3.5.1 The IQ test**

The test had open and close-ended items. The test was divided in three parts; general information, the IQ questions and past academic performance based on end year exam results. The first part of the test contained information on gender, age, school and student identity. The second part of the consisted of 35 standardized I.Q questions extracted from Howard IQ test. The third part contained student's academic achievement as extracted from the End of year exam results. The IQ test had a total of 42 items.

#### **3.5.2 Secondary source of data (average end term 1, 2 and 3 exams of 2012 and 2013 result)**

This source of information entailed the various ends of term exams of the sampled schools in Nairobi region. The result of the academic performance of the sampled students was picked for this study.

#### **3.5.3 Instrument validity**

Validity is the degree to which the instrument measure what they are purported to measure (Gay et al. 2006). In this study, content validity (both item validity and sampling validity) of the instrument was established before conducting the actual study. Content validity is the degree to which a test measures an intended content area as per the objectives and research questions of the study (Gay et al. 2006).

Item validity is concerned with whether the items are relevant to the measurement of the intended content area. Sampling validity is concerned with how well the items will sample the total content area to be measured. The expert (supervisor) and the specialist in the field of education measurement reviewed and verified the relevance of the items in the instruments in line with the study objectives and research questions. The instrument was piloted to measure content validity. The instrument to be set for pilot study was the IQ test item only since the researcher has no control of the content in secondary data sources. The aim of the pilot study was to determine if the instrument would elicit the type of data anticipated and also to determine whether the research objectives would be appropriately addressed. The pilot study thus, was carried out in order to check on instrument's validity and reliability.

Piloting was conducted in three schools one school from each of the three strata (high achievers, middle and low achieving schools respectively). The pilot schools were identified by simple random sampling from among members of the same strata. Nine students from each selected school were used in the pilot. The nine were also selected randomly from the members of the identified schools with three students coming from each category of high, middle and low achieving students in each school. The result of the pilot study was analyzed and discussed with the colleagues who made constructive criticism and suggestions for improving some items. The result of the pilot study assisted the researcher in reorganizing and restructuring of the items and sections of the instrument. Language, grammar and writing style were also checked, ambiguous items were discarded, others restructured and more items may be included.

#### **3.5.4 Instrument reliability**

Reliability is the degree to which an instrument consistently measures what it is supposed to measure (Mugenda and Mugenda, 1999). Thus, a more important aspect of reliability is the consistency of the scores obtained by the same individual when re-examined with the same measuring instrument on the same or different occasions, or under variable examining conditions (Majumdar, 2005). A data collection instrument must have the ability to consistently yield the same results with repeated measurement of the same group under the same conditions (Koul, 2006; Gay et.al, 2006). The IQ test item is the only instrument the researcher subjected to reliability test. Test- retest reliability was applied.

Test-retest reliability is the degree to which the scores on the same test are consistent over time. It provides evidence that scores obtained in a test at one time are the same or close to the same when the test is re-administered some other time. Thus, test-retest method was implored where the IQ test item was given to the respondents for the first time, and then administered again after one week. The two set of scores were computed and correlated using the Pearson r correlation coefficient, and the results interpreted. The reliability results were examined, discussed and reviewed by the researcher in relation to the purpose and the objectives of the study. Suggestions given were used to make adjustments in the instrument.

#### **3.6 Data collection procedure**

Before the process of data collection, the researcher obtained the research permit from Ministry of Education Science and Technology and a research authority letter from department of Education of Nairobi County Government. Letters of introduction from

the researcher were sent to the administration of all responding schools. After about a week, the researcher visited each of selected schools. An introductory meeting was held with the administration, then the respondents for the purpose of creating rapport, confidence and removing suspicion.

### **3.7 Data analysis techniques**

Raw data collected were cleaned. The quantitative data that were collected from the IQ test item and secondary sources were checked, edited, organized and coded by the computer. The coded data were analyzed through Statistical Package for Social Sciences programs (SPSS), version 19.0. Data from different items of research instrument were analyzed depending on the type of the data collected. For instance, items that elicited background information in research questions 3, 4 and 5 were organized in various themes as per the study objectives and analyzed through content analysis processes. Content analysis process is a careful, detailed, systematic examination and interpretation of a particular body of material in an effort to identify patterns, themes, biases and meanings (Berg and Latin, 2008). Quantitative data collected in research questions were analyzed through inferential and descriptive statistics. The results were presented through the tables, graphs and percentages to allow for data interpretation, conclusion and recommendations as per the objectives of the study.

## **CHAPTER FOUR**

### **DATA PRESENTATION, ANALYSIS AND INTERPRETATION**

#### **4.1 Introduction**

In this chapter, the key issues related to data presentation, analysis and interpretation are discussed. First, the research rate is computed and presented. Second, the findings on the three key objective areas of the study are presented and interpreted.

The first objective was to determine the level of intelligence among secondary school learners. Under this objective, the following specific issues are addressed:

- i. The I.Q of third year students using Howard IQ test form three students,
- ii. The learners' areas of interests using Howard IQ test.

The second objective was to investigate whether gender influences the intelligence of secondary school learners. Under this objective, the following specific issues are addressed:

- i. Comparison between male and female level of intelligence,
- ii. Determining male and female mental orientation, that is comparing male and female intellectual interests.

The third objective seeks to establish the extent to which intelligence relates to academic performance among secondary school learners .Under this objective, the researcher looks at the correlation between intelligence and academic performance generally and along gender lines.

#### **4.2 The study response rate**

As stated earlier, a sample of eight secondary schools in Nairobi County was selected for this study. A total of six schools out of the targeted eight schools participated in

the study, giving a response rate of 75%, which was considered adequate for the study.

#### **4.2.1 Learners' response according to gender**

A total of 160 IQ test papers to be filled by learners were issued to the eight selected schools each school getting 20 test papers. However, two schools in which the test papers were left behind by the researcher did not return the papers, thus, only 6 schools out of 8 who received 120 test papers responded. Of the 120 IQ test papers, 70 were given to the boys while girls received 50. During the analysis, 4 test papers and 6 from the boys and girls respectively were inappropriately filled hence only 66 IQ test papers and 44 from the boys and girls respectively were used for analysis giving a response rate of 94.2% and 88% for boys and girls respectively. This is a total of 110 out of 120 respondents giving 91.67 % response which is well within the acceptable range.

**Table 4.1: Response rate**

Type of school	Male			Female		
	No. of IQ test papers issued	No of IQ test papers received	Percentage of male respondent	No. of IQ test papers issued	No of IQ test papers received	Percentage of female respondent
Public	40	38	95%	30	24	80%
Private	30	28	93.3%	20	20	100%
<b>Total</b>	<b>70</b>	<b>66</b>	<b>94.2%</b>	<b>50</b>	<b>44</b>	<b>88%</b>

### **4.3 Analysis**

At this level, I look at the level of intelligence of third year students in secondary schools using the IQ scale. I also measured the various interests of students as described by Howard Gardner in his theory of Multiple Intelligence. I finally determine whether there exist a relationship between intelligence and academic performance as looked at by several scholars including Howard Gardner, Richard Berlach and B.H Chew. This is in line with the objectives of the study.

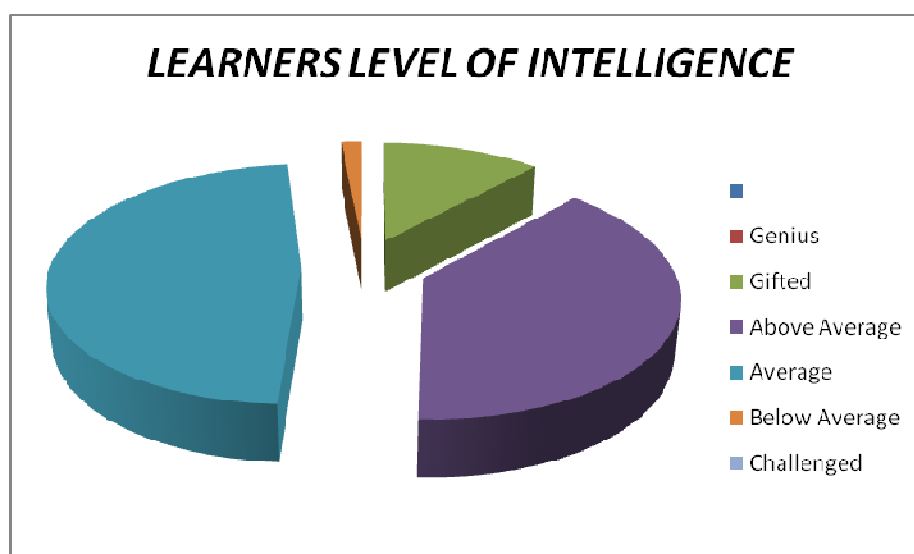
#### **4.3.1 Learners level of intelligence (males and females)**

The first objective aimed at looking at the intelligence level of secondary school learners. It was discovered that majority of the students both boys and girls at 46.36% had an IQ range of between 85 and 114, which psychologists consider as average or normal intelligence. Another dominant group was those of above average intelligence at 40%. 12.73% of the students interviewed were considered gifted while no student exhibited genius. However, some 0.91% had below average mental capability, with 0% being mentally challenged. The table and circle graph below show the distribution of the level of intelligence among students in the third level of secondary education in Nairobi County.

**Table 4.2: Distribution of students (males and females) by IQ levels**

<b>IQ level</b>	<b>Frequency (No. of learners)</b>	<b>Percentage of learners</b>
<b>Average</b>	51	46.36
<b>Above Average</b>	44	40.00
<b>Gifted</b>	14	12.73
<b>Below Average</b>	1	0.91
<b>Genius</b>	0	0
<b>Challenged</b>	0	0
<b>Total</b>	<b>110</b>	<b>100</b>

**Fig 4.1: Distribution of learners IQ rating**





### **KEY (criteria of analysis)**

<b>IQ Level</b>	<b>IQ Range</b>	<b>Meaning</b>
Genius.....	145 – 159	high mental capabilities
Gifted.....	130 – 144	mentally gifted
Above Average.....	115 – 129	mental abilities above normal
Average.....	85 – 114	normal mental ability
Below Average.....	70 – 84	mental ability below expectation
Challenged.....	Below 70	almost mentally retarded

In summary, majority of learners exhibited normal mental abilities and mental abilities above normal of ranges (85 - 115) and (116 - 129) at 46.36% and 40% respectively. The results confirm Alfred Binet work of 1912 where he argues that up to 95% of learners fall between IQ levels 70 and 130 (Stanford-Binet scale, 1916). There was no learner who was mentally challenged neither was there a genius student. One boy however exhibited mental ability that was below average at 82 as shown earlier in table 4.2.

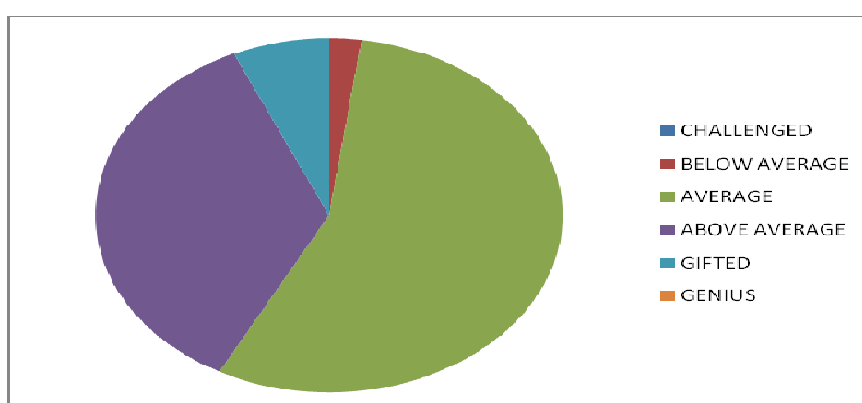
#### **4.3.2 Learners level of intelligence by gender**

To respond to objective 2, we looked at the level of intelligence according to gender. Here 22.73% of the girls interviewed were considered gifted with an IQ range of 130 to 144 compared to the boys' 6.06%. 45.45% of girls were found to be above average compared to the boys' 36.36%. Majority of the boys had average mental capability with 56.06% while girls at this level were only 31.82%. No girl was below average whereas 1.52% of the boys fell in this category. No. girl or boy was either genius or mentally challenged.

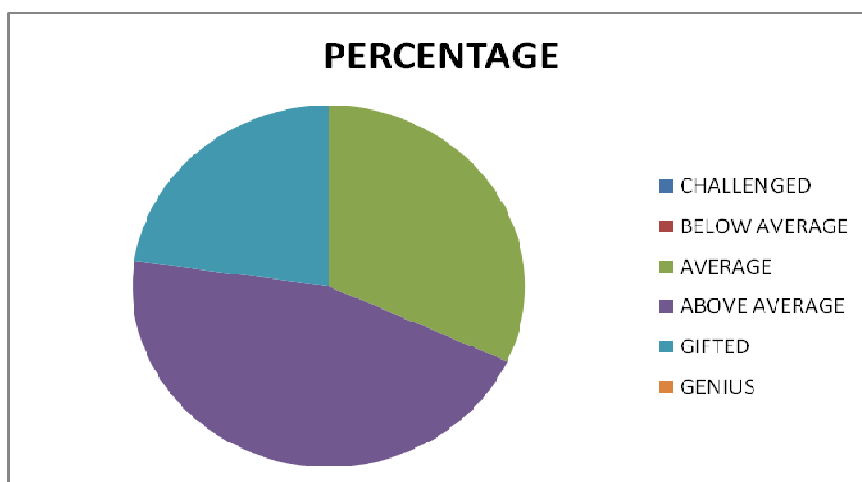
**Table 4.3: IQ level across gender**

Level of Intelligence		Challenged	Below Average	Average	Above Average	Gifted	Genius	Total
Male	No. of boys	0	1	37	24	4	0	66
	% of boys	0%	1.52%	56.06%	36.36%	6.06%	0%	100%
Female	No. of girls	0	0	14	20	10	0	44
	% of girls	0%	0%	31.82%	45.45%	22.73%	0%	100%

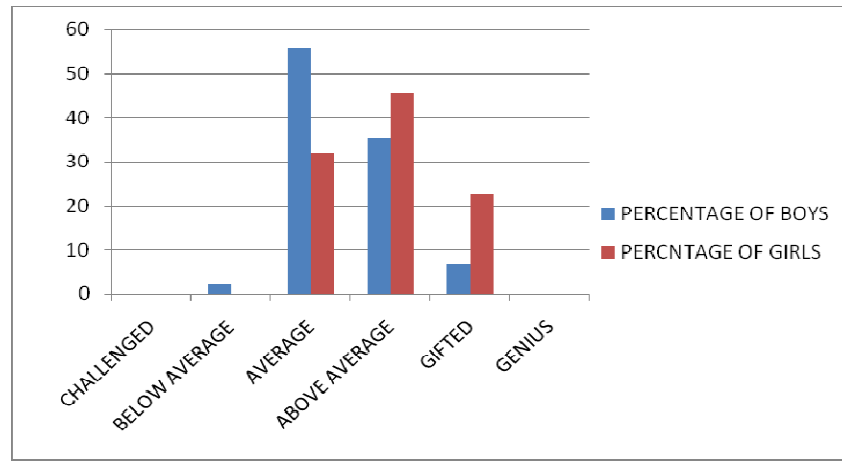
**Figure 4.2: IQ levels by gender (Male)**



**Figure 4.3: IQ levels by gender (Female)**



**Figure 4.4: IQ levels by gender (Male and Female)**



According to the findings, majority of the learners, males and females alike fall under average and above average categories. However, comparatively the percentage of girls at higher levels of intelligence that is at gifted, IQ range (130 - 144) and at above average (115 - 129) is higher than that of boys in that 22.73% girls and 6.06% of boys are considered gifted, also 45.45% of girls and 36.36% of boys are in above average category. Interestingly, boys are dominant at lower intelligence with 56.06% of boys compared to 31.82% of girls fall under average intelligence (85 - 114). In addition, 1.52% of the boys have below average mental capability (70 - 84) with no girl falling here. From this finding, one can conclude that girls tend to exhibit higher intelligence than the boys at the same level.

#### **4.3.3 Learners mental orientation (interests) according to gender**

Howard Gardner argues that students learn better, when they are allowed to learn what interests them. The researcher therefore looked at the mental orientation of the learners and discovered that majority of the boys at 28.89% were interested in Bodily-Kinesthetic activities Intelligence compared to 4.55% of the girls. Another 17.78% of the boys leaned towards Logical-Mathematical related problems compared to 13.64%

of the girls. Female students on the other hand preferred socializing at 31.81% compared to 15.56% of the boys. Another 18.81% liked Linguistic and music.

**Table 4.4: IQ types by gender (Male)**

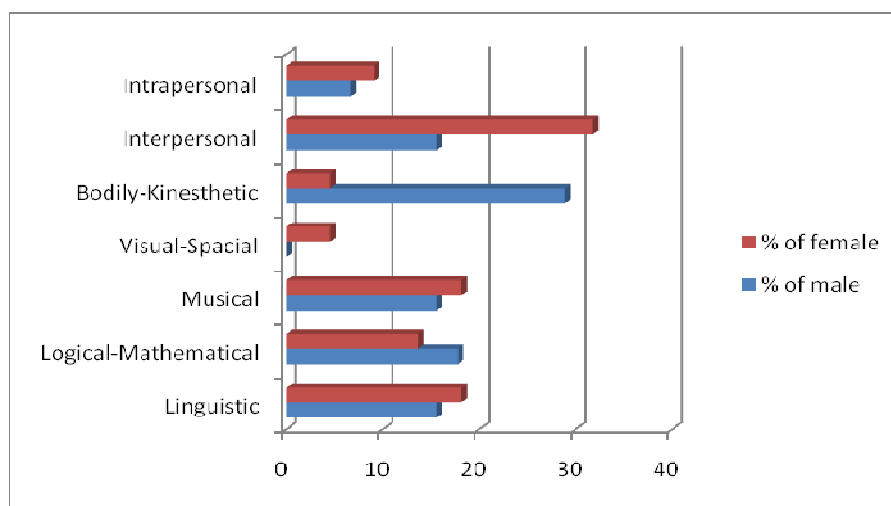
<b>Intelligence Type</b>	<b>Percentage(%) of male</b>
Bodily-Kinesthetic	28.89
Logical-Mathematical	17.78
Musical	15.56
Interpersonal	15.56
Linguistic	15.56
Interpersonal	15.56
Visual-Spatial	0%
<b>Total</b>	<b>100</b>

**Table 4.5: IQ types by gender (Female)**

<b>Intelligence type</b>	<b>Percentage(%) of female</b>
Interpersonal	31.81
Linguistics	18.18
Musical	18.18
Logical-Mathematical	13.64
Bodily-Kinesthetic	4.55
Visual- spatial	4.55
Intrapersonal	9.09
<b>Total</b>	<b>100</b>

From the above tables, one can say that males tend to incline more towards bodily-Kinesthetic and mathematical activities compared to females who prefer socializing and linguistics.

**Figure 4.5: IQ types by gender (Male and Female)**



On mental orientation of the learners, majority of the boys showed interest in bodily-kinesthetic and logical & mathematical activities compared to girls. The girls tend to dominate interpersonal intelligence.

#### **4.3.4 Relationship between intelligence and academic performance**

According to Howard Gardner in his theory of multiple intelligence, learners perform better academically if challenged with tasks that provoke their mental preferences. Richard in his study on the relationship between teacher perception on intelligence and academic performance he found out that there is a slight positive correlation between intelligence and academic performance at 0.2 in low social class and 0.4 positive correlation among high social class. However, this study agrees with the work of (J.E Ormrod, 2010) who argued that high IQ does not necessarily predict high

academic performance. It indicates that there is a slight positive correlation between general intelligence and academic performance at about 0.173 at significance level of 0.221 and 0.178 at significant level 0.214 according to Spearman's correlation and Pearson's correlation respectively among the female student. The study also shows that there is an inverse correlation between learners' intelligence and their academic performance at -0.12 among the male students. It also shows that the relationship between intelligence of both gender and their academic performance is also inverse at - 0.38.

**Table 4.6: IQ levels and academic achievement compaired**

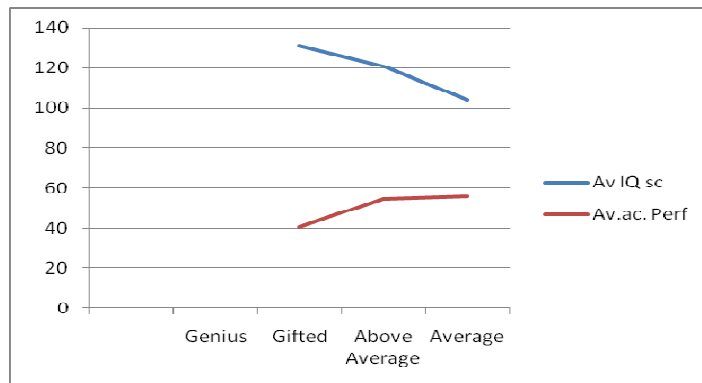
<b>IQ level</b>	<b>Number of males</b>	<b>Male average IQ score</b>	<b>Male average academic performance score in %</b>	<b>Number of females</b>	<b>Female Average IQ score</b>	<b>Female Average academic Performance Score in %</b>
<b>Genius</b>		–	–		–	–
<b>Gifted</b>		131	40.5		133	54.678
<b>Above Average</b>		121	54.779		122	54.986
<b>Average</b>		104	56.03		105	49.549
<b>Below Average</b>		82	–		–	–
<b>Challenged</b>		–	–		–	–
<b>Total</b>		<b>66</b>			<b>44</b>	

The table is derived by determining the number of students attaining IQ level (x 5) and corresponding academic achievement scores. These were averaged resulting in the given table.

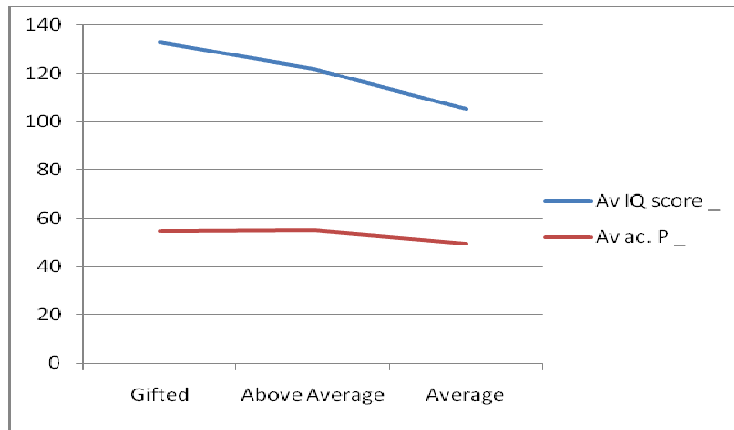
From the table above, male learners with average intelligence of 104 performed better academically with a mean of 56.03% than their counterparts who are perceived to have higher intelligence that is above average intelligence at 121 and gifted at IQ 131 with academic mean scores of 54.779% and 40.5% respectively. This led to the negative correlation of  $-0.12$  between IQ and academic performance among the males as described earlier and demonstrated in the line graph below.

The table also shows that female students with average IQ of 122 performed better with a mean of 54.986% compared with learners with higher intelligence at IQ 133 as well as those with lower intelligence at IQ 105 who scored an academic means of 54.678% and 49.549% respectively. This led to the small positive correlation among the girls IQ and academic performance at  $0.173$  as described above and in the graph below.

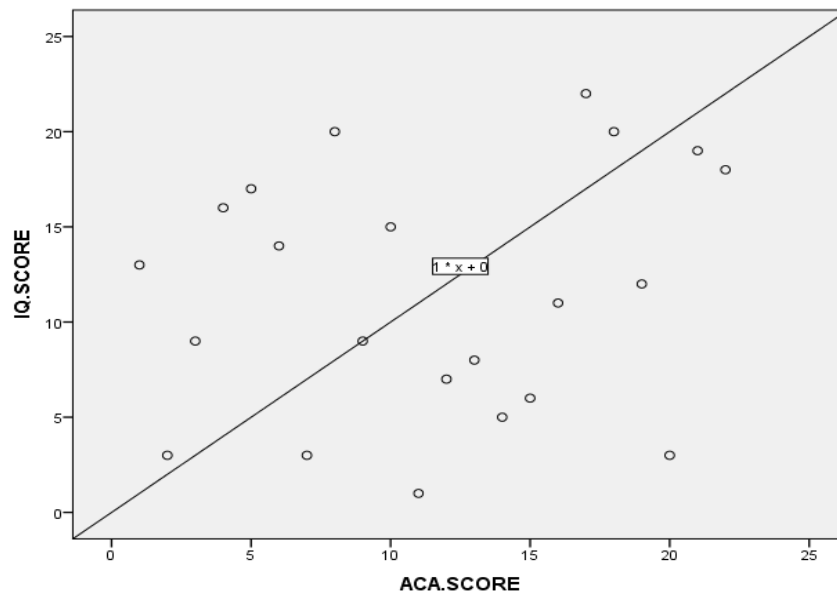
**Fig 4.6: IQ levels and academic performance (males)**



**Fig: 4.7: A line graph comparing the intelligence rating and academic performance among girls**



**Fig.4.8: Scatter Diagram Showing the Relationship between Girls IQ and Academic Performance as obtained in table 4.6**



According to the table 4.6 and the graphs shown, males who are average in intelligence tend to perform better academically than their counterparts who are considered above average or even gifted. On the other hand the research shows that girls with IQ above average perform better than the gifted and the average.



## **CHAPTER FIVE**

### **SUMMARY, CONCLUSION AND RECOMMENDATION**

#### **5.1 Introduction**

This chapter presents a summary of the entire study. Conclusion is then drawn from the findings of the study. The last section provides the recommendation of the study to theory, practice and further research.

#### **5.2 Summary of the findings**

This study had three objectives;

- i. To determine the level of intelligence of secondary school learners,
- ii. To compare the level of intelligence of secondary school learners along gender
- iii. To investigate the extent of the relationship between students' intelligence and their academic performances

##### **5.2.1 Level of intelligence of learners**

According to the first objective which seek to determine the level of learners' intelligence, it was revealed that the majority of learners exhibited average intelligence and above average intelligence of ranges (85 - 114) and (115 - 129) at 46.36% and 40% respectively. There was no learner who was mentally challenged neither was there a genius student. One boy however exhibited mental ability that was below average at 82. In summary one can confidently say that secondary schools have average intelligence at least as far as this work is concerned.

### **5.2.2 Gender and learner intelligence**

The second objective intended to determine the influence of gender to student intelligence. According to the findings, girls exhibited higher IQ than the boys with majority of the girls at 22.73% and 45.45% falling on the gifted and above average IQ categories of IQ ranges (130 -144) and (116 - 129) respectively compared to the boys who dominated normal intelligence level of IQ range (85 -114) at 56.06% and therefore we can say that secondary school girls tend to show higher IQs than their boys counterparts, at least as far as this research is concerned. However, this contradicts the findings by Jones and Dindia who thought otherwise in their work of 2004 (Jones & Dindia, 2004) and (Patchen, 2006). Despite this finding girls still perform dismally compared to boys academically, probably this is because girls have more distracters that hinder their academic achievements compared to boys as argued by Francis (2000) in his UK study.

On mental orientation of the learners, most of the boys showed interest in bodily-kinesthetic activities and logical & mathematical activities at 46.6%. This probably explains why boys tend to do well in sciences, physics in particular and mathematics compared to the girls. According to Mendick (2005), schools serve as sites for the construction of masculinity and femininity. Thus subjects such as mathematics and physics may become construed as masculine making female students not do better in them. On the other hand, girls showed interest in interpersonal activities and linguistics at 50%. This probably explains why females are good at collective activities such as Mary-go-rounds and Chamas and also perform better in languages than boys at school level.

### **5.2.3 The relationship between intelligence and academic performance**

The third objective seeks to investigate the extent of the relationship that exists between intelligence and academic performance. According to the findings as shown in the tables and the graphs, males who are average in intelligence tend to perform better academically than their counterparts who are considered above average or even gifted. On the other hand the research shows that girls with IQ above average perform better than the gifted and the average.

In summary, this study shows that students' academic performance does not necessarily depend on learner's intelligence only but a number of other factors as discussed in literature review confirming Howard Gardner's work of MI and J.E. Ormrod work of 2010. In their work, they argue that factor such as learner interest, learner motivation, quality of instruction, parental support, peer group expectation among others besides intelligence influence learners' academic achievement, an argument that agrees with this study. However, the study contradicts the findings by Richard Berlach who argued that there is a strong positive correlation of 0.503 among students from high social class and a low positive correlation of 0.226 among the financially poor students. In his study, B.H Chew found out that there is a positive correlation between student's emotional intelligence and academic achievement (B.H. Chew, 2013).

### **5.4 Conclusion**

Intelligence quotient (IQ) is a component in influencing outcomes of learning such as performance outcome. Being an important predictor of performance, it is important to explore the extent to which learners exhibit IQ characteristics. The results show that

majority of those who took the test have average IQ rating (85-115) meaning they have IQ abilities that are normal. There was none with high mental capability or genius (145-159). Of the Gifted (130-144), only 14 out of total of 110 students tested. This means that IQ attributes is lacking among students thus impeding on desired influence on education performance.

Of interest, in exploring the types of IQ, girls display more interpersonal (32%) and linguistics at (18%), while boys exhibit more of body- kinesthetic (29%) and logical-mathematical activities (18%). Both genders score low on visual spatial.

This shows that learners in general, in secondary schools in Kenya do not have what is necessary to carryout and perform learning task, especially

- Collective talent
- Ability to solve problems and develop new knowledge
- Ability to reason from concepts and solve problems using unfamiliar information.

The challenge for education is the fact that current learning perspective does require orientation towards learners having IQ skills. Recommendation is for educators to address this need and to explore IQ determinants further.

## **5.5 Recommendations**

Based on the findings of this study, the researcher proposes the following recommendation:

- i. Incorporate IQ testing in schools to determine students' actual intelligence, abilities and competences.
- ii. Encourage use of IQ scores in academic selection activities such as the university and college entry.

- iii. IQ skills and use should be encouraged and included in the teacher education programmes as well as incorporated in the school's curriculum.

### **5.6 Suggestions for further research**

- i. A similar study should be carried out to determine the extent to which intelligence relates to academic performance among secondary school students in the whole country.
- ii. A study should also be done to investigate the extent to which 8-4-4 education system nurtures learner intelligence.
- iii. A study should also be done to give suggestions on how summative exams can be molded to measure the actual intelligence of learners.
- iv. A study should be carried out to determine the best way to get the right students for the right courses at college and university levels.

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## **Appendix A: Letter of Introduction to the Respondents**

**University of Nairobi,  
School of Education,  
Department of Psychology,  
Box 30197,  
Nairobi.**

Dear Respondent,

I am a Post-Graduate student pursuing a Masters Degree in Educational (Measurement and Evaluation) at the University of Nairobi. I am conducting a research for my final year project, which is a requirement of the Degree Program. The research topic is “The extent to which intelligence influences academic performance among public secondary school learners in Nairobi County.

I therefore kindly request you to spare a few minutes to fill in this questionnaire. The information obtained will be purely for the purpose of this research and will be treated as strictly confidential. In order to ensure utmost confidentiality, do not write your name anywhere in this questionnaire.

Thank you for your cooperation and assistance.

Okoth George Ouma

M.Ed Student

## **Appendix B: Learners' IQ test**

### **Introduction**

This IQ test is aimed at collecting information about interests hence intelligence and to check whether there exist a relationship between intelligence and academic performance among public secondary school learners. The information you give will be of benefit to the researcher in accomplishing academic goal. Please respond to the items honestly. The information you give will be held in total confidence and used only for the purpose of the study.

### **Instructions**

Please put a tick/fill in the blank space against the information most applicable to you.

#### **Part A: General Information**

1. Indicate your gender

Male                    [   ]      Female                    [   ]      Student number [   ]

2. School .....

District.....

Division.....

3. Indicate your age.....

#### **Part B: Standardized IQ Questions for Age 15-17**

**(Howard Gardner MI test allowed for public use)**

#### **Read the Instructions Carefully.**

4. In this section you are required to read the statements carefully and tick where best suits you.

**Statement score                      meaning**

5        *Strongly Disagree*

6        *Disagree*

7        *Slightly Agree*

8        *Agree*

9        *Strongly Agree*

5. The following table contains statements that describe you. Tick in one of the boxes to the right-side of the statement to respond.

6. Please respond to all statements.

<b>Statement   Score</b>					
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
I can play a musical instrument					
I find it easy to make up a story					
I am a convincing liar (if I want to be )					
I often have a song or a piece of music in my head					
I have always been physically co-ordinate					
I play a sport or dance					
I am a very social person and like being with other people					
I find graphs and charts easy to understand					
Music is very important to me					
I find it easy to remember quotes or phrases					
I can always recognize places that I have been before, even when I was very young					
When I am concentrating I tend to doodle					
I find mental arithmetic easy					

At school one of my favorite subjects is English					
I like to think through a problem carefully, considering all the consequences					
I love adrenaline sports and scary rides					
I enjoy individual sports best					
I find it easy to remember telephone numbers					
I set myself goals and plans for the future					
I can tell easily whether someone likes me or dislikes me					
To learn something new, I need to just get on and try it					
I often see clear images when I close my eyes					
I don't use my fingers when I count					
At school I love/loved music lessons					
I find ball games easy and enjoyable					
My favorite subject at school is/was math					
I always know how I am feeling					
My favorite subject at school is/was art					
I find pleasure in reading					
It upsets me to see someone cry and not be able to help					
I prefer team sports					
Singing makes me feel happy					
I am happy spending time alone					
My friends always come to me for emotional support					
I keep a diary					

**Section C: official use. Do not fill this part**

**Part 1: Student's Intelligence Test Scores**

Intelligence type	Scores						
	Q1	Q2	Q3	Q4	Q5	Total	% score
Linguistic							
Logical-Mathematical							
Musical							
Bodily-Kinesthetic							
Spatial-Visual							
Interpersonal							
Intrapersonal							
Average Score							

**Part 2: Student's Academic Performance**

This section will be attended by the researcher with information obtained from the school administration.

Year	Year 1 (2012)	Year 2 (2013)	Average score
Mean mark			
Mean grade			