

THE RELATIONSHIP BETWEEN PERFORMANCES IN  
MATHEMATICS AND PHYSICS AT KCSE  
CASE STUDY GUCHA DISTRICT-KENYA

BY

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## DECLARATION

I Nashon Kembero Mogonchi, hereby declare that this report is my original work and has never been published or submitted for any other degree to any other University, College or any other educational institution before.

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Date 28.08.08

## APPROVAL

This research report has been submitted by Mogonchi K. Nashon for examination with my approval.

Name of Supervisor-----Mr Tusiime-----

Signature----------

Date-----28/8/08-----

## DEDICATION

I dedicate this research project report to my beloved family, parents, brothers, sisters and colleagues for their dynamic role played in regard to spiritual, emotional, financial and material support which led to the success of this project.

## ACKNOWLEDGEMENT

Many people have played a key role in making this project a reality and a success. Hence am immensely grateful and pleased to acknowledge their support and encouragement both materially, morally, financially and information contributions. First and foremost my acknowledgement goes to Mr. Simanya who greatly contributed in terms of guidance and general help to make this research project a success. He guided me on research proposal writing and research report writing. My appreciation also goes to Mr. Joseph Nyakundi for his assistance to make the research project a success and also the many other friends who were directly and indirectly involved.

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## **ABSTRACT**

The performance in Mathematics and sciences has been low over the years. The sciences borrow heavily from Mathematics concepts and principles. The research was on the relationship between performances in Mathematics and Physics. The research was carried out from secondary sources based on textbooks, magazines, KCSE results of selected schools over three years. The findings were based on the summary of the facts gathered from literature review. The findings were presented objective by objective, drawing contrast, similarities and identifying on new inferences from the study. The researcher's opinion is given at the end.

Recommendations stated were centered on the loop holes identified during the study. It includes adding value to the teaching-learning experiences in Physics, enhanced team teaching amongst Physics and Mathematics teachers. Secondary schools should invest in the building of library facilities for the students to access reference textbooks of sciences and mathematics. This will encourage individualized study among students and that will definitely improve performance.



# CHAPTER ONE

## 1.0 INTRODUCTION

### 1.1 BACKGROUND

Mathematics in secondary school curriculum is a core and mandatory subject while physics is not. The time allocations between the two subjects vary, yet physics is optional according to the current Kenya secondary schools education curriculum. The two subjects are related in one way or the other in terms of concepts and application of skills and knowledge learnt, in this respect the following are the definitions of the subjects.

In the 15<sup>th</sup> edition of the Encyclopedia Britannia (1978), physics is defined as, the science that deals with the structure of matter and the interaction between the fundamental constituents of the observable universe. In the broadest sense physics which has a long natural philosophy (from the physikos) is concerned with all aspects of nature on both the microscopic and sub-microscopic level. Its scope of study encompasses not only the behavior for the objects under the action of given forces but also the nature and origin of gravitational, electromagnetic and nuclear force fields. Its ultimate objective is the principle that brings together and explains all such desperate phenomenal (micropadia Vol.7 p44)

In the same article mathematics is defined as the science of structure, order and relation that has evolved from the medieval elemental practice of counting, measuring and describing the shape of objects. It deals with logical reasoning and quantitative calculations (miropaedio Vol.7 p933). The study of mathematics and sciences (physics, chemistry and biology) is the key to technological advancement. This is a requirement for all the Engineering courses world over, the fields of nuclear technology weaponry,

medicine, law, teaching, administration, social sciences and the natural sciences. Hence it's good and desirable for many people world wide to get exposure to the subjects. In Kenyan schools the study of mathematics and at least two sciences subjects are compulsory under the present curriculum. The significance and importance of mathematics was observed by the KNEC secretary in 1990 KCSE examination report that;-

“Mathematics is very important not only because of the type of skills and knowledge that learners acquire from learning the subject but also because of its use in the learning of other subjects of the curriculum and its application in industry and commerce after school. It is for this reason that mathematics is made mandatory for all students”

It's also a subject which has been given different time allocation and mathematics is a core subject. Generally physics cannot exist without mathematics. This has made it necessary to study the relationship between physics and mathematics terms of performance at KCSE.

## **1.2 STATEMENT OF THE PROBLEM**

Performance in physics and mathematics has been decried in most parts of the world in general. For instance, in December 1996 the issue of Physics world a monthly magazine by the institute of Physics (UK), it was found from research in British Schools that at A-level, a class of 100 students when given a choice between Law, Economics, Accounting, Biology and Physics, the students will select as follows 35, 25, 20, 14 and 6 respectively. And after about six months of the six doing Physics, if given the opportunity to reselect two more will drop the subject and opt for a different subject. This has been attributed to high amounts of man-hour needed to internalize the physics concepts and the abstract nature of the physics concepts. Many researches done in Kenya have revealed that the poor performance in Mathematics and Physics depends on lack of adequately qualified personnel, poor and inadequate preparations of the teachers before going to class, lack of adequate and sufficient resources in most schools especially

reference materials, laboratories which are well equipped, lack of motivation on students from teachers, parents, other students and other stakeholders. Students negative attitudes towards Mathematics and physics. The researcher therefore has decided to carry out this research project to determine, the relationship between mathematics and physics in terms of performance at KCSE due to close linkage between the two (mathematics and physics).

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

The purpose of the study was to determine the correlation between performance in physics and Mathematics. This would be used in making recommendations for the reorganization in teaching of Mathematics to improve its performance and that of physics. It may also act as a baseline in making physics and other science subjects compulsory for creating enough manpower for technological advancement and industrial growth.

### **1.4 OBJECTIVES OF THE STUDY**

The following were the objectives of the study;-

1. To determine the correlation between performance in mathematics and physics by taking statistical treatment of the raw data (scores) for the last three years i.e. 2005, 2006 and 2007.
2. To compare the performance of students in mathematics and physics at KCSE for five secondary schools of Kenya Division.
3. To suggest how the teaching of mathematics can be used to supplement and improve the teaching of Physics.

### **1.5 RESEARCH QUESTIONS**

The following are some of the questions that were derived from the objectives.

1. What are the correlations between the scores in mathematics and physics for the last three years?

2. What are the levels of scores for mathematics and physics by students for KCSE?
3. How can the teaching of mathematics be used to supplement and improve the teaching of physics?

## **1.6 SIGNIFICANCE OF THE STUDY**

The world is becoming a global village due to technological advancements and the use of sophisticated communication network, Kenya in particular aims to join the newly industrialized countries through Sessional Paper entitled Vision 2030. Therefore it is important to seek ways of improving the performance of sciences and mathematics as they form the backbone of technological development.

For instance the trends in living standards are directly related to levels of technology. Economic success heavily relies on industrial break-through as noted in some countries of the world among them South Korea, Japan, and China. These countries started by making solid scientific innovations. Since the best measure of understanding which is reliable is examinations, the study will help teachers and curriculum developers to identify the causes of poor performance in sciences and mathematics in order to find solutions and ways of improving the performance. The study will reveal the relationship between the various topics in Physics and mathematics for quantitative requirements. The correlation found between mathematics and physics will help the teachers to take remedial steps to improve the understanding and performance of physics and mathematics in Secondary Schools. This will make the teaching and learning of Mathematics to be more relevant to real life situations with a possibility of looking into how various topics could be reorganized and taught co-currently in Physics and Mathematics.

## **1.7 LIMITATIONS OF THE STUDY**

The study will be limited to five secondary schools of Kenyena Division of Gucha District because of the following reasons:-

- To minimize traveling costs during data collection since most schools are far.

- The data will be restricted to only those students doing both Physics and Mathematics.
- The schools sampled will be those which offer Physics for the KCSE examination.
- The study will be limited to scores of the last three years i.e. 2005, 2006 and 2007.

## **1.8 ASSUMPTION OF THE STUDY**

The researcher assumed that the sample from the five schools and the scores for three years were a proper representation of all the categories of secondary schools in Kenyena Division of Gucha District.

## **1.9 DEFINITION OF TERMS**

**Population;** the universe of interest that is the total number of students who did both Physics and Mathematics at KCSE from 2005 to 2007.

**Sample;** is a fair representative of the population selected for research such as the candidates for Physics and Mathematics for the last three years.

**8-4-4 System;** Kenyan education system comprising of eight years of primary education, four years secondary education and four years of university education.

## CHAPTER TWO

### 2.0 LITERATURE REVIEW

#### 2.1 INTRODUCTION

The importance of Mathematics and Sciences to mankind is unequalled by any other sphere of learning. According to Kopiyo (1986) in a paper entitled Changing the Face of Physics Education in Secondary Schools says; “Science is the greatest intellectual and cultural achievement of modern man. It’s a fact that in those achievements Physics plays a role alongside other Science disciplines, if not more” Physics provides an opportunity for man to know more about nature and to understand himself and get power over his destiny which should not be a mystery; it also opens situations where all arithmetic gymnastics applies. The purpose of understanding the physical world around himself both intellectually and culturally is that the learner uses that understanding to explain the behavior of matter that surrounds him and to utilize the environment for his own good. On the other hand Howson and McLone (1983) noted that mathematics represents to one either a challenging intellectual stimulation and enjoyment or failure and drudgery. He observed that this is so because an accountant who miscalculates may waste time and money, while a nurse who miscalculates may kill someone. Its clear from the statement that mathematics is very important for our life for it controls virtually all our daily activities. For this reason performance in mathematics and science related subjects i.e. Physics, Chemistry and Biology is of greater concern to examiners teachers, parents, curriculum developers and the world at large.

Whitney (1966) writes that, “The study of Physics is important .... It consists of applying physical principles for our needs and pleasures. The motor cars, trains, aero planes, cameras and electronic gadgets require the knowledge of Physics to exist. In addition to this, the national committee on Educational

objectives and Policies (Gachati Commission 1976) noted that science contributes distinctive skills, concepts and perceptions different from those offered by other disciplines. The acquisition of those skills is greatly facilitated by structured formal education”

The teaching and learning of mathematics and physics involves transmission of knowledge,

Scientific skills and attitudes to learners by an experienced person called a teacher. Its carried out in such a manner as to encourage each student to:-

- Understand the environment and apply accumulated knowledge and exposure to deal with the problem posed by it.
- Utilize experimental approaches to acquire the ability to device, carry out experimental observations and record data.
- Appreciate the place of science in today’s world.
- Heighten the students’ to curiosity of scientific inquiry.
- Improve his capacity to criticize his own work, admit errors where possible and respect other points of view.
- Understand the arithmetic and scientific methods of data analysis, reaching conclusions, draw generalizations and learning to test them.

## **2.2. NATURE OF MATHEMATICS**

Mathematics as a science is used in measuring, counting, description of shapes and phenomena, other concepts taught and learnt include time, money, distance, volumes and areas among others. It employs logical reasoning and quantitative calculations used in almost all branches of knowledge such as business, engineering, applied science, research and social studies. As a branch of knowledge it heavily relies on abstract knowledge (abstraction). According to world book encyclopedia vol.13 pg 238, Mathematics is the most useful and fascinating division of man’s knowledge. It helps us in many significant areas of

study, and has the power to solve some of the deepest puzzles man must face. Mathematics is the study of quantities and relations through the use of numbers and symbols.

English scientist Roger Bacon (1267) wrote Mathematics is the gate key to sciences. Most scientists depend on Mathematics for exact descriptions and formulae of observations, experiments and analysis which involve data processing. Most scientific problems have become complicated that only highly trained mathematicians working with sophisticated giant electronic computers can supply the required answers/solutions. The physical sciences such as astronomy, Chemistry and Physics, depend heavily on Mathematics. In the social sciences and Economics/Accounting there is a remarkable increase in the use of Mathematics for data collection, data analysis and research project

### **2.3. MATHEMATICS AND PHYSICS SCIENCE.**

Physics science differs from mathematics in both nature and method. While science is seen as the normal and the only mode of the knowledge, Mathematics can be viewed only as a tool of science. Dan (1992 pg. 188, 189) points out that science without mathematics is inconceivable. No science can be exact without the application of Mathematics directly. Mathematics can be said to be the language of science. In studying science the knowledge of graphs, equations, statistics, curricular and other arithmetical processes such as ratios, proportions and drawing are necessary. All these require the knowledge of Mathematics.

Science is mainly inductive while Mathematics is essentially reductive hence the divergence. Mathematics is not confined to physical realities while Physics is in the UNESCO handbook for science teachers (1988, p24), it is reported that both philosophers (Hirst and Phenix) agree that Mathematic is not empirical and is not classified as a science. Hirst puts Mathematics under logic. While Phenix puts Mathematics in language. There is no doubt that Mathematics is a language one that is much used by scientists. Since it



Form I and Form II and at least two science subjects in Form III and Form IV. It has been a common thing that the third subject being dropped by most students in most schools is Physics. Those who take Physics are either forced to do so by the schools or are relatively better in mathematics and more so they are all round students. So the 8-4-4 system has not addressed the problem of deteriorating performance in both mathematics and science subjects. This problem has been around for a long time. This is explained in the report by the National Committee in Educational Objective Policies (1976, NCEOP) popularly known as the Gachathi Committee. The report says in part that there has been a general deterioration on Mathematics and sciences throughout the formal system of education. The problem is compounded by the persistent poor performance by students in national examinations in these subjects. Kimame (1985) describes attitude as a feeling and behavior about activities and can either be positive or negative. Attitudes towards Mathematics and Physics have been associated with achievements by many scholars, researches by Eshiwani (1974), Sheikh (1977) showed that generally girls tend to have negative attitudes mathematics and this tended to affect their performance.

According to an article in the Daily Nation (10<sup>th</sup> Feb. 1996, p.19) a lecturer at Egerton University indicated that the most probable causes of negative attitudes towards mathematics among learners are:-

- The scoring nature of the subject.
- Accuracy demanded in working out problems.
- The number of concepts which require learners to discriminate or differentiate may also attribute.

All these mathematical aspects create anxiety which greatly affects students' perception of the subject and performance. Another complaint carried in the same copy of the Daily Nation (10<sup>th</sup>

Feb. 1996 p.20), someone observed that mathematics deals with properties and ideas which are applicable in the real world, but are rarely connected to actual feeling. Hence, thus leads to little appreciation of the subject by learners. Thus the dislike of mathematics and other concepts related to mathematics in some topics of Physics.

The above account indicates that the underlying causes of poor performance are not technically limited to the examinations, but also the teaching-learning process of the subject. The trend of poor performance is endemic even in universities which admit the best candidates. The mass failure of the first 8-4-4 students of the faculties of engineering and science of the University of Nairobi illustrates that better. It was baffling to the top students when they ended up not measuring to the expectations of academics. This grave problem must be having a root cause because the students are average citizens and thus the problem lies somewhere in the system. The accusing finger has been pointed at mathematics as an excuse. The common thread between mathematics and other subjects is only mathematical concepts applied in the sciences. Physics employs inductive empirical approach as opposed to mathematics which employs deductive rational approach. This research hypothesizes that it's the lack of the understanding of mathematics which causes poor performance amongst students in the sciences.

The poor performance in mathematics and physics presents worries to policy planners for industrial or technological take off by the year 2020. The way forward lie on the application of Physics and mathematics to industrial development, but the performance in the two areas is precarious. The Academic Magazine, East African Standard (10<sup>th</sup> Sep.1994) reports that the trend is worrying. Because sciences form the backbone of industrialization, industrialists and policy planners have a cause to worry about. The Academic Magazine (16<sup>th</sup> Sep.1995) also reported that it has been said that no country can expect to

advance technologically if it has no clear cut policies on the teaching of the science subjects in its educational institutions. Developed countries have done exactly that and that is why they have advanced both scientifically, economically and technologically. As shown by diverse literally comments in this topic, the problem of poor performance in sciences and mathematics is known. The question is whether the poor performances on these subjects are related or not. Therefore, this research project seeks to determine the level of association between performance in Mathematics and Physics on secondary schools KCSE examination.

## **CHAPTER THREE**

### **1.0 RESEARCH METHODOLOGIES**

#### **1.1 INTRODUCTION**

This chapter examines methods used in carrying out the research. Various methodologies and techniques which were used to achieve the stated objectives will be discussed. These methods provide a basis for analyzing and presenting data. Some of the aspects looked into include:-sample design, sources of data, nature of data collected, techniques of data analysis and presentation.

#### **3.2 THE SAMPLE FRAME**

The study was conducted in five secondary schools of Kenyeny Division – Gucha District. The study was undertaken through inquiry into the performance of students taking Mathematics and Physics. These secondary schools in the Division formed the universal population due to limited resources. It was not possible to cover completely the universal population (all secondary schools in the Division). A random sample frame of five was selected as a representative of the universal population.

The target population was the students studying both physics and mathematics. KCSE examination records of all the students' performance from 2005, 2006 and 2007 results were examined and each considered for analysis. The performance of both physics and mathematics will reveal the relationship in performance and the correlation which exists between the two subjects.

### 3.3 THE NATURE OF DATA COLLECTION

The availability and quality of the data plays an important role in the research undertaking. The types of data outlined below were collected to achieve the research objectives;

- Data on performance in both Physics and Mathematics.
- Data on the number of students who did both Physics and Mathematics
- Data on the number of schools offering for KCSE examinations

### 3.4 RESEARCH INSTRUMENT

The content analysis and survey of records was used for data collection. This involves document analysis method for KCSE results, for mathematics and Physics for the three years 2005, 2006 and 2007.

### 3.5 DATA COLLECTION PROCEDURES

Data was collected from the examination files on the selected schools, where the researcher extracted the required scores for the period under study. These were listed in tabular form with four columns i.e. school, pupil, Mathematics scores (x) and Physics scores (y). The scores were in form of points attached to the grades acquired by individual students as follows;-

A=12      A=11      B+=10      B-=8      C+=7  
C=6      C-=5      D+=4      D=3      E=1

#### TABLE FORMAT

SCHOOL	PUPIL	MATHS (x)	PHYSICS (y)
A			
B			
C			
D			
E			

### **3.6 DATA ANALYSIS.**

In order to assess the variation in the magnitude or association of the various variables (parameters) under study, various statistical techniques were utilized in analyzing the research findings, namely descriptive and inferential statistics.

#### **3.6.1 Descriptive Statistics**

Descriptive statistics will involve the use of basic statistics techniques like tables and graphs.

The table will be used to indicate the description of performance indices in the given subjects  
i.e. physics and mathematics

#### **3.6.2 Inferential Statistics**

These are statistical techniques that enable one to make inferences or generalizations about a large group on a sub-set of that group (sample), given that certain assumptions can be made. It will test whether the variables are related or what had been observed could have happened by chance rather than representing a real connection. Inferential statistics employed were regression analysis and correlation analysis.

##### **3.6.2.1 Regression Analysis**

This is a statistical technique through which one can analyze the relationship between a dependent and independent variables. In broad terms it's defined as the analysis of relationships among variables. The general linear regression analysis assumes that the underlying relationships among the variables are linear and additive. Regression was employed both as a descriptive and an inferential tool. As a descriptive tool it was used to show the kind of relationship that exists between the dependent variable and the independent variable. While an inferential tool regression analysis was used to establish the functional relationship that exists between the variables. This relationship was

expressed in the form of an equation connecting variable (y) and the independent variable (x). The regression equation (line) is written as follows

$$y = a + bx$$

Where: - a is referred to as the y – intercept

b is the slope coefficient

### 3.6.2.2 Correlation Analysis

In order to validate the obtained linear equation, correlation analysis was necessary to test the goodness of fit. In other words, the accuracy of the estimates of y that are given by the regression line. To achieve this, correlation coefficient (r) was computed. It was a measure of how well the model fits the observed data. It indicated the strength and the direction of the linear relationship. Correlation coefficient  $r_{xy}$  hence measure the relationship between y and x. It's computed as:-  $r_{xy} = \frac{S_x}{S_y} b$

$$S_y$$

Where: -  $S_x$  - the standard deviation of the variable x.

$S_y$  - the standard deviation of the y variable.

$r_{xy}$  - the correlation between x and y.

## CHAPTER FOUR

### 4.0 RESEARCH FINDINGS AND DISCUSSIONS

#### 4.1 INTRODUCTION

This chapter presents results of data analysis. The results are also interpreted and discussed to provide possible answers to the research questions. Therefore what is considered in the chapter are those data that answer the set objectives of the study. These include:-

- (a) Data mean scores and standard deviations for mathematics and Physics.
- (b) Correlation coefficients for Mathematics and Physics.

The researcher collected the data from five secondary schools of which both of them are mixed day schools. The results from students who sat for KCSE examinations in both Mathematics and Physics were collected. The data analysis for the five secondary schools (i.e. A, B, C, D and E) for the three years were tabulated as below and discussion done for each school.

#### 4.2 PERFORMANCE IN MATHEMATICS AND PHYSICS AT KCSE

The student performance may be summarized as follows in the tables:

Where:  $\bar{x}$  stands for Mathematics mean score.

$\bar{y}$  stands for Physics

$\sigma_x$  stands for standard deviation for Mathematics

$\sigma_y$  stands for standard deviation for Physics

$r_{xy}$  stands for correlation coefficients

N stands for total number of students enrolled for Mathematics and Physics



**Table 1****Data Analysis For KCSE 2005-2007 For School A**

Year	N	$\bar{x}$	$\delta x$	Xdn-1	$\Sigma x$	$\Sigma x^2$	$\bar{y}$	$\delta y$	Ydn-1	$\Sigma y$	$\Sigma y^2$	a	b	r	$\Sigma xy$	$r_{xy}$
2005	22	6.82	2.85	2.92	150	1202	6.68	2.44	2.50	147	1113	1.025	0.8296	0.9713	1151	0.969
2006	10	5.40	3.64	3.84	54	424	5.80	2.89	3.50	58	420	2.097	0.686	0.8631	404	0.864
2007	23	7.17	2.014	2.06	165	1277	4.43	2.79	2.86	102	632	4.889	1.2996	0.9366	853	0.936

**Discussion**

For the three years the enrolment of students in the school ranged between 10 and 23 students as indicated in the table above. In the year 2005 the performance in Physics and mathematics are almost the same with mean scores of about 7.0 (I.S.F), the correlation coefficient  $r_{xy} = 0.97$  shows a strong relationship between performance thus an improvement in mathematics may lead to better performance in physics. In the year 2006 the performance in Physics is better with a mean of about 6.0 (I.S.F) than that in Mathematics with a mean of 5.0 (I.S.F). The correlation coefficient  $r_{xy} = 0.86$  shows very strong relationships between the two subjects. The standard deviation for Mathematics ranged from 2.44 to 2.89, as shown in the table.

**Table 2****Data Analysis For KCSE 2005-2007 For School B**

N	$\bar{x}$	$\delta x$	Xdn-1	$\Sigma x$	$\Sigma x^2$	Y	$\delta y$	Ydn-1	$\Sigma y$	$\Sigma y^2$	a	b	r	$\Sigma xy$	$r_{xy}$
19	8.05	3.53	3.63	153	1469	5.37	2.64	2.71	102	680	-0.023	0.6695	0.8955	980	0.895
43	4.72	2.52	2.55	203	1231	4.21	2.06	2.09	181	945	0.443	0.7978	0.9735	1072	0.976
32	3.16	1.50	1.53	101	391	6.19	2.08	2.12	198	1364	2.426	1.192	0.8594	1056	0.869

**Discussion**

As indicated in the table above, the candidates enrolment for both Physics and Mathematics ranged within 19 and 42, where the 2006 recorded the highest enrolment. In the year 2005

performance in Mathematics was better than that of Physics with a mean of 8.1(1dp) and 5.4(1dp) respectively. The correlation coefficient of 0.895 shows strong positive relationship between the two subjects. In the year 2006, the mean of Mathematics and Physics were low with mean scores 4.7 and 4.8 respectively. There is a strong positive relationship between performances in Mathematics and Physics as indicated by  $r_{xy} = 0.98$ . In the 2007 the mean score for Mathematics dropped further to 3.15 from the previous year. But that of Physics improved to 6.19 from the previous year's performance. This shows that the performance in the year in review was better in Physics than in Mathematics. The correlation coefficient of  $r_{xy} = 0.87$  shows strong positive relationship. The standard deviation varies within 1.50 to 3.53 for Mathematics and 2.06 to 2.64 as shown in the table above

**Table 3**

**Data Analysis For KCSE 2005-2007 For School C.**

Year	N	$\bar{x}$	$\delta x$	$X_{dn-1}$	$\Sigma x$	$\Sigma x^2$	$\bar{y}$	$\delta y$	$Y_{dn-1}$	$\Sigma y$	$\Sigma y^2$	a	b	R	$\Sigma xy$	$r_{xy}$
2005	40	6.33	2.54	2.58	253	1859	3.60	1.53	1.55	144	612	0.051	0.5611	0.9329	1056	0.932
2006	43	3.79	2.57	2.61	163	903	4.79	1.65	1.67	206	1104	2.423	0.6247	0.9747	959	0.973
2007	46	4.96	2.64	2.67	228	1450	4.24	2.30	2.32	195	1009	0.2189	0.8111	0.9318	1226	0.931

## Discussion

The candidates enrolment for school C varied between 40 and 46 because the school is double streamed. In 2005 the performance for Mathematics was better than Physics with a mean score of 6.32 And 3.60 respectively. The correlation coefficient of  $r_{xy} = 0.93$  indicated a strong positive relation between performance of the two subjects. In 2006 the performance index of Mathematics dropped to 3.79 and that of Physics improved to 4.79, which shows better performance in Physics than Mathematics. The correlation coefficient of  $r_{xy} = 0.97$  shows a strong relationship between the two subjects.

In 2007 the performance index for Mathematics improved slightly to 4.96 and that of Physics dropped to 4.24. This shows that there was a slightly better performance in Mathematics than Physics. The standard deviation for both Mathematics and Physics ranged from 2.54 to 0.64 and 1.53 to 2.30 as shown in the table above.

**Table 4**

#### Data Analysis For KCSE 2005-2007 For School D

N	X	$\delta x$	Xdn-1	$\Sigma x$	$\Sigma x^2$	Y	$\delta y$	Ydn-1	$\Sigma y$	$\Sigma y^2$	a	b	r	$\Sigma xy$	$rx_y$
24	6.67	3.39	3.46	160	1342	5.54	2.20	2.25	133	853	1.5627	0.59685	0.9197	1051	0.920
35	6.83	2.92	2.97	239	1931	6.71	2.51	2.55	235	1799	1.0434	0.8305	0.9656	1853	0.966
37	7.05	2.77	2.81	261	2125	5.46	1.87	1.89	202	1232	0.9103	0.6449	0.9560	1608	0.955

#### Discussion

The candidates enrolment for the three years in this school ranged from 27 to 37 as can be seen from the table 4 above. In 2005 the overall performance in Mathematics was better than in Physics, which recorded a performance index of 6.67 and 5.54 respectively. The relationship is a strong positive with the coefficient of 0.92 that was obtained. In 2006 the mean grade for Mathematics and Physics was 6.83 and 6.71 for Mathematics and Physics respectively. The correlation coefficient of  $rx_y = 0.97$  shows a strong relationship.

In 2007 there was a further improvement in Mathematics performance to a mean score of 7.05 while Physics dropped in performance to a mean score of 5.46 as in the table. The relationship is a strong positive as seen from the coefficient obtained of  $rx_y = 0.96$ . The standard deviations varied between 2.77 and 3.39 for Mathematics and also 1.87 and 2.51 for Physics as indicated in table 4 above.

**Table 5****Data Analysis For KCSE 2005-2007 For School E**

N	$\bar{x}$	$\delta x$	Xdn-1	$\Sigma x$	$\Sigma x^2$	$\bar{y}$	$\delta y$	Ydn-1	$\Sigma y$	$\Sigma y^2$	a	b	r	$\Sigma xy$	Rxy
20	6.75	2.12	2.17	135	1001	5.50	2.25	2.31	110	706	-1.4568	1.0306	0.97154	835	0.971
60	4.58	2.87	2.90	275	1755	5.35	2.53	2.55	321	2101	1.3953	0.8628	0.97968		
46	6.37	2.33	2.35	293	2117	3.98	1.79	1.81	183	875	-0.70571	0.73537	0.96044	1350	0.957

**Discussion**

For the three years the number of candidates enrolled for Mathematics and Physics ranged from 20 to 60 as shown in table 5 above. In 2005 the performance index for Mathematics was 6.75 and that of Physics was 5.5. The relationships between the two subjects is strong positive as shown by coefficient of  $r_{xy} = 0.971$ . In 2006 there was a drop in performance index for both subjects where the mean scores were 4.58 and 5.35 for Mathematics and Physics respectively.

In 2007 there was an improvement in Mathematics with a mean score of 6.37 but still a drop in Performance index for Physics with a mean of 3.98. This indicates that in this particular year there was better performance in Mathematics than in Physics. The correlation coefficient of 0.957 indicates a strong positive relationship. The standard deviation for the three years ranged within 2.12 and 2.87 for Mathematics and 1.79 and 2.53 for Physics.

### 4.3 DISCUSSION OF THE SCHOOLS RESULTS 2005-2007

Table 6

#### 2005-2007 KCSE Results Analysis

SCHOOL	MATHEMATICS		PHYSICS		NUMBER OF STUDENTS	CORRELATION COEFFICIENT
	$\bar{x}$	$\delta x$	$\bar{y}$	$\delta y$		
A	6.46	2.83	5.64	2.71	55	0.923
B	5.31	2.52	5.26	2.26	94	0.945
C	5.03	2.58	4.21	1.83	129	0.945
D	6.85	3.03	5.90	2.19	96	0.947
E	5.90	2.44	4.93	2.19	126	0.964
ALL	5.91	2.68	5.19	2.24	500	0.938

#### Discussion

Generally in all schools analyzed students who take both Mathematics and Physics tend to do better in Mathematics and Physics as indicated in table 6 above. The overall mean for each school for the three years indicated that Mathematics is better performed. This implies that Physics contributes to good performance in Mathematics. The correlation coefficients are generally greater than 0.70 that shows that the relationship between performance in Physics and Mathematics is strongly positive. Hence they are interdependent.

## **CHAPTER FIVE**

### **5.0 CONCLUSIONS AND RECOMMENDATIONS**

#### **5.1 INTRODUCTION**

In this chapter, conclusions and recommendations are presented based on the literature relating to the two subjects, KCSE results for the three years under review and analysis of findings in the previous chapter.

#### **5.2 CONCLUSIONS**

The findings and analysis in the previous chapter reveals that:-

- Performance in mathematics is normally better than physics for students taking both Mathematics and Physics at KCSE. Most students taking both subjects tend to be better in other subjects.
- There is a very strong positive correlation between performance in Mathematics and Physics. This is due to the greater proportions of Physics syllabus which requires mathematical manipulation and the portion which needs qualitative approach borrows a lot from the other portion.
- The symbolization abstraction nature of some mathematical principles also applies to some extent to Physics. Therefore, that results to strong positive correlation in performance.
- The skills of Mathematics are highly needed for effective teaching of Physics. This is because Mathematics tests high level skills while Physics tests low level skills.

### 5.3 RECOMMENDATIONS

From the above conclusions and observations the researcher has come up with the following recommendations:-

- Physics teachers should teach hand in hand with Mathematics teachers in that the Mathematics concepts required in Physics are taught before topics in Physics are tackled.
- The importance of Mathematics in Physics should be stressed by Physics teachers, mathematics teachers, administrators, parents and curriculum developers and other stakeholders to the learners.
- A research be carried out to give reasons as to why performance to Physics is homogenous than that of Mathematics at KCSE.
- Secondary schools should invest in library facilities so that students can have enough reference science and mathematics textbooks at their disposal. This will encourage individualized study among students in order to improve performance.
- Regular in servicing of teachers is necessary to keep them abreast with the reforms and changing methods and content in Physics and mathematics.
- Physics and Mathematics teachers should use teaching approaches and methods which help students discover knowledge on their own in order to cultivate interest and confidence in the subjects.

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## APPENDIX A

### CANDIDATE POINTS FOR MATHEMATICS (X) AND PHYSICS (Y) FOR KCSE

#### RESULTS 2005 – 2007 FOR FIVE SCHOOLS OF KENYENYA DIVISION

SCHOOL A							
X	Y						
12	12	9	9	7	7	5	2
12	10	3	6	8	3	4	4
11	11	9	7	6	6	5	2
11	10	9	8	7	3	3	4
11	10	3	5	6	5	5	2
10	7	8	6	7	3	2	3
10	9	8	8	6	5	5	2
9	9	2	3	6	3	2	3
8	6	8	5	6	5	5	2
9	9	8	8	6	3	2	3
9	9	2	2	5	5	5	2
3	6	8	4	6	3	4	1
9	7	7	7	5	5		
		2	2	5	2		
		8	4	4	5		



# APPENDIX B

SCHOOL B	
12	11
12	11
3	3
12	10
9	8
2	3
12	9
9	8
2	3
12	8
9	7
2	3
12	7
8	7
2	3
12	7
8	7
2	2
11	7
7	6
2	2
11	6
7	6
2	2
10	6
7	6
1	1
9	5
7	6
1	1
0	5

7	3
6	5
6	3
6	5
4	3
6	5
3	3
5	5
3	3
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3	2
5	4
2	2
5	4
4	4
4	4
4	3
4	3
4	3
4	3
4	3
3	3
3	3
3	3
3	3
9	10
6	10
5	10
4	9
4	8
4	8
1	2

3	7
3	6
3	6
3	5
2	5
2	5
2	5
2	5
2	5
2	4
2	4
2	4
2	4
2	4
2	4
2	4
2	3
2	3
1	3

# APPENDIX C

SCHOOL C	
X	Y
11	8
3	2
11	9
2	4
10	12
3	3
11	7
3	2
10	9
2	4
10	10
2	3
11	7
3	2
8	8
1	4
9	8
2	2
11	6
3	2
8	8
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9	8
2	2
10	6
3	2
7	7
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9	7
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10	6
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8	7
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9	5
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8	6
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9	4
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8	6
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8	4
6	6
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7	6
2	2
7	4
6	6
7	6
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7	4
6	6
7	6
1	2
7	4
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7	4
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11	8
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5	3
4	5

# APPENDIX D

SCHOOL D	
12	12
12	10
3	3
12	9
3	3
12	9
12	12
12	9
3	3
11	8
11	11
11	9
3	3
10	8
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3	4
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3	3
3	3
3	3
2	3

# APPENDIX E

SCHOOL E	
X	Y
12	11
12	11
3	5
11	8
5	3
10	10
3	4
5	3
5	3
3	4
4	3
5	3
3	4
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5	3
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4	2
2	4
3	3



**FACULTY OF EDUCATION**

December 20, 2007

**TO WHOM IT MAY CONCERN**

Dear Sir/Madam


This is to introduce you Mr. / Ms. **Nashon Mogonchi** Registration No. **BED/13559/61/DF** who is a student of our University in the Faculty of Education.

He/She is undertaking a resource project which requires your input as part fulfillment for the completion of his / her programme of study.

I kindly request you to avail him/her with all the necessary assistance.

Thank you.

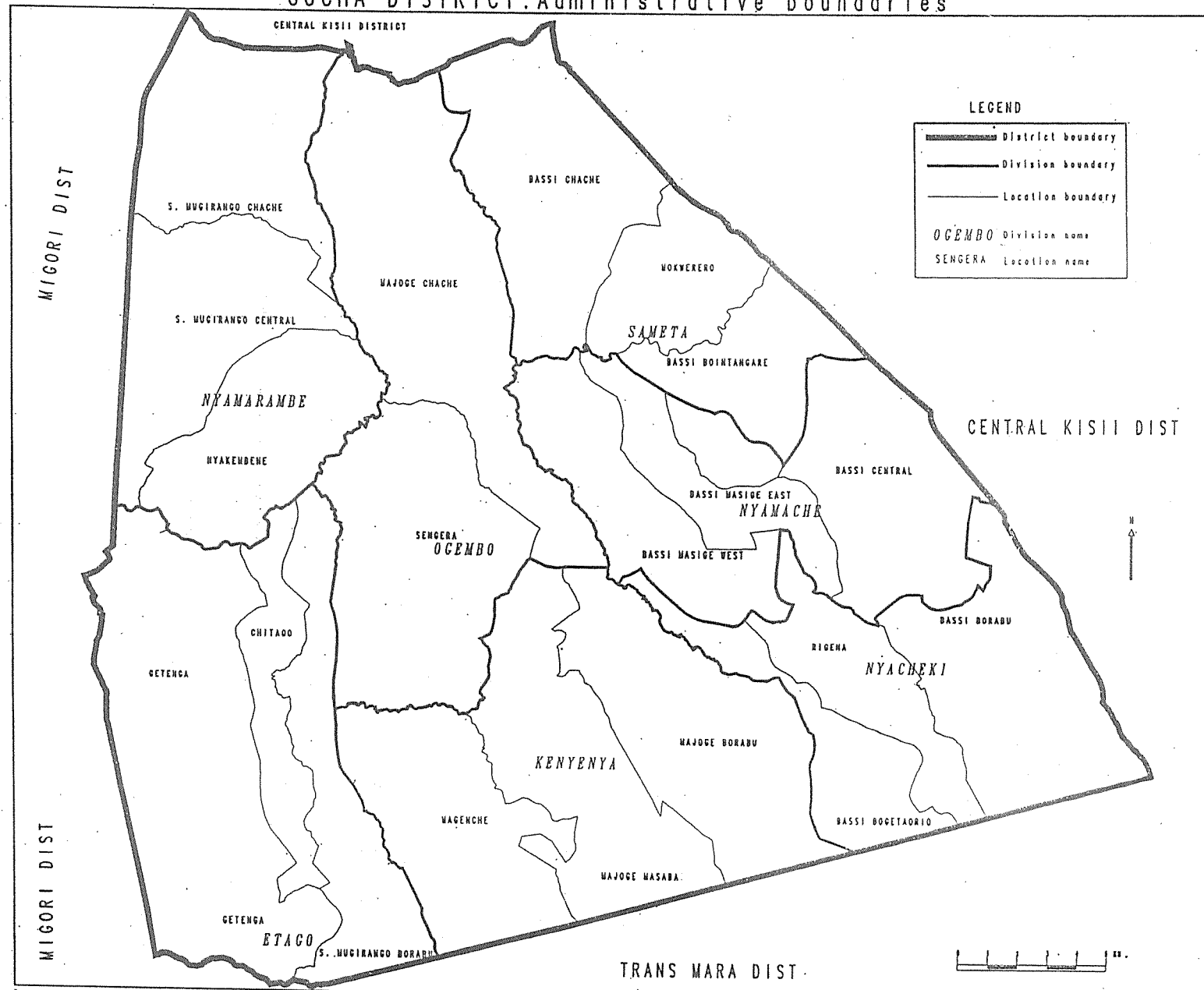
With kind regards

  
**OKIRIMA MICHAEL**  
DEAN, Faculty of Education  
Kampala International University

*"Exploring the Heights"*

# APPENDIX G

## GUCHA DISTRICT: Administrative boundaries



APPENDIX H

KENYENYA DIVISION

