ADVANCED LEVEL PHYSICS PERFORMANCE AMONG UGANDA STUDENTS AS A FUNCTION OF ORDINARY LEVEL PHYSICS AND MATHEMATICS PERFORMANCE

BY

LEONARD WAMBI WAMAKOTE

A RESEARCH DISSERTATION SUBMITTED

IN PARTIAL FULFILMENT OF THE REQUIREMENTS

FOR THE AWARD OF THE DEGREE OF MASTER OF EDUCATION

OF MAKERERE UNIVERSITY

OCTOBER, 1990

DECLARATION

I, Leonard Wambi Wamakote, declare that this is my own work and it has never before been submitted to this or any other university or institution of higher learning for the award of a degree or other qualification.

Signed……

LEONARD WAMBI WAMAKOTE

Date:……

Counter – signed……

EMMANUEL KIGONGO-MUSIGE

(SUPERVISOR)

Date: .....

DEDICATION

This work is dedicated to my father, Mr. Charles Peter Wambi for having successfully orchestrated the various forces responsible for my eventual success.

"The glory of young men is their strength; the attractiveness of old men is their gray head."

Proverbs 20:29

ACKNOWLEDGMENTS

This work would have been impossible to complete without the helpful advice and assistance from various individuals and bodies. I am indebted to the ministry of education for having funded this study. The Headmaster, Bulucheke Secondary School and the Chief Education Officer in this respect deserve special thanks for having seconded my application for the course.

I owe special gratitude to the Ugandan National Examination Board for their kind permission to use their records on students' performance for this study. Several officials working with this board offered me their very kind and patient assistance during the tedious process of digging out the records. Even though I have not cited them by name here. I will always remember with appreciation their assistance.

I am indebted to Mr. Cyprian Cele whose study provides the foundational framework for the present study. I hope that he will find it comforting to see some of his findings re-examined.

My supervisor. Mr. Emmanuel Kigongo – Musiige will always flare up my memory for his fatherly patience and courage in ensuring the completion of this project. The inconvenience that he suffered as a result of supervising this work, including the not infrequent need to work at odd hours cannot be soothed by any words of appreciation within my grasp.

My special thanks also go to all my colleagues of the M.Ed. Programme (1989/90) especially those in the department of science and technical education and the members of staff in the school of education, especially the Dean. Prof. Jethro Opolot. Interaction with all of them greatly boosted my knowledge and experience.

The calculations involved in this study would have been too immense to be handled accurately by a human head. In this respect, I convey my heartfelt appreciation to Mr. Fab Nabugoomu of the Institute of Statistics and Applied Economics who diligently ran the calculations on computer. I cannot forget to mention, with thanks, the assistance of Mr. George Wamukota who carefully and neatly type-set this work.

It is indeed difficult to mention all the people who assisted me in one way or another during this course. But mine would be an incomplete task if I did not mention the large group of friends and relatives who assisted me both materially and morally to enable me complete this course. Listing all of you would certainly cover a separate report on its own, but rest assured I have all of you in mind.

Leonard Wambi Wamakote

Makerere University

October 1990.

TABLE OF CONTENTS

	Page
Title of study.....	(i)
Declaration.....	(ii)
Dedication.....	(iii)
Acknowledgments.....	(iv)
Table of contents.....	(vi)
List of tables and figures.....	(ix)
List of abbreviations used.....	(x)
Abstract.....	(xi)
CHAPTER ONE: INTRODUCTION.....	1
1.1 Background to the study..... ..	1
1.2 Statement of the problem.....	4
1.3 Significance of the study.....	5
1.4 Definition of terms.....	6
1.5 Limitations and delimitations.....	7
1.5.1 Limitations.....	7
1.5.2 Delimitations.....	8
CHAPTER TWO: REVIEW OF RELATED LITERATURE.	10
2.0 Introduction.....	10
2.1 Factors affecting performance in science....	10
2.1.0 General.....	10
2.1.1. Home factors.....	11
2.1.2 Intelligence.....	12
2.1.3 Attitudes.....	13
2.1.4 School quality.....	14
2.1.5 Inter-disciplinary dependence.....	17
2.1.6 Gender differences.....	19
2.1.7 Examination Nature.....	21

2.2 Prediction of performance in science..... 24
2.3 Summary of literature review..... 28
2.4 Statement of Hypothesis..... 28

CHAPTER THREE: METHODOLOGY..... 29
3.1 Selection of subjects..... 29
3.2 Data collection..... 30
3.3 Data analysis..... 31
3.3.0 General..... 31
3.3.1 Hypothesis Ho1..... 32
3.3.2 Hypothesis Ho2..... 33
3.3.3 Hypothesis Ho3..... 33

CHAPTER FOUR: RESULTS..... 34
4.0 General..... 34
4.1 Hypothesis Ho1..... 36
4.2 Hypothesis Ho2..... 42
4.3 Hypothesis Ho3..... 43

CHAPTER FIVE: DISCUSSION, CONCLUSION AND RECOMMENDATIONS..... 47
5.1 Discussion of results..... 47
5.1.0 General..... 47
5.1.1. Prediction of performance in A-level physics from O-level physics and mathematics..... 48
5.2.1 Gender and prediction of performance..... 50
5.1.3 Gender and performance in physics..... 51
5.1.4 School quality and performance in physics..... 53
5.1.5 Sex-school quality interaction..... 54

5.2 Summary of conclusions..... 55
5.2.1 Prediction of performance in
A-level physics..... 55
5.2.2 Gender school quality and
performance in physics..... 56
5.3 Recommendations..... 57
5.3.1 To students and teachers of
physics..... 57
5.3.2 To the UNEB..... 58
5.3.3 To educational planners..... 59
5.3.4 To future researchers..... 60

REFERENCES..... 62
APPENDICES..... 66

LIST OF TABLES AND FIGURES

Page

Table 4.1: Descriptive statistics of predicator and criterion variables..... 35

4.2: Pearson's product-moment correlation matrix between predicators and criteria.. 37

4.3: Z-tests of significance for predicator-criterion correlation coefficients..... 39

4.4: Multiple regression analysis summary for predicting performance in A-level physics..... 40

4.5: Summary ANOVA for regression model... 41

4.6: Z-tests for significance of differences between male and female correlation coefficients 42

4.7: Sample sizes, Means and standard deviations for overall performance in A- level physics according to sex and O-level school quality..... 44

4.8: summary ANOVA for effects of sex and O-level school on performance in A-level Physics..... 45

Figure 4.3.1: Graphical representation of sex X school quality interaction on performance in A-level physics..... 45

LIST OF ABBREVIATIONS USED

1. A-level: Advanced Level (last two years of secondary education)
2. ANOVA: Analysis of Variance
3. A.S.E: Association of Science Education
4. C.E.S: Classroom Environment Study
5. G.C.E: General Certificate of Education
6. H.M.L: Her Majesty's Inspectors (U.K)
7. I.E.A: International Association for the Evaluation of Education Achievement.
8. I.Q: Intelligence Quotient
9. O-level: Ordinary Level (First four years of secondary education)
10. P.L.E: Primary Leaving Examination
11. U.A.C.E: Uganda Advanced Certificate of Education
12. U.C.E: Uganda Certificate of Education
13. UNEB: Uganda National Examination Board.

ABSTRACT

Performance in U.C.E. Physics and Mathematics is used as a selection criterion for admitting students to A-level physics. The extent to which a student's performance in A-level physics can be predicted from his performance in O-level physics and mathematics is reported.

460 students (364 males and 96 females) from 33 randomly selected A-level schools in Uganda who sat the U.C.E examinations in November, 1986 and the U.A.C.E examinations in March, 1989 were used in the study.

Using grades awarded by UNEB to these students in O-level physics 535 and mathematics 456 (as predictors) and A-level physics P510/1. P510/2. P510/3 and P510 (as the criteria). The following hypotheses were tested:

Ho1 "There is no significant correlation between performance in O-level physics and mathematics and the corresponding performance in A-level physics."

Ho2 "Males and females are equally predictable on performance in A-level physics."

Ho3 (a) "There is no difference in A-level physics performance of students from low-performance and those from high performance O-level schools.

(b) "Males and females perform equally well in A-level physics."

(c) “There is no interaction between sex and 0-level school quality in determining performance in A-level physics.

To test the first two hypotheses, Pearson’s product-moment correlation coefficients were computed between the predictors and criteria and they were found to range between 0.34 and 0.47 for males: 0.35 and 0.68 for the females: and 0.33 and 0.49 for the entire group. All the correlation coefficients were found to be highly significant ($p<0.0005$) leading to a rejection of hypothesis Ho1. The correlations with the practical paper (P510/3) were found to be the lowest, possibly due to the low-weight given to the physics practical when grading the 0-level physics examination.

Overall performance in A-level physics was regressed on the performance in 0-level physics and mathematics. The combination of physics and mathematics was found to improve the prediction of performance in A-level physics, explaining about 30% of the variation therein.

The significance of the differences between the correlation coefficients for each sex was tested using the Fisher Z- transformation. Females were found to be more predictable than males when overall performance in A-level physics was considered. This difference in prediction, however, broke down when the individual physics papers were considered. Hypothesis Ho2 was thus rejected, only in part.

Using the overall performance in A-level physics as the dependent variable. A two-way ANOVA was performed to test the significance of differences in performance due to sex and 0-level school quality. The school quality was established dichotomously judging from the overall performance of candidates in the school in 0-level physics. Schools whose mean-grade was better than the national mean were categorized as high-performance and for the reverse as low-performance.

Contrary to views expressed in current literature, the study found the performance of females to be significantly higher than that of males in A-level physics. It was further found that students form high-performance 0-level schools performed better than those from low-performance schools. On the interaction between sex and school quality it was found that the difference in performance between students from high-performance and low-performance schools was more marked among the females. The third hypothesis was thus rejected as well.

Plausible explanations for the above findings were given and as a result, recommendations were made to students, teachers, educational planners, UNEB and to future researchers.