

PRODUCTION AND UTILIZATION OF TEACHERS FOR  
SECONDARY SCHOOLS IN KENYA: AN ECONOMIC  
EVALUATION

BY

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Research Paper submitted to the Department of  
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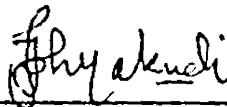


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This Research Paper is my original work and has not been presented for a degree in any other University.



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S. F. NYAKUNDI

This Research Paper has been submitted for examination with our approval as University Supervisors.



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Prof. L. P. MUREITHI

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A. C. D'SOUZA

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ABSTRACT

Human resource problems are many. But the common ones can broadly be categorized into two. First, those focusing on the underdevelopment of human skills, knowledge and talents; and second problems, that arise from underutilization of human capabilities for those already in the working force. Each of these problems can be broken down into several aspects of major economic concern. This study seeks to address itself to the second category of problems. In particular, the study focuses on one category of manpower, teachers for secondary schools in relation to their utilization rates in service and the extent to which they are retained in the profession once produced.

The study begins by examining the growth of the secondary school education and the expansion of teacher education with reference to the capacities of the training institutions. It goes further to hypothesize that there are no teacher production constraints and that the problems facing the education sector are those related to misallocation, underutilization and attrition of teachers.

Contending with the crucial difficulties of measuring human utilization capacities, the study used teacher "contact periods" per a five-day working week as a proxy for capacity utilization. However, teacher utilization extends outside classwork a phenomenon which was acknowledged but not included due to non-availability of data. Teacher utilization rates were measured

and compared between different categories of teachers based on the teachers' school location (urban or rural), subject specialization and level of qualification.

An analysis of the magnitude and trend of teacher attrition was also done over a period between 1973 and 1984. Two aspects of attrition that the study focused on were resignations and dismissals and were also classified into teachers' level of qualification.

The major findings included the acceptance of the general hypothesis that teacher production in Kenya is not constrained. But, the problems the education system faces are those of:

- (i) Underutilization of teachers which varied from the teachers' school location, level of qualification and subject specialization.
- (ii) Massive attrition of teachers from the profession, though this showed a falling trend over time.

The general causes of these two problems stem from the administration inefficiencies, in particular the action of the Teachers Service Commission; and the working of the economic indicators in the labour market to which labour units respond. These cause artificial shortages of teachers and geographical imbalances. Then, arising from these findings, the study makes suggestions for policy regarding teacher analysis in the country. These suggestions included:

- (i) the calculation of teacher requirements based on the curriculum rather than on teacher-student ratio;

- (ii) giving incentives to rural based teachers to solve the geographical imbalance of teacher distribution;
- (iii) teacher postings should be done systematically involving school headteachers who should identify the existing teaching posts to avoid misallocation and underutilization; and,
- (iv) teaching should be made more professional by making scholarships available only to those students who are willing and determined to be teachers, and also that the teaching profession should be made more competitive in the labour market so as to hold down attrition rates.

TABLE OF CONTENTS

|  | <u>PAGE</u> |
|--|-------------|
| ACKNOWLEDGEMENTS:  | 11          |
| ABSTRACT:  | 111         |
| LIST OF TABLES:  | vii         |
| CHAPTER ONE:   |             |
| <u>INTRODUCTION</u>  | 1           |
| 1.1 General introduction   | 1           |
| 1.2 Statement of the problem   | 4           |
| 1.3 Importance and objectives of the<br>study                            | 8           |
| 1.4 Organization of the study  | 10          |
| CHAPTER TWO:   |             |
| <u>SECONDARY SCHOOL TEACHING</u>   |             |
| <u>PROFESSION IN KENYA</u>   | 12          |
| 2.1 Pre-independence situation   | 12          |
| 2.2 After independence   | 13          |
| 2.3 Later developments of teacher<br>education                           | 19          |
| 2.4 Teachers after training  | 26          |
| * 2.5 Teacher demand and supply  | 28          |
| 2.6 Teaching profession and employment                                   | 33          |
| CHAPTER THREE:   |             |
| <u>THEORY AND LITERATURE REVIEW</u>                                      | 35          |
| 3.1 Introduction   | 35          |
| 3.2 Theory of labour market and its<br>application to teachers' services | 35          |
| 3.3 Studies on the determinants of<br>demand for teachers                | 43          |
| 3.4 Studies on the determinants of<br>supply of teachers                 | 47          |
| 3.5 Shortage of teachers in Kenya  | 54          |

|               | <u>PAGE</u>   |
|---------------|---|
| CHAPTER FOUR: |   |
|               | <u>HYPOTHESES, METHODOLOGY AND</u>                      |
|               | <u>DATA SOURCES</u> 60                                  |
| 4.1           | Hypotheses 60   |
| 4.2           | Methodology 66  |
| 4.3           | Data requirements, sources and<br>sampling procedure 70 |
| CHAPTER FIVE: |   |
|               | <u>DATA ANALYSIS</u> 73                                 |
| 5.1           | Introduction 73   |
| 5.2           | Data presentation 73                                    |
| 5.3           | Matching hypotheses with empirical<br>evidence 86       |
| CHAPTER SIX:  |   |
|               | <u>SUMMARY AND CONCLUSIONS</u> 99                       |
| 6.1           | Introduction 99   |
| 6.2           | Summary of findings 99                                  |
| 6.3           | Conclusions and policy implications 104                 |
| BIBLIOGRAPHY: | 109   |
| APPENDIX 1:   | 116   |
| APPENDIX 2:   | 118   |
| APPENDIX 3    | 119   |
| APPENDIX 4    | 120   |
| APPENDIX 5    | 121   |

LIST OF TABLES

| <u>TABLE</u> | <u>TITLE</u>  | <u>PAGE</u> |
|--------------|---|-------------|
| 2.1          | Growth of general secondary education (number of schools and student enrolment) 1964 - 1983   | 15          |
| 2.2          | Growth of technical secondary education (number of schools and student enrolment) 1964 - 1983 | 16          |
| 2.3          | Cut-off points for B.Ed entry to KUC  | 21          |
| 2.4          | KUC student enrolment per course 1975/76 - 1983/84  | 22          |
| 2.5          | Student enrolment of KSTC 1974/75 - 1984/85   | 23          |
| 2.6          | KTTC student enrolment per course 1978/79 - 1984/85   | 25          |
| 2.7          | Subject - period allocation per class   | 30          |
| 2.8          | Allocation of periods among teachers (per teaching week)                                      | 32          |
| 2.9          | Total teacher - output and the teaching force 1964 - 1984                                     | 34          |
| 5.1          | Teacher contact period in rural and urban schools   | 75          |
|              | Teacher contact period of graduate and nongraduate teachers                                   | 77          |
| 5.3          | Contact periods of Science and non Science teachers   | 78          |
| 5.4          | Contact periods of teachers in well-performing schools and those in the whole sample studied  | 79          |
| 5.5          | Teachers by major subject specialization  | 81          |
| 5.6          | Number of dismissals per cause, 1974 - 1983   | 83          |
| 5.7          | Teacher resignations by qualification, 1973 - 1984  | 85          |

## CHAPTER ONE

### Introduction.

#### 1.1 General introduction

For a country's development process, the central concern of policy makers, planners and economists is the availability of all resources, their allocation and utilization. Lack of adequate resources is a major characteristic of the less developed countries (henceforth referred to as LDC<sub>s</sub>), of which Kenya is not unique. Economists focus on three critical factors - namely: capital, natural resources and human resources to constitute the basis for feasible growth and development in any economy. Of the three, the human resource is assigned a paramount role. The other two factors are regarded as passive for it takes human skills to mobilize and accumulate capital and to exploit natural resources<sup>1</sup>.

In Kenya, the testimony of the Sessional Paper<sup>2</sup> No.10, called attention to the three critical shortages of resources that were to be alleviated if rapid economic growth had to be achieved immediately after independence. These were domestic capital, high and middle level manpower and foreign exchange. However, one of the most pressing shortages was the high and middle level manpower. For this reason therefore, manpower development has in recent years

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<sup>1</sup>See Harbison, H. F. : Human Resources and Wealth of Nations. Oxford University press. New York. 1975. P.3

<sup>2</sup>Republic of Kenya: African Socialism and its Application to Planning in Kenya. Government printer. Nairobi. 1965. PP.18 - 24

become a subject of major concern to those entrusted with the responsibility of managing national economics in the country.

As a means of meeting manpower requirements, Kenya like many other LDC<sub>s</sub> resorted to educational planning as an integral part of national planning. At the country's stage of development, education is regarded to be much more of economic than a social service<sup>3</sup>. It is viewed as the principal means for alleviating the shortage of domestic skilled manpower and also alleviating the inequalities that exist among citizens.

Viewing human resource as the only active agent in the development process, the major struggle of the LDC<sub>s</sub> is the problem of obtaining adequate skilled manpower in all fields to accelerate the process. It is sometimes very costly, putting on formidable financial constraints to produce the required numbers of skilled manpower to satisfy the demands in these countries. However, this depends on whether the manpower requirement forecast undertaken in a particular country correctly stipulates the relevant number of each category, say teachers, engineers, doctors, etc that the economy needs. Failure at this stage renders the economy to experience an over-production of certain skills alongside under-production of others which, in both cases, represent a loss to society. A simplistic projection of a manpower category, say teachers, shortage and excess often ignore the fact that people make choices and their decisions depend on how their options are changing. Commonly such projections are misleading. There should

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<sup>3</sup> ibid; PP.39 - 40.

be a consideration of the exogenous demographic variable with evidence concerning occupational decisions at various stages in college and after entering the labour market-including the decision to become teachers in this case. Therefore, the problem facing most LDC<sub>s</sub> can be asserted to stem from unreliable and inadequate manpower forecasts.

While it is a usual contention in economic analysis that it is the lack of skilled manpower in LDC<sub>s</sub> that hinders the process of rapid economic growth and development, the validity of the argument stands challengeable. Production of these manpower categories may be adequate and the problems faced by these countries could be poor allocation, especially within the relevant economic sectors, or inability to retain them in service of which they have been trained or underutilizing the personnel. This study would concentrate on only one category of manpower, that is teachers for secondary school education in Kenya. In general, teachers are fundamental productive resource input that go into the production of education in any economy. The educational system of any country is the one charged with the responsibility of producing people of various skills. Needless to say, teachers produce themselves and produce other professionals.

Therefore, this study can be looked at as falling within the general rubric of economics of education and more particularly manpower analysis in terms of production, allocation and retention in the fields in which they are trained, and their utilization in the education sector. Two major concerns in the education sector are the problems of ensuring that:-

(a) the total resources of the sector are optimally

allocated among different claimants within the

sector, for example, the distribution of both trained and untrained teachers, between rural and urban schools; and,

- (b) the resources within each sub-unit (such as secondary school section) are utilized in the most economically efficient way, for example, that appropriate number of teachers of a certain qualification and subject combination are in the right school at the right time in order to ensure high productivity levels.

These call for an analysis of the quantities of the resources available, sections needing these resources in order of priority and what quantities of them, and forecast of future situation so as to embark on strategies of producing more to cater for future demands to avoid shortages.

### 1.2 Statement of the problem

Manpower training process starts all the way from the initial learning. In formal schooling, this process extends from primary education through secondary to tertiary and higher levels of education. The majority of Kenyan pupils who continue with schooling after their primary education, join general secondary schools whereas a minority enter technical schools<sup>4</sup>. In the latter case, students start learning some professionally oriented courses and therefore become more specific e.g technicians, etc. In the case of general secondary education students get exposed to general areas of education out of which each student end up choosing his or

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<sup>4</sup>Republic of Kenya: Ministry of Education. Annual Report, 1979. Government printer. Nairobi. 1979. PP.4 - 5.

her specialization later. In other words, general education has a diversity of fields of study out of which several professionals which are technical and non-technical develop in the long run for example economists, doctors, engineers, lawyers, etc. It is this case of general education that attracts our interest.

At the secondary level, students start contemplating on what kind of profession they will take up after schooling through their career choices. Career choice depend on the subject combination students undertake at this level of education. This is only a very important background factor because studies<sup>5</sup> have indicated that students will choose those careers which have highest rate of return when considering education as an investment, other things constant. Students will choose those careers as economic theory will predict if and only if their subject combination or requirement for the profession is satisfied. Hence any future deficiencies or discrepancies in professions and skills may have their roots right into the inadequancies at secondary level education. Lack of medical doctors, for example, may be explained by lack of enough students studying subject combinations including Biology and Chemistry at secondary level education. One major reason commonly used for failing to have students studying and qualifying

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<sup>5</sup>See Koch, J. V. "Student choice of undergraduate major fields of study and private IRR" in International and Labour Relations Review. Vol.26. 1973. PP.680 - 685.

Weiss, Y. "Investment in graduate education" in American Economic Review. Vol.61. 1971. PP.833 - 852.

in particular subjects in Kenya is shortage of teaching cadre in those fields. Shortage of teachers or understaffing in secondary schools lags behind the initial stages of manpower skill development which has got detrimental implications in the country. In this respect therefore, the role played by secondary school teachers cannot be over emphasized, and shortage raises concern.

In all, this stresses the importance of secondary school education. It has been shown<sup>6</sup> that there exist a positive relationship between secondary education and economic growth and development. That is efforts to increase the quality of secondary education in the economy will have an effect of increasing per capita incomes. To increase the quality of education, adequate educational resource inputs, teachers in this case, should be available.

The government of Kenya spends large sums of money so as to produce enough qualified teachers to man her secondary schools. In spite of high production of qualified teachers from the training institutions for secondary school teachers, supply into the profession is rather low and the majority of the teaching staff is composed of untrained personnel<sup>7</sup>. It could be that our production is always short of demand. But, more appropriately, it could be argued that, the government's plans to supply enough qualified

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<sup>6</sup>Lewis, W. A. "Secondary education and Economic structures" in Social and Economic Studies. University of West Indies. Jamaica. Vol. 13. 1964. PP.11 - 18.

<sup>7</sup>This is observed from recent annual Statistical Abstracts, Economic surveys and the Teachers Service Commission files.

local teaching staff to satisfy the needs of the secondary schools are being frustrated by drifts of teachers from the teaching profession into other sectors of the economy. The problem we are addressing ourselves to is that teacher production in the country is not the cause resulting into any shortages in secondary schools. Rather, this shortage arise due to the attrition of teachers from the teaching profession. Further, the shortages in the country conceals a lot of underutilization of teachers which arise from overstaffing of certain schools while others are understaffed at the same time. Such underutilization of the produced qualified cadre can also occur due to misallocation of teachers in schools where they have no relevant subjects to teach when other schools are in short supply of such teachers.

Teacher attrition, especially withdrawals, represents a serious inhibiting factor to manpower development. From the education sector's viewpoint, this represents a loss or wastage of trained manpower, though socially these teachers get themselves engaged in various types of employments throughout the country. There exists an apparent loss from the teacher dropout since in terms of human capital theory, those trained will have their contribution to social welfare highest in teaching profession compared to other alternative employment opportunities<sup>8</sup>. This means that teachers with specific training will have a considerably higher

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<sup>8</sup>See the development of this argument by Rottenberg, S. "On choice in labour markets" in Industrial Labour Relations Review. Vol.9. October, 1956. PP.58 - 72.

productivity inside teaching than outside.

Attraction and retention of teachers in the profession simultaneously is quite critical in teacher planning in the economy. Teacher shortages are also experienced on regional basis, particularly in schools situated in rural areas, and this also exist on the basis of particular subjects. Inequality in teacher distribution geographically can be a cause of a more central problem in LDCs of inequality in income earnings and opportunities. An attempt to provide answers to questions regarding sources of teacher shortages and their magnitudes would be the central problem of investigation. Also the levels of teacher utilization on regional basis and in terms of qualification will constitute a problem area.

### 1.3 Importance and objectives of the study

This study is an empirical enquiry into the problems of teacher planning in the Kenyan economy. Teacher planning encompasses the market mechanism of the teacher labour services (i.e demand and supply), allocation and utilization from an economic point of view.

The importance of teacher studies depends on the importance of education in the country. It is through the educational system that knowledge, skills and capabilities are developed in order to accelerate the process of social and economic development. Availability of teachers is a prerequisite for education production and a study that takes detailed analysis of teachers should be viewed as important and quite relevant in the economy.

Teacher planning studies entail an evaluation of quantities of teachers in each category that may be required and efforts to

embark on the training and production to avoid shortages or surpluses. The aim is to achieve a long term equilibrium between inflow and outflow of teachers. A study that gives an indication of areas of shortages and maybe causes of such shortage contains good feedback which will be useful in planning. Though the study may not present precisely the reasons as to why teachers quit the profession, the number of quits broken down into categories of qualifications, and the trend this takes, will be good for policy making.

The objectives of the study are three:-

1. To examine the nature and magnitude of the demand for and supply of teachers for secondary schools in the Kenyan economy, identifying the determinants of each. Further, we will seek to ascertain whether there exist excess demand or supply and possible factors explaining the situation which may be prevailing. The implication of this to the educational economists and planners are quite evident. The knowledge of these tendencies, and of the way to which they interact each other, should make the educational authorities aware of the potential tension to which the market is moving and should prompt the necessary measures to avoid these tensions without the need for painful adjustments.
2. To examine the teacher-capacity utilization in the profession and allocation between regions and among teaching subjects per teacher. This will be an attempt to investigate the extent to which certain schools are

under - or over-staffed and forces behind whatever the case is. Also we will try to answer as to whether teachers really teach what they are trained in so as to enhance the quality of education in secondary schools. Closely related, the study will attempt to investigate whether there has been overproduction of teaching cadre in certain subjects relative to others.

3. To estimate the teacher dropout or attrition in the economy if attrition has been established to exist. The nature of attrition that the study concentrates on relates to resignations and dismissals. The study will not be able to present empirically the reasons for resignations but it will for the case of dismissals.

#### 1.4 Organization of the study

This study will consist of six main chapters. After the introductory chapter, chapter two will be dedicated to the development of the secondary level teacher education in Kenya. Here, the historical development of the secondary school education and teachers for secondary schools will be presented chronologically. It will indicate the teacher requirements and teacher sources identifying existing bottlenecks.

Chapter three will be devoted to the theory and literature survey. The general theory of labour demand and supply with special reference to teachers will be utilized. The chapter also presents some selected empirical studies which have been done on teachers and manpower in general especially in relation to labour

wastage and utilization.

Chapter four states the operational hypotheses, the methodology adopted to test those hypotheses and data sources. Chapters five and six would be on data analysis, and summary and conclusions respectively.

CHAPTER TWO

SECONDARY LEVEL TEACHING PROFESSION IN KENYA

This chapter presents some insights into the historical developments of the secondary level teaching and teacher education in Kenya. Both pre-independence and post independence situations would be analysed in terms of the origins and expansion of secondary level education, the development of teacher education institutions, deployment of teachers after training, and teacher demand and supply in the economy.

2.1 Pre-independence situation

Any analysis of the origins and developments of secondary level teacher education requires a sound background of the origins and growth of the secondary school education in the country. The need to establish institutions for training teachers for African secondary schools during the colonial period did not arise<sup>1</sup>. The colonial administration never viewed secondary education as an important aspect of the African educational system in Kenya because of both political and economic reasons.

The introduction of the plantation economy by the early European settlers had far reaching effects in terms of content and structure of the African education. The need for highly

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<sup>1</sup>Indire, F. F. : A history of the development of teacher education in Kenya. Unpublished. 1974, pp. 145 - 146.

educated manpower beyond primary education was not a priority. The plantation economy required a ready supply of unskilled labour and any step to encourage Africans beyond primary education was bound to be detrimental in terms of labour supply. These attitudes hindered the development of secondary education in the country<sup>2</sup>. In spite of the colonialists' attitudes towards education, christian missionaries who considered education as a concomitant of conversion defied such policies and established both primary and secondary schools. However, the growth of secondary schools was very slow. By 1930, there were only two secondary schools and by independence the country had 55 secondary schools<sup>3</sup>. Up to this period, there were no institutions training teachers for secondary schools and therefore, staffing was largely of expatriate component with a few Africans who had had an ordinary or postgraduate diploma from Makerere in Uganda. Makerere was the only college in East Africa at that time and trained up to the diploma and degree levels.

#### 2.2 After independence.

Immediately after independence, there was a rapid expansion of secondary school education marked by the number of schools

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<sup>2</sup>Weeks, S.: Divergence in educational development. Teachers College Press. Columbia University. New York. 1967, p.3.

<sup>3</sup>Indire, F. P. : op cit. p.147.

and student enrolment, and by the diversity of education into general and technical. Tables 2.1 and 2.2 below illustrate this point. These two tables show that the majority of Kenyan pupils who continue with their education beyond primary enter general secondary schools whereas the minority enter technical schools whose growth has been very slow.

The fast growth of general secondary schools in the country is attributed to the spontaneous growth of non-aided schools initiated and financed by the local communities, religious institutions and private individuals. The motive of the local people in undertaking the considerable financial sacrifice to establish such schools was basically economic. At the time of independence the output of the country's primary schools had grown at a pace much faster than that of wage employment leaving many primary school leavers unemployed. Thus, parents hoped that by keeping their children in school for a further two years in secondary would go a long way to improving their children's chances of getting absorbed into the labour force.

By 1964, the Harambee movement to this regard had presented itself as a real problem to the educational planners in terms of control and planning. The first Kenya Education Commission<sup>4</sup> devoted a whole chapter of its report on the necessity to control and plan these non-government aided schools. The reasons on which the commission based its recommendations to this effect were economic, related to resource allocation problem. Some of

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<sup>4</sup>Republic of Kenya: Ministry of Education. Kenya Education Commission Part II. Government printer. Nairobi. 1964.  
pp.22 - 32.

Table 2.1

GROWTH OF GENERAL SECONDARY EDUCATION (NUMBER OF SCHOOLS AND STUDENT ENROLLMENT) 1964 - 1983.

| Year | No. of Schools | (% Growth) | Total Student Enrolments | (% Growth) |
|------|----------------|------------|--------------------------|------------|
| 1964 | 222            | -          | 35 921                   | -          |
| 1965 | 336            | (51.4)     | 47 976                   | (33.6)     |
| 1966 | 400            | (19.1)     | 63 193                   | (31.7)     |
| 1967 | 542            | (36.0)     | 88 779                   | (40.5)     |
| 1968 | 601            | (10.9)     | 101 361                  | (14.2)     |
| 1969 | 694            | (15.5)     | 115 246                  | (13.7)     |
| 1970 | 782            | (12.8)     | 126 855                  | (10.0)     |
| 1971 | 809            | (3.3)      | 140 722                  | (10.9)     |
| 1972 | 949            | (17.3)     | 161 910                  | (15.1)     |
| 1973 | 964            | (1.6)      | 174 767                  | (7.9)      |
| 1974 | 1,019          | (5.7)      | 195 776                  | (12.0)     |
| 1975 | 1,160          | (13.8)     | 226 835                  | (15.9)     |
| 1976 | 1,268          | (9.3)      | 280 388                  | (23.6)     |
| 1977 | 1,473          | (15.2)     | 319 982                  | (14.1)     |
| 1978 | 1,773          | (20.4)     | 361 622                  | (13.0)     |
| 1979 | 1,779          | (0.3)      | 384 389                  | (6.3)      |
| 1980 | 1,785          | (0.3)      | 419 201                  | (9.1)      |
| 1981 | 1,904          | (6.7)      | 425 609                  | (1.5)      |
| 1982 | 2,131          | (11.9)     | 438 424                  | (3.0)      |
| 1983 | 2,230          | (4.0)      | 493-710                  | (13.0)     |

Source: Original data obtained from Statistical Abstracts and Economic Surveys of the Central Bureau of Statistics, Ministry of Economic Planning and Development.

Table 2.2

GROWTH OF TECHNICAL SECONDARY EDUCATION (NUMBER OF SCHOOLS AND STUDENT ENROLMENT) 1964 - 1983

| Year | No. of Schools | Total Student Enrolments |
|------|----------------|--------------------------|
| 1964 |                | -                        |
| 1965 | 8              | 1274                     |
| 1966 | 8              | 1349                     |
| 1967 | 7              | 1479                     |
| 1968 | 11             | 2036                     |
| 1969 | 10             | 2344                     |
| 1970 | 10             | 2426                     |
| 1971 | 10             | 3051                     |
| 1972 | 9              | 3214                     |
| 1973 | 10             | 3525                     |
| 1974 | 10             | 3659                     |
| 1975 | 10             | 5463                     |
| 1976 | 13             | 6121                     |
| 1977 | 13             | 6333                     |
| 1978 | 15             | 7170                     |
| 1979 | 16             | 7607                     |
| 1980 | 18             | 8575                     |
| 1981 | 18             | 9123                     |
| 1982 | 18             | 9199                     |
| 1983 | 18             | 14235                    |

Source: Statistical Abstracts and Economic Surveys of the Central Bureau of Statistics, Ministry of Economic Planning and Development.

these were<sup>5</sup>: first, for their establishments, these schools took over permanent buildings of primary schools. The P1 teachers were induced to leave primary teaching to be recruited in the Harambee section. This practice of robbing primary schools of their best buildings and teachers was fraught with serious consequences for primary education. Second, these schools (Harambee) faced a deficit of teachers from the very beginning both quantitatively and qualitatively something which questioned the quality of education they were offering. Third, the financial odds required for the setting of these schools were a formidable burden well beyond the resources of most local communities. Lastly, the hopes that parents had that some years of education beyond primary education could enable their children to escape rural life was defeated by sheer logic of numbers. The corollary of this development was an ever increasing flow of school leavers which was in no relation to the limited and decreasing absorptive capacity of the modern sector labour market. Based on this resource allocation problem, the commission, recommended the control of the expansion of Harambee schools but never offered alternatives. Controlling the number of Harambee schools, assuming other things unchanged, meant curtailing most people from attaining higher levels of education unless the government could expand the aided schools fast enough to absorb the increasing number of primary school leavers aspiring to continue with their education.

The expanded secondary education system meant high demands for the necessary educational inputs. One such input is the teacher component. By the year 1965, the country did not have

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<sup>5</sup>ibid. P.23

any institution for training Kenyan teachers to teach in secondary schools, and the only major source continued to be expatriates. Shortage of teachers to man the secondary schools reached the peak when the expatriates started leaving the country soon after full independence. With this, a group<sup>6</sup> of Africans, Americans and British educators assembled at Princeton for a conference to discuss ways of meeting this acute shortage created at a time when secondary education was expanding rapidly. The conference led to the formation of the "Teachers for East Africa Scheme" which identified Makerere University College as the only source for such teachers. But, in order to achieve the objectives of less reliance on expatriates, it could not be possible if the country continued looking at Makerere as the only source for graduate teachers. It was imperative therefore, that efforts be made to produce locally both graduates and non graduate teachers as soon as possible to meet the rising demands. As a matter of priority, the commission had proposed to this effect the installation of the department of education at the university college, Nairobi<sup>7</sup>.

The government reckoned that the trickle down of teachers from Makerere and the proposed department of education at university college, Nairobi to be inadequate sources to cope up with the striking bombshell of secondary education expansion. Sources of teachers other than graduates had to be found and

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<sup>6</sup>UNESCO: University of East African Teacher Education Conference. Unpublished. Paris. 1965. pp.(i) - (ii).

<sup>7</sup>Republic of Kenya: Ministry of Education. Kenya Education Commission. op cit. p.120.

a crash programme had to be inaugurated. The programme involved upgrading of selected primary teachers through in-service training for secondary teaching. These teachers attained S1 grade and were posted to teach lower secondary classes (forms I and II). As part of the crash programme also, Kenyatta College was established to train non graduate teachers for secondary schools<sup>8</sup>. The college was to train the form IV certificate holders for three years and P1 teachers for two years to attain S1 grade. This was one of the most realistic emergency solution to the problem of teacher shortage, however, it was financially a burden and also took time to produce teachers. The last phase of the crash programme was the installation of the Kenya Science Teachers' College in 1966 to train Science based non graduate teachers. It was established as a joint venture between the Kenya government and the Swedish government. The latter contributed 70 per cent of the recurrent costs during the 1966 - 70 plan and also 90 per cent of the capital expenditures which were estimated to be K£1,500,000<sup>9</sup>. All these programmes were aimed at producing teachers of Kenyan origin to manage local secondary schools.

### 2.3 Later developments of Teacher Education.

The high priority assigned to education by the State has brought about the rapid expansion of the educational system in recent years and a commensurable development of the teaching profession. However, the educational system face several problems related to teachers for secondary education which Hanson and

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<sup>8</sup> Republic of Kenya: Ministry of Economic Planning and Development. Development Plan 1966 - 70. Government printer. Nairobi. 1966 p.311.

<sup>9</sup> ibid.

Indire<sup>10</sup> have categorised into three as: the provision of more teachers for the expanding system; up grading or replacing unqualified local teaching staff; and, the phasing out of expatriate teachers. During the fourth Development Plan period, one of the major objectives was to train sufficient teachers for secondary schools to cater for these problems and achieve the goals which were stated as:<sup>11</sup>

- (i) to allow significant improvement in the quality of education in both maintained and assisted schools;
- (ii) to supplement Harambee schools with qualified diploma and graduate teachers in order to raise the quality of education; and
- (iii) to reduce the country's dependence on expatriate teachers in all studying subjects.

Currently, there is only one institution with the sole responsibility of producing trained graduate teachers, that is, the Kenyatta University College (KUC), and six institutions with the responsibility of training diploma teachers for secondary schools. These six colleges are the Kenya Science Teachers' College (KSTC), the Kenya Technical Teachers' College (KTTC), Kagumo Teachers' College, Siriba Teachers' College, Kisii Teachers' College and Moi Teachers' College.

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<sup>10</sup>Indire, F. F. and Hauson, J. W. (ed): Secondary School level Teachers: Supply and demand in Kenya. American Council of Education Overseas Liaison Committee East Lansing Michigan. 1971. p.55

<sup>11</sup>Republic of Kenya: Ministry of Economic Planning and Development. Development plan 1979 - 83. Government printer. 1979, pp.163 - 164

(a) Kenyatta University College (KUC)

KUC came into being in 1975 as a result of replacing the Kenyatta College which formerly used to train S1 teachers. Its inception led to the phasing out of the faculty of education at the University of Nairobi of which it became a constituent college. The entrants for a Bachelor of Education (B.Ed) degree were required to obtain a minimum of two A-level principal passes totalling to at least ten points for Arts-based curriculum and five points for Science-based curriculum. These requirements have been oscillating slightly as shown on table 2.3 depending on the general performance at A-level examinations. The low cut-off points for Science students is a device to get more Science teachers as they are considered to be scarce than the Arts teachers.

Table 2.3

CUT-OFF POINTS FOR B.Ed ENTRY TO KUC

| Year         | 1975/76 | 1976/77 | 1977/78 | 1978/79 | 1979/80 |
|--------------|---------|---------|---------|---------|---------|
| Course:      |         |         |         |         |         |
| B.Ed Arts    | 10      | 10      | 12      | 10      | 10      |
| B.Ed Science | 5       | 6       | 6       | 7       | 7       |
| Year         | 1980/81 | 1981/83 | 1983/84 | 1984/85 |         |
| B.Ed Arts    | 10      | 11      | 12      | 12      |         |
| B.Ed Science | 7       | 8       | 8       | 8       |         |

Source: B.Ed Review, KUC, 1981 and University of Nairobi Admission records.

The student intake has gradually expanded and in 1979, KUC launched a diploma in education course. Those admitted into this course were from six certificate holders with at least one A-level principal pass in either Science or Arts subjects. This programme was terminated during the 1981/83 academic year when more diploma colleges were instituted<sup>12</sup>. Instead, the college expanded the postgraduate diploma and B.Ed intake as shown in table 2.4 below.

Table 2.4

KUC, STUDENT ENROLMENT PER COURSE 1975/76 - 1983/84

| Year/<br>Course       | 75/76 | 76/77 | 77/78 | 78/79 | 79/80 | 80/81 | 81/83 | 83/84 |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| B.Ed <sup>a</sup>     | 919   | 824   | 1019  | 1395  | 1566  | 1830  | 2019  | 2140  |
| Dip. Ed <sup>b</sup>  | 298   | 293   | 171   | 10    | 183   | 346   | 162   | -     |
| PGDE <sup>c</sup>     | 2     | 10    | 20    | 148   | 86    | 102   | 141   | 204   |
| B.A.F.A. <sup>d</sup> | -     | -     | -     | -     | -     | -     | 19    | 4     |
| Total                 | 1219  | 1127  | 1210  | 1555  | 1840  | 2278  | 2341  | 2348  |

Key.

a = Bachelor of Education

c = Postgraduate diploma in Education

b = Diploma in Education

d = Bachelor of Arts in Fine Art

Source: Annual Statistical Abstracts and Economic Surveys of the Central Bureau of Statistics. Ministry of Economic and Development.

<sup>12</sup> Republic of Kenya: Ministry of Economic Planning and Development. Economic Surveys, 1982. Government printer. Nairobi. 1982.

(b) Kenya Science Teachers' College (KSTC)

The aim of establishing the KSTC in 1966 was to provide the country with adequate science-based teachers for secondary schools. Up to 1981/82 academic year, the college was enrolling trainees for S1 qualification but since then, the college attained the status of training diploma teachers lasting two years instead of three years for S1. Entry requirements are at least one A-level principal pass in any of the science subjects as: Mathematics, Chemistry, physics and Biology. The past academic years' student enrolment is as shown in table 2.5 below.

Table 2.5

STUDENT ENROLMENT AT KSTC, 1974/75 - 1984/85

|          |       |        |       |       |       |       |
|----------|-------|--------|-------|-------|-------|-------|
| Year     | 74/75 | 75/76  | 76/77 | 77/78 | 78/79 | 79/80 |
| Students | 484   | 434    | 519   | 497   | 496   | 506   |
| Year     | 80/81 | 81/82* | 82/83 | 83/84 | 84/85 |       |
| Students | 560   | 590    | 572   | 476   | 566   |       |

\* First diploma intake started.

Source: Annual Statistical Abstracts of the Central Bureau of statistics and KSTC Registrar's files.

(c) Kenya Technical Teachers' College (KTTC).

In 1977, KTTC was established as a joint venture between the Canadian and the Kenyan governments. Its purpose was to train both academic and technical professional teachers to diploma level for secondary schools lasting three years. Initially, entry requirements

were O-level holders division two which has been raised to at least two A-level principal passes with one in either English, Mathematics, Chemistry or Physics depending on which course a student wants to enrol. For Business Education, Mathematics or English becomes a prerequisite whereas for technical education students must have either Physics, Mathematics or Chemistry and Mathematics, Physics and maybe fine Art is required for students enrolling for industrial education. The emphasis is that each student teacher must have an academic teaching subject alongside Business, Technical or Industrial courses to enable them to be adequately utilized after graduation in secondary schools. KTTC had its first output of diploma teachers in 1979 consisting of 94 graduates of whom twenty-four were in technical education, forty-five in business education and twenty-five in industrial education<sup>13</sup>.

One interesting feature to note is that up-to-date, there are only eighteen technical and thirty-six industrial schools in the country<sup>14</sup>. Then, with the expanded production, indicated by enrollment figures in table 2.6, of technical, industrial and business teachers, there must be an apparent surplus of such professional teachers. However, as mentioned earlier, these teachers undertake at least an academic subject as their minor which they can be deployed to teach. This in a sense leads to a waste of valuable resources as such teachers are not economically utilized in areas where their contribution could have been highest.

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<sup>13</sup> Republic of Kenya: Ministry of Education. Annual report, 1979. Government printer. Nairobi. 1979. p.19

<sup>14</sup> Republic of Kenya: Ministry of Education. "An appraisal of the need for more diploma teacher colleges". Unpublished. June, 1984. p.4.

Table 2.6

KTTC STUDENT ENROLLMENT PER COURSE

| Year/<br>Course | 78/79 | 79/80 | 80/81 | 81/82 | 82/83 | 83/84 | 84/85 |
|-----------------|-------|-------|-------|-------|-------|-------|-------|
| Business        | 123   | 200   | 198   | 185   | 176   | 186   | 180   |
| Industrial      | 74    | 103   | 104   | 102   | 95    | 69    | 75    |
| Technical       | 142   | 234   | 185   | 191   | 197   | 186   | 204   |
| Total           | 339   | 537   | 485   | 476   | 468   | 241   | 459   |

Source: KTTC Registrar's enrolment files.

(d) Other diploma colleges.

During the 1981/82 academic year, two former primary teachers' colleges, Kagumo and Siriba, were up-graded to train diploma teachers for secondary schools based on demand for more teachers for these schools. Their first outputs came out in July, 1984 totalling to 600 teachers<sup>15</sup>. Two more colleges to produce diploma teachers were launched i.e Kisii in 1984/85 academic by up-grading it from primary teacher training with a capacity of 170 teachers annually and Moi (Eldoret) college to have 290 teachers annually. The effect of up-grading primary colleges to produce teachers for secondary schools without replacing should be shortage of trained teachers for primary schools but this has not been considered by the ministry.

With all these colleges, the country expects to have an adequate supply of teachers to man her secondary schools so as to achieve the earlier stated plan objectives. But it would be worthwhile

<sup>15</sup> ibid. p12

to examine closely what happens to these student teachers after leaving their respective training institutions.

#### 2.4 Teachers after training

On completion of their respective courses the student teachers apply for an employment post to the Teachers Service Commission (TSC). The TSC is an employing agency of teachers acting on behalf of the ministry in charge of education. It was formed in 1967 by an Act of Parliament<sup>16</sup> with the following objectives:-

- (i) to recruit and employ registered teachers, to assign teachers employed by the commission for service in any public school;
- (ii) to promote or transfer any such teachers;
- (iii) to terminate the employment of any such teachers; and
- (iv) to exercise the powers conferred on the commission by the code of regulations published under section six of the same Act.

Applications are done before the student teachers graduate as qualified professional teachers. On the official application forms, the applicants indicate, among other things their subject specialization and names of three schools they would want to be posted for employment in order of individual's preferences. After graduating, teachers are faced with several decisions on what they want to be in life which depends on the prevailing economic setting in which the individual operates, especially the anticipated benefits to be obtained by taking up an alternative job. These decisions affect most, those teachers who are not bonded to the teaching profession. In general, the decision

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<sup>16</sup>Republic of Kenya: Ministry of Education. "The teachers service commission Act" in the Laws of Kenya Cap212. Revised edition, 1968.

to join an alternative job will be influenced by the socio-economic conditions of the country and the degree of flexibility to effect such decisions.

In economic terms, an individual teacher will opt for alternative employment if and only if he/she anticipates high economic returns from such alternative with lowest cost. Returns and costs are in this sense considered to be both pecuniary and nonpecuniary. An individual will therefore be pursuing a strategy of "maximization" of benefits. Those who by default entered the teaching profession especially B.Ed graduates who could not enter other faculties due to high cut-off points or other reasons find themselves in such situation of decision making. Another group of teachers who face such decisions are those who undertake courses which are widely applicable outside the teaching profession and these include B.Ed graduates with Business option and graduates from KTC who can work elsewhere as technicians, accountants, etc. So if the courses are too general, there would be high flexibility for teachers in terms of getting absorbed elsewhere, and the assumption held here is that such alternative openings exist.

The actions of TSC could also be a source of teachers' decision to seek for alternative employment. Traditionally, teachers are supposed to be posted to schools of their choice. But due to the increased number of applicants who may be citing similar schools which may be already overstuffed, such preferences are dishonoured. The tendency of dishonouring teachers' preferences aggravates their decision of taking up an alternative opening in the job market. Teachers choose particular schools by taking into account several factors: location in terms of urban versus rural or nearness to their homes; availability of essential facilities;

utilites such as means of communication, electricity, water, housing facilities, etc, availability of their subject combination in those schools; etc. These factors only satisfy the teachers' objectives but if they were followed, there would be an apparent deficiencies of teachers in certain schools while others would be overcrowded both in total numbers and distribution across subjects.

The TSC reckons such a problem and randomly posts teachers disregarding their preferences. In this practice, the TSC aims at achieving balance in staffing among schools. It is also equally argueable that this practice by the TSC has resulted into massive underutilization of teachers. More often, teachers get themselves in schools where their subject specialization does not exist because certain subjects like Economics and Accounting are only available in specific schools. Qualified secondary school teachers are known to be subject specific and any attempt to allocate them different subjects creates discontent, frustration and bitter feelings among the new teachers which exarcebates their urge to make decisions regarding taking up alternative opening should it exist. This analysis throws light on the way in which teachers react towards economic variables and other administrative considerations both in the short run and in the long run.

## 2.5 Teacher demand and supply

Demand for teachers in the economy refer not only to the teacher requirements by numbers but also their qualifications and subject specializations. Basically, this demand is dependent upon the rate of expansion of the secondary education system.

Expansion of education is measured by several variables but the most common one is the growth of number of schools and student enrolment. The common practice used to calculate the teacher requirements is to apply the teacher-student (teacher-class) ratio. The more generous this ratio is, the higher the teacher requirements would be in the economy. That is to say that teacher demands can be satisfied by regulating the teacher-student ratio. The problem such formulation face is that the ratio does not take into account things like the teaching strategy, the official number of periods a student should be taught per week and the diversity of the curriculum. In Kenya such device was adopted during the 1970 - 74 plan<sup>17</sup> and at the end of the period the economy was facing shortages both in total number of teachers and by subject combination.

The Ministry of Education stipulates certain conditions which should be used in forecasting the required number of teachers per subject<sup>18</sup>. These include:-

- (i) The number of periods of 40 minutes each student must be taught per week. This is stated to be 40 periods per week and maybe 42 under certain conditions with permission from the Inspector of schools.
- (ii) Subject period allocations which vary from class to class per week as shown in table 2.7 below.

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<sup>17</sup> Republic of Kenya: Ministry of Economic Planning and Development. Development Plan 1970 - 74. Government printer, Nairobi, 1970, p46

<sup>18</sup> Republic of Kenya: Ministry of Education. The organization of school curriculum in non technical schools. Government printer, Nairobi. 1960. p.2 - 9.

Table 2.7

SUBJECT-PERIOD ALLOCATION PER CLASS

| Code | Subject                | PERIODS PER WEEK |                 |
|------|------------------------|------------------|-----------------|
|      |                        | Form I and II    | Form III and IV |
| 01   | English                | 8                | 8               |
| 02   | Literature             | 3                | 3               |
| 03   | Kiswahili              | 5                | 5               |
| 04   | Fasahi                 | -                | 3               |
| 05   | Mathematics            | 7                | 7               |
| 06   | Physics                | 3                | 4               |
| 07   | Chemistry              | 3                | 4               |
| 08   | Biology                | 3                | 4               |
| 09   | P/Science              | -                | 6               |
| 10   | G/Science              | -                | 6               |
| 11   | H/Biology              | -                | 4               |
| 12   | History                | 3                | 3               |
| 13   | Geography              | 3                | 3               |
| 14   | CRE                    | 3                | 3               |
| 15   | Additional Mathematics | -                | 3               |
| 16   | P.E                    | 1 or 2           | 1 or 2          |
| 17   | Art                    | 2                | 4               |
| 18   | Music                  | 2                | 4               |
| 19   | Industrial Education   | 6                | 6               |
| 20   | Business Education     | -                | 5 (per subject) |
| 21   | Home Economics         | 4                | 5 (per subject) |
| 22   | Agriculture            | 4                | 5               |

Source: Ministry of Education. The organization of school curriculum in non technical schools, 1980, p.3.

Subjects listed under codes 01, 03, 05, 06, 07, 08, 12, 13, 14 and 16 are basic for forms I and II and any addition should be from subjects under codes 17, 18, 19, 21 and 22 but the minimum and maximum periods taught to a student be 40 or may be 42. Once students enter form III, their curriculum in school must be consistent with the conditions laid down by the Kenya National Examination Council. The most significant of these are as follows:<sup>19</sup>

- (i) English and Mathematics are compulsory.
- (ii) There must be at least one science subject.
- (iii) There must be at least six and not more than nine examination subjects.

In forms V and VI, all subjects taken at principal level must be taught for nine periods a week, five periods for subsidiary subjects and five periods for general paper.

(c) The third condition is the number of periods a teacher should teach in a week regardless of the number of students per teacher. This vary from teacher to teacher depending on the number of classes a school has and the teacher responsibility in the school as shown in table 2.8 below.

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<sup>19</sup>ibid., p.8.

Table 2.3

ALLOCATION OF PERIODS ALONG YEAR EMS (PER TEACHING WEEK)

| Number of Classes | Head-teacher | Deputy Head-teacher | Head of Department * | Ordinary Teacher |
|-------------------|--------------|---------------------|----------------------|------------------|
| up to 10          | 20           | 25                  | 25                   | 30               |
| 11 - 15           | 15           | 20                  | 25                   | 30               |
| 16 - 20           | 10           | 15                  | 25                   | 30               |
| over 20           | 5            | 10                  | 25                   | 30               |

\* The position of Head of Department is created when at least three teachers teach the same subject or closely related subjects e.g Biology, Chemistry and Physics can form a Science department.

Source: Ministry of Education files, Inspectorate Department.

Therefore, with these prescriptions, the appropriate teacher requirements would be arrived and this is what can be referred to as curriculum based establishment, instead of using the teacher-student ratio which does not portray a true picture. This could be done for individual schools adding them to obtain the demands for the economy. A model for calculating these requirements has been presented using an hypothetical school which could apply to any other school with subject and class adjustments in appendix 1.

In order to meet the demands for teachers in the economy, there should be planned production of each category as it would be required. Supply of teachers is basically determined by the production capacity of our training institutions which have been described in section 2.3 and also the attrition rate from the

teaching profession through death, retirement, change of responsibilities within the ministry, resignations, etc. The said outlets of attrition result into the discrepancies existing between the numbers that have been produced over the years and those in the service. Table 2.9 shows this discrepancy and also indicates that among those in the service, the untrained type has been assuming an increasing rate and grows faster than the trained type. The growth rate of the former composition has more than doubled since independence. Then if training of teachers has anything to do with the productivity or efficiency in teaching, the situation in Kenya remains questionable in terms of the quality of education offered in schools.

#### 2.6 The teaching profession and employment

Apart from its contribution in manpower production through the process of imparting skills and knowledge, there are other measurable contributions by the profession to economic progress of the country. The teaching profession significantly contribute by providing a reasonable proportion of the population with gainful employment. Teaching is the sector with the largest capacity to absorb the majority of the wage employment persons in the economy. By 1974, the entire teaching population constituted eight per cent<sup>20</sup> of the modern sector wage employment a figure which grew to 15 per cent<sup>21</sup> by 1984 of which 12.96% were in primary and 2.04% in secondary. Therefore, the teaching profession can be ranked as one of the largest consumers of both middle and high level manpower in the economy.

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<sup>20</sup> Ministry of Economic Planning and Development. Employment and Earnings in modern sector 1974. Government printer, Nairobi. 1974. P51.

<sup>21</sup> Vandermoortele, J. and Gatangi, M. "Kenya Data Compendium" Occasional paper N.44 IDS. University of Nairobi. Nairobi, April, 1984. P58.

Table 2.9

TOTAL TEACHER-OUTPUT AND THE TEACHING FORCE 1964 - 84

| Year        | Total output from colleges/<br>year | TEACHERS IN SERVICE |               |
|-------------|-------------------------------------|---------------------|---------------|
|             |                                     | Total force         | Untrained (%) |
| 1964        | 15                                  | 2000                | 25.5          |
| 1965        | 55                                  | 2494                | 25.2          |
| 1966        | 121                                 | 3004                | 28.1          |
| 1967        | 234                                 | 4055                | 39.1          |
| 1968        | 355                                 | 4645                | 40.9          |
| 1969        | 475                                 | 5267                | 37.9          |
| 1970        | 249                                 | 5881                | 37.4          |
| 1971        | 593                                 | 6365                | 38.1          |
| 1972        | 709                                 | 7106                | 37.1          |
| 1973        | 578                                 | 7388                | 35.7          |
| 1974        | 770                                 | 7979                | 39.2          |
| 1975        | 948                                 | 8617*               | 41.1          |
| 1976        | 964                                 | 11258               | 44.2          |
| 1977        | 960                                 | 12696               | 47.0          |
| 1978        | 1163                                | 14486               | 47.5          |
| 1979        | 632                                 | 14901               | 50.6          |
| 1980        | 984                                 | 15916               | 48.3          |
| 1981        | 942                                 | 17077               | 53.7          |
| 1982        | 1122                                | 17847**             | 53.6          |
| 1983        | 1074                                | 18960               | 53.6          |
| 1984        | 1825                                | 20662               | 47.5          |
| Total 13663 |                                     |                     |               |

\* Estimated

\*\* From National Head Count exercise

Source: Annual Statistical Abstracts, Economic Surveys, and various colleges' graduation booklets.

CHAPTER THREE

THEORY AND LITERATURE REVIEW

3.1 Introduction

This chapter presents a brief analysis of theory and literature review relevant to the study. It does not claim any degree of exhaustiveness regarding the two aspects. However, the chapter introduces the theory of labour market and examines its relevance to teachers' services. It also briefly surveys a few studies which have been conducted on the determinants of demand for teachers and supply of teachers; and teacher shortages in Kenya.

3.2 Theory of labour market and its application to teachers' services

Theoretically, any full explanation of the market for teachers' services, as of any other category of manpower, requires certain conditions. First, a market situation in which it is possible to identify supply as distinct from demand. Second, an analysis of the determinants of individual's occupational decisions such as to join the teaching profession. Lastly, a realistic analysis that requires a consideration of costs or lags in information and job search particularly from the supply side of the market.

From the general economic theory, demand for labour by an individual hiring firm reflects the marginal contribution of that particular type of labour to the production of the final

good or service<sup>1</sup>. In this analysis, the demand function for labour is derived from two hypotheses<sup>2</sup>. First, that firms are profit maximizers so that an individual firm will be in equilibrium when the amount of labour it employs is such that its marginal contribution equals the market determined real wage rate. Second, that the marginal contribution of labour to the production of the final commodity declines as employment increases, "ceteris paribus", which demonstrates the law of diminishing returns. This yields a demand function for labour represented by the marginal revenue product denoted as  $MRP_L$ <sup>3</sup>. The  $MRP_L$  is obtained by the product of the marginal physical product of labour ( $MPP_L$ ) and the marginal revenue of the output the particular labour is employed to produce ( $MR_Q$ ). Therefore, in order to be in equilibrium an individual firm will be equating  $MRP_L$  to the real wage rate ( $W$ ) as indicated in figure 3.1 below. The employer will be induced by a fall in real wage rate from  $W_1$  to  $W_2$ , to increase employment of labour from  $L_1$  to  $L_2$ . The demand curve for labour is then defined to be an inverse function of real wage rate.

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<sup>1</sup>Baumol, W. J.: Economic theory and operations analysis 4th edition. Prentice-Hall of India private Limited, New Delhi, 1980, pp.54 - 575.

<sup>2</sup>Harris, L.: Monetary theory. McGraw-Hill Book Company. New York. 1931 pp.146 - 147.

<sup>3</sup>Muchulp, P.: "On the meaning of marginal product" in Fellner, W. and Halay. B. (ed) Readings in the Theory of income distribution. George Allen and Urwin Ltd., London, 1950, pp.164 -165.

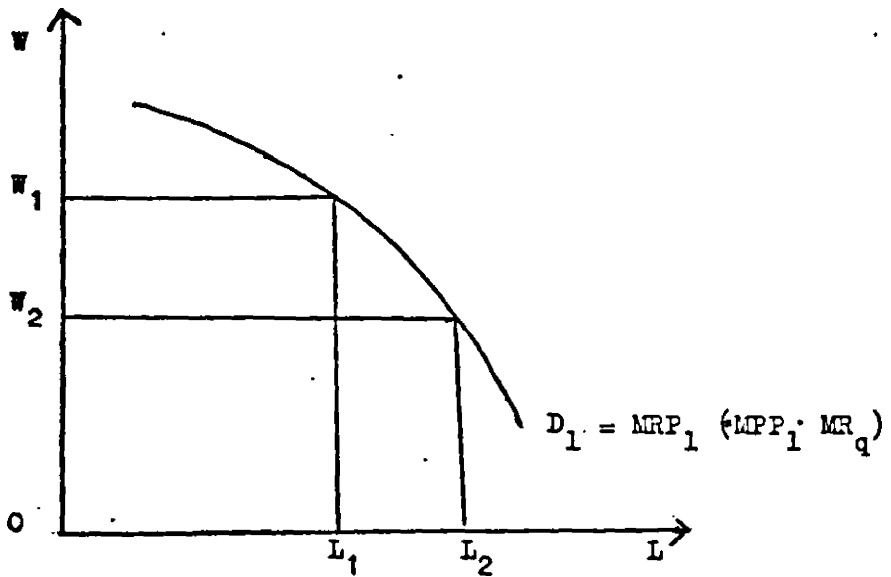


Figure 3.1

But, this theoretical analysis of the labour market, operation can not explain the demand for teachers' services. Zabalza et al<sup>4</sup> while studying the economics of teacher supply in Great Britain argued that such an approach may face difficulties because of two reasons.

First, underlying the approach is the assumption that the profit maximizing firms are perfectly competitive in supplying goods and services and in hiring labour. But, demand for teachers tend to be monopsonistic in nature while their supply is monopolistic. In planned or mixed economies, the public tends to be

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<sup>4</sup>Zabalza, A. et al: The economics of teacher supply. Cambridge University press, London, 1979, p.16.

the sole supplier of education and a near monopsonistic buyer of teachers' services, particularly of the trained type. On the other hand, teachers are unionisable group of workers. This occasions the situation of bilateral monopoly in the analysis of teacher demand and supply in the economy.

Referring to figure 3.2 below, the demand curve for a monopsonist is represented by the  $MRP_L$  curve from which the marginal revenue curve ( $MR$ ) is derived and it lies below the demand curve at all levels of employment. The supply curve facing the monopsonist is drawn upward sloping indicating the quantity of labour forthcoming at different levels of wage rates<sup>5</sup>. This supply curve is also viewed as the average factor cost (in this case average cost of labour), denoted as  $AFC_L$  because it shows how much the monopsonist pays per unit of labour at different levels of employment. From this  $AFC_L$  the marginal factor cost of labour ( $MFC_L$ ) is derived showing the change in the monopsonist's total cost resulting from one unit change in employment of labour, and it lies above  $AFC_L$  at all levels of employment. The monopsonist's strategy is to equate  $MRP_L$  to  $MFC_L$  so as to operate at a point A where  $L_2$  units of labour are employed at a wage rate  $W_2$ . Labour is in this case paid less than its marginal contribution ( $MRP_L$ ) and the distance  $AC$  represents the monopsonistic exploitation of labour.

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<sup>5</sup>See Koutsoyannis, A.: Modern microeconomics. 2nd edition. The Macmillan press Ltd., London, 1979, pp.463 - 465.

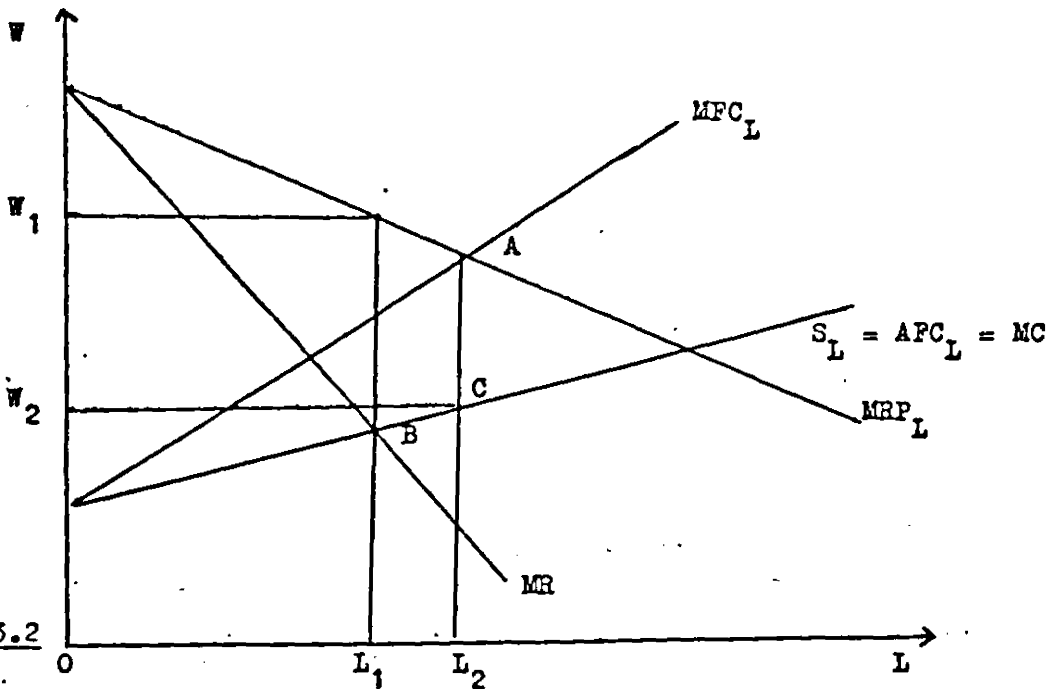


Figure 3.2

If there exists a monopolistic supplier of labour say, a union, the monopsonist will not be faced with the supply curve  $S_L = AFC_L$ . The union will look at the  $AFC_L$  as the marginal cost curve (MC), showing how much it will cost to produce a unit of labour. The union will also look at the  $MRP_L$  as its demand curve. The union's strategy is to equate  $MR$  to  $MC$  and operate at point like B supplying  $L_1$  units of labour at a wage rate  $W_1$ .

This means that while the monopsonist seeks for a higher quantity of labour at a lower wage rate, the monopolist (union) strives to supply a small quantity of labour at a higher wage rate. The situation becomes indeterminate as to what wage rate to offer in order to employ the required labour and there must be some bargaining between the union and the employer. The union must choose between high wages and few workers or moderately low wages and more workers. This illustration indicates that the marginal contribution framework of the

teacher demand and supply is quite inappropriate in real world situations.

Among the studies that have attempted to demonstrate the economic impact of collective bargaining on teachers' salaries, are those by Hellriegel et al<sup>6</sup>. These scholars conducted a behavioral analysis of collective bargaining attitudes among teachers and found, among other things, that relatively lower salaries were associated with positive attitudes towards collective bargaining. On the bargaining table, teachers' union are faced with a choice between high salaries and less teachers employed. They found that the teachers' attitudes were that their union, to large extent, prefer more teachers being employed to high salaries with few teachers employed. But, these scholars did not expand their study to demonstrate whether or not collectively negotiated salaries were significantly different from non-negotiated salaries.

Thornton<sup>7</sup> used data for eighty-seven large school systems in America to study the effect of unionization on teachers' salaries and employment of teachers in these schools. He found

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<sup>6</sup>Hellriegel, D. et al: "collective negotiations and teachers' salaries: A behavioral Analysis" in Industrial and Labor Relations Review. Vol.25, April 1970, pp.389 - 399.

<sup>7</sup>Thornton, R. J. "The effects of collective negotiations on teacher salaries" in Quarterly Review of Economics and Business. Vol.11 No.4 1971, pp.214 - 239.

that unionization had a very significant positive impact on the teachers' salaries. Further he found that the high salaries resulting from the effect of unionization were accompanied with less number of teachers employed in these schools. Whether these salaries were different from the ones without the union, the study never investigated. Frey<sup>8</sup> laid a highly sophisticated theoretical framework for the determination of teachers' salaries. Among his explanatory variables, he included the effect of unionization. He found that the impact of unionization was significant and positively related to teachers' salaries. His study never considered the effect of this unionization on the number of teachers employed in relation to the salaries.

Landon and Biard<sup>9</sup> studied the effects of monopsony in the market for public school teachers and compared it with competition in the labour market in general. In their findings, they concluded that competition in the local market, which they were considering, for teachers did not play a consistent and significant role in the determination of salary levels. The natural recourse for teachers was strong unionization in order to raise their salaries. With the existence of monopsony (union), those teachers already in the market i.e

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<sup>8</sup>Frey, D. E. : "Wage determination in public schools and effects of unionization" in Hamermesh, D. J. (ed) Labour in the public and non-profit sectors. Princeton University press, New York, 1975, pp.183 - 219.

<sup>9</sup>Landon, J. H. and Baird, R. H. ; "Monopsony in the market for public school teachers" in American Economic Review. Vol.61 December, 1971, pp.966 - 971.

teachers already in service could raise their salaries significantly compared with a situation where the free market forces operate.

The other reason as to why the marginal analysis can not be used in the study of teacher demand relates to the measurement of education. While it is possible and straight forward to determine the marginal contribution (product) of labour in an industry, it is very difficult to derive such a measure for education. Education is the product teachers are employed to produce. But, it is not quite clear what the output of education is and there is no agreement on how to measure it. The way teachers' services are combined with other inputs in the production of education is also not well understood. All these tear apart the application of the marginal theory in the studies of demand for teachers in the economy.

With these difficulties of measurement and of factor proportions in the production of education, the concept of teacher productivity will be misleading. The OECD<sup>10</sup> study on teacher recruitment and utilization argued that the concept of productivity as used in industry does not apply to education. Productivity of a teacher is difficult to define because it can not be isolated from that of the whole educational system of which it is part. Therefore, the use of marginal physical product and marginal revenue product of teachers as a measurable

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<sup>10</sup>OECD: Training, recruitment and utilization of teachers in primary and secondary education. Oecd, Paris, 1971, p.359.

concept is fallacious.

### 3.3 Studies on the determinants of demand for teachers

In order to determine the factors that influence the demand for teachers in the economy, Zabalza et al argued that there are only three independent variables thus:

"We can single out three independent variables in the number of the demand for teachers: First, the number of pupils to be educated and the desired pupil-teacher ratio; second, the amount of money the public authorities are willing to spend on teachers' salaries; and third, the average level of salaries per teacher"<sup>11</sup>.

This implies that the demand for teachers will increase with an expanded pupil enrolment assuming a constant pupil-teacher ratio subject to the budget constraint represented by the availability of funds to spend on the teachers' salaries. Relaxing the assumption of constant pupil-teacher ratio, one can conclude that given the financial constraints, the ratio can be used as a policy variable to satisfy the demands. The more generous the ratio is, the higher will be the demand for teachers and the opposite holds.

Sheehan<sup>12</sup>, to a large extent agrees with the preceding contentions. He argues that the major determinat of the demand for teachers at any level of education is obviously the numbers attending school, such that forecast of teacher demands

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<sup>11</sup>Zabalza, A. et al: op cit, p.17

<sup>12</sup>Sheehan, J.: Economics of Education. George Allen and Urwin Ltd., London. 1973. p.106 107.

must start by making forecast of student enrolment but he stresses the fact that teacher demands are largely determined by administrative and educational policies based on variables such as student-teacher ratio, range of subjects taught or minimum class size, etc. The conclusion he draws then, is that the overall size of educational system which includes teacher demands is governed by the policy decisions based on the availability of funds than on the consumers' (pupils or students) demand. Number of subjects taught for instance, assumes importance at secondary level education where teachers are specialized by subject and a large range of subjects leads to greater fragmentation of classes and higher demand for teachers. Hence demand for teachers in the economy is not determined by the market forces.

According to Williams<sup>13</sup>, demand for teachers is broadly determined by the number of learners to be enrolled, and the teaching technology resulting from the pupil-teacher ratio. These variables are not technically predetermined but are largely amenable to policy decisions depending upon certain economic factors like the cost of educational input and in particular teachers' salaries; the share of total cost of education that the government is to meet from public resources; the overall resource availability for educational purposes; and, the assessment made on the overall contribution that education would make to the process of economic growth based on the human capital theory. He then, concludes that the calculation of

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<sup>13</sup>Williams, P.; Planning teacher demand and supply. International Institute of Educational Planning (IIEP), UNESCO, Paris 1970, pp.38 - 49.

teacher requirements can be based on the pupil-teacher ratio which should also take into account other factors like the teaching and learning strategy which specifies, among other things, the total number of teacher contact periods per week, the average teaching load per teacher and the extent of the curriculum establishment in a particular economy.

The foregoing discussion puts it clear that teacher demand in an economy is not influenced by the market forces but by policies of the government. Whether the desired number of teachers will be sustained in the educational sector all depends on the resource availability and the priority assigned to education in the budget allocation. High student or pupil enrolment reflect a high demand for education and this create a further demand for teachers. From the public point of view, demand for education is dependent upon its contribution to economic growth, whereas an individual will want more of education to enable him achieve higher returns in future<sup>14</sup>. In this respect, Williamson<sup>15</sup> considers an individual's educational lack as an inhibiting factor to future earning opportunities. Educational level attained by an individual is an important determinant of life income chances. This relationship holds

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<sup>14</sup>See Weiss, Y.: "Investment in Graduate Education" in American Economic Review. op cit., pp.833 - 852.

Fields, G. S.: "The private Demand for Education in Relation to Labour Market conditions in less developed countries" in Ghai, D. and Godfrey, K. (ed) essays on Employment in Kenya. Kenya Literature Bureau, Nairobi, 1979, pp.107 -127.

<sup>15</sup>Williamson, B.: Education, Social Structure and Development: comparative analysis. The Macmillan press, London, 1979,

true for all societies and the correlation between the two i.e. educational level and future earnings, is highest in poor societies than in rich ones<sup>16</sup>. Therefore, one should expect LDCs to have a high and rising rate of pupil and student enrolment at all levels of education and this calls for an expanded demand for teachers in the country as demand for teachers is "derived" demand.

Demand for education is based on the acquisition of skills. Schultz's<sup>17</sup> work on investment in human capital focused on education as a predominantly on investment activity undertaken for the purpose of acquiring capabilities that render future satisfaction or enhance further earnings of a person as a productive agent. To him, higher expectations by individuals to earn more in the future through the attainment of higher levels of education will increase the demand for education in the economy. Increase in the demand for education will call for an expansion of factor inputs that are employed to produce it. Teachers are the largest, and most crucial input of an educational system, the quantity and quality demanded of it will be expected to rise.

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<sup>16</sup> ibid.

<sup>17</sup> Schultz, T. W. ; Investment in human capital. The free press, New York collier Macmillan Ltd., London, 1971, p.23.

Becker's<sup>18</sup> study seeking to offer an explanation for high rates of school enrolment in the American learning institutions showed that future earnings were the principal cause. He explained that there was a high and persistent yield of educational investment to individuals. And if people associate high positive returns to high levels of education, then, enrolments will be expected to be great at all levels of education and this will instigate massive demands for teachers, other things constant.

#### 3.4 Studies on determinants of supply for teachers

The preceding part of this chapter has thrown some light towards the possible factors that determine the demand for teachers in the economy. For the educational system to operate effectively, these demands must be satisfied. Supply of teachers (quantity and quality) seen to be straight forward as it touches on teacher sources. However, the whole analysis may not be as simple as it looks since it focuses on the manpower production processes which involve high costs and time lags to produce the required number at a given time. Harbison<sup>19</sup> in his study on human resource development identified several categories

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<sup>18</sup>Becker, G. S. : Human capital. 2nd edition. University press, New York, 1975, pp.169 - 81.

<sup>19</sup>Harbison, H. F. : "An approach to human resource development" in Meier, G. M. Leading issues in Economic Development. 3rd edition. Oxford University press, New York, 1976, pp.531 - 552.

of manpower which were in short supply among the LDC<sub>s</sub>. Among these categories, were teachers whom he described to be almost in short supply and with high turnover rates because they tend to leave the teaching profession whenever more attractive jobs become available in other occupations. He further found that this scarcity was felt most in the fields of Science and Mathematics. Such conclusion was also arrived at by Coombs<sup>20</sup> who argued that in nearly all the LDC<sub>s</sub> from 1950's, there has been teacher shortages and these shortages have been drastic in the Sciences, Mathematics and various technical fields where overall manpower shortages have also been greatest - causing a vicious circle.

Shortage of competent teachers is a master bottleneck which retards the entire process of human resource development and utilization in the economy. The two scholars (Harbison and Coombs) although writing at different periods and environments summarily incorporate two important aspects of teacher supply in their works. First, inspite of high levels of production, high rates of defection from the profession (or attrition) constitute a major source of teacher shortage in LDC<sub>s</sub>. Such defection is influenced by the attractiveness of the available alternative job opportunities compared to teaching. Second, they recognize shortages in particular fields which has got far reaching implications in terms of future manpower production.

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<sup>20</sup>Coombs, P. H. : The world educational crisis: A system analysis. Oxford University press, London, 1968, pp.34 - 36.

This introduces the study of teacher supply into the workings of the overall labour market in the economy. Sheehan<sup>21</sup> argues that the educational system has to compete with other industries and occupations for its labour supply. Therefore, any examination of the supply of teachers should be based on the operations of the economy's labour market. In such market, both market forces and institutional variables come into play. In this competition for labour inputs, education is usually at a disadvantage in winning back enough of its own best quality products because other competitors with large purses set the standards for attractive salaries and other terms of service. This apply to modern industries whose new technologies and rising labour productivity permit steady increases in wages without corresponding increases in the real cost of production<sup>22</sup>. In the degree to which the educational sector fails to compete effectively in the labour market, contributes to a downward spiral of the teacher status and thus further compounds the difficulty it has in attracting precisely the kind of people it needs to improve education's quality and productivity. Net advantages (pecuniary and non-pecuniary) associated to a particular occupation are important in influencing the supply of labour to that occupation. Changes in the factors considered to enter into the complexity of net advantages will induce marginal

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<sup>21</sup>Sheehan, J. : op cit., p.109.

<sup>22</sup>Coombs, P. H.: op cit., p.34.

workers to move. The factor which is most likely to change is the wages.

In her findings, for the United Kingdom, Wootton<sup>23</sup> concluded that teachers were enjoying relatively high non-pecuniary benefits such as job security, and long holidays. But, these were outweighed by unfavourable promotion prospects and low earnings which increased the propensity for teachers to quit the profession and create shortages. This also created a disincentive for new entrants into the labour market to choose the teaching profession. She compared the teaching profession with other occupations and ranked it high with respect to manual workers while it ranked low among most professional and managerial posts. In terms of earnings, the teaching profession had low rates and this was used to explain the existing high levels of teacher attrition and, therefore, shortages.

Selby - Smith<sup>24</sup> examined the Australian market conditions for teachers in the sixties and came up with interesting results which he concluded that were common in all LDCs. To summarise his findings, he found that the teacher shortages were caused largely by the inability of the educational system to retain teachers in the profession and these were marked with high and rising rates of resignations. These resignations tended to be

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<sup>23</sup>Wootton, B.: The social foundations of wage policy. 2nd edition. George Allen and Urwin Ltd., London, 1962, pp.45 - 50

<sup>24</sup>Selby - Smith, C.: "An economic approach to teacher loss and retention" in Davis, T. and Duke, C. (eds) The retention of teachers. Centre for continuing education, The Australian National University, December, 1971, pp.8 - 10.

serious among teachers whose skills were in short supply which by itself increased the incentive to resign particularly when alternative employment prospects are so inviting, even though the earnings were the same. In other words, the more scarce a particular group of teachers is, the heavier the working load they experience which induce decisions to quit the profession for alternative openings. Another finding was that high levels of employment opportunities elsewhere increase the urge to resign and that the young and the highly qualified teachers are more sensitive to this situation. The argument was that the higher the level of educational background and qualification an individual attains, the higher the probability of this particular individual to get more alternative jobs in the labour market. Whether or not then, teachers should be of low qualifications in order to stay in the profession raises several issues related to the quality of education which the study never investigated.

Within the same Australian teacher case study, Burckhardt<sup>25</sup> identified two causes leading to teacher dropout. First, those stemming from the level of job satisfaction experienced by teachers themselves, and second, those stemming from the teachers' desire to improve their professional state, economically or professionally. He concluded that in all LDCs, monetary or salary factors appear to play a large part in motivating teachers to seek for other employment opportunities, and attributed job satisfaction to administrative or professional factors.

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<sup>25</sup> Burckhardt, G. A.: "Characteristic of teacher turnover in primary and secondary schools" in Davis, T. and Duke, C. (eds) *ibid*, pp.19 - 22.

Zabalza et al<sup>26</sup> described the attraction of teachers to the profession as a function of earnings such that people will be ready to work as teachers if and only if wages are higher in teaching relative to other available occupations. He hypothesized that for a given set of preferences at any given moment, people will choose from among courses of action open to them, one for which the expected benefits are greatest. Benefits can be pecuniary or non pecuniary but, due to difficulties of measurement, the latter are rarely stated explicitly leaving wages as the main economic factor that attempt to account for these choices. The exclusion of these non quantifiable factors renders such framework invalid for practical purposes. Higher wages for teachers will result into more people choosing to enter the teaching profession and fewer people leaving it. In economic theory analysis, this incorporates the basic element of the concept of the 'supply function of labour' which expresses for a given period of time, a positive relationship between the number of teachers forthcoming into the profession and the levels of real wages.

The United Nations<sup>27</sup> survey of 1962 in African countries on teachers concluded that all countries were facing the problem of teacher shortages. In all countries visited, teachers complained of low pay relative to those of others, even with low qualifications outside the teaching profession, and that there were paucity of promotion prospects. The survey also found that in the African states visited, there has been a steady drift away from the teaching profession as there were many posts outside

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<sup>26</sup> Zabalza, A. et al: op cit, pp. 13 - 16

<sup>27</sup> United Nations: National teachers survey for sub-saharan Africa. Unpublished. 1962, pp. 12 - 13.

with high emoluments. The opportunities outside offer inducements which young teachers on low salary find hard to resist. From the survey findings, rural based teachers were found to be deriving high satisfaction from the profession and they tend to be more involved and highly utilized in the service with a low urge to quit. Highly qualified teachers tended to leave the profession more often than those with lower academic qualifications. Though there were teacher supply problems, regional disparities were more serious such that the rural based schools experienced high shortages relative to urban schools.

According to Coombs<sup>28</sup>, the geographic problem of teacher supply will continue to plague many countries, even after they have achieved an over-all teacher supply - demand balance. In heavily rural countries, the educational system face the perennial human problem of getting qualified teachers to staff the schools in rural areas where the majority of the students are. Rural life holds little appeal for teachers and the best teachers tend to congregate in the urban centres while the education of the rural youth is left to the hands of inferior teachers. Apart from the geographical imbalances, Coombs argued that many LDC<sub>s</sub> will continue to face teacher supply problems in terms of subject specialization. He argued that countries' policy to pay teachers uniformly, regardless of the area of work and subject specialization, imposes difficulties in achieving the desired level of teachers by subject and the desired balance between rural and urban schools. He criticises the salary structure which does not give any special incentives to rural teaching and to subject differences.

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<sup>28</sup>Coombs, P. H.: op cit., p44

Shortage of teachers in Nigeria was identified by a report<sup>29</sup> on secondary level teachers' supply and demand to be resulting from, among other causes, attrition of teachers from the profession. Those who withdrew completely do so for the reason of marriage, general dissatisfaction with the profession, death, retirement, etc. The report stated that the attrition attributed to resignations could be controlled only if: competing alternatives diminish; preparation is made strictly professional; scholarships remain available to those only interested in the profession; and, if the future economic security of the beginning teachers is assured. Above all, defection from the profession will be inevitable if alternative employment opportunities competing fairly well existed.

### 3.5 Shortage of teachers in Kenya.

Shortage in supply of teachers in Kenya has also been documented. Raju<sup>30</sup> views shortage of teachers for secondary schools as a major obstacle in the educational expansion in Kenya. She argued that economic expansion in the country since independence resulted into shortage of graduate teachers despite the increased output. The reason is that better pay and terms of service in the private sector attracted graduate teachers away from the teaching profession as a career creating shortages. The production of teachers to man secondary schools has expanded but

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<sup>29</sup>American Council of Education: Secondary level teachers' supply and demand in Nigeria. Overseas Liaison committee, East Lansing, Michigan, 1970, pp.27 - 29.

<sup>30</sup>Raju, M.: Education in Kenya: Problems and perspectives in educational planning and administration. Heinemann, London, 1975, p.70.

the problem is the inability of the state or the educational sector to retain them in the profession. Raju's consideration is that massive drifts from teaching have been induced by varied alternative job opportunities in the country with better terms of service. This can be asserted to be less operative in Kenya now due to the tightness of the labour market in securing a job leading one to argue that, teacher quits in the economy have declined over time.

Indire<sup>31</sup>, editing a report on the secondary level teachers' supply and demand in Kenya, also recognized a situation of inadequate teaching force. By the time of the report, Kenya had achieved a remarkable expansion in secondary education but this was accompanied by an acute shortage of well-qualified staff. The report referred to the projections of the 1970 - 74 plan<sup>32</sup> which, on optimistic grounds, foresaw the state achieving a surplus of local teachers by the rapid production programmes, by holding attrition from the profession at approximately four per cent per annum, and by introducing a lesser generous student - teacher ratio. However, at the end of the plan period, teacher shortage, more particularly degree graduates, was a chronic problem in the

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<sup>31</sup>Indire, F. F. and Hauson, J. W. (ed): Secondary school level teachers: supply and demand in Kenya. American Council of Education. Overseas Liaison committee. East Lansing. Michigan. 1971, pp.54 -55

<sup>32</sup>Republic of Kenya: Ministry of Economic Planning and Development. Development plan 1970 - 74. Government printer, Nairobi, 1970, p.468.

economy because the attrition rate was very high.

The current development plan<sup>33</sup> acknowledges the existence of high wastage rates especially of graduate teachers. It proposes that new teachers graduating from the training institutions be bonded to the profession for a certain period as a tentative measure to retain graduate teachers especially holders of B.Ed degree. This is based on the fact that attrition of teachers from the profession represent a waste of valuable scarce resources (teachers already trained), and lead the educational sector to incur extra costs of training more new teachers than is necessary, who also if attrition is not controlled, may leave the profession. The plan does not examine the underlying causes that lead to wastage so as to prescribe a policy to curb the problem rather than bonding.

Maranga<sup>34</sup> studied the mobility of Bachelor of Education graduate teachers in Kenya and identified a high wastage rate of about 24 per cent per annum resulting from resignations only. His study adopted a very systematic follow-up of these graduates from Kenyatta University College between the years 1975 and 1981. From his preliminary findings, he concluded that the majority of those who resigned drifted in the private sector. The empirical causes for such drifts were not analysed as the study was not

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<sup>33</sup>Ministry of Finance and Planning. Development plan 1984 - 88 Government printer, Nairobi, 1983, p.151.

<sup>34</sup>Maranga, J. S. : "Mobility of graduate teachers: A follow-up study of K.U.C. B.Ed. graduate teachers, 1975 - 81". Unpublished paper, 1982, p.24.

completed. However, the forces that make an individual join or quit the profession were exhaustively analysed as being centred on the theory of job satisfaction, the pecuniary and non-pecuniary benefits attached to the profession and the status accorded to the profession vis-a-vis others<sup>35</sup>.

A study by Eshiwani<sup>36</sup> established that in Kenya other than the overall shortage of teachers, subject imbalances tend to be more serious. Demand for Science and Mathematics teachers in the economy has been highest while its supply has been lagging. He however, noted that the training institution could claim to have produced substantial numbers to reduce this excess demand for teachers but the efforts to achieve this are frustrated by massive drifts. Taking a case study of the graduates from the Kenya Science Teachers' College, he found that there was a high drift of these Science teachers. Only twenty per cent of the Science teachers by 1981 were willing to stay in the profession. The estimated rate of departure from the profession was about forty per cent per annum which was a very high figure leading to scarcities of science-based curriculum in the economy. When comparing, he found that this dropout rate was relatively higher for Science degree graduates than non-degree graduates. From his findings, one can argue that it is uneconomical for

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<sup>35</sup>See Grambs, J. D.; "Teachers as a minority group" in Journal of educational sociology. Vol.22. 1949, pp.400 - 405 and "The sociology of the born teachers" in The Journal of Educational sociology. Vol.25. 1952. pp.31 - 34.

<sup>36</sup>Eshiwani, G. S.; "Report on Kenya Science Teachers' College: An evaluation, 1981". Unpublished paper, 1981. pp.8 - 10.

the educational sector to invest a lot of resources in training highly qualified teachers who end up leaving the sector, representing a loss to the sector. The study concluded that the nature of competition in the labour market for these type of manpower was responsible for such wastage. As it retains its labour-intensive character, educational sector has failed to match competitive salaries attractive to such personnel and it can not claim a larger share of its own product.

Labour wastage is not only typical to the teaching profession alone but, to any other occupation. Oesternman<sup>37</sup> has demonstrated that labour quits from any occupation measures the perceptions of individuals regarding that particular occupation relative to others. To him, factors that induce people to quit any occupation are economic in nature. The view which economic models of quitting tend to emphasize is that individuals are less likely to quit if they perceive good economic conditions in their current employment. Therefore, the probability of an individual to quit a given occupation depends of the improvement or deterioration of terms of service and condition of work in the occupation.

Oesternman singled out education as one of the economic factors, among many, which positively affect quit rates. People with more education presumably have more alternative opportunities hence, having high rates of quitting their current employment.

When a category of a highly skilled manpower becomes scarce, given the time lag to produce more, the situation is examined

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<sup>37</sup>Oesternman, P. : "Affirmative Action and opportunity: A case study of female quit rates" in The Review of Economics and Statistics: Vol. XIV No. 4 Nov. 1982, pp.604 - 612.

whether this available manpower is rationally and optimally utilized. According to the OECD<sup>58</sup>, countries which have been faced with severe teacher shortages, the educational authorities have naturally had the choice between intensive utilization of the available qualified staff and recourse to less qualified staff. The first alternative imply high level of capacity utilization of the available teachers measured in terms of number of hours a teacher actually works per legally established working week. But, the number of teaching hours means little to teachers because other important duties should also be taken into consideration such as preparation and marking of students' assignments. The OECD stated thus: "The optimum utilization of teachers and the fixing at national level of their working hours are still based on every little knowledge of their real duties. The absence of data makes the issue look simple"<sup>59</sup>.

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<sup>58</sup>OECD: op cit., PP. 343 - 349

<sup>59</sup>ibid.

## CHAPTER FOUR

### HYPOTHESES, METHODOLOGY AND DATA SOURCES

#### 4.1 Hypotheses

This study examines two sets of operational hypotheses. The first set relates to teacher capacity utilization while the second set relates to teacher wastage or dropout.

##### 4.1.1 Hypotheses related to teacher capacity utilization.

In order to define teacher capacity utilization in this study, two aspects are considered. First, teacher utilization can be measured in terms of the length of the working load within a legally established working week, which in our case is a five-day week. Clearly, teachers' work over this period is not possible to quantify explicitly. Certain variables which constitute teachers' work are difficult to assign measurable units because the duties extend from actual teaching in classrooms to other activities including preparatory work, marking of students assignments, administrative responsibilities, extra curriculum activities, guidance, etc. Some of these duties are usually done outside the established working week. However, in this study, one variable has been used as a proxy to measure the teacher capacity utilization and this is the teacher "contact periods". This is defined as the actual number of periods a teacher goes to class. The length of one contact period is legally defined to be 40 minutes for secondary schools in Kenya<sup>1</sup>.

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<sup>1</sup>Republic of Kenya: Ministry of Education. Curriculum organization in nontechnical secondary school. Government printer, Nairobi, 1980. p.5

The second consideration in evaluating teacher capacity utilization is the extent to which teachers are deployed to teach relevant subjects in which they are trained and qualified. Certain economic shortages may require even specialist teachers to be asked or even pushed to teach subjects they never trained in. Alternatively, because of poor allocation or staffing stemming from administrative practices of the employer (as explained in chapter two section 2.4), certain teachers find themselves in schools where their subject specialities are not available and they recourse to teach any other subject. This is so because certain subjects are only available in particular schools. It is assumed that a teacher's highest efficiency in the contribution to the production of education should be attained if the particular teacher is deployed to teach in the subjects trained in. Any misallocation therefore, will mean underutilization of trained manpower whose demand may be highest elsewhere.

These two aspects are quite critical for a developing country like Kenya where shortage of skilled manpower is often cited as one of the major obstacles to economic development. They tend to indicate the extent of resource misuse in the economy more particularly the problem of distribution of teachers in all schools so as to achieve a more balanced quality of education. Schools with teachers having low capacity utilization rates are normally those which are understaffed whereas those with high capacity utilization rates belong to schools which are understaffed. Noting that teachers can have different capacity utilization rates depending on school location, subject specialization and academic qualifications; and also that the differences in capacity

utilization account for performance in schools the following hypotheses are stated:

4.1.1 (a)

On average, teacher capacity utilization rate measured in terms of 'contact periods' per week is higher for teachers in schools located in rural areas than for teachers in schools located in urban areas.

This hypothesis has been put forward on the argument that urban-based schools tend to be overstaffed relative to rural-based schools. Therefore, the subject and subsequent period sharing load becomes lighter in the former as opposed to the latter schools. Letting the average rate of capacity utilization for urban and rural secondary school teachers be  $C_u$  and  $C_r$  respectively, the hypothesis can be restated symbolically as follows:

$$H_0 : C_r = C_u$$

$$H_1 : C_r > C_u$$

4.1.1 (b)

The extent to which low qualified teachers are utilized in terms of average 'contact periods' is higher compared to those with high qualifications.

Highly qualified teachers will in this analysis refer to those teachers with at least a Bachelor of Education (B.Ed) degree whereas those with qualifications less than B.Ed degree will constitute the group of teachers with low qualifications. This has been stated noting that highly qualified teachers are subject specific and their sphere tend to narrow as they attain even higher levels of education and professional standards. They are more reluctant to take up any additional subject compared to those with low qualifications and

particularly the untrained type. We restate the hypothesis symbolically as:

$$H_0 : C_1 = C_h$$

$$H_1 : C_1 > C_h$$

where,  $C_h$  and  $C_1$  are average rates of capacity utilization measured in terms of 'contact periods' for teachers with high qualifications respectively.

#### 4.1.1 (c)

The average rate of capacity utilization in terms of 'contact periods' for science-based curriculum teachers is higher than that of arts-based curriculum teachers irrespective of academic qualifications.

Science<sup>2</sup> oriented teachers tend to be fewer in the majority of schools and their 'contact period' or subject sharing load tend to be heavier relative to arts oriented teachers. Understaffing of any category of manpower (teachers) stretches the teaching load and raises their utilization rate. This is restated as:

$$H_0 : C_s = C_n$$

$$H_1 : C_s > C_n$$

where,  $C_s$  and  $C_n$  are average rates of capacity utilization for science and nonscience teachers respectively all measured in terms of 'contact periods'.

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<sup>2</sup>Science subjects are defined to include: Mathematics Biology, Chemistry and Physics. All others in nontechnical education are regarded as nonscience.

4.1.1 (d)

Lower average teacher contact periods has not a positive effect on the teaching efficiency and hence examination performance.

In order to facilitate the testing of the above hypotheses, the following formula will be used to calculate capacity utilization rates. For an individual teacher, the rate will be;

$$C_i = \left\{ \frac{Ap_i}{Max_p} \times 100 \right\} \%$$

Where,  $C_i$  = an individual teacher i's capacity utilization rate.

$Ap_i$  = the actual number of contact periods for teacher i in a week.

$Max_p$  = maximum number of periods which a teacher can be deployed in a week (=40 periods of 40 minutes each).

To obtain an average rate of capacity utilization for a given sample of teachers, we will use the formula:

$$C_j = \left\{ \frac{1}{n} \sum_{i=1}^n \frac{Ap_i}{Max_p} \times 100 \right\} \%$$

Where,  $C_j$  = sample j's average rate of capacity utilization; j can be Science teachers for instance, etc.

n = sample size.

4.1.2 Hypotheses related to teacher wastage or dropout

It is the central thesis of this study that teacher production trends in Kenyan economy have been quite sufficient to satisfy the existing demands if it were not for the immense wastage. The type

of attrition that real constitutes a waste to the educational sector and particularly the teaching profession is that which can be controlled. Other forms of attrition like deaths and retirements are inevitable. The type of teacher dropout which is real a waste and raises concern is that one arising from resignations and dismissals. Under this we state two hypotheses based on resignations.

#### 4.1.2 (a)

The amount of teacher quits in Hong Kong have been declining over time.

This is hypothesized with a priori understanding of the labour market in the economy. With an increasing rate of unemployment in the economy which affects even graduates, the alternative job opportunities to which teachers fall into have diminished, reducing quit rates.

#### 4.1.2 (b)

The higher level of educational qualifications in the profession, the higher the propensity for teachers to quit the profession.

This proposition has been forwarded on the premise of 'ceteris paribus' that given the labour market conditions, more job opportunities tend to be open for people with higher educational background or qualifications. Thus, it becomes difficult to retain such category of teachers compared to those with lower qualifications. Should the proposition hold true, concern could be raised by policy-makers and planners as to what advantage it is to allocate scarce educational resources to expand the academic and teaching

capabilities of the cadre who later defect the profession. Higher qualification is here defined to include those teachers with at least a B.Ed degree and are in the teaching profession.

#### 4.2 Methodology

The methodology adopted in this study employs statistical tools to analyse data. In order to be able to test the first set of hypotheses, sample means would be computed. Then, the test of hypothesis concerning the difference between two means would be applied in each case. Since all the samples would be large ( $>30$ ), the appropriate statistical test will be the Z-test statistic. The level of significance is chosen to be 5% (i.e.  $\alpha = 0.05$ ). The way all the hypotheses have been formulated they require a one-tail test.

The formula for obtaining the computed (or empirical) Z-value is given by<sup>3</sup>:

$$Z_c = \frac{|C_i - C_j|}{\sqrt{\frac{\sigma_i^2}{n_i} + \frac{\sigma_j^2}{n_j}}}$$

where,  $Z_c$  = computed Z-value

$|C_i - C_j|$  = absolute difference between the two means,  $C_i$  being the mean for sample i and  $C_j$  mean for sample j;  $i \neq j$ .

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<sup>3</sup>See Karmol, H. P. and Polerek, H. Applied statistics for Economists. Pitman publishing Ltd., Australia, 1973. p.103.

$s_i^2$   $\equiv$  the variance of sample i calculated by the formula:

$$s_i^2 = \frac{1}{n_i} \sum_{i=1}^n (X_i - c_i)^2$$

Where,  $X_i$  is defined as the observed individual value and  $n_i$  = size of sample i.

$s_j^2$   $\equiv$  the variance of sample j calculated by the formula:

$$s_j^2 = \frac{1}{n_j} \sum_{j=1}^n (X_j - c_j)^2$$

Where,  $X_j$  is the observed individual value and  $n_j$  = size of sample j.

Accepting or rejecting the null hypotheses will be based on the comparison between the computed Z-value and its theoretical value from the tables given the level of significance,  $\alpha = 0.05$ .

Regarding the second set of hypotheses, time series data will be used for a specified period of time. In both of them, quits will be stated as being a function of time, thus:

$$Q = r(t) \tag{4.1}$$

For the hypothesis 4.1.2(a), the quit function is specified explicitly in logarithmic form as:

$$\ln Q = \alpha_0 + \alpha_1 t \tag{4.2}$$

Hypothesis 4.1.2(b) requires a specification of two separate equations for the two levels of teacher qualifications. Hence for high educational qualification, we specify the function as:

$$\ln Q_h = \alpha_2 + \alpha_3 t \tag{4.3}$$

and for low educational qualification as:

$$\ln Q_l = \alpha_4 + \alpha_5 t \tag{4.4}$$

Where,  $Q$  = grand total of teacher quits

$Q_h$  = total quits of teachers with at least a degree.

$Q_1$  = total quits of teachers with qualifications lower than a degree.

$$Q_h + Q_1 = Q$$

t = time

$\alpha_i$  (i = 0, 1, ..., 5) = parameter estimates

According to these formulations, three things are critical for our hypotheses. First, the signs of the coefficients of the independent variables ( $\alpha_1$ ,  $\alpha_2$  and  $\alpha_3$ ) should be negative. Which means that the teacher quit in the country is exponentially declining over time. Second, is the statistical significance of these parameters to enable us make conclusions on the effect of time over teacher quits. Third, according to hypothesis 4.1.2(b), the value of  $\alpha_3$  should be greater than  $\alpha_5$  in absolute terms and be statistically different from each other. To test for this statistical difference, we will consider  $\alpha_3$  and  $\alpha_5$  as estimates of different sample means and we can employ a t-statistic test given the degrees of freedom (n-2) and level of significance as 0.05.

The testing of this last part entails the stating of the hypothesis as follows:

$$H_0: \alpha_3 - \alpha_5 = 0$$

(a two-tail test).

$$H_1: \alpha_3 - \alpha_5 \neq 0$$

We choose a two-tail test at 95% level of confidence and since the observations are 11 cases (<30), t - statistic test will be relevant. The formula for t - calculated is given by<sup>4</sup>

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<sup>4</sup>See Kontoyannis, A: Theory of Econometrics. The MacMillan press Ltd. London. 1981. pp.86 - 91.  
Karnel, N. P. and Polecek, E. op cit, pp.180 - 83.

$$t_c = \frac{(\hat{\alpha}_3 - \hat{\alpha}_5) - (\alpha_3 - \alpha_5)}{\sqrt{s(\hat{\alpha}_3 - \hat{\alpha}_5)}}$$

Where,  $s(\hat{\alpha}_3 - \hat{\alpha}_5) = \text{var}(\hat{\alpha}_3) + \text{var}(\hat{\alpha}_5) - 2\text{cov}(\hat{\alpha}_3, \hat{\alpha}_5)$ ;

and  $\alpha_3$  and  $\alpha_5$  are parameter estimates.

But because  $(\alpha_3 - \alpha_5)$  is the hypothesized value and that  $\hat{\alpha}_3$  and  $\hat{\alpha}_5$  are independent parameters then:

$$(\alpha_3 - \alpha_5) = 0$$

and

$$2\text{cov}(\hat{\alpha}_3, \hat{\alpha}_5) = 0$$

This makes our formula to be:

$$t_c = \frac{(\hat{\alpha}_3 - \hat{\alpha}_5)}{\sqrt{\text{var}(\hat{\alpha}_3) + \text{var}(\hat{\alpha}_5)}}$$

The value of  $t_c$  will be compared with the critical value of  $t$  from the tables given the level of significance to be 0.025 for two tail test and nine degrees of freedom.

The same procedure can be employed to test whether the individual sample estimates  $\hat{\alpha}_3$  and  $\hat{\alpha}_5$  are statistically different from  $\hat{\alpha}_1$  which is the estimate of the two samples combined.

4.2.1 Data on Resignations

A lot of data would be required to determine the extent of the types of cross-sectional data which are available.

Data is required in the form of a survey of the number of contact periods per teacher over a period of time.

Data is required in the form of a survey of the number of teacher resignations.

4.2.2 Data on Hours

For the cross-sectional data, the study is primarily a survey of resources. First, is the survey in a country which is being conducted by the Ministry of Education, Belgium. The survey was launched in September, 1964 and by the end of the survey, it was not known how well the exercise was carried out. The necessary information. The survey consisted of a questionnaire on the 3-4-4 educational system which were to be filled out and sent to the ministry by the headteachers. Of 2010 questionnaires, about 1500 had been returned from which we obtained our data. The second survey was conducted after the 3-4-4 teacher exercise was the normal course of events. The statistical questionnaires which were also to be filled out and sent by the headteachers. The case numbers were sent and the questionnaires were returned in the same envelope. The questionnaires which the study could have used were also sent to the ministry.

Data on resignations and dismissals were obtained from the closed and pending files of the ministry.

Service Commission (ESC). Other supplementary data sources include the Central Bureau of Statistics publications and the Ministry's annual reports. However, data on resignations is for a short period (1974 - 1984) because for the years before 1974, proper records were not available.

#### 4.3.3 Sampling procedure

The sampling procedure only applied to choice of schools from which the teachers to be analysed were picked from. A sample of 200 schools was selected. The population constitute of about 2100 registered secondary schools such that 200 is approximately ten per cent of the population. The procedure adopted is a stratified sampling by assigning weights between school's location whether in rural or urban. The population's proportion of urban and rural situated schools is given by the ratio 1 : 3 (urban : rural). Applying the same ratio, 50 urban and 150 rural schools were chosen. The ratio of government<sup>5</sup> to the private schools in the country also happens to be nearly 1 : 3 such that among the 50 urban schools 10 were government and among the 150 rural schools, 33 were government schools. From these 200 schools chosen, a sample of  $n = 1847$  teachers was arrived at which is about ten per cent of the teacher population of 18,950<sup>6</sup>.

From this sample, six sub-samples were selected for analysis

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<sup>5</sup>In this definition, government schools include all government maintained, aided and assisted.

<sup>6</sup>The total number of teaching force by the beginning of 1984, see Central Bureau of Statistics: Economic Survey. Government printer. Nairobi, 1984, p.208.

as follows:-

$n_1$  = teachers in urban areas

$n_2$  = teachers in rural areas

$n_3$  = science-oriented teachers

$n_4$  = non science-oriented teachers

$n_5$  = teachers with qualification of a bachelors degree  
or above.

$n_6$  = teachers with qualifications lower than a bachelors  
degree.

Sample  $n_7$  will not necessarily be teachers among the 1847 already selected. This sample was later chosen and it includes all the teachers in the 1984 KACE and KCE examination best performed schools. Best performed schools chosen are the top ten in each examination giving a total of 15 schools (see appendix 3). The size of each  $n_i$  ( $i = 1, 2, \dots, 6$ ) is determined by selection.

CHAPTER FIVE

DATA ANALYSIS

5.1 Introduction

This chapter deals with two broad aspects. First, is the presentation of data which has been collected and compiled from the sources described in section 4.3.2 of the previous chapter. Statistical formulae have been employed to calculate measures of central tendency and dispersion in order to ease analysis where applicable. The second aspect is concerned with the matching of the stated operational hypotheses with the empirical evidence.

5.2 Data presentation

The presentation of data is organised in such a way that it covers major issues of investigation in the study. These issues are those related to:

- a. teachers' utilization measured in terms of contact period in relation to their schools' location, level of qualification and subject curriculum orientation. Under the same aspect of utilization, data is presented regarding the teachers' area of specialization in training and their present areas of teaching.
- b. the extent to which there has been overproduction and/or underproduction of the teaching cadre in certain teaching subjects; and
- c. the teacher wastage (drop-out) by two sources designated as dismissals and resignations where

the latter is classified according to the level of teachers' qualifications.

Each of these issues is considered separately and in detail below.

### 5.2.1 Teacher utilization

It is argued in this study that there are significant differences in utilization between teachers in rural and urban schools, between teachers with high and low qualifications and between science and non-science teachers all measured by the teaching load over the working week. Further, it is asserted that teacher utilization in those schools which perform well in examinations is significantly different from the rest of the schools. Each of these categories is presented pairwise so as to enable comparisons. In all cases data is grouped and presented in frequency tables. Means, variances and standard deviations have also been computed.

#### (i) Rural versus urban teachers.

At the outset, it should be made clear that the classification of schools into urban and rural pose a lot of difficulties. However, the one adopted in this study is that which is applied by the administration such that unless a school is within a city, a municipality or an urban town, it is not urban. Certain schools which could generally be described as being within the urban environment are treated as rural schools<sup>1</sup>.

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<sup>1</sup>An example is Alliance Girls and Alliance Boys which could be viewed as being in Nairobi city but counted as rural.

Table 5.1 shows the frequency distribution of teacher contact periods in the 50 urban and 150 rural schools which are sampled. The questionnaire sought for the number of hours a particular teacher taught in a week. This information has been converted into contact periods by a conversion factor given as  $3/2$  and rounded into whole numbers<sup>2</sup>.

Table 5.1

TEACHER CONTACT PERIODS IN RURAL AND URBAN SCHOOLS

| No. of contact periods | FREQUENCY     |               |
|------------------------|---------------|---------------|
|                        | Rural schools | Urban schools |
| 0 - 5                  | 20            | 17            |
| 6 - 10                 | 55            | 59            |
| 11 - 15                | 135           | 61            |
| 16 - 20                | 177           | 168           |
| 21 - 25                | 315           | 139           |
| 26 - 30                | 185           | 83            |
| 31 - 35                | 169           | 60            |
| 36 - 40                | 142           | 68            |
| n                      | 1192          | 655           |
| mean                   | 24.09(60.23)  | 22.02(67.55)  |
| variance               | 75            | 81            |
| standard deviation     | 8.66          | 9             |

Note: Figures in parenthesis indicate the percentage of the possible maximum contact period per week which is given as 40.

Source: Total sample survey.

<sup>2</sup>An hour is 60 minutes and one contact period is defined to be 40 minutes giving the conversion factor as  $3/2$ .

Of the 1192 teachers in rural schools, only 712 (59.7%) were trained whereas out of the 655 teachers in urban schools 504 (76.9%) were professionally trained. In either cases, the majority of the untrained teachers were in private or Harambee schools. All the untrained teachers in urban schools were in private schools while 454 of the untrained component in rural schools were in the private or Harambee package. Further classification indicated that among the trained teaching force in rural schools, 4.2% were graduates<sup>3</sup>, 39.2% were diploma holders, 11.9% were S1 teachers and the rest were P1 teachers. In urban schools among the trained, 30.5% were graduates, 17.3% were diploma holders and 2.2% S1 teachers with nil P1 group. The observation made here is that schools in urban areas are supplied with more qualified teaching staff as opposed to rural schools.

(ii) High versus low qualified teachers

The classification of teachers between high and low educational qualification has been earlier explained. In short, the comparison will be between those with at least a university degree and those without. The data for the two groups is presented in table 5.2 below.

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<sup>3</sup> Graduate teachers include the approved teachers. An approved teacher is one who has completed the equivalent of a university education

Table 5.2

TEACHING CONTACT PERIODS OF GRADUATE AND NON-GRADUATE TEACHERS

| No. of contact periods | FREQUENCY    |               |
|------------------------|--------------|---------------|
|                        | Graduates    | Non graduates |
| 0 - 5                  | 49           | 21            |
| 6 - 10                 | 117          | 81            |
| 11 - 15                | 153          | 118           |
| 16 - 20                | 95           | 222           |
| 21 - 25                | 190          | 241           |
| 26 - 30                | 64           | 196           |
| 31 - 35                | 42           | 111           |
| 36 - 40                | 22           | 120           |
| n                      | 737*         | 1110          |
| mean                   | 17.92 (44.3) | 22.07 (55.19) |
| variance               | 75           | 78.35         |
| standard deviation     | 8.66         | 8.85          |

Notes:

1. \* includes approved graduates
2. Figures in parenthesis are percentage of possible maximum contact period per week.

Source: Total sample survey.

The total graduate composition had 4.3% untrained as opposed to 53.9% in the nongraduate composition. The large untrained component among the nongraduate were holders of KACE or BACE and were teaching in private or Harambee schools.

(iii) Science versus non-science teachers

In this pair, the level of qualification is not important. Science teachers are treated to be any teacher capable of teaching any of the science subjects<sup>4</sup> in secondary level education. Information on this pair is presented in table 5.3.

Table 5.3

CONTACT PERIOD OF SCIENCE AND NONSCIENCE TEACHERS

| No. of contact periods | FREQUENCY    |              |
|------------------------|--------------|--------------|
|                        | Science      | Non-science  |
| 0 - 5                  | 0            | 20           |
| 6 - 10                 | 51           | 146          |
| 11 - 15                | 96           | 180          |
| 16 - 20                | 71           | 246          |
| 21 - 25                | 133          | 301          |
| 26 - 30                | 122          | 138          |
| 31 - 35                | 98           | 54           |
| 36 - 40                | 87           | 54           |
| n                      | 658          | 1189         |
| mean                   | 24.24 (60.6) | 19.4 (47.85) |
| variance               | 83           | 74.5         |
| standard deviation     | 9.11         | 8.63         |

Note: Figures in parenthesis are as earlier defined.

Source: Total sample survey

An observation one makes from this table is that science

<sup>4</sup>See footnote 43 in chapter four.

teachers are scarce, constituting only 35.6% of the total sample. Inadequacy of such teachers bear serious implications of future manpower developments.

(iv) Well-examination-performing schools.

The top ten KCE and KACE results of 1984 schools were identified. Five of the schools appeared in both lists giving rise to only 15 schools with a total of 316 teachers. The contact periods of these teachers are compared with the average contact period of the total sample which is assumed to be representative of the whole population. This is contained in table 5.4 below.

Table 5.4

CONTACT PERIODS OF TEACHERS IN WELL-PERFORMING SCHOOLS AND THOSE IN THE TOTAL SAMPLE STUDIED

| No. of contact periods | FREQUENCY        |              |
|------------------------|------------------|--------------|
|                        | Well-performing* | Total sample |
| 0 - 5                  | 9                | 70           |
| 6 - 10                 | 35               | 190          |
| 11 - 15                | 37               | 276          |
| 16 - 20                | 98               | 317          |
| 21 - 25                | 65               | 431          |
| 26 - 30                | 55               | 260          |
| 31 - 35                | 15               | 153          |
| 36 - 40                | 2                | 142          |
| n                      | 316              | 1847         |
| mean                   | 19.49 (43.73)    | 21.0 (52.5)  |
| variance               | 54               | 83           |
| standard deviation     | 7.3              | 9.1          |

Notes: 1. \* Well-performing schools were not necessarily in the sample of the 200 schools.

2. Figures in parenthesis as above.

Source: Ministry of Education statistic division and Kenya National Examination Council.

(v) Teachers' subject specialised and subject taught.

This section considers only the trained teaching force.

Out of the total sample, 1216 teachers were trained. Of these, 115 teachers (9.5%) were not teaching subjects they were trained in, indicating an apparent misallocation of resources. We could expect a teacher's teaching efficiency and hence productivity to be highest if deployed in relevant areas of training.

As we discussed in chapter two, such misallocations could be due to many sources. Random posting of teachers by the Teachers Service Commission without considering their subject specialisation leads to this phenomenon. Certain subjects are not available in particular schools which needs caution before distributing teachers. Another possible arrangement which is ascertained to result into misallocation is based on marital status. Married couples prefer a common residence, and it is acknowledged by the administration. Female married teachers on completion of their training, request or canvass to be posted to their husbands' place of work. This could be in urban centres where there is already overstaffing. Once such arrangements have succeeded, teachers may find themselves in schools where their major subject of training is not available and resort into teaching any other. Though it was not verified whether or not the female teachers were married, 59 out of 115 deployed in different subjects from

what they specialized in, were female and a total of 93 were in urban schools.

Another probable source of misallocation could be due to the overproduction and/or underproduction of teachers in particular subjects. The majority of the trained were found to be in humanities or nonsciences. This is illustrated in table 5.5 giving teacher distribution by major subject of specialization irrespective of the level of professional qualifications.

Table 5.5

TEACHERS BY MAJOR SUBJECT OF SPECIALIZATION

| Major subjects specialized in                 | No. of teachers | %      |
|---|-----------------|--------|
| 1. English Language and Literature in English | 211             | (17.4) |
| 2. Kiswahili                                  | 93              | (8.0)  |
| 3. Other Languages (e.g) French               | 1               | ( - )  |
| 4. Geography                                  | 114             | (9.4)  |
| 5. History                                    | 102             | 8.4    |
| 6. Economics                                  | 28              | (2.3)  |
| 7. Mathematics                                | 203             | (16.7) |
| 8. Biology                                    | 78              | (6.4)  |
| 9. Physics                                    | 64              | (5.3)  |
| 10. Chemistry                                 | 71              | (5.8)  |
| 11. Agriculture                               | 12              | (1.0)  |
| 12. Christian Religious Education (CRE)       | 188             | (15.5) |
| 13. Technical Subjects                        | 8*              | (0.7)  |
| 14. Home Economics                            | 9               | (0.7)  |
| 15. Business Studies                          | 7*              | (0.6)  |
| 16. Physical Education (P.E)                  | 22              | (1.8)  |

Notes: 1. \* none of them was teaching the subject.

2. figures in brackets are percentage of the total trained proportion in the total sample (=1216).

5. (-) means less than 0.1%

Source: Total sample survey.

Teacher distribution (of trained type) across subjects indicate a clear discrepancy between sciences and humanities and also show low supply in areas related to Agriculture, Technical Education, Business Education and Home Economics. Manpower production in all fields can only be achieved if there are enough teachers in those fields to impart the required knowledge and skills. Student enrollments in those undersupplied areas would be bound to be low constituting one of the setbacks of manpower development and the general functioning of the economy. Hence, if secondary education is to be a basis for future professional specialization teacher demands should be met in all areas.

#### 5.2.2 Teacher wastage.

As explained earlier, teacher wastage sources range from deaths, dismissals, retirements to resignations. But, only data on dismissals and resignations has been compiled here. These were the two types of drop-out which represent a clear wastage to the educational sector particularly when the concerned teachers are trained.

##### (i) Dismissals.

Teachers are dismissed from the profession either permanently or temporarily depending on the cause for dismissal. The letter for dismissal (interdiction) to a particular teacher involved is issued by the employer, TSC. Temporary dismissal imply that those involved have an opportunity to defend themselves before the disciplinary committee of the commission. Table 5.6 gives the causes for dismissal and number of teachers who have been affected annually between 1974 and 1985. In this case only the

trained graduates are indicated and also the trained diplomats and S1 teachers.

Table 5.6

NO. OF DISMISSALS FOR CAUSE, 1974 - 1985

| Year<br>Reasons                            | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | Totals |
|--|----|----|----|----|----|----|----|----|----|----|--------|
| 1. Desertion of duty and Absentism         | 24 | 8  | 13 | 16 | 54 | 26 | 15 | 23 | 29 | 25 | 213    |
| 2. Having carnal knowledge of school girls | 5  | 6  | 7  | 16 | 7  | 7  | 6  | 4  | 7  | 1  | 66     |
| 3. Drunkenness                             | 1  | -  | -  | 1  | -  | 1  | 1  | -  | -  | -  | 4      |
| 4. Being convicted of criminal offence     | -  | -  | -  | 2  | -  | -  | -  | 1  | -  | -  | 3      |
| 5. Misappropriation of funds               | 4  | -  | 1  | 16 | 4  | 4  | 5  | -  | 1  | -  | 35     |
| Totals                                     | 34 | 14 | 21 | 51 | 45 | 38 | 27 | 28 | 37 | 26 | 321    |

Source: TSC files, discipline department.

For the ten years which data was available, the sector has lost 321 trained manpower involuntarily from the personnel side. Most of the reasons for dismissal do not face realities. While the employer (TSC)

strives to maintain professional ethics, some of these offences could be relaxed. It would be worthwhile to consider which is more costly between absence or desertion and complete suspension of the trained cadre. Causes for absence without permission could be genuine but depending on the relationship between the headteacher and the ordinary teacher involved, the latter ends up suffering. Insubordination could play a great influence in this. The reason of having carnal knowledge of school girls irrespective of whether under coercion and also staff mates marrying appears significant. It was learnt that even if the student agrees to marry the teacher, interdiction is administered. Such teachers could be transferred to different schools because if the offence has been committed, there is little which could be done. By and large, ways should be sought for to deal with this problem more realistically to enable holding down of the manpower losses.

(ii) Resignations

The main source of teacher drop-out which is also voluntary is resignation. Formally when teachers resign, they do it in written to their employer. The records of resignations which were available for the years 1975 to 1984, missed two major informations which should be fundamental in prescribing policies to curb this drop-out. These are the causes or reasons for resignations and teachers' speciality in terms of subject of teaching. Also the destination of the involved teachers could be important to enable us study the economic, social or political indicators for resignations. However, table 5.7 shows only the numbers by qualifications, who have defected the

... division over the short period studied.

...

TEACHER RESIGNATIONS BY QUALIFICATION, 1973 - 1984

| Year  | KACE (U.T) | S1 + D | GRAD. | TOTALS |
|-------|------------|--------|-------|--------|
| 1973  | 51         | 83     | 162   | 301    |
| 1974  | 83         | 44     | 121   | 248    |
| 1975  | 46         | 89     | 123   | 258    |
| 1976  | 44         | 71     | 132   | 247    |
| 1977  | 81         | 22     | 124   | 227    |
| 1978  | 58         | 39     | 99    | 196    |
| 1979  | 43         | 21     | 83    | 147    |
| 1980  | 63         | 30     | 44    | 137    |
| 1981  | 50         | 21     | 65    | 136    |
| 1982  | 25         | 35     | 72    | 132    |
| 1983  | 21         | 29     | 55    | 96     |
| 1984  | 17         | 11     | 269*  | 297    |
| Total | 582        | 491    | 1349  | 2422   |

Key: KACE = Kenya Advanced Certificate of Education.

U.T = Untrained.

S1 + D = S1 plus diploma teachers

Grad. = Graduate teachers

\* Of these, 241 were graduates who were employed at the end of 1983 and early 1984 as untrained teachers from the University of Nairobi. They were later appointed to different posts within the civil service.

Source: SSC personnel division, registers for resignations.

### 5.3 Matching hypotheses with empirical evidence

In this section, we subject the operational hypotheses to statistical testing using the data presented in the previous section. We first consider those hypotheses which were related to utilization.

#### 5.3.1 Teacher utilization hypotheses

Under this we had four hypotheses. The first one stated that on average teacher utilization measured in contact periods per week was higher for teachers in rural schools than those in urban schools. Symbolically, it was restated as:

$$H_0 : C_r = C_u$$

$$H_1 : C_r > C_u$$

all symbols defined as in chapter four.

The value of Z - computed is empirically calculated by the formula given in chapter four section 4.2. Using information in table 5.1, the Z - computed turns out to be:

$$Z_c = \frac{|24.09 - 22.02|}{\sqrt{\frac{75}{1192} + \frac{31}{655}}} = 4.81$$

This means that the difference between the two means of teaching contact periods is 4.81 standard errors which is far greater than the critical 1.65<sup>5</sup> standard errors at 95% level of

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<sup>5</sup>At 5% level of significance, the value of Z - computed is given as:  $Z_{(1-0.05)} = Z_{0.05}$  which is 1.65 from the normal distribution tables (see appendix 5).

confidence under one -tail test. Therefore at 5% level of significance we reject the null hypothesis and accept the alternative hypothesis that the rural based teachers are more utilized than the urban based teachers in terms of teaching load. This could possibly explain the existence of overstaffing (understaffing) among urban (rural) schools. Overstaffing makes subject sharing light and the opposite is the situation when schools are understaffed. Understaffing of rural schools can be associated to many factors. Availability of basic facilities such as housing, piped water, electricity, etc tend to be less appealing to attract teachers into such schools. Lack of accessibility from the major urban centres where essential activities take place also discourage teachers to accept teaching in remote schools. The authorities concerned do not provide enough inducements to attract the new entrants admire such schools, by say compensation. What is being addressed to here is that there exist a skewed distribution of secondary school inputs in the economy.

The second hypothesis under utilization compares teachers who have at least a degree education vis-a-vis those without in their labour inputs. It stated that the extent to which teachers with low qualification are utilized is greater than those with high qualification. Measuring these in contact periods, the hypothesis is restated as:

$$H_0 : C_1 = C_h$$

$$H_1 : C_1 > C_h$$

all symbols defined as in chapter 4. One tail test is preferred on the a priori understanding that as a given category of manpower attains more education or training it becomes more job specific with less flexibility. Teachers narrow their specialization the moment they attain at least a degree education<sup>6</sup>. There, they would tend to teach only what is in their lines and should they be many in a particular school, their utilization becomes low. Using data in table 5.2, we calculate the value of Z-computed as:

$$Z_c = \frac{|17.92 - 22.07|}{\sqrt{\frac{75}{737} + \frac{78.35}{1110}}} = 10.12$$

At a 5% level of significance, we reject the null hypothesis and accept the alternative hypothesis that the rate of utilization of nongraduate teachers is significantly higher than that of at least graduate teachers. The same conclusion could be arrived at 1% level of significance.

What this raises is the question as to whether we should discourage higher educational advancement in the teaching profession. To be able to handle secondary school education, teachers should be educated or trained up to degree level. But, it can be argued that if first degree holders can teach this level effectively, the need for qualifications of postgraduate and above for the same purpose who, turn out to be underutilized after consuming

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<sup>6</sup>See Williams, P. op cit., p.80

a lot of scarce resources should not arise. Caution should be exercised in drawing these conclusions because the low qualified teachers have been highly aggregated i.e the untrained KACE, P1, S1 and diploma teachers. The untrained (53.9%) form the majority in the sample who we expect to be more complying in matters related to taking up an extra period for fear that they can even be sacked. The untrained teaching composition is an indication of shortage of proper teaching force. However, they form the backbone of the secondary education under private and Harambee package, since training has been shown not to be a significant factor in teachers' efficiency<sup>7</sup>.

The third hypothesis compares the utilization of science based curriculum teachers vis-a-vis nonscience teachers. It is asserted that on average, the science-based teachers have a higher utilization rate than the nonscience based teachers measured in contact periods. This is irrespective of the level of academic or professional qualification. In symbol form we restate it as:

$$H_0 : C_s = C_n$$

$$H_1 : C_s > C_n$$

all symbols defined as in chapter four. A one-tail test is chosen because in this study, it is argued that science teachers

And when a category of manpower becomes scarce,

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<sup>7</sup>See Gatangi, M. N. "Productive efficiency of forms five and six in Kenya". M.A Research paper, Department of Economic, University of Nairobi. 1982. P.25. (Unpublished).

the alternative open to concerned authorities is to explore possibilities of raising the utilization of such personnel. The value of Z-computed is empirically calculated from the information in table 5.3 above. It turns out to be:

$$Z_c = \frac{|24.24 - 19.14|}{\sqrt{\frac{83}{658} + \frac{74.5}{1189}}} = 11.86$$

It means therefore, that at 5% level of significance, the Z- theoretical which is 1.65 is quite low. The null hypothesis is rejected and we accept the alternative hypothesis that science teachers are more utilized than non-science teachers. (same results at 1% level of significance)

One probable effect of this to the teaching profession is that science teachers would feel overworked compared to their colleagues in the non-science curriculum. They may start developing an urge to quit the profession. With the same salary structure which is not discriminating, such kind of teachers will be difficult to be retained causing a perpetual problem of shortages in those disciplines. The overall supply of teachers in the country in fact represents an excess of humanities and social science teachers and conceals a serious shortage of mathematics and natural sciences.

The last hypothesis under utilization considers the effect of low contact periods for teachers on the teaching efficiency. Their teaching efficiency is evaluated through examinations performance. This one will be an indicative perspective. We first assumed that the 1847 teachers who constituted our

major sample of analysis is representative of the total population i.e total secondary school teaching force.

The task then, is to compare on average to contact periods of teachers in schools which were pronounced as 'A' level and 'O' level top ten examination performers in 1984 with the average of the whole sample. To facilitate the comparison, the hypothesis is restated thus:

$$H_0 : C_t = C_w$$

$$H_1 : C_t < C_w$$

where  $C_t$  and  $C_w$  are average contact periods for the teachers in the schools which performed well and the average contact periods of the whole sample of 1847 teachers respectively.

With the information in table 5.4, we calculate the value of Z-computed as follows:

$$Z_c = \frac{|19.49 - 21.0|}{\sqrt{\frac{84}{316} + \frac{83}{1847}}} = 5.38$$

This means that the difference between the two average contact periods is 5.38 standard errors which is far larger than the critical standard errors at 95% level of confidence under one tail test. Hence, at 5% level of significance we reject the null hypothesis and accept the alternative hypothesis.

This implies that teachers belonging to those schools which perform well in examinations have very low period (of 40 minutes each) input in a week. It is also observed that their average teaching load (19.49) is about 33% less than the recommended average contact period by the ministry of education<sup>8</sup>.

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<sup>8</sup>Kenya. Ministry of Education files, inspectorate department.

Teaching efficiency and productivity increases with the diminishing of the teaching load. This gives enough time for teachers to perform their preparatory and research work in their areas. It will also give teachers time to assess candidates and provide appropriate guidance. Contact periods only constitute a negligible component of teachers' duties which are usually under estimated because most of them are non-quantifiable.

Lowering contact periods will automatically put a lot of stress on the production capacity of the training institutions in the country. It will call for an increased demand for teachers and to satisfy such demands without over reliance on the untrained type more training institutions would be established or the existing ones would be expanded. This will be a costly exercise since Kenya faces scarcity of capital. Therefore, a cost effectiveness analysis would be necessary to ascertain that the capital to be utilized for the purpose would provide reasonable economic and social returns as asserted.

From the theory of human capital, it would be appreciated if the quality of education rises by extra expenditures. Third world countries like Kenya are poor because of their notable lack of human capital and development would only be possible if such countries improve the quality of the woefully inadequate human resources<sup>9</sup>. Increased examination performance will reduce

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<sup>9</sup>Karahel, J. and Halsey, A. H. (eds). Power and Ideology in Education. New York, Oxford University press. 1977. p.15.

school dropouts. Hence, irrespective of the costs involved giving teachers more time outside class work would lead to a sound accumulated human capital to compensate the costs. A question we are not able to answer at this moment is that, if all schools performed well in the country, what would be the implications on further training, employment, etc. However, it would all depend on what the country perceives to be a more serious problem in the process of economic prosperity. Production of relevant manpower and of best quality should not pose difficulties on absorption.

We have hereby argued that better examination performance in secondary school education is influenced by the teaching efficiency. It has been indicated that the teaching efficiency increases as the teaching work load diminishes. Many other factors could influence the teaching efficiency significantly. One such factor is the teaching experience and teachers' permanence in a particular school. It can be argued that the number of years one has taught equips one with the necessary skills and experience required in successful teaching. Therefore, productivity is increased. But the teaching will not be efficient enough if teachers are caught in high mobility (transfer) cycles. The longer a teacher stays in a school teaching the same subject, efficiency and productivity of the particular teacher can be enhanced. In the 15 schools which were classified as best performing, teacher transfers were found to be minimal and the average years of stay in those particular schools was calculated to be about nine years and seven months, see appendix 4. The

same schools were well served with essential facilities<sup>10</sup> like teachers' houses, water, electricity, laboratories etc.

One can argue soundly therefore, that the ministerial praise to certain schools for good examination performance and for maintaining the tradition for several years is questionable. The whole issue questions the very ministry's ability to distribute the essential educational resources and facilities equally to all schools in the Republic. Any feasible comparative analysis on this regard can only be meaningful if the condition of equal distribution is effected.

### 5.3.2 Teacher Wastage

The aspect of teacher wastage (attrition) on which our two hypotheses were constructed is resignation. The first of these hypotheses asserted that on the overall teacher quits assume a declining trend over time. This was formulated and specified in an exponential log function as:

$$\ln Q = \alpha_0 + \alpha_1 t \quad (5.1)$$

such that  $\alpha_1 < 0$  and statistically significant.

Q is the grand total of teacher quits whereas  $\alpha_0$  and  $\alpha_1$  are parameter estimates.

In order to check on the sign and the significance of  $\alpha_1$ , the log linear regression results based on table 5.8 were as

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<sup>10</sup>As indicated in the respective schools' statistical information returns to the Ministry of Education.

follows:

$$\ln Q = 5.8471 - 0.1070t$$

$$S.E \quad \quad \quad 0.0091$$

$$t \quad \quad \quad (-11.745)$$

$$r^2 = 0.939$$

$$n = 11$$

This confirms that the sign of  $\alpha_1$  is negative and it is statistically significant from zero meaning that time has an influence on teacher resignations such that as time goes by less and less teachers will be ready to quit the teaching profession. Given time, as job opportunities contract evidenced by a high unemployment (of about 13% p.a) growth rate<sup>11</sup>, those already having jobs would tend to stay in their respective professions with no urge to quit. Hence the problem of teachers quitting in the country is self-correcting over time.

It is worthwhile to compare the rate of quit by teacher qualification though we have shown that the overall trend diminishes over time. This was the objective of the second hypothesis which stated that teachers of high qualifications have a higher propensity of quitting than those of low qualifications. The same specifications were used as above but disaggregated into these two categories of teacher qualification as follows:

$$\ln Q_h = \alpha_2 + \alpha_3 t \quad \quad \quad (\text{for high qualification}) \quad (5.2)$$

$$\ln Q_l = \alpha_4 + \alpha_5 t \quad \quad \quad (\text{for low qualification}) \quad (5.3)$$

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<sup>11</sup>The unemployment growth rate between 1976 and 1981 is given as 12.9. See Republic of Kenya Development plan 1984 - 88. Government printer. Nairobi. 1983. pp.6 - 7.

Where,  $Q_h$  and  $Q_l$  are total number of teachers classified as high and low qualified respectively; and  $\alpha_2$ ,  $\alpha_3$ ,  $\alpha_4$  and  $\alpha_5$  are parameter estimates. According to the hypothesis,

$$\alpha_3 < 0;$$

$$\alpha_5 < 0;$$

$$\alpha_5 > \alpha_3, \text{ and statistically different; and}$$

that these parameters should be statistically different from zero.

The empirical results of the time series regression turned out to be as follows:

$$\ln Q_h = 5.1681 - 0.1090t$$

$$\text{S.E} \quad 0.0200$$

$$t \quad (-5.440)$$

$$r^2 = 0.767$$

$$n = 11$$

$$\ln Q_l = 5.1418 - 0.1085t$$

$$\text{S.E} \quad 0.0148$$

$$t \quad (-7.331)$$

$$r^2 = 0.857$$

$$n = 11$$

We note from these results that:

$$\alpha_3 = -0.1090$$

$$\alpha_5 = -0.1085$$

and that they are statistically significant.

Our central thesis is that teachers of high qualification tend to leave the teaching profession at a high rate than those

of low qualification. This means that having established that on both classifications the trend of teacher quit is declining, then we would expect the rate of the high qualified teachers to be declining at a slower rate as opposed to the other group. But from our results  $\alpha_3 > \alpha_5$  which invalidates our argument and therefore, reject the null hypothesis and conclude that in Kenya the less qualified category of teachers leave the profession at a higher rate as opposed to those who are more qualified. This finding disagrees with the 1975 study<sup>12</sup> by the Ministry of Education which showed that about 11% of graduates resigned annually while the rate for nongraduate teachers was 4% per annum. The conclusion of the study was that generally graduate teachers leave the profession at a higher rate which has been contradicted by our study. However, the Ministry's argument was based on a cross section data whereas in this study we have used time series data.

The task that remains is to determine whether these declining rate of the two teacher classification are statistically different from each other. This is tested by formulating the hypothesis as:

$$H_0 : \alpha_3 - \alpha_5 = 0$$

$$H_1 : \alpha_3 - \alpha_5 \neq 0$$

Employing the formula in chapter four (section 4.2), we get

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<sup>12</sup>Ministry of Education - Planning section. S. M. Macharia  
"General survey secondary school teachers". 1975. (Unpublished)

the value of  $t$  - calculated as follows:

$$t_c = \frac{\bar{.1090} - \bar{.1085}}{\frac{\sqrt{0.0004 + 0.0002}}{0.0245}} = \bar{0.0005}$$
$$= \bar{0.0204}$$

from tables,  $t$  critical with nine degrees of freedom at 5% level of significance turns out to be 2.262.

Therefore, we accept the null hypothesis and conclude that even though the two categories of teachers have got different quit rates, these rates are not statistically different from each other. That is, their rate of resignation can be asserted to be similar over time.

## CHAPTER SIX

### SUMMARY AND CONCLUSIONS

#### 6.1 Introduction

This study started with the investigation of three major issues on which hypotheses were formulated. These were issues related to the nature of teacher production in Kenya; their allocation and utilization; and their attrition from the profession. In this chapter, we review the major findings showing the extent to which the study's objectives have been achieved. Thereafter, main conclusions of the study would be drawn and also provide some selected suggestions for policy implications.

#### 6.2 Summary of findings

First, on the demand and supply of teachers, this study established that there has been an excess demand for teachers of secondary schools in the country. This was evidenced by the high proportion of non-trained teachers in service compared to the trained type, particularly in recent years. The recruitment of untrained teachers indicate the existence of a potential gap between demand and supply of teachers. The exercise was used as a 'stop-gap' emergence during the times of shortages which has persisted over years.

The capacity of the existing seven training institutions of teachers for secondary schools seem quite adequate. These have averagely 2,625 teachers as an annual output to be added to the teacher supply. Even with this, teacher supply has been lagging

behind demand over the years.

On utilization, the study revealed that there are significant differences between teacher participation. This participation was measured in terms of contact periods for a five-day week. These differences in utilization rates were based on the teachers' school location, teachers' level of qualification and teachers' subject curriculum orientation.

In this respect, it was found that teachers working in schools located in urban areas have their utilization rate significantly low, on the average, compared to that of teachers in rural schools. The revelation gave an indication that the core source for this difference stems from overstaffing of urban schools vis-a-vis the understaffing of the rural schools. Once a school is overstaffed, subject sharing becomes lighter. Overstaffing of urban schools is as a result of variables of social, economic and administration.

Teachers of high qualification were found to have a significantly low utilization rate compared to those of low qualification. The composition of low qualified teachers was majorly untrained type who we found to be more active in the educational system. It shows an apparent miscallocation of resources because it is expected that those with high educational background and training should participate more in imparting skills and knowledge. To the contrary, these are grossly underutilized. If the trained teachers could be more utilized, the trend of recruiting and heavily relying upon untrained teachers from the labour market could be reduced.

Untrained teachers form the backbone of the education under Harambee

package.

On the same issue of utilization, it was revealed that teachers with science curriculum orientation had, on average, high utilization rate compared to the non-science curriculum oriented teachers. As in the other two cases above, the average percent periods were significantly different even at 99% level of confidence. This finding ascertained a fact that science teachers in the country tend to be scarce, and hence overworked. Overall teacher supply if not classified into subject specialization will be bound to conceal a lot of shortages in certain fields. This also confirms that when a category of manpower becomes more scarce, the immediate alternative open to the authorities concerned is to explore ways of increasing the utilization of the category. We therefore, indicate that there exist an imbalance of supply of teachers among fields of study. The implication of this overworking or overloading is that those involved will tend to look for ways to change jobs, particularly when salary incentives and other inducements are not awarded. In general, though teacher shortage hits the country, shortages are more serious in science subjects.

Another finding is that there is a mismatch between the production of teachers from the training institutions and their deployment. An indication of manpower requirement in any economy is the testimony that once that manpower has been produced, it will be utilized in areas relevant to its training. Once this is satisfied, productivity will be enhanced. Some teachers were

found not to teach those subjects they were trained in in their colleges. The majority of such teachers were in schools located in urban centres. Further some of these were those who have specialized in Business Education and Technical Education.

Business and Technical schools in the country are so few to absorb the teacher output trained in those fields. By itself, this is a clear source of resource waste whose productivity could be highest if employed in their areas of specialization. All these arise due to the administration and planning inadequacies.

On the relationship between the teacher contact period and the teaching efficiency, it became indicative that there was a negative association. Low contact periods, were associated with better teaching efficiency. Efficiency here was assumed to be reflected by the student performance in examinations. Then, it was found that those schools with the tradition of performing well at 'O' and 'A' level examinations had teachers who, on average, taught low periods. The argument is that less class participation gives enough time for teachers to prepare for their presentations and also assess students more appropriately. However, it was difficult to only assign this to better performance of students. The same schools had teachers who were all qualified and who had stayed in the same school for a long period (average of 9 years and 7 months). It is arguable, therefore, that mobility of teachers had an effect on examination performance which needs teachers to stay in a particular school for at least a generation. Hence other things constant, low contact periods and long period of stay in a particular school have positive effects on students' examination performance.

Regarding teacher wastage, the study revealed that this has been immense. Considering the two sources of such wastage as dismissal and resignation, it was found that they were both significant. For the period 1974 - 83, a total of 321 teachers were dismissed from the profession for various reasons. Some of these reasons might not be sufficient to warrant dismissal particularly when teacher shortage hits the country. A teacher absenting himself or herself without permission for one week for example, would be dismissed. Instead this could be given a penalty and retained. However, the inflexibility of the professional ethics, which the employer (TEC) gives a lot of weight to rather than the urgency with which the system needs teachers is responsible for most dismissals. This causes a colossal manpower loss whose replacement takes time at the detriment of the education of the youth.

It was found that voluntary resignations constituted the major source of teacher loss. For the period 1973 - 84, a total of 2,422 teachers had resigned from the teaching profession. Of these, 1,349 were graduates, 491 were diploma and S1 holders, and 582 were K.A.C.E untrained teachers. This act has been going on unabated and yet there is an outcry of teacher shortage in the country.

However, it was established that the trend which these resignations take on overall is declining over time, meaning that given time, the problem will solve itself. This is based on the premise that the job market in the country is becoming tighter and we would

expect those who have already secured a post to retain it.

Comparing the nature of resignation rates between teachers of high and low qualifications, it was established that though the latter tended to have a higher rate, it was not statistically different from the one of the high qualified teachers. Among the low qualified teachers are those who are untrained and were expected to quit in a bid to join professional training and occupations elsewhere. However, the two categories had their resignations exponentially declining over time.

### 6.3 Conclusions and policy implications

For a country like Kenya facing enormous tasks of development, with funds generally insufficient to meet all needs, there can be little question as to the prime role of education during this process. The education system must be geared to produce the skills which the country needs for its development by devoting more resources to producing individuals who enter occupational fields which contribute to the mobilization of resources to accelerate social and economic advance. In order to achieve this role, the education system must be in a position to equip itself with essential inputs. One such necessary input is an appropriate quantity and quality of the teaching force which has been the central thesis of this study.

In conclusion, Kenyan educational system does not suffer bottlenecks in teacher production. The existing teacher training institutions have enough capacity of training teachers to man all secondary schools. But, there exist shortages of teachers which vary from region to region and subject to subject. All these shortages are artificial arising from the inability of the ministry

concerned to supply those graduating student-teachers into the profession and retain them. This is also due to gross misallocation and unfair distribution of these teachers arising from the administrative problems which ultimately result into massive underutilization.

The reasons as to why teachers leave the profession were not empirically investigated in this study but they can be viewed with varied understandings. One can conclude that the decision to leave can be interpreted as a wealth maximizing response of the individual to modifications in relative earnings and job opportunities. The individual moves because, given his tastes the new set of constraints, as he views it, has altered the return calculations that made him or her choose teaching in the first place. With this therefore, we can conclude from this implicit view that the massive teacher resignations is an indication that teaching does not compete competently in the labour market in attracting its working force. But in order to arrive at this conclusion which is based on economic theory predictions, other variables such as the status accorded to the profession, and the non-pecuniary benefits need to be considered.

Turning to utilization, it is concluded that it is the administration's weakness to implement its prescriptions that cause misallocation and subsequent underutilization of teachers. The number of contact periods per teacher-category in terms of responsibility is all specified in the files of the Ministry of Education. If this could be followed, the country will not have problems of geographical and subject distribution of teachers.

These imbalances were unambiguously evident in causing differentials in teacher utilization measured in contact periods. Further, teacher programmes do not have any mechanism to ensure a fair and balanced distribution of teachers in terms of subject specialization. Rather, intake into these institutions is based on minimum requirements which does not give weights to those areas which are more hit by shortages.

In view of these conclusions, and in order to avoid tensions related to the problems of teacher shortage, underutilization and attrition in the economy, we make the following suggestions for policy.

First, there should be a systematic analysis of teacher demand based on the curriculum. This will enable the educational sector to precisely project the number of teachers required per subject specialization. Should such manpower forecast be employed, the country will clearly determine the magnitudes of excess demand and/or supply distributed by area of specialization and then embark on the production of those showing serious shortages in a bid to achieve an equilibrium in the teacher market. This will ensure that teachers are deployed in their relevant areas for the purpose of high productivity in the education sector and avoid resource misuse. Such strategy is perceived to be superior to the one based on the teacher-student ratio which assumes, among other things, the number of subjects taught and the teaching technology.

Second, there should be a fair geographical distribution of teachers. In Kenya, the majority of the secondary schools, and also the total population are in rural areas. As identified, these schools face a perennial problem of getting enough teachers and of good quality compared to those in urban centres. It is argued that

rural life holds little appeal for teachers so that the best teachers tend to struggle for postings in urban centres leaving education of rural youths in the hands of teachers of whom the majority is less qualified. The effect of this is worsening of the quality of education and increasing school drop-outs.

So as to solve this problem of geographical imbalance, we suggest that the Ministry should consider the possibilities of giving incentives that could attract teachers into rural schools. One such an incentive could be a differential salary structure to compensate for the social and economic amenities not available in these areas.

Third, the Teachers Service Commission random posting should be revised so that a particular teacher lands to a school where his or her services are required to avoid underutilization. We therefore recommend that the commission should, in liaison with the headteachers in the country, try to identify existing vacancies before any allocation. Once this is done there will be no over-staffing alongside with understaffing of teachers. In order to effect this, the ministry, particularly the inspectorate department, should be able to prepare forms for all schools for the furnishing of such important information which the TSC should follow.

Fourth, in order to hold down attrition, specifically those emanating from resignations, we suggest that scholarships be made available only for those students willing and determined to be

teachers. To make sure that this is achieved, the education sector could impose a bonding contract stating the number of years the newly graduating teachers must be in the profession before leaving at all. By the end of such a period, we hope that the teachers concerned would be more settled in the profession with no intentions to quit. Coupled with this, we suggest that the teaching profession be made more competitive in the labour market in terms of remuneration and other benefits.

Lastly, we suggest that there should be further research on teacher attrition. Such study will focus on the empirical causes of teacher resignations and this will entail a systematic follow-up of those involved. It should be able to determine the effect of relative earnings, whether they have a predictable influence on the leaving rate. And the study will focus on the determination of the rate of attrition that will be considered tolerable in the country. Such study will enrich suggestions for policy concerning teachers in the economy.

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APPENDIX 1

A MODEL FOR CALCULATING TEACHER REQUIREMENTS BASED ON CURRICULUM ESTABLISHMENT:

NAME OF SCHOOL: XY

TYPE OF SCHOOL: NONTECHNICAL

Number of streams: one class from form 1 - 6

Number of subjects taught: 14

| LESSONS PER WEEK                    |           |           |           |           |             |           |           |             |             | TEACHING POSTS |
|-------------------------------------|-----------|-----------|-----------|-----------|-------------|-----------|-----------|-------------|-------------|----------------|
| Forms                               | F1        | F2        | F3        | F4        | Forms 1 - 4 | F5        | F6        | Forms 5 - 6 | Forms 1 - 6 |                |
| Subjects                            |           |           |           |           |             |           |           |             |             |                |
| English                             | 8         | 8         | 8         | 8         | 32          | -         | -         | -           | 32          | } 2            |
| Literature                          | -         | -         | 3         | 3         | 6           | 9         | 9         | 18          | 24          |                |
| History                             | 3         | 3         | 3         | 3         | 12          | 9         | 9         | 18          | 30          | } 1            |
| Geography                           | 3         | 3         | 3         | 3         | 12          | 9         | 9         | 18          | 30          |                |
| Kiswahili                           | 5         | 5         | 5         | 5         | 20          | 9         | 9         | 18          | 38          | } 2            |
| Fasihi Ya Kiswahili                 | -         | -         | 3         | 3         | 6           | -         | -         | -           | 6           |                |
| CRE                                 | 3         | 3         | 3         | 3         | 12          | 9         | 9         | 18          | 30          | } 1            |
| Economics                           | -         | -         | -         | -         | -           | 9         | 9         | 18          | 18          |                |
| French                              |           |           |           |           |             |           |           |             |             | } 1            |
| Music                               |           |           |           |           |             |           |           |             |             |                |
| Art                                 |           |           |           |           |             |           |           |             |             | } 1            |
| General Paper                       | -         | -         | -         | -         | -           | 5         | 5         | 10          | 10          |                |
| <b>TOTAL ARTS</b>                   | <b>22</b> | <b>22</b> | <b>28</b> | <b>28</b> | <b>100</b>  | <b>59</b> | <b>59</b> | <b>118</b>  | <b>218</b>  | <b>8</b>       |
| Maths                               | 7         | 7         | 7         | 7         | 28          | 9         | 9         | 18          | 46          | } 2            |
| Biology                             | 3         | 3         | 4         | 4         | 14          | -         | -         | -           | 14          |                |
| Chemistry                           | 3         | 3         | 4         | 4         | 14          | -         | -         | -           | 14          | } 2            |
| Physics                             | 3         | 3         | 4         | 4         | 14          | -         | -         | -           | 14          |                |
| P/science                           |           |           |           |           |             |           |           |             |             | } 2            |
| G/science                           |           |           |           |           |             |           |           |             |             |                |
| <b>TOTAL MATHS AND SCIENCES</b>     | <b>16</b> | <b>16</b> | <b>19</b> | <b>19</b> | <b>70</b>   | <b>9</b>  | <b>9</b>  | <b>18</b>   | <b>88</b>   | <b>4</b>       |
| P.E                                 | 2         | 2         | 2         | 2         | 8           | -         | -         | -           | 8           | * 1            |
| Agriculture                         |           |           |           |           |             |           |           |             |             |                |
| Industrial Education                |           |           |           |           |             |           |           |             |             |                |
| Business Education                  |           |           |           |           |             |           |           |             |             |                |
| Home Science                        |           |           |           |           |             |           |           |             |             |                |
| <b>TOTAL OF OTHER SUBJECTS</b>      | <b>2</b>  | <b>2</b>  | <b>2</b>  | <b>2</b>  |             |           |           |             | <b>8</b>    |                |
| <b>GRAND TOTAL PERIODS PER WEEK</b> | <b>40</b> | <b>40</b> | <b>49</b> | <b>49</b> | <b>178</b>  | <b>68</b> | <b>68</b> | <b>136</b>  | <b>314</b>  | <b>12</b>      |

Key.

\*Any of the teachers taking other subjects below the average number of periods and did P.E can take up this subject. Therefore, it may not require a teacher separately.

APPENDIX 1 (CONT.)

Notes: School X enrols 40 students per class from form 1 to 4 and 55 students in forms 5 and 6. Of the 14 subjects taught, only Maths, Geography, History, Literature, Kiswahili, CRE, Economics and General Paper are taught for A-levels. Total student enrolment is 250 per year. Assuming the teacher student ratio of about 1 : 53, this school will require about six teachers. But using the curriculum based establishment model we have formulated, this school will demand 12 teachers of who will be utilized appropriately. This exercise can be done for all schools in the country to arrive at a national teacher requirement in terms of numbers and subject specialization.

APPENDIX 2

TOP TEN KACE AND KCE SCHOOLS, 1984

A KACE TOP TEN

1. Alliance Boys
2. Mangu High
3. St. Patrick's Iteni
4. Nyandu Girls
5. Alliance Girls
6. Strathmore College
7. Loreto High, Limuru
8. Kagumo High
9. Kabarak High
10. Cardinal Otunga High

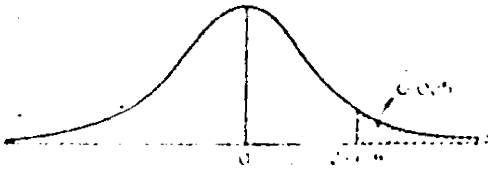
B KCE TOP TEN

1. Nyandu Girls
2. Nyeri High
3. Alliance Girls
4. Mangu High
5. Starcke Boys
6. Nkabune Girls
7. Alliance Boys
8. St. Brigid's Girls
9. Loreto High, Limuru
10. Nkubu Secondary

Note: Only five schools in group B do not belong to group A giving a total of 15 schools to handle.

Source: Kenya examination council files on the 1984 and KACE results.

Appendix 3: Areas under the Normal Curve



Example

$$Z = \frac{X - \mu}{\sigma}$$

$$P(Z > 1.96) = 0.250$$

| z   | .00   | .01   | .02   | .03   | .04   | .05   | .06   | .07   | .08   | .09   |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0.0 | .5000 | .4960 | .4920 | .4880 | .4840 | .4801 | .4761 | .4721 | .4681 | .4641 |
| 0.1 | .4602 | .4562 | .4522 | .4483 | .4443 | .4404 | .4364 | .4325 | .4286 | .4247 |
| 0.2 | .4207 | .4168 | .4129 | .4090 | .4052 | .4013 | .3974 | .3936 | .3897 | .3859 |
| 0.3 | .3821 | .3783 | .3745 | .3707 | .3669 | .3632 | .3594 | .3557 | .3520 | .3483 |
| 0.4 | .3446 | .3409 | .3372 | .3336 | .3300 | .3264 | .3228 | .3192 | .3156 | .3121 |
| 0.5 | .3085 | .3050 | .3015 | .2981 | .2946 | .2912 | .2877 | .2843 | .2810 | .2776 |
| 0.6 | .2743 | .2709 | .2676 | .2643 | .2611 | .2578 | .2546 | .2514 | .2483 | .2451 |
| 0.7 | .2420 | .2389 | .2358 | .2327 | .2296 | .2266 | .2236 | .2206 | .2177 | .2148 |
| 0.8 | .2119 | .2090 | .2061 | .2033 | .2005 | .1977 | .1949 | .1922 | .1894 | .1867 |
| 0.9 | .1841 | .1814 | .1788 | .1762 | .1736 | .1711 | .1685 | .1660 | .1635 | .1611 |
| 1.0 | .1587 | .1562 | .1539 | .1515 | .1492 | .1469 | .1446 | .1423 | .1401 | .1379 |
| 1.1 | .1357 | .1335 | .1314 | .1292 | .1271 | .1251 | .1230 | .1210 | .1190 | .1170 |
| 1.2 | .1151 | .1131 | .1112 | .1093 | .1075 | .1056 | .1038 | .1020 | .1003 | .0985 |
| 1.3 | .0968 | .0951 | .0934 | .0918 | .0901 | .0885 | .0869 | .0853 | .0838 | .0823 |
| 1.4 | .0808 | .0793 | .0778 | .0764 | .0749 | .0735 | .0721 | .0708 | .0694 | .0681 |
| 1.5 | .0668 | .0655 | .0643 | .0630 | .0618 | .0606 | .0594 | .0582 | .0571 | .0559 |
| 1.6 | .0548 | .0537 | .0526 | .0516 | .0505 | .0495 | .0485 | .0475 | .0465 | .0455 |
| 1.7 | .0446 | .0436 | .0427 | .0418 | .0409 | .0401 | .0392 | .0384 | .0375 | .0367 |
| 1.8 | .0359 | .0351 | .0344 | .0336 | .0329 | .0322 | .0314 | .0307 | .0301 | .0294 |
| 1.9 | .0287 | .0281 | .0274 | .0268 | .0262 | .0256 | .0250 | .0244 | .0239 | .0233 |
| 2.0 | .0228 | .0222 | .0217 | .0212 | .0207 | .0202 | .0197 | .0192 | .0188 | .0183 |
| 2.1 | .0179 | .0174 | .0170 | .0166 | .0162 | .0158 | .0154 | .0150 | .0146 | .0143 |
| 2.2 | .0139 | .0136 | .0132 | .0129 | .0125 | .0122 | .0119 | .0116 | .0113 | .0110 |
| 2.3 | .0107 | .0104 | .0102 | .0099 | .0096 | .0094 | .0091 | .0089 | .0087 | .0084 |
| 2.4 | .0082 | .0080 | .0078 | .0075 | .0073 | .0071 | .0069 | .0068 | .0066 | .0064 |
| 2.5 | .0063 | .0060 | .0059 | .0057 | .0055 | .0054 | .0052 | .0051 | .0049 | .0048 |
| 2.6 | .0047 | .0045 | .0044 | .0043 | .0041 | .0040 | .0039 | .0038 | .0037 | .0036 |
| 2.7 | .0035 | .0034 | .0033 | .0032 | .0031 | .0030 | .0029 | .0028 | .0027 | .0026 |
| 2.8 | .0026 | .0025 | .0024 | .0023 | .0023 | .0022 | .0022 | .0021 | .0020 | .0019 |
| 2.9 | .0019 | .0018 | .0018 | .0017 | .0016 | .0016 | .0015 | .0015 | .0014 | .0014 |
| 3.0 | .0013 | .0013 | .0013 | .0012 | .0012 | .0011 | .0011 | .0011 | .0010 | .0010 |

Source:

Koutsoyannis, A: Theory of Econometrics, 2nd Edition.  
The Macmillan Press Ltd., London,  
1981, P659.

APPENDIX 4

TEACHERS' YEARS OF STAY IN THE 15 WELL-EXAMINATION-PERFORMING SCHOOLS, 1984.

| Years<br>School        | Under<br>1 year | 1 - 5     | 6 - 10     | 11 - 15   | 16 - 20   | Over 21   | Total      |
|------------------------|-----------------|-----------|------------|-----------|-----------|-----------|------------|
| 1. Alliance Boys       | 0               | 1         | 15         | 9         | 4         | 2         | 31         |
| 2. Alliance Girls      | 0               | 10        | 14         | 1         | 2         | 2         | 29         |
| 3. St. Brigids         | 1               | 3         | 0          | 6         | 1         | 0         | 11         |
| 4. Cardinal Otunga     | 0               | 2         | 9          | 4         | 2         | 7         | 24         |
| 5. St. Patrick Iteni   | 2               | 6         | 4          | 2         | 2         | 0         | 16         |
| 6. Kagumo High         | 0               | 3         | 5          | 10        | 3         | 3         | 24         |
| 7. Ngandu Girls        | 2               | 12        | 3          | 2         | 0         | 1         | 20         |
| 8. Mangu High          | 0               | 1         | 6          | 12        | 5         | 1         | 25         |
| 9. Kabarak High        | 0               | 7         | 8          | 1         | 1         | 0         | 17         |
| 10. Nyeri High         | 0               | 9         | 6          | 4         | 2         | 3         | 24         |
| 11. Strathmore College | 0               | 4         | 3          | 3         | 2         | 2         | 14         |
| 12. Loreto, Limuru     | 0               | 5         | 9          | 2         | 3         | 0         | 19         |
| 13. Nkubu Secondary    | 2               | 6         | 5          | 9         | 1         | 0         | 23         |
| 14. Nkabune Secondary  | 0               | 3         | 6          | 3         | 0         | 0         | 12         |
| 15. Starehe Boys       | 0               | 9         | 8          | 7         | 2         | 1         | 27         |
| <b>TOTALS</b>          | <b>7</b>        | <b>81</b> | <b>101</b> | <b>73</b> | <b>30</b> | <b>24</b> | <b>316</b> |

The mean of this distribution becomes about nine years seven months for all the 316 teachers.

Source: Ministry of Education, secondary school statistical returns (see Appendix 5 question 13(vii)).

APPENDIX 5

QUESTIONNAIRE

These were some of the relevant questions contained in the 8-4-4 Bureau Survey conducted in late 1984 and also the secondary school annual statistical returns of the same period. The questions were answered by the headteachers and forwarded to the ministry.

1. Name of your school \_\_\_\_\_
2. Type of school
  - (a) technical secondary school \_\_\_\_\_
  - (b) non-technical secondary school \_\_\_\_\_
3. Where is your school located? (Rural or Urban) \_\_\_\_\_
4. If it is in Rural, state:
  - (a) Province \_\_\_\_\_
  - (b) District \_\_\_\_\_
5. If it is in Urban, state the town, city or municipality \_\_\_\_\_  
\_\_\_\_\_
6. Under what category does your school belong?
  - (a) maintained \_\_\_\_\_
  - (b) assisted \_\_\_\_\_
  - (c) harambee (community) \_\_\_\_\_
  - (d) church assisted \_\_\_\_\_
  - (e) private \_\_\_\_\_
7. What was the total number of student enrolment at the beginning of 1984? \_\_\_\_\_
8. Is your school having classes up to form iv or vi? \_\_\_\_\_

9. If you have forms v and vi, what subject combination do you offer? Classify them as:
- (a) Science
  - (b) Arts
  - (c) both a and b
10. On the overall, what is the total number of subjects taught in your school? \_\_\_\_\_
11. What is the maximum number of teaching posts in your school? \_\_\_\_\_
12. What is the total number of teachers now in your school? \_\_\_\_\_
13. For every individual teacher at your school, indicate the following particulars:
- (i) Name of TSC No. \_\_\_\_\_
  - (ii) Sex \_\_\_\_\_
  - (iii) Qualifications \_\_\_\_\_
  - (iv) If trained, where trained and when \_\_\_\_\_  
\_\_\_\_\_
  - (v) Major subjects trained in \_\_\_\_\_
  - (vi) Minor subjects trained in \_\_\_\_\_
  - (vii) Main subject now teaching \_\_\_\_\_  
and \_\_\_\_\_
  - (viii) Number of teaching hours per week for both  
the main and minor subjects where applicable  
\_\_\_\_\_

(ix) For how long has the teacher been in your school? Classify into the following groups:

- (a) Under one year \_\_\_\_\_
- (b) Between 1 and 5 years \_\_\_\_\_
- (c) Between 6 and 10 years \_\_\_\_\_
- (d) Between 11 and 15 years \_\_\_\_\_
- (e) Between 16 and 20 years \_\_\_\_\_
- (f) Over 21 years \_\_\_\_\_