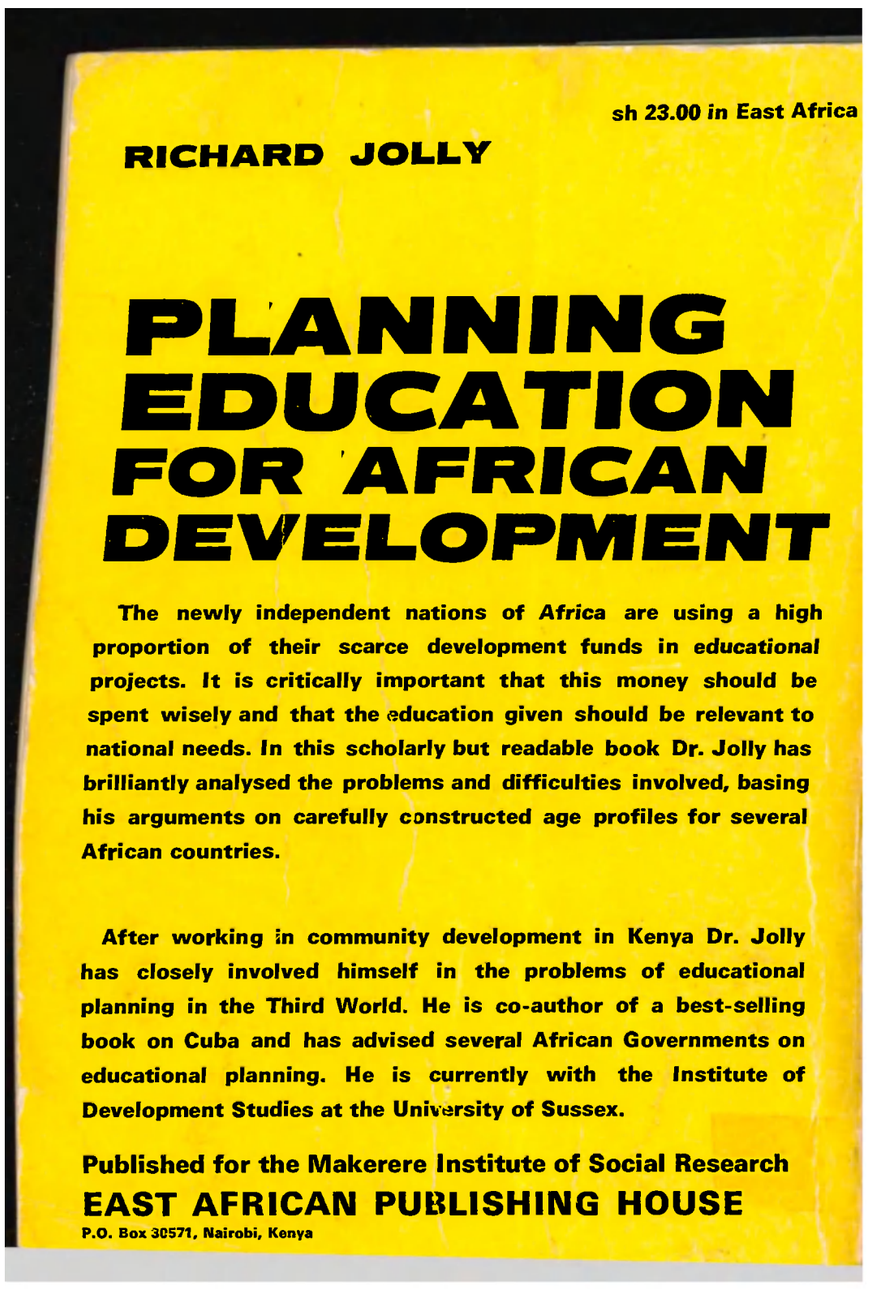
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RICHARD JOLLY
PLANNING EDUCATION FOR AFRICAN DEVELOPMENT
The newly independent nations of Africa are using a high proportion of their scarce development funds in educational projects. It is critically important that this money should be spent wisely and that the education given should be relevant to national needs. In this scholarly but readable book Dr. Jolly has brilliantly analysed the problems and difficulties involved, basing his arguments on carefully constructed age profiles for several African countries.
After working in community development in Kenya Dr. Jolly has closely involved himself in the problems of educational planning in the Third World. He is co-author of a best-selling book on Cuba and has advised several African Governments on educational planning. He is currently with the Institute of Development Studies at the University of Sussex.
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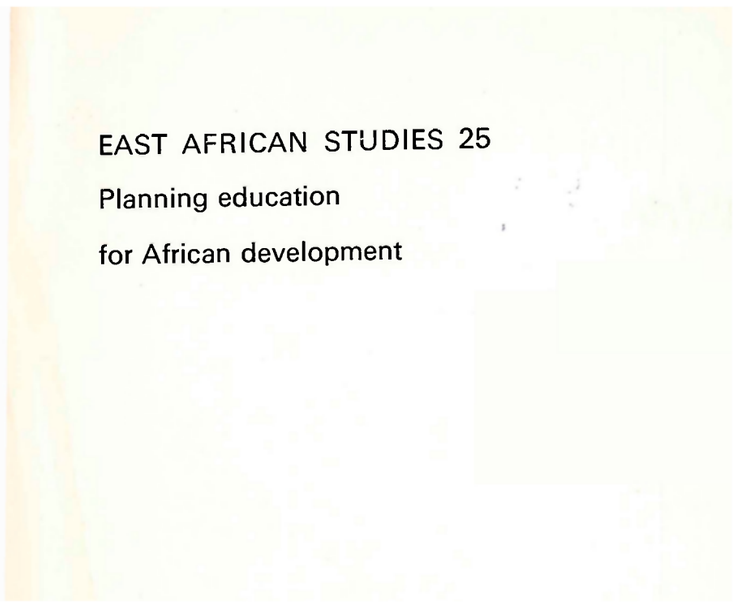
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Planning education
for African development

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PREFACE

There is some truth in the taunt that economists have only recently discovered education. It now seems hard to credit that only a decade ago development economics concentrated almost exclusively on capital needs and on the optimal composition of investment. Education policy-makers went their own way, bothered mainly by the question of what "standards" were appropriate, and allocating slowly growing funds between various types of education according to the balance of political and administrative forces (with the help of a dash of intuitive judgement).

Economists are now in a rather exciting period which occurs in a subject from time to time when a big step forward has been taken, but its implications have not yet been worked out. How is this related to planning of education in financial terms and to national economic planning? Will economists have actually to adopt an "interdisciplinary" approach to which reference is piously made from time to time in professional circles?

This study by Dr. Jolly is a major contribution, which helps us answer each of these questions. To start with, the theoretical advances he makes are based on intensive field experience in Africa. In "age-education profiles" he has developed an ingenious new technique for showing the levels of educational attainment in a country and how they are built up by flows through the educational system. This tool is used to bring out the basic manpower problems of Ghana, Uganda and Zambia, and to show how current educational policies affect the level and composition of the stock of qualified manpower at various future dates. Comparisons with non-African countries enable the reader to assess the extent of the start they had over the countries of Africa due to earlier and faster development of their educational systems.

This book was originally a doctoral thesis, but a most unusual one, because it incorporates work on which governments have taken decisions. The study in depth of Uganda was the basis of advice in the government and includes a striking comparison of secondary school building costs there with those in other East African countries which helped the Ugandan government to save several million pounds.

The result of the combination of the theoretical and the practical is what one might call an illustrated handbook for those planning the educational elements in development.

Dr. Jolly comes back continually to the need to see the problems of educational programming in real terms if proper decisions are to

be taken. After a burst of rapid educational expansion, African governments have come up against severe budgetary restraints. Dr. Jolly recognizes the inevitability of these restraints but shows that the question of how much education a country can afford must still be looked at in physical as well as financial terms. His discussion of class size, double-shift use of buildings, teachers' salaries, etc., leads to the conclusion that governments could obtain much greater contribution to development from their educational systems, despite financial limitations.

It is a common platitude of those writing prefaces to say that a book is essential reading for academics or alternatively for people working on practical problems. Very rarely can one say that neither can afford to miss it. A university teacher will find here a study which pushes the frontier of development theory further forward; it is also the book for the planning official up to his eyes in files who only finds the time to read one a year. It is written primarily for those concerned with overseas development problems, but, like all worthwhile studies in this field, it has many lessons for those concerned with the underdeveloped countries of the North Atlantic area, such as Britain.

DUDLEY SEERS

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ACKNOWLEDGMENTS

Many people must be thanked for helping with the preparation and writing of this study. The study began at Yale, took shape during a study tour of a number of African countries, was largely written in Makerere and was completed in Zambia. At each stage, many people gave generously in advice and encouragement. At Yale University, I should like to thank many friends but especially Professors Reynolds, Green, Montias, Powell, Hymer and Frank. In Uganda, Kenya, Madagascar, Zambia, Ghana, and Guinea, many persons in government and outside must be thanked for information and friendly discussions. The Hoschild Fund and the Economic Growth Centre at Yale University need to be thanked for making the trip possible, and the Earhart Foundation for supporting research prior to departure. Tommy Gee, Peter Williams, Emil Rado, and Raymond Lyons made many helpful comments on all or parts of the manuscript.

At Makerere College, Kampala, I am especially grateful for a stimulating year in the East African Institute of Social Research under Professor Paul Clark, who provided many ideas and wonderful leadership.

Above all, I must thank Mr. Dudley Seers who, in many ways and many places, has emphasized that development must be analyzed in dynamic terms and has offered rich insights into the process.

While I am grateful for all the assistance I have received, the remaining errors are entirely my own.

The members of one's family give more than one realises until afterwards: a certain resigned faith that all things come to an end and a healthy scepticism that the sooner the better. No one pressed this view more sympathetically and with more practical encouragement than Alison, my wife—by producing Margaretta and Susan Alison, our joint additions to someone's problems of long-run educational planning!

RICHARD JOLLY
Department of Applied Economics
Cambridge University

December 1966

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INTRODUCTION

1. Introduction

The central economic question of our time is why some countries grow faster than others. For very practical reasons, it is an urgent question to answer. Few persons with recent experience of the less developed countries of the world doubt the need for their social and economic development. Expanding education is a vital part of this development.

Economists have been increasingly aware of the relation between education and growth. Literacy levels, school and university enrolments are now commonly used as statistical measures of development.[1] In developed countries, it is clear that increased productivity has resulted from not only an expansion of the labour force and physical capital, but of education and training. In developing countries, development demands infrastructure, in particular an educated and enterprising labour force.

This interest in education is not entirely new. Vaizey,[2] Clark[3] and Kiker[4] have shown that the classical economists clearly realised the importance of the quality of the labour force, and had spotted the link between education and wages. What is new, however, is the quantitative nature of modern studies, using better data in more sophisticated ways.

There is still a gap however between the issues of educational planning which pre-occupy economists and the economic problems which confront Ministries of Education. Economists have rightly emphasised the need for quantification and for valuing the benefits of education and they have recently developed new techniques to do this. But as I explain in the next section, much of this work rests on conventional cost analysis or the technique of "discounted returns", both of which can be very misleading in developing countries. In their own way too, officials in Ministries of Education often have a rather restricted view of the economic problems of educational expansion, in many cases limited to the problem of finding the finance to meet ever rising expenditures. There is a need to explore other economic aspects of educational planning.

1. See, for instance, United Nations, *World Social Situation* (New York United Nations, 1961).
2. John Vaizey, *The Economics of Education* (London, Faber, 1962).
3. H. F. Clark, *Cost and Quality of Public Education*, The Economics and Politics of Public Education, No. 5 (Svracuse, N.Y., Svracuse University Press, 1963).
4. B. F. Kiker, "The historical roots of the concept of Human Capital", *Journal of Political Economy*, October 1966, pp. 481–499.

It is true that recently great progress has been made, largely by O.E.C.D. and by practitioners in developing countries, in manpower planning as a technique for estimating the numbers of doctors, engineers, craftsmen, administrators and others who must be trained if development is to proceed. These studies have done much to bridge the gap, by analysing the problems in operational terms, both on the side of demand and of supply. This present study takes up some of the economic and quantitative problems of supply, particularly those concerned with planning expansion in the long run.[1]

Of course, quantitative planning is no substitute for the brilliant teacher, or the well-constructed curriculum. In many ways, though, the quantitative and qualitative aspects of education are independent. And it is only by a quantitative manpower approach that a nation can make its choices clear; how many students it should send to university; in what year every man will know how to read and what must be sacrificed to make this possible.

This book is not comprehensive but its themes are introduced in terms of the questions an educational planner needs to answer.

The first problem is to quantify the present situation and long-run prospects: the stock of educated manpower and how it will evolve over time. The *age-education profile*, presented in Chapter I, shows this graphically, simply but in terms which can serve to focus the different interests of a whole range of persons concerned with educational goals.

Chapter 2 relates stocks to flows, the levels of educational attainment of the whole population to the pyramid of the school system. The relationship is simpler than one might expect. Afterwards the educational system is analysed into the components which determine its monetary cost.

The first part of Chapter 3, a case study of Uganda, applies this form of analysis to a practical situation. It investigates the

1. Two major matters are not covered by this study. The quality of education is only lightly touched upon, largely because the study is mainly concerned with the quantitative aspects of expansion and little comparative information on quality (either between countries or over time) is available in this form. Several detailed studies on the abilities and achievements of teachers and students in Uganda have been made recently, and the reader is referred to them. The rationale of treating the quantitative issues apart from the qualitative is defended briefly in Chapters 2 and 4 largely on the ground that in countries where so few children get much schooling the quality of education is primarily a function of student selection and teacher training, not of the magnitude or rate of expansion of the system.

The second matter omitted from this study is methods of calculating requirements for educated manpower. Manpower planning is a growing subject and much has been written. But the present study concentrates on the supply questions of education. For a detailed treatment of the demand, the literature must be referred to separately. On East Africa, see especially E. R. Rado, "Manpower Planning in East Africa", in Mark Blaug ed. *Educational Planning, The World Year book of Education* 1967 (Evans, London 1967).

history of changes in the various manpower components, such as number of teachers and pupil-teacher ratio and the trends they have followed with expansion. It also analyses the trends in financial costs. Surprisingly, changes in financial costs were very large, far larger than the real expansion of the educational structure in Uganda, so much so that other factors seemed more important in explaining the changes in money costs than the educational expansion itself. In the light of this experience Chapter 4 re-examines the constraints to educational expansion, and shows how they operate. It compares the size and trends in the key factors of educational systems of 44 African countries from 1950 to 1960. The conclusion is that the true limitations are real resources, that is, manpower and foreign exchange not finance. This is the theme of the book.

If one accepts the real-resource approach, how then should one proceed with optimization in the short run and planning in the long run?

Chapters 5 and 6 outline some of the answers. In the short run, many financial relationships are already given, and the desired manpower goals can be approached while minimizing these costs. In the long run rapidly expanding education is an integral part of the structure of the entire economy, in particular, closely interrelated to the wage level; educational planning must take into account many factors usually ignored and be made part and parcel of much broader, comprehensive economic planning.

This is an economic study, not a political document. Some of it involves of course some large political assumptions, as do most economic studies dealing with practical problems. The most important political issue touched upon is the need for a wages and incomes structure related to the economic resources of the country. Wages and incomes must be at a level which makes it possible both to finance the educational budget and later to employ the people emerging from the educational system. The political strategy of winning national support for such a policy is not discussed, although the author is under no illusions about its immense practical difficulties. But it is the job of an economist to show the choices involved, and in the author's opinion the seriousness of the political and human problem of unemployed school-leavers and the mounting financial costs of education equals if not exceeds the political difficulties of considering some policies towards wages and incomes. It would be tragic if educational expansion and rising employment were sacrificed because wages and incomes were uncontrolled—particularly if the possibilities and choices were never made clear.

This real-resource approach will, it is believed, be useful in practice. Yet it is not only the operational advantages of working in manpower terms, but the theoretical disadvantages of valuing

manpower in current prices which give rise to this study. It may help to prepare the ground for what follows if the weaknesses of a purely financial approach to the economics of education are first discussed in more detail.

II. The Case Against Planning Education in Financial Terms

Current practice in many, probably most, African countries is to judge what educational expansion is possible by what can be afforded. The cost criteria are almost always financial—the size of the educational budget which the government thinks it can finance in relation to the growth in other expenditures and revenues which it anticipates. These are the dominant economic influences in deciding the rate of educational expansion which can be undertaken and planned and they are frequently not much more sophisticated than this.

While the crudities of actual practice would probably not be defended by many economists, there is widespread support for the view that a monetary criterion, properly refined, is suitable and, from an economic standpoint, ideal. This belief largely rests on the general faith of economists that activities using scarce resources must be weighed as alternatives. This is not disputed here. What is questioned is whether this is best done in monetary terms.

There are three main ways in which financial criteria can be used in planning education:

(i) To value the cost of education in relation to other things.
(ii) To value the economic return from educational outputs.
(iii) To keep educational expenditure within some overall budget constraint.

The first two can be very misleading for the reasons made clear in the following paragraphs. The third, although important, is often misinterpreted and can lead to a narrow concentration on the wrong issues.

The use of the first two criteria in education has been encouraged by the discounted returns approach, which is really a somewhat refined combination of both. This technique attempts to calculate the economic value of each level of education, say a degree, from what persons with degrees earn compared with persons without them. Usually the calculations are based on the average earnings or incomes of a sample of the population, grouped by age and education. By assuming that all of the differences in average earnings are the result of differences in age and education, and that these differences will not change in the future, the extra earnings which degree-holders can expect can be calculated for each year of their lives. This prospective income stream is then discounted at some rate

of interest and summed to give a monetary value for a degree. The value of a degree can then be compared with the cost of acquiring one. The calculations are applied in a similar fashion to other levels and types of education.[1]

Apart from non-economic objections to this type of approach, there are a number of fundamental economic weaknesses in the assumptions on which it rests, especially in the context of developing countries. By considering these assumptions in some detail, the danger of basing educational plans primarily on financial measures of either their costs or their benefits can be made clear.

Consider first the assumptions. In order to derive the returns to education from the observed differentials in earnings of persons with different amounts of education and of different ages, the following assumptions must be made.

1. Assumptions About Market Forces, Competition and Productivity

(*a*) That earnings before tax equal individual marginal products, if not for every individual at least on the average.

(*b*) That private marginal products equal social marginal products.

(*c*) That all (or a known amount of the) differences in productivity arise from differences in education or age.

2. Assumptions About the Future Economy

(*a*) That earnings of a newly educated person will equal the present average of earnings of persons with the same level of education and of the same age, at all periods in the future.

(*b*) That differentials in earnings will remain constant, regardless of substantial changes in the numbers and relative supplies of educated persons, and in the amount of physical capital.

3. Assumptions About the Cost of Education

(*a*) That the educational system is currently operating at minimum cost (or that the marginal cost is known).

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1. As yet, there have been few attempts in Africa to assess the returns to education by discounting salary differentials, although three such calculations have been made in East and Central Africa. These are W. J. Simpson, *The Return on Investment in Primary and Secondary Education in Central Africa* and *The Return on Investment in Post-Certificate Education in Rhodesia and Nyasaland*, 1960. J. Ilett, *Cost Benefit Evaluation of Education to School Certificate and Graduate Levels*, Uganda, 1963. (Both unpublished mimeographs). *See also*, J. A. Smyth and N. L. Bennett, "Rates of Return on Investment ih Education: A tool for Short-term Educational Planning, Illustrated with Ugandan Data" in Mark Blaug ed. *Educational Planning*, *The World Yearbook of Education 1967* (Evans, London 1967).

Through lack of data, these studies were largely based on assumed, rather than actual, differentials.

(*b*) That the level of teachers' salaries and the costs of other educational inputs equals their opportunity cost elsewhere.

(*c*) That the marginal cost of education is constant (or known) within the range of all likely rates of expansion.

Even in the large markets of the richer countries, where communications and transport facilities are well developed, labour relatively mobile and labour markets fairly advanced, it is highly debatable whether these assumptions are sufficiently valid to justify the calculations which are rested upon them. In spite of a variety of detailed calculations and defences by Schultz,[1] Houthakker,[2] Becker,[3] Miller,[4] Weisbrod,[5] Bowman,[6] Denison,[7] and Blaug[8] there is widespread agnosticism about whether their studies have established any causal link between education and economic growth, and widespread doubts about the "rates of return" to education which have been deduced from the correlations observed. Among economists directly concerned with the economics of education, Vaizey,[9] Renshaw,[10] Schaeffer,[11] Eckhaus,[12] Balogh and Streeten[13] and Merrett[14] have strongly attacked the rate of returns approach, both as a measure of the economic returns to education and as a criterion for further investment.[15]

1. T. W. Schultz, "Capital Formation by Education", *Journal of Political Economy*, December 1960, pp. 571–84.
2. H. S. Houthakker, "Education and Income", *Review of Economics and Statistics*, February 1959, pp. 24–28.
3. G. S. Becker, "Under-Investment in College Education", *American Economic Review*, May 1960, pp. 346–354.
4. H. P. Miller, "Annual and Lifetime Income in Relation to Education: 1939–59", *American Economic Review*, December 1960, pp. 962–87.
5. B. A. Weisbrod, "Education and Investment in Human Capital", *Journal of Political Economy*, Supplement October 1962, pp. 106–24.
6. M. J. Bowman, "Human Capital; Concepts and Measures", *The Economics of Higher Education*, ed. S. J. Mushkin. (Washington D.C., Government Printing Office, 1962.)
7. E. F. Denison, *The Sources of Economic Growth in the U.S. and the Alternatives Before Us*. (Committee for Economic Development Supplementary Paper No. 13, N.Y., 1962.)
8. Mark Blaug, "The rate of return on Investment in Education in Great Britain", *The Manchester School*, September 1965, pp. 205–261.
9. *Op. cit.*
10. E. Renshaw, "Estimating the Returns to Education", *Review of Economics and Statistics*, August 1960, pp. 318–24.
11. H. Schaeffer, "Investment in Human Capital", *American Economic Review*, December 1961, pp. 1026–35.
12. R. S. Eckhaus, "Economic Criteria for Education and Training", *Review of Economics and Statistics*, May 1964, pp. 181–190.
13. T. Balogh and P. P. Streeten, "The Coefficient of Ignorance", *Bulletin of the Oxford University Institute of Statistics*, May 1963, pp. 99–107.
14. Stephen Merrett, "The rate of return to education: a critique", *Oxford Economic Papers*, November 1966, pp. 289–303.
15. For a critical but positive appraisal of the various approaches see W. G. Bowen's contribution to Appendix Four of the Robbins Committee's Report on *Higher Education*. Part III, pp. 73–96. A broader discussion less concerned with the strictly economic aspects of the subject is given by Seymour E. Harris in "General Problems in Education and Manpower", Part I of *Economic Aspects of Higher Education*, O.E.C.D. (Study Group in the Economics of Education) O.E.C.D., Paris, 1964.

Even if this method of computing the returns to education were appropriate in a developed country, there are a number of special reasons why its validity should be questioned in the developing economies. These additional objections arise from the characteristics of primary producing economies, heavily dependent on export earnings with a large government sector and at the earliest stages of industrialization, if that.

There are, for example, many sectors in developing economies where it is difficult to believe that the assumptions about market forces and competition are even approximately valid.[1] Agricultural (and other) markets are often subject to large tariffs subsidies or export taxes and heavily dependent on prices in the world export markets. With a change in world prices, the value of domestic product and the productivity of capital and labour can be widely affected, not only in the agricultural sectors of the primary producing country, but in other sectors too.

While this also happens in the developed countries, the part of the economy affected is very much smaller. In the developed country it is the exception; in the under-developed, the rule.

This applies particularly to the labour market and the level of wages and salaries, where non-economic factors are very influential. The capacity for industrial conflict may be negligible in many developing countries, but the political influence of the urban labour force is often considerable. Increases in legal minimum wages and government salary scales are often introduced to fulfil the promises of independence or prove its value. Governments threatened by instability are anxious to placate a new and potentially formidable working class. "Arbitration and members of legal wage boards are susceptible to public agitation, and governments intervene readily in disputes: indeed the strike is often a demonstration to influence the authorities rather than a means of direct pressure on employers".[2] Wage patterns set in colonial times continue in the changed circumstances of Independence, because of the difficulties of changing them. The result of these and other forces is that wage levels may rise

1. See for example, T. Balogh, Economic Policy and the Price System, reprinted from the U.N. Economic Bulletin for Latin America, March 1961, in *The Economics of Poverty* (Weidenfeld & Nicholson 1952).

2. H. A. Turner, *Wage Trends, Wage Policies and Collective Bargaining: the problem for Under-developed Countries*, Occasional Papers (Department of Applied Economics, Cambridge, 1965) surveys a good deal of evidence and shows that the generalizations of this paragraph apply to many developing countries in recent years. Studies of individual countries also suggest that increases in wages and salaries often occur in spite of market forces rather than because of them e.g.:

J. E. Meade, "Mauritius, a Case Study in Malthusian Economics", *Economic Journal*, No. 283, Vol. LXXI, September 1961, pp. 521–534.

L. G. Reynolds, "Wages and Employment in a Labor-Surplus Economy", *American Economic Review*, Vol. LV, No. 1, March 1965, pp. 19–39.

Dudley Seers, "The Mechanism of an Open Petroleum Economy", *Social and Economic Studies*, March 1964.

rapidly, even in a situation of labour surplus. The trends and structures of wages and salaries may then bear little relationship to the pattern of productivity.

At skilled and educated levels in developing countries there are many jobs in which the productivity of manpower cannot be measured at all.

In Uganda in 1961, for example, over half of all graduate manpower and nearly a third of secondary qualified manpower was employed in the public service or in education, where the very nature of the work made productivity, in any conventional economic sense, unmeasurable.[1] If full-time (but unpaid) students are included, the proportion of all high-level manpower occupied in government or education rose to nearly a half. Furthermore, many of those employed outside the public services are also in jobs where productivity is not easily measured in any market sense: either in some profession where competition is limited and the "product" not sold on a free market, or in some executive position where the process of production and the chain of command is so complex that the value of an individual's contribution is not easily identified. In other words, the vast majority of high-level manpower was occupied in occupations or educational activities where salaries could not be equated to productivity in any direct sense.[2]

It does not follow of course that in these circumstances salaries can altogether break free from market forces. As long as the opportunity exists for high-level manpower to shift between jobs where productivity is not measurable to those where it is, free mobility of labour would in theory keep salaries and productivities equal at the margin. Within very broad limits this undoubtedly happens. But for three reasons, at least, the tendency towards equating the margins is often not carried very far.

First, there are all the usual reasons why labour is not as mobile (or substitutable) as the equalizing process would require: the special aptitudes or training needed for many jobs, the natural lethargy towards changing occupations and losing seniority, the discriminations of race (in Africa often the inevitable counterpart, first of

1. Guy Hunter. *High Level Manpower in East Africa*, (unpublished report, University of East Africa, 1962.) The proportion of *non-expatriate* manpower in occupations where productivity could not be measured was very much higher. This is the employed manpower which corresponds to the output of the schools.

2. This is largely true of the developed countries also. Mark Blaug, *op. cit.*, states that 45 per cent of the 450,000 university graduates and about 60 per cent of the 750,000 people with full-time higher education in Great Britain in 1961 were public servants, that is, worked in education, health, Civil Service, local government, armed forces, nationalized industries and government research establishments with as many as 45 per cent of those with full-time higher education teaching in schools, colleges and universities. (See C. A. Moser, R. G. Layard, "Planning the Scale of Higher Education in Britain: Some Statistical Problems", *Journal of the Royal Statistical Society*, December 1964, Table 6).

colonialism, now of Africanization) and so forth. Secondly, there are the non-salary benefits associated with different jobs: in addition to other benefits not included in the present salary, the prospects of a job, measured in terms of future income, position or power, are of great importance in countries undergoing rapid political change, where graduates of today can become the Ministers of tomorrow. Such benefits are more important relative to present salaries than in the developed countries, where the economic and social framework is more stable and seniority is usually established over many years.

Finally the sheer size of the government sector gives it a dominance over the general pattern of salaries such that it often sets the pattern rather than merely conforms to it. The reasons why this can happen are, as before, basically reasons why the labour market is not perfectly competitive. When government employs such a large proportion of high-level manpower, the number of competing occupations outside (already restricted by geographic and occupational immobilities) can be very small. Thus the boundary between the public and private sector, across which salaries might be equated in comparable occupations, is short. *Inside* the boundary, different forces are at work. Salaries within the public service are largely set by a unified "scale". When revised the scale is revised as a whole and traditional differentials are slow to change. The result is that, in Africa, government salary scales often perpetuate colonial wage structures.

The trouble economically is that a unified scale tends to give more importance to the internal relationship between different sections of the scale, comparing qualifications in terms of educational standards, length of service and such, and less to differences in economic productivity (where and if it can be measured). The result is that differentials are often fixed on the basis of differences of age and education judged by some tradition or convention with very little relation to current differences in productivity. When, for the reasons given earlier, the pattern of salaries in the public sector exercises a decisive influence on the general wage structure in the economy, differentials everywhere lose their value as a guide to economic returns.

The reasons why the second set of assumptions fail to hold true —why the pattern of future differentials cannot be derived from the present—may be dealt with more briefly. Current differentials in earnings between persons of different ages and levels of educational attainment would only remain constant if there were perfect substitution between different types of labour or if the supplies of different factors remained in constant proportions. Perfect substitution of labour would imply that any type of labour (grouped by age and education) could be replaced at the margin by any other

type in some fixed proportion, indicated by the wage differential. Reasons have already been given why labour is not perfectly substitutable even across existing margins, let alone in the future when other economic circumstances have changed.

The second condition under which differentials would be unchanged would be if all factor supplies remained in constant proportion. As the express purpose of educational expansion is to change the supplies of some types of labour in relation to other types, and in relation to capital and other factors of production, such an assumption is patently absurd.

The third set of assumptions—those concerning the cost of education—are also subject to particular criticism within the conditions of a developing country. The economic cost per student of expansion may differ from the present monetary cost of educating a student for three reasons:

(i) Schools may be operating far from optimally for a wide variety of reasons. The typical condition, in fact, is for many schools to be in the midst of programmes of rapid expansion, and thus running far below capacity. Average cost in these schools is therefore a particularly misleading indication of marginal cost. Even if marginal cost were known, it is not easily applied to the large non-marginal changes which rapid expansion of education may involve.

(ii) Secondly, the money spent on education is a poor indicator of its true cost. In the first place, education is predominantly an activity involving people, some of whom receive salaries but the majority of whom do not. It is by no means clear that the economic cost of the activity should be judged by the salaries paid to the few who earn them, when the opportunity cost of the students (some more qualified than many people gainfully employed in the rest of the economy and more qualified than most of the primary teachers) is ignored. Although academic studies often include estimates of the opportunity cost of unpaid manpower, the information on which such estimates have to be based is very inadequate.[1]

(iii) Thirdly, when salaries have risen rapidly as in many countries of Africa in spite of wide-scale unemployment and underemployment, it is not clear that they accurately or even approximately indicate the opportunity cost of the manpower

1. Foreign aid to education introduces a particular disparity between monetary cost and the true opportunity costs of educational expansion. Foreign aid is usually administered to institutions of secondary or higher education and as such this problem does not often affect primary education. But as cost comparisons are often used to compare the relative costs of different levels of education, comparisons which ignore the differential benefits of foreign aid can be very misleading in countries short of foreign exchange and heavily dependent on overseas assistance.

which does get paid. This almost certainly applies to the lower levels of education manpower, and may well apply to the more highly educated also.

Perhaps most important, primary producing countries are subject to enormous fluctuations of income, employment and economic activity, dependent on world export prices. Most are short of the foreign exchange and high-level manpower they need for development; yet development is their major need. In this setting, to judge the cost of manpower primarily in terms of costs which are based on some fixed salary scale, or to judge the cost of education mainly in terms of how much government has to pay the teachers, may be to assume a particular market structure and to miss more important choices. As the United Nations Report said of the educational system in Zambia: "When considering a national system which *involves over 350,000 persons in full-time activity and is the largest* single user of high-level manpower in the country, the basic economic decisions must be made in terms of real resources, not of finance."[1]

In fact, considered as a whole there is something of a circular contradiction in the method of valuing the returns to education by comparing discounted differentials *in* earnings with the money costs of education to each level of schooling. Average earnings are used to value the manpower outputs of the educational system. Average earnings of teachers (and possibly the students—if their opportunity costs are included) are used to value the manpower inputs. The fact that teaching is one of the lower paid occupations (relative to others requiring similar educational qualifications) gives an initial bias to the calculation. The fact that the typical teacher-pupil ratio enables a teacher over his lifetime to impart many more man-years of education than he himself spent to acquire his own training means that in physical terms the manpower outputs will almost always far outweigh the manpower inputs. If teachers are so productive and if the assumptions about perfect competition are justified, why are teachers not paid their true economic worth?[2] This may be another case of isolating one particular relationship by *assuming* that all else is in equilibrium and then treating its disequilibrium as the one imbalance to be set right.

When used as a criterion for investment, rate of returns calculations are even less satisfactory. Non-economic returns must be treated as unimportant, ignored or expressed in sums of money. Monetary value must be used to measure welfare, the social role

1. United Nations Economic Survey Mission: *The Economic Development of Zambia*, 1964, Chapter VI, para. 58.
2. Eckhaus puts the same point very neatly, when he asks: "Is the low rate of return on teachers' education a signal to stop educating teachers?", *op. cit.*, p. 183.

of education, equality of educational opportunity and all the other things which are not measured by the salary differentials. None of this is very helpful for decision-making.

Perhaps the strongest criticism of all is that a comparison of educational cost and discounted returns cannot answer the practical questions most vital to the economics of educational planning.

In the first place, discounted returns refer to marginal adjustments, whereas decisions on expansion in developing countries usually involve major changes. Yet if this theoretical nicety is ignored, and the rates of return are used as measures of non-marginal changes, the calculation leads to an absurd conclusion.[1] Suppose, for instance, that the return on primary education is four per cent, on secondary 25 and on higher 15, the logical implication if returns are constant is that all development should go into secondary and none at all into primary or higher. (It even follows that money should be withdrawn from primary and higher education!)

The truth is that educational planning in the developing countries must grapple with all types of manpower shortages, bottlenecks of students and a shortage of foreign exchange. Educational plans must be made with an eye on ever-expanding enrolments over a number of years, not on some spurious marginal equality at some instant of time. In other words, the economic questions to be answered are questions about optimal sequences, within continuing shortages of manpower which the expansion of education is designed to alleviate.

III. The Case for Planning Education in Terms of Manpower

The case for planning education in terms of manpower rests partly on the theoretical inadequacy of planning in terms of market costs and benefits and partly on the practical difficulties of working in terms of shadow prices. It is not disputed that shadow prices, if they could be calculated not only for the present but for the future, would provide a comprehensive basis for evaluating the opportunity costs of education over time. But as already suggested the interrelationship between salaries and manpower supplies is highly complex and determining shadow prices at current and at future dates and under greatly changed conditions would be a highly speculative operation.

1. The alternative conclusion—that one should make only a marginal change and then recalculate to obtain a new measure of discounted returns—is equally absurd. Changes in the educational system will take four or five years to begin to have any effects. Ignoring other lags and the time needed to collect data, etc., is it reasonable to plan education in developing countries on the basis of making only marginal changes every five years?

In the first place, shadow prices—if they are to reflect the essence of the problem—would involve a sophistication well beyond the sort of data available. As mentioned, educational policy is largely concerned with non-marginal decisions. Thus even in the current period a set of shadow prices would be required for each input (a shadow price supply function) corresponding to different rates of expansion. Furthermore, such shadow price supply functions would be needed for different periods in the future.

But in addition, changes in the educational system will affect the demand for educated manpower, thus requiring a shadow price demand function and making the shadow costs and returns of education dependent on what was done before and what is planned for the future. With existing knowledge, and the typical data problems of the developing countries, it will be obvious that such an approach is completely unmanageable. In any case, the calculation of shadow prices is only a first step, and would not eliminate the need for judging whether it was possible to bring actual salaries into line with the shadow ones.

In the second place, the nature of the educational system—a sequence of flows of students and teachers, in which all the outputs and most of the inputs are manpower of different educational levels and qualifications—means that manpower units are the natural ones in which to plan for consistency. Furthermore, in developing countries, the bottlenecks to educational expansion are often the inadequate supplies of high-level students or teachers. These constraints are partly of increasing scarcity but largely of absolute limitations.

This situation calls for a direct application of linear programming techniques (applied to manpower) rather than marginal cost analysis. This is especially obvious when contrasted with financial planning using market prices—an approach which places no value at all on students, at some levels the scarcest educational input.

Thirdly, as will be argued in Chapter 6, the cost of education in terms of finance may—at least in the long run—be more flexible than its cost in terms of manpower. To plan in terms of finance may thus be to take as given the factor it is most important to vary—the wage level, the unit costs of manpower. By planning in terms of manpower, the full range of possibilities is laid bare, unobscured by a misleading wage structure or by the hidden assumption that education can only be extended through the market mechanism.

These three reasons on the supply side are reinforced by two considerations of demand. For the reasons elaborated in the case against financial planning, the methods of calculating the economic demand for education in financial terms are theoretically weak in any context, let alone amid the fluid conditions of a developing

country. The result is that estimates of manpower needs are increasingly being assessed in physical terms, as a manpower plan giving the numbers of professional and skilled personnel required to fulfil certain economic and social targets at some future date. Manpower plans are usually constructed using labour-output coefficients and are thus open to some of the same theoretical objections as capital output ratios. But as with capital output ratios, manpower planning finds a rough practical justification in its usefulness. Inevitably present techniques need considerable refinement. But the fact remains that there is a growing tendency to formulate the demand for manpower in physical terms. This in itself provides a strong practical reason for developing ways to plan the supply of education in the same units.

What is true of the economic demand for education is also largely true of the non-economic demands. There is no need to list the many reasons why education is wanted, though their wide variety must not be under-estimated. Because of this, education is in competition with other consumption goods and for this reason a few economists have argued that education should be bought and sold on the market place, to enable individuals to adjust their expenditure on education to their own preferences. But these economists are a minority, and most would argue that education is a fundamental right as well as a prime factor in social mobility, and for this reason should be supplied free or greatly subsidized at least at the basic levels, in order to guarantee a measure of social justice. Again, whether one agrees or not, the fact is that in most countries, including the developing countries of Africa, education is a national subsidized activity and that educational planning must largely take place with imperfect guidance from the market place. In this context of political decision, to measure the non-economic benefits of education in terms of direct results—that is in terms of the proportion of the population in school, the numbers passing certain exams or adults made literate and so forth—is obviously useful.

But in the last resort the test of any approach is how well it works and in what ways it is capable of further development. It has already been argued that much educational planning already takes place in terms of real resources.

Some further developments of the approach are the subject of the study which follows.

Chapter I

PROFILES OF EDUCATIONAL ATTAINMENT IN AFRICA

I. Introduction

Africa, at present, is the most under-educated continent in the world. Widespread illiteracy and ignorance of modern techniques among the adult population are largely the heritage of the past. But insufficient schools and inadequate education mean that for many years under-education will also be the pattern of the future. However heartening may be school progress during recent years, progress in enrolling schoolchildren must always be distinguished from educational advance of a whole population. A new school can be built in a few months. But it has usually taken three-quarters of a century for a whole population, from oldest to youngest, to pass through schools. Indeed, the years in school as a child in large part provide the educational foundation on which much of a person's life is built. For every person in the labour force to obtain the economic advantages of a school education may thus require 50 years of universal education, unless unconventional measures are adopted.

In comparison with other continents, the present stock of African education is grossly deficient. Less than one-third of the adult populations of Madagascar, Central and Southern Africa were literate around 1950, hardly a sixth in ex-British West and East Africa, and fewer still in most of the ex-French countries of West Africa. Egypt and Algeria were the most literate countries of North Africa but even there at most a quarter of the adult population could read and write around 1950. The most literate areas of the continent —South Africa, Congo (Kinshasa) and Madagascar—were proportionally only about two-thirds as literate as Belgium was one hundred years before, and hardly half as literate as the United States at that time. The U.S.S.R. has made rapid progress by means of widespread adult education over the last 50 years, but even its rate of literacy was 26 per cent in 1897, over 65 years ago.[1] In Africa a half century later only Congo (Kinshasa), Mauritius, Reunion, Uganda, Lesotho, South Africa and Madagascar could better the Russian percentage of basic literacy in 1897, and in these seven African countries, only the "Europeans" in South Africa had comparable rates of higher education.

1. Data from United Nations, *Report on the World Social Situation 1961*, p. 46.

At the higher levels of formal education—that of the universities and technical schools of the post-secondary level—the present stock of local graduates is severely inadequate, as the heavy reliance on expatriate assistance makes clear. Accurate information about the total number of Africans with this level of education is not available but some tentative estimates may be offered.[1]

At the beginning of 1950 there were at the very most 3,000 Africans with degrees or equivalent qualifications in the whole of Middle Africa (sub-Sahara excluding South Africa). This stock was increasing by about 15 to 20 per cent each year during the 1950's, reaching perhaps 7,000 in 1955 and about 16,000 in 1960. Yet relative to total population the number of graduates in 1950 was scarcely more than three per 100,000 and ten years later only about three times this number.

The very small size of these numbers may be made clear by comparison with other countries. In 1960 in Middle Africa, most graduates were male and there was less than one per 10,000 of the total population, under three per 10,000 of the population over 25 years old. In Italy in 1951, for instance, there were 250 males with higher education per 10,000 of the population 25 years old or over; in Greece 340 (1951); in Japan 270 (1950); in Portugal 160 (1950). In most countries of Latin America the ratio was greater than 100. In India in 1951 there were 50 persons with higher education for every 10,000 adult males. These comparisons differ somewhat in coverage and definition but their implication is clear. The proportion of local persons with higher education in Middle Africa is far below that in any other region of the world.

II. The Age-Education Profiles of Uganda, Ghana and Zambia

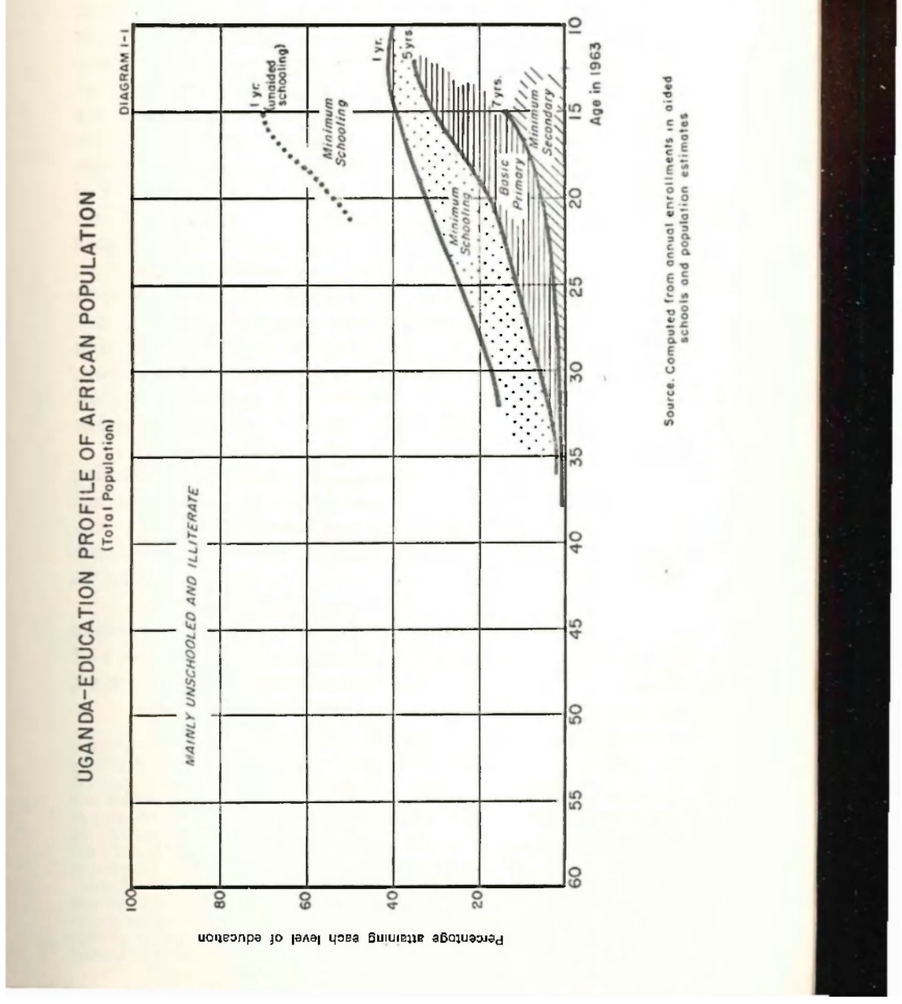
Many of these characteristics can be shown more clearly by the "age-education profile" of the different countries. These profiles are a way of showing the levels[2] of educational attainment of the whole population in a single graph. They thus provide a comprehensive picture of the stock of education in each country. They can be used to make comparisons between different countries and at different times. In conjunction with educational plans, these profiles can be used to project the future levels of educational attainment of the

1. Based on calculations made by the author for the Economic Commission for Africa, United Nations, Addis Ababa.

2. The levels of education can be defined in terms of the number of years schooling, the highest grade or exam completed or, less accurately, in terms of the general level of education reached, primary, secondary and so forth.

population and the anticipated stocks of educated manpower, grouped by age.

The profile is best explained with the aid of an example. Diagram I—1 gives the age-education profile of the African population of Uganda. The horizontal axis refers to the different age groups of the



population in 1963 and the vertical axis to the percentage of each age group attaining each level of education.[1]

The profile clearly shows how the expansion of education has widened the coverage of education among the younger age groups. Thus of Africans 30 to 39 years old, on average only about ten per cent have had any schooling at all and under five per cent have had five years schooling or more. (An additional proportion of the older age groups had attended unaided and sub-grade schools but the data on these are very unreliable).[2] Amongst the 15 to 20 years old group, the proportions with schooling are much larger—over half having started primary school and nearly a quarter having reached the fifth year. The distinctive contrast between the education of the younger age groups and that of their parents is that the average length of schooling has been growing. Indeed the proportion of the older age groups who had been to school for some period may be higher than is often realized, but their education was very brief.

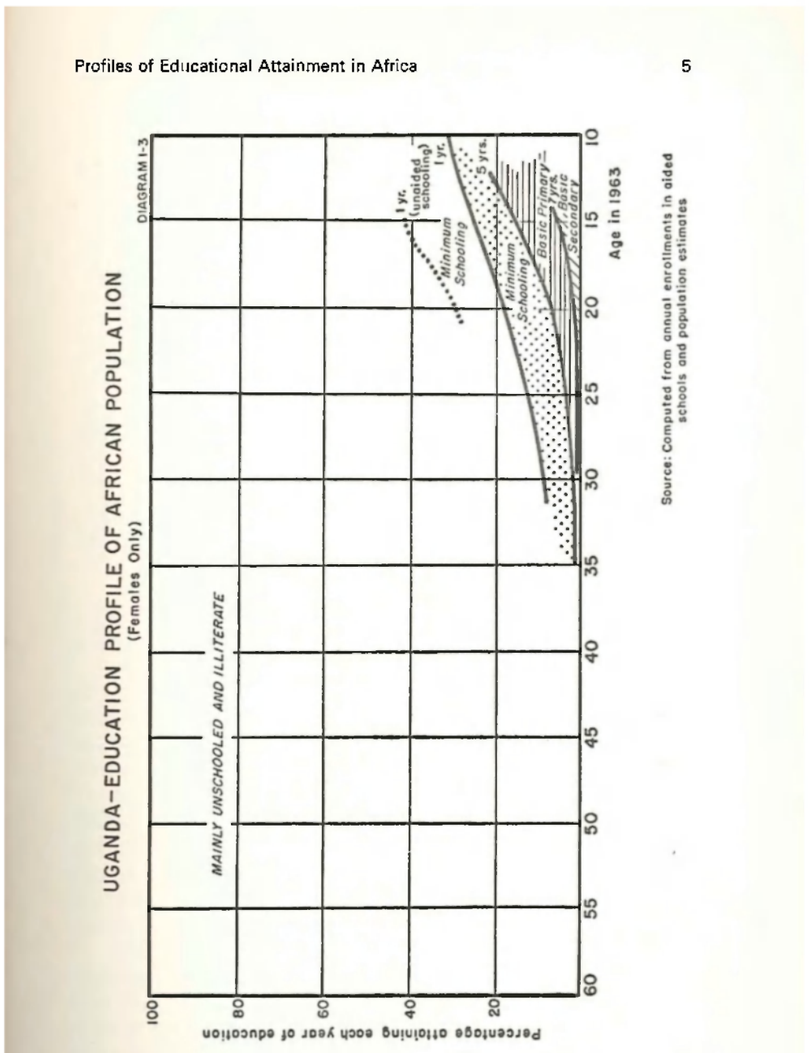
Diagrams I—2 and I—3 show the age-education profiles separately for the male and female African populations. Certain basic characteristics stand out. In Uganda in 1963 rather more than twice as many African males as females had some schooling, and of these, the males had generally spent longer at school than the females. These contrasts are more pronounced at the higher age groups than at the lower.

For manpower and educational planning, the age-education profile is needed in more detail and precision; the numbers at each level of education, as well as the proportions, must be known and, where possible, specific data concerning vocational skills. For such purposes, the profile can be produced in the form of a matrix, as detailed as the data available.

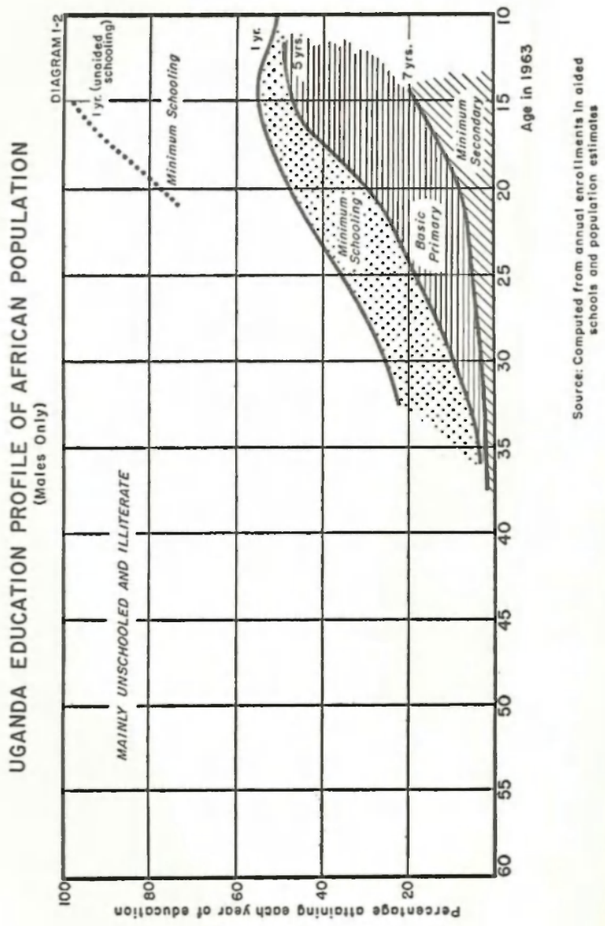
In Uganda, the numbers with secondary and higher education are too small to be clearly shown on a graphical profile. Table I—1 therefore gives the stock of persons completing secondary school,

1. To make comparisons possible, the Uganda profile, like most of the others which follow, is defined in terms of a number of years of schooling, though only the major levels are shown: thus illiteracy corresponds to no schooling at all, "minimum levels of schooling" to less than four years completed schooling and "basic primary" to four or five years primary. Six, eight and more years of schooling are also distinguished, though in the profiles of African countries the proportions at the upper levels are too small to be shown graphically, and some figures are given in Table I—1. Because, however, every person is included in some category of education shown graphically, the totals add to 100 per cent.

2. For several reasons: the 1930 unaided schools were often uninspected and their enrolments measured by attendance as recorded on one particular day of the year. In addition, it seems highly probable that enrolments were swollen by figures referring to catechumen classes and such. The number of "adults" over 18) recorded as school attenders is high. See Chapter 3.



grouped by age and based on cumulative totals of school certificate holders with an allowance made for mortality. By mid-1963, less than 10,000 Africans possessed a complete secondary school education and only about 6,300 had a school certificate. In addition, about 3,500 Asians had a complete secondary school education, of whom about 2,400 possessed school certificates.



The advantage of a graphical profile is for making comprehensive comparisons between countries. Because the profiles refer to the proportion and not the absolute numbers of each age group attaining each level of education, profiles of countries with different populations, and population pyramids of different shapes, can meaningfully be compared. Thus the profiles of Ghana and Zambia

TABLE I—1

STOCKS OF LOCALLY EDUCATED SCHOOL CERTIFICATE HOLDERS IN UGANDA, GHANA AND ZAMBIA IN 1963

Years of qualification	*Probable age in 1963*	*Uganda*[a]	*Ghana*[b]	*Zambia*[c]
1930–34	48–52	—	156	—
1935–39	43–47	30	424	—
1940–44	38–42	104	856	—
1945–49	33–37	305	1,374	25
1950–54	28–32	1,135	2,980	137
1955–59	23–27	3,384	5,103	425
1960–62	20–22	3,804	3,884	374
		8,762	14,777	961

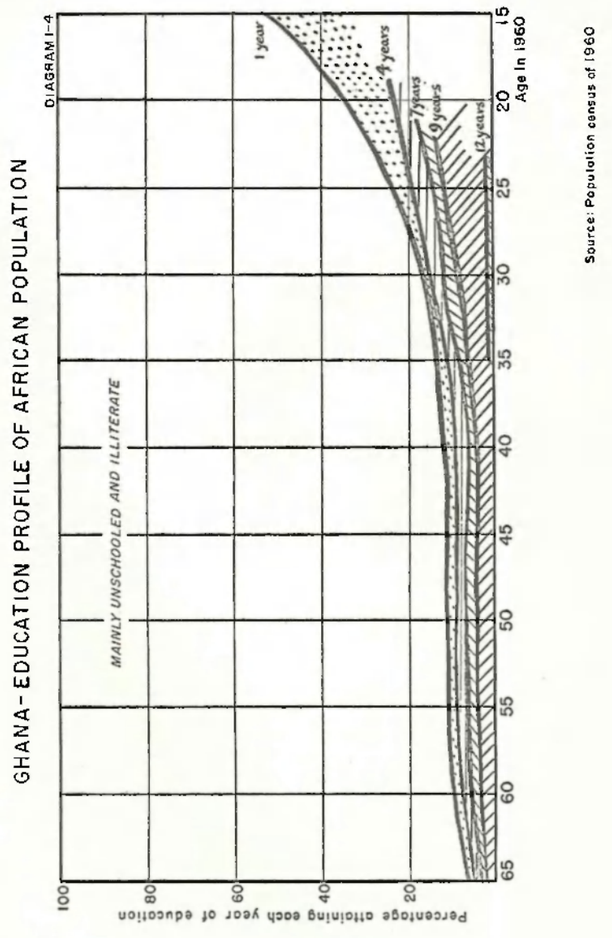
N.B. Calculations assume students sit the exam ~~aged~~ aged 19 and allow for mortality based on U.N. model life tables with survival rates equivalent to life expectancy at birth of 50 years.
School certificate exam is sat at the end of the basic secondary course. Results include G.C.E. passes.
([a]) Includes 2,396 Asians.
([b]) Figures prior to 1930 are not available but would make little difference. Recent years refer to West African Examinations, and may omit some external candidates still taking Cambridge School Certificate examination.
([c]) African only.
Source: Computed from annual results of the School Certificate exam given in Ministry of Education Reports.

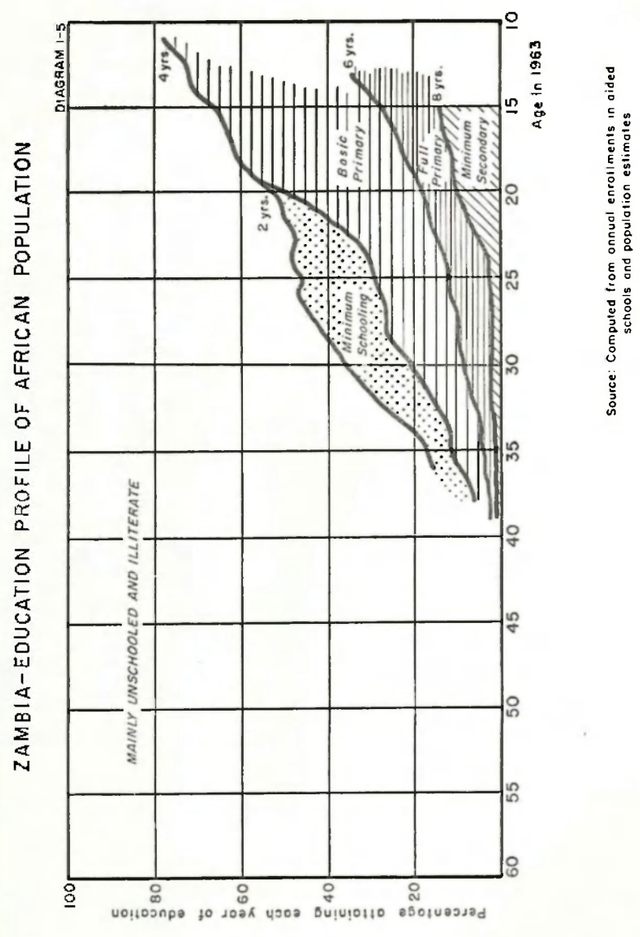
(Diagrams I—4 and I—5) show graphically that four years of primary education, at least up to the 40 year age group, is more widespread in Zambia than in Ghana, but that at the higher levels of education (secondary schooling of ten years or more) Ghana is well ahead of Zambia. Uganda, in the younger age groups, lies somewhere between Ghana and Zambia, but among persons over 35 rather better than Zambia. Among persons over 45, Ghana clearly has a higher proportion of persons educated at every level, indicating that their educational facilities were more widespread in the early years of this century than in Uganda or Zambia.

The profiles for each sex separately (not shown) reveal some important contrasts. The male population has had more education than the female, in all three territories and at every level of schooling. Slightly more than half the males over six in Zambia have been to school, about two in five in Uganda: between one in seven in Uganda and one in five in Zambia had five years or more. Of the females, only about one in five have been to school in any territory and scarcely one in 20 have had five years or more.

The sharp contrasts between the three countries are largely typical of the regions of Africa from which they are drawn. In many West African countries, as in Ghana, a smaller proportion of the

African population has gone to school than in Eastern Africa, but those who have, have generally gone further than those in East Africa. There is thus an increasing proportion of persons with a little education (four years schooling or less) and a decreasing proportion with ten years schooling or more as one moves from West Africa





to East (and from North Africa to South).[1] These patterns are partly continued in the present school systems but are mainly the result of the educational structure of the past. West African territories in general had in the 20 or 30 years until 1960 less widespread facilities for basic education, but proportionally more facilities for higher education, than countries in East Africa and, even more markedly, than countries of Central Africa.[2] This is clearly shown by the numbers of persons educated to school certificate level, shown in Table I—1, Ghana is far ahead of Uganda, and Zambia far behind.

The proof of this widening of educational opportunity in Africa, at primary levels since the early 1930's[3] and, more significantly, at secondary levels since the early 1950's is found in the increasing proportions of the younger age groups who have attained each level of education. The profiles show this very clearly, both for the whole population and usually for males and females separately. The only exception occurs at the very lowest age groups (the youngest group shown in Diagram I—2) where the percentage with schooling is less than for the age group above simply because many children enter school when they are ten or more years old.

Even without going into detail, the broad comparison of the profiles indicate general features of economic and social importance. The fact that basic education, and thus literacy, is generally more widespread in East Africa than in West, and more in the South (excluding Angola and Mozambique) and further North, is noteworthy. The fact that education almost everywhere in Africa is predominantly concentrated among the 15 to 30 age groups affects the political structure and national stability, as well as the

1. To some extent this trend is obscured by the different coverages of recent census data. The Ghanaian data actually referred to those with 11 years schooling or more, and the Zambian data to those with nine years or more. The Uganda data referred to 1959 and considerable expansion of secondary education took place between then and 1963, the date of the Zambian data. These incomparabilities tend to disguise the general trend already mentioned, though the fact that the Ghana data refers to persons of all races provides a contrary tendency because the non-Africans have generally a higher level of education than the Africans. As the non-Africans form only about .4 of one per cent of total population this effect is not important except at the highest levels of education.

2. More evidence for this general characteristic can be found in the estimated enrolment ratios at primary levels given for selected African countries for the years 1930 onwards in UNESCO, *World Survey of Education*, Vol. II, 1958. Recent data is given in Table IV—1.

3. See, for instance, data given in UNESCO, *World Survey of Education*, Vol. II, 1958, p. 53, which shows that the median rate of increase of the primary enrolment ratio (ratio of primary enrolments to estimated population aged 5–14 years) from 1930–34 to 1950–54 was 2.1 per cent for 17 African countries, compared with 1.5 per cent for South America and 3.4 per cent for Asia. Median rates of increase of ratios in North America, Europe and Oceania were all less than one per cent.

labour force available for development. As a final point the large number of persons with minimum levels of schooling is especially significant. They form a group with sufficient schooling to have awakened modern ambitions but not enough to obtain the skills needed to achieve them. These people, especially numerous in the younger age groups, often feel frustrated, even if they find unskilled work. Since the numbers of wage earning jobs has, in recent years, been growing more slowly than the numbers in this group, increasingly their frustration has been growing.

III. Comparisons with Profiles in Other Continents

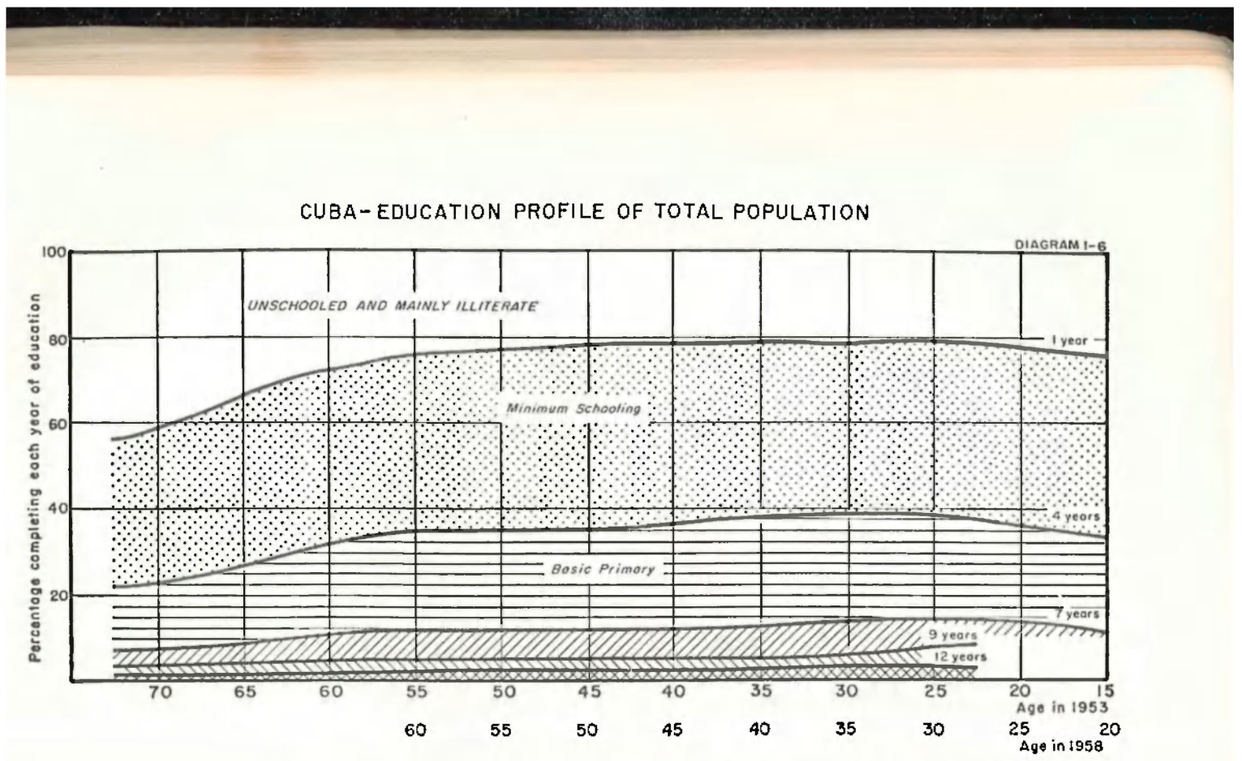
1. *Inter-Country Comparisons*

Some of the most interesting comparisons from an economic viewpoint are with countries in other parts of the world which have reached a higher stage of economic development. Diagrams I—6, I—7 and I—8 give age-education profiles of Cuba, the Philippines and Burma. The striking feature of these profiles is the margin by which all levels of education attainment in these three countries at present surpass those of the African countries. The pool of educated persons which Cuba and the Philippines have to draw upon is a vast reservoir compared to that in Africa. The African profiles, of course, show signs of tremendous growth among the younger age groups, in contrast to the gradual improvement in Burma, and the nearly static situation which existed in Cuba until the revolution in 1959.[1] But even with continued expansion, it will be some long while before the age-education profiles in the African countries can begin to resemble those typical of other continents in the 1950's.

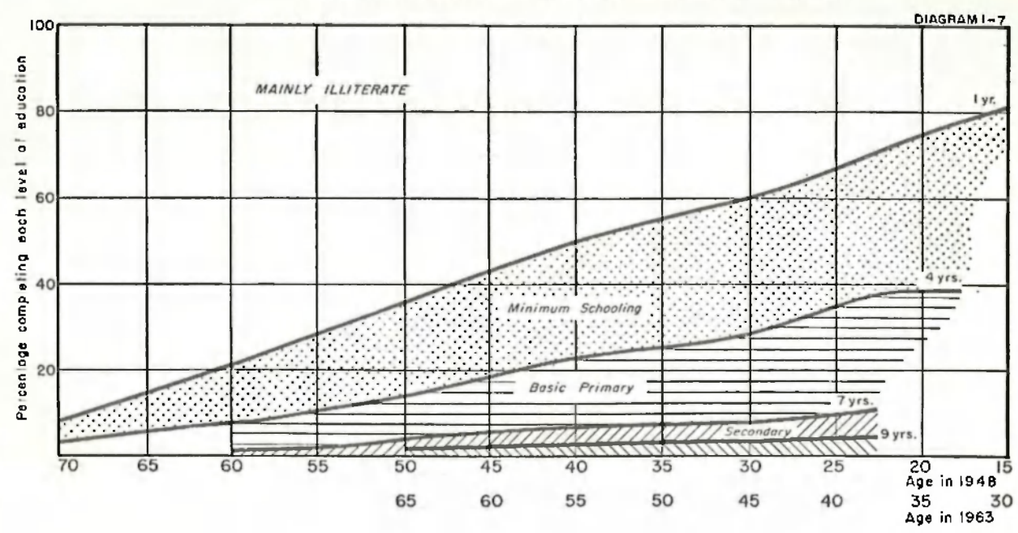
Three particular differences may be mentioned. First, the proportion of persons educated to the higher levels is much greater in the countries outside Africa than within. This is most noticeable in the profile for Burma but it is also true of the others. Secondly, the proportion of educated persons among the older age groups is much larger. Often growth has been small, sometimes occurring only at the upper levels of education. But it has led to a more balanced distribution of the educated population among the different age groups and this is reflected in many aspects of economic and social life.

Thirdly, the experience of educational expansion has been different. Where rapid expansion has occurred, as in the Philippines, it has usually been supported by a broader base. It has not been necessary to draw so heavily on the stocks of secondary-educated

1. After the revolution, Cuba initiated a vast programme of educational expansion both for schoolchildren and adults. This has changed the whole age-education profile, which is therefore shown in Diagram I—6 only until 1958. See next section on "Comparison Over Time".



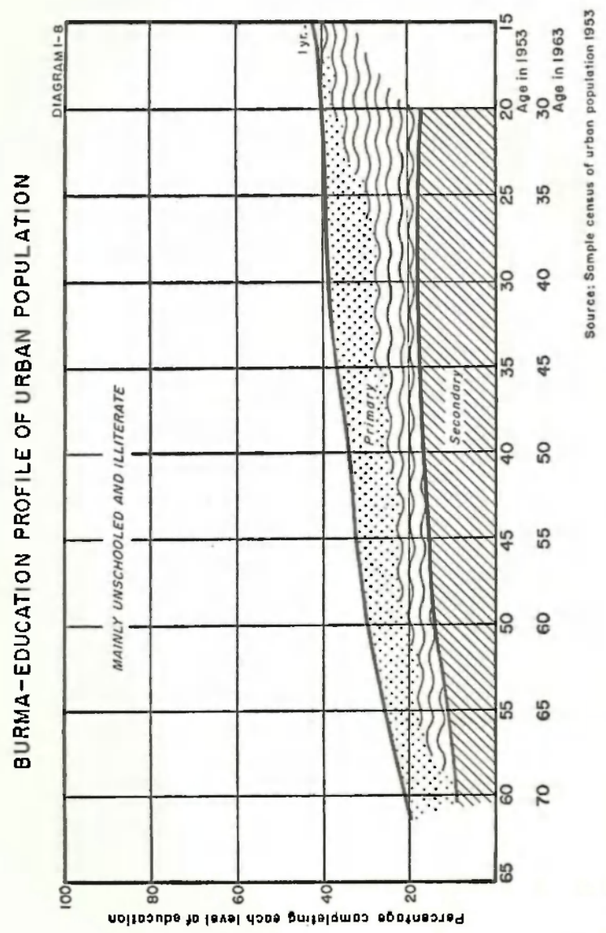
Source: Computed from Population Census 1953



Source: Computed from population census 1948

persons in order to provide the teachers and students for rapid expansion. Thus expansion has taken a smaller proportion of the stock of educated manpower than in Africa, leaving a larger propor-

tion available to the economy. Furthermore, it is appropriate to remember that the profiles refer only to the number of years of



formal education attained. Both in respect of informal education, acquiring skills appropriate to modern techniques, and of the quality of formal education, persons at the lower levels of education

in more developed countries may be better prepared than their African counterparts.

2. *Comparisons Over Time*

Comparisons between profiles need not be limited to those of the same period. Any complete profile, of course, only shows the levels of educational attainment of the population alive at a particular date, and because the population will be continuously changing, the profiles at different dates will be different.

Nevertheless, the way the profiles change over time is particularly convenient for making comparisons. In essence, flows from the schools add to the stock of education among the lower age groups, but the educational levels of the older age groups are largely unchanged. Naturally, the stock of accumulated education will be "ageing" and mortality will be taking its toll. But the construction of the profile in proportional terms means that given three conditions mortality can be ignored. A large block of the profile—everything corresponding to the post-school-age groups—will then be unchanged from year to year, except that the age of each cohort will be correspondingly older. In graphical terms, it appears as if each year the profile grows by one year's interval to the right, the new addition to the stock of education depending on the size and coverage of the present school system. The rest of the profile, the major part, remains as before.

The three conditions needed for post-school-age sections of the profile to remain substantially unchanged over time are the following:

(i) life expectancy is unrelated to level of education
(ii) relatively few persons of post-school age take courses of formal education
(iii) migrations are not sufficiently correlated with age or educational level to disturb the pattern.

There is little evidence on the first point, but at least at lower levels of education it is probably a fair approximation. The second condition is largely true, in the absence of any mass compaign of adult education, as in Cuba in 1961 and afterwards. Finally, although migration is usually more prevalent among the younger and better educated, its net effect on the profiles of most countries is limited.[1] In any case, any known variation from these conditions could be incorporated as a slight vertical shift in the contours of the profile.

The process of expansion over time becomes much clearer if a third axis showing the population pyramid is added to the profile

1. Except at higher levels, where that brain drain may be important.

as in Diagram I—10. The total stock of education is then the product of the numbers in each age cohort (the population pyramid) and the percentage of the cohort attaining each level of education (the education profile). Over time, the profile gradually grows on the right as described above and the population pyramid shifts to the right. Thus, although most of the post-school-age profile is not changed, the continual shifting of the population pyramid to the right means that any vertical section of the profile refers to successively older sections of the population. Furthermore, because the population pyramid tapers to the left, the left-hand end of the profile (corresponding to the upper age groups) is numerically less important within the total stock.

The unchanging contours of the education profile means that comparisons are possible between profiles of widely differing periods, simply by re-dating the ages of each cohort by the appropriate interval.[1] For instance, the stock of education in 1980 can be projected by re-dating the 1963 profile according to ages each cohort will have reached in 1980. Persons aged 18 in 1963 will be 35 in 1980, and so forth. In the absence of widespread adult education or migration, the broad outline of educational attainment of the population over 35 in 1980 is already determined.

The educational levels of those under 35 in 1980 will be partly given by the numbers already enrolled in the schools, and partly by enrolments in future years. A combination of present and projected school enrolments would give the rest of the 1980 profile. The method is outlined in Chapter 2.

In a similar way comparisons are possible with profiles of much earlier periods. Perhaps the most interesting comparisons are between several projected profiles of one country and earlier profiles of another, the former of a country striving towards a stage of development which the latter country passed through several decades previously.

Some comparisons may illustrate this use of the profiles. The lead which the non-African countries have over the three African countries can be estimated at various levels of education and in terms of either stocks or flows.

For instance, in respect of stocks of education in the countries shown, the lead at primary levels is greatest in the case of Cuba and least in Burma. The stock of primary education in Cuba about 55 years ago, relative to population, exceeded that of Zambia in 1963 and, by a larger margin, that of Uganda or Ghana. The gap in the

1. Numerical comparisons also require the population pyramids of the appropriate date.

flows of education is not usually so large, because the coverage of education in Africa has expanded more rapidly than elsewhere. In the Philippines, however, where education also expanded rapidly, the lead for both flows and stocks of persons with four or six years of primary education is between 30 and 45 years, less over Zambia than Uganda or Ghana.

At basic secondary levels, the order of the African countries is reversed and, as regards flows, the lag is reduced. In Cuba, for example, primary education was widespread after the turn of the century but the coverage of secondary education was, and remained, limited. Thus in terms of the annual output of persons with seven years of education Cuba's lead over Uganda was very roughly 50 years, the Philippines about 35 and Burma's (urban population) about 50. Over Ghana, the lead was less but Zambia until recently was further behind.

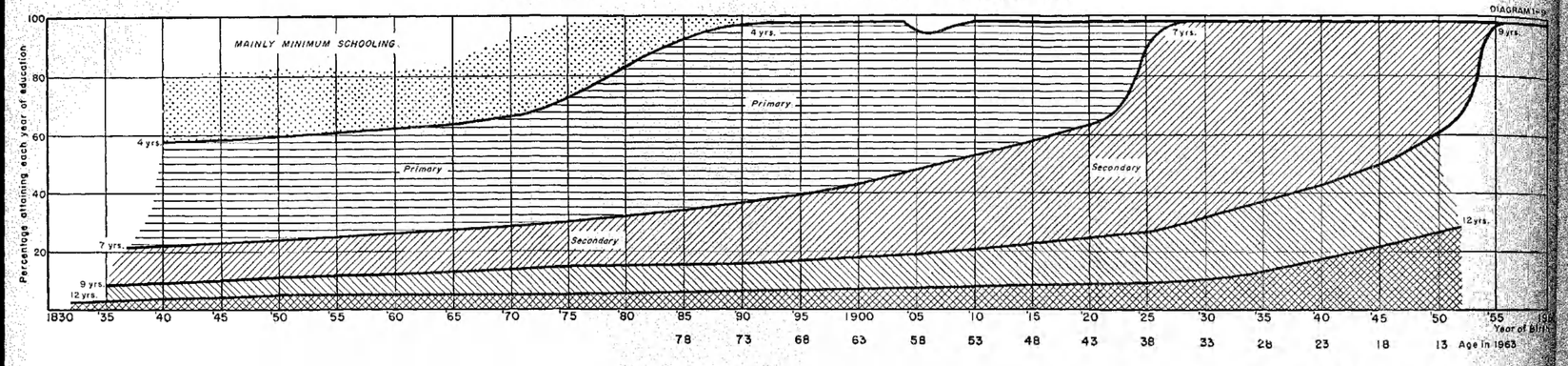
The length of the lead cannot, of course, be taken as a measure of how long it will take to reach the stage of another country. The profiles of both countries will be extending according to the different education policies and accelerated programmes of school expansion may effect marked improvements in the educational levels of the younger age groups. In addition, educational attainment among the adult population need remain constant only in the absence of widespread programmes of adult education. Thus, both in schools and outside them, there are opportunities to make big improvements in the levels of skill and education of the population.

Nevertheless it is helpful to get some feel for the magnitude of the educational lead which the developed countries have over the under-developed. A continuous profile[1] is available for France, based on data published in the periodic censuses since 1851. This profile is shown as Diagram I—9[2] and used to illustrate the dimensions of the gap between the profiles of developed countries and of Africa.

Comparisons may be made with several aspects of the French profile. In terms of basic education, it appears that even 100 years ago well over half the total population in France had reached minimum levels of formal schooling. The literacy rate in France in

1. From a Table of enrolment ratios since about 1850, constructed by M. Pierre Maes of the Bureau de Statistique de l'Universitee, Paris, whose helpful discussion on a number of aspects in this study is gratefully acknowledged. His original data is included in an article by M. Debeauvais, "The balance between the different levels of education", printed as Chapter 20 of E. A. G. Robinson and J. E. Vaizey, eds., *The Economics of Education* (Macmillan, London, 1966).
2. Diagram 1—9 also includes projections until 1970 based on the current educational plans.

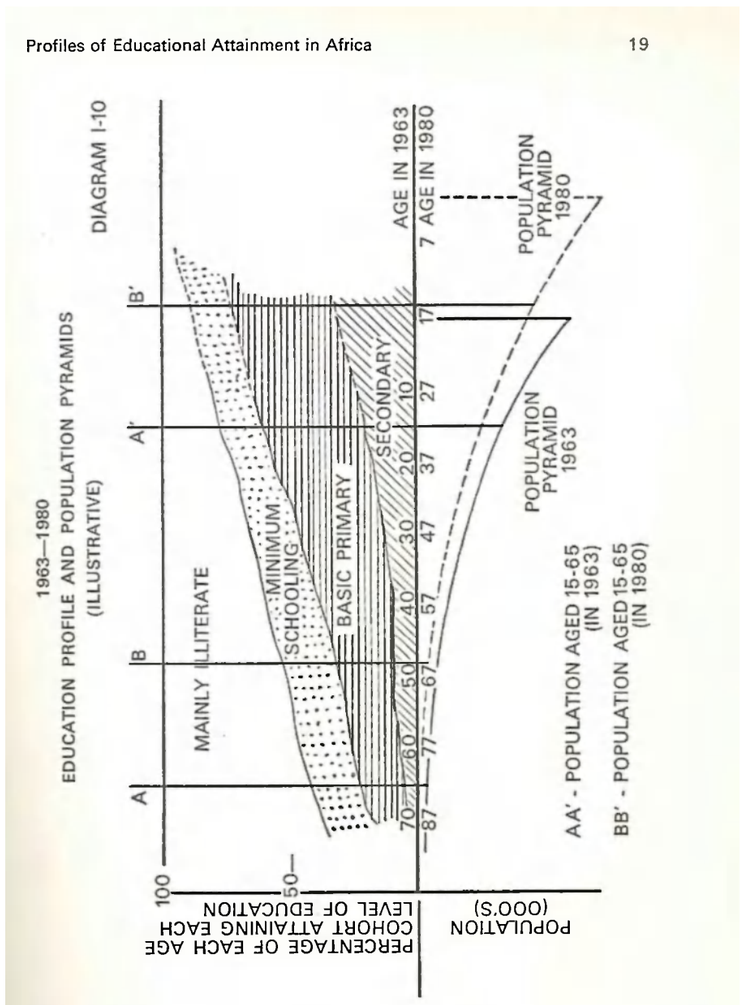
FRANCE – EDUCATION PROFILE OF TOTAL POPULATION BORN 1830–1960



Source: Constructed after estimates of enrollment ratios 1850–1970 made by Pierre Moes, Bureau Universitaire de Statistique, Paris

1863–1960

1872
toda
towa
1980
Afri
thos
the



1872 was 77 per cent, a situation far in excess of any African country today. Given continuous rapid expansion of African education towards, for instance, the target of universal primary education by 1980, as called for by the Addis Ababa conference, the profiles in Africa amongst the youngest age groups could begin to resemble those of France in the 1880's, 100 years before. But, even if the lag is reduced to 100 years among the lowest age groups,

there will still be a large backlog remaining among the older groups. This would be true for most African countries, although closer comparison of the three profiles with that of France will show that the backlog will be greater for countries like Uganda and Ghana than Zambia.

Above the minimum levels of education the length of the lag is even longer. At levels of schooling of ten years duration or above (the barest qualifications for "high-level manpower") none of the three African countries approaches the levels achieved in France in the 1850's, even among persons under 25, and the lag at the higher levels is even greater.[1]

Note however the growth of school coverage shown in the African profiles is considerably faster than the very gradual expansion of the French profile until the 1890's. To this extent, continued expansion of education in the African countries may enable them to achieve the former position in France, by exceeding the French profile by a greater margin in the younger age groups than the margin by which they fall behind in the older. In terms of total population they would then have an equal number of persons educated to a particular level as France had, although the age structure of this educated group will be markedly younger. In other words, the emphasis on youth will long remain in the developing countries.

IV. The Education Profiles, the Labour Force and Development

The education profiles as given refer to the total stocks of education within the whole population. But the available stocks, of course, need not correspond with the stocks in use. By increasing the proportion of the available stocks in use, or the intensity of use, a country whose profile lags far behind may appreciably reduce the consequences of the lag. This is of crucial importance for economic and manpower planning in the developing countries.

The distinction between the availability and use of manpower is also vital when using profiles to analyse the relationship between education and development. Differences between profiles of whole populations may for instance be more significant for social and political changes than for economic development. For economic

1. If the differences in the population pyramids are taken into account when the profiles are compared, the differences between the profiles become less extreme. This is partly because in every profile the left-hand sections are quantitatively less important than the right, and partly because the rapid rates of population growth in Africa have produced an exceptionally large proportion of younger persons in the total population. Thus the numerical weight of the right-hand sections of the African profiles is usually greater than in the profiles of more developed countries.

development, the profile of the labour force (monetary or subsistence) or the profile of the male population separately may be more relevant, and for other purposes the profile of the urban population, or of immigrants, may be wanted.

If participation in the labour force were not related to age or level of education, the profile of the whole population would indicate the age-education structure of the labour force simply by reducing the whole population pyramid by a constant factor, corresponding to the "crude activity rate"[1] in the country concerned. Conversely, studies which link development directly to the total stock of education implicitly assume that the crude activity rate is unity.

There is, however, clear evidence that participation in the labour force is related to age and sex. Diagram I—11 shows the rates of male and female participation in the labour force of Ghana in 1960 (including subsistence agriculture, and unemployed, excluding home-makers). It also gives the average rates of participation in two groups of agricultural and industrialized countries as a standard of comparison. A number of points arise from Diagram I—11 but only those directly relevant to the age-education profile will be mentioned.[2]

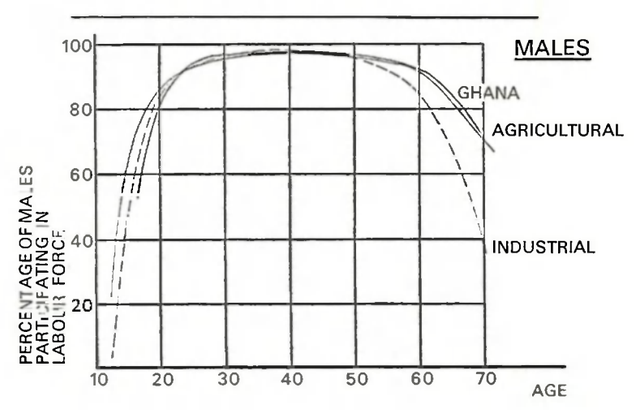
First, providing the subsistence sector is included, a large and remarkably consistent proportion of the male population aged 15 years or more belongs to the economically active population, in agricultural and industrial countries alike. As regards males, therefore, the age-education profile of the total male population closely approximates the profile of the male labour force. Because of slightly higher participation rates in the agricultural countries, the approximation is a little closer than in the industrial countries. Comparisons between the education profiles of the male populations would then slightly overstate the educational standards of the labour force in the more developed country compared with the less developed.

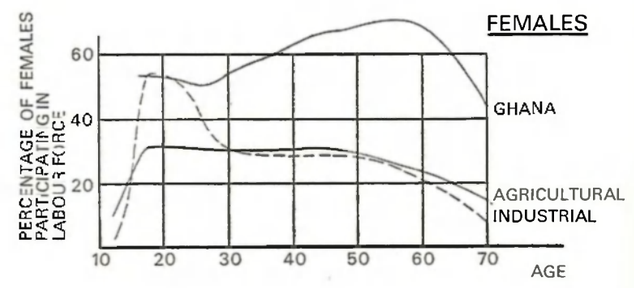
Secondly, female participation in the labour force varies more widely. Rates of participation in industrial countries are generally much higher than in agricultural countries among women under 30 but above this age slightly lower. Ghana appears to be an exception though its high participation rates probably arise as much from a very wide definition of "active population"[3] as from the

1. Total economically active population as percentage of total population.
2. For full details, the reader is referred to the sources: United Nations, *Demographic Aspects of Manpower*, 61, XIII, 4 and *1960 Population Census of Ghana, Advance Report of Volumes III and IV. 1962*, pp. XIV–XVI and Table 29.
3. See *op. cit.*, pp. xiv–xvi.

DIAGRAM I-11

RATES OF PARTICIPATION IN LABOUR FORCE IN GHANA AND TWO GROUPS OF AGRICULTURAL AND INDUSTRIAL COUNTRIES





Source: *Other Countries: United Nations*
Ghana: Population Census 1960. Data

ubiquity of lively women traders and "Mammy wagons". Because of the low proportion of females engaged in the labour force, in both the variations between and industrial countries, the education profile of the total female population is a poor proxy for that of the female labour force, and worse in agricultural countries than in industrial. There is probably some tendency for lower overall rates to disguise higher rates among more educated women.

Just as employment is related to age, there is also evidence that employment and unemployment in Africa is related to education. In Zambia, for instance, a much higher proportion of the more educated persons was employed in the money economy and a much lower proportion was unemployed. The rates of participation of males in the wage earning labour force in 1963 varied from under 20 per cent among those with no education at all to almost 75 per cent of those with nine years or more. Participation increased at each level of education, but unemployment (of the wage earning labour force)[1] decreased, from 30 to 12 per cent, less markedly than might be expected.

For Ghana and Uganda comparable data is not available, though unemployment was certainly more widespread among primary school leavers than among persons with more education. This is a common characteristic of unemployment in the developed countries, and is probably true of most of the less developed countries.

Thus although participation in the labour force varies with age and education level, the age-education profile is a fair approximation to the education profile of the potential labour force, at least among males. For the female labour force, or for the urban and rural populations separately, either a separate profile can be constructed, or a more complicated matrix of labour force participation must be used. In either case, the basic profile remains important. It shows the total stock of educated persons available, whatever the purpose. It shows the age-education structure of the whole population. Whenever development arises from the efforts of those outside the labour force, the profile of the whole population is wanted. Because universal schooling has a value in itself, the coverage of education among the whole population is of basic interest.

In any case, for planning, the historical tendency in one country, or the average tendency in a number of countries is no indication of a pattern which inevitably must continue or cannot be changed. There is considerable scope for varying participation rates, especially among women. The mistake of imagining that persons not actively employed are not useful (according to some definition which excludes home and family activity) must of course be avoided. But with this in mind, rates of participation should be analysed and planned, to meet the needs of national development.

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1. Defined as the total of the employed and those "seeking paid work last week" at the time of the census (May 1963). Unemployment as a percentage of total males (i.e. including those in subsistence) formed a remarkably constant eight to 12 per cent of all those with three years schooling or more. Data from *Economic Development of Zambia*, United Nations, 1964, based on 1963 National Census.

The relation between the educated labour force and the schools thus involves a double link between the labour force and the educated population and between the educated population and the schools. The second link is the subject of Chapter 2.

APPENDIX

The Construction of Age-Education Profiles

Two methods can be used to construct an age-education profile for a particular country. The most straightforward is the use of census data on educational attainment of the population. Providing this information is available in detail, the profile can be prepared directly by simply calculating the percentage of each age group attaining or completing each level of education. This method was used for the profiles of Ghana, Cuba, Burma and the Philippines. (For Ghana, census information on educational attainment was only available for broad age groups and estimates had to be made of the detailed breakdown within them.)

The second method is to build up the profile from historical data on school enrolments and population. Diagram II—3 in Chapter 2 shows what is involved. For as many years as possible, enrolments (less repeaters) are completed for each level of schooling for which a contour of the profile is wanted. These enrolments are then expressed as enrolment-ratios by dividing by total population in the age group related to the enrolment and year in question. By plotting these enrolment ratios for each group, the profile is produced. This method was used for the profiles of Uganda and Zambia.

A graphical approach is particularly convenient when using historical data which is incomplete. The trend in total enrolments can first be plotted, filling in any gaps by interpolation. The continuities of the educational system make interpolation an appropriate technique, both for the trend in enrolments and for the profile itself. The profile for France was constructed from census data on school enrolments, interpolating for periods between censuses.

Chapter 2

MANPOWER FLOWS IN THE SCHOOL SYSTEMS OF DEVELOPING COUNTRIES

I. Introduction

This chapter deals with the basic manpower flows in an educational system of a developing country. Its purpose is to investigate the relationship between the structure of a national school system and the levels of educational attainment which the system produces within the population of the country—between the school pyramid and the education profile.

The chapter begins by showing why a quantitative approach is needed for both analysis and planning of an educational system and states the underlying assumption of such an approach. In the main section of the chapter, the key elements in the manpower flows within an educational system are discussed: the flows are related to the size of the school pyramid and the pyramid is related to the educational profile, first in the static case and then as the system expands. The manpower limitations to expansion are explained and the financial costs of education are expressed in terms of the manpower variables of the system. In the appendix, a model of the system is worked out algebraically and its parameters related to statistical measures in current use.

II. The Need for a Quantitative Approach

However varied may be the range of individual abilities, motives or experiences, certain generalizations must be made about them if social activities are to be analysed and planned. This is the case with education. No quantitative analysis of the flows of students, the qualifications of teachers or the pass rate in the examinations can adequately describe all the complexities of a national school system, let alone the virtues of a good headmaster or, indeed, the value of education itself. Nevertheless a quantitative approach is necessary, if only to decide how many classrooms will be wanted or how much teachers' salaries will cost in total.

There are two specific reasons why a quantitative approach is needed if education is to be planned. First, a national system of education, as opposed to an unco-ordinated collection of private schools, must be planned in global terms. Only thus can it be made internally consistent and related to such things as total population, employment, and economic needs. The sheer magnitudes involved—the hundreds of thousands of pupils enrolled, for instance—make

it impossible to do this except numerically. Secondly, many of the components of the educational system have an economic importance in direct proportion to their number. This is most obviously true of manpower, but it also applies to classrooms, desks and other materials. In this respect, to concentrate on the flows of manpower within education, far from being a crude misrepresentation of an educational system may in fact be giving proper attention to what is, economically speaking, the most significant part of it.

The need for a model, as opposed to a statistical description, arises because schooling is a long-term process. There are well-established relationships between, for instance, enrolments in one year and enrolments in the next. Furthermore, an expansion of enrolments requires additional teachers, and therefore an expansion of enrolments in teacher training some years previously. These, and other such interconnections, mean that a quantitative model is indispensable for an adequate analysis. Again note that in many respects, particularly economic, the model can closely correspond to the actual process of educational expansion.

The need for a global approach is worth emphasizing because of the common belief that planning a national school system involves many of the same considerations as running a school. (This belief explains why educational commissions are often dominated by educationalists with years of school experience). In fact, national planning involves macro-considerations as different from those at the micro-level as central banking differs (or should differ) from commercial. Unless changes in the educational system of the country are related to the changes they will *cause* in employment, manpower and the economic and social structure of the country, as well as to changes within the schools, the decisions will be inadequate. It is particularly for analysis at this level that a formal framework for analysing the system is needed.

III. The Underlying Assumption in a Global Quantitative Approach

Implicit in the approach followed is the assumption that the quantitative aspects of an educational system can be meaningfully discussed and planned apart from the qualitative ones. Both are important and necessary for a complete analysis and to some extent, it is admitted, one is influenced by the other and is a substitute for the other in making plans. (As when an improvement in the examination pass rate results from, or makes more acceptable, a lower enrolment.) But it is assumed that, in the main, the interconnections between them are of second importance.

As regards the *aims* of education, this assumption can be justified on the grounds that planners themselves are interested in quantitative achievement *per se*. Educational attainment, for example, is often measured in terms of "a number of years of schooling" and compulsory schooling is usually defined within a certain age range, not level of scholastic attainment. In part, these conventions have arisen because of the difficulties and ambiguities in measuring educational quality, especially when making comparisons over time. In part, they reflect the judgment that a major way to raise the quality of education is to extend the length of schooling.[1] But these are precisely the reasons why a quantitative model may be acceptable, even if qualitative matters are excluded from it.[2]

As regards the *results* of education, a separate treatment of the quantitative aspects can be defended on the grounds that the qualitative aspects are largely exogenously determined. In developing countries, improvement in quality of performance is largely a matter of improving the quality of instruction and school environment—both of which are often more directly related to teacher training and school organization than to the quantitative aspects of expansion.[3] A major exception to this assumption would be in countries where the ablest students were already enrolled and expansion would therefore have to draw in those less capable. But this implies very accurate methods of selection and in any case does not seem relevant in countries where very few students reach the higher levels and where many children never get to school at all.

IV. The Basic Manpower Flows within a School System

The most important economic aspects of a national school system are all closely related to its manpower flows: outputs are manpower and so are most of the inputs. Developments from year to year are largely changes in the flows of manpower: students moving up each year through the different school classes and, eventually, out into the economy; teachers being drawn from the accumulated stocks of educated people and used to teach the present flows of students. Furthermore, the financial cost of the manpower—

1. This was the judgment made by the Castle Commission in Uganda, which recommended raising the quality of primary education by reducing wastage. But the Commission failed to take account of the enormous quantitative implications of this "qualitative" recommendation, thereby leaving their proposals seriously incomplete. See A. R. Jolly and E. R. Rado, "Education in Uganda: Reflections on the Report of the Uganda Education Commission", *East African Economics Review*, January 1965.
2. The need for making international comparisons is a further reason for having a quantitative model.
3. This issue is discussed further in Chapter 4, Section II.

teachers' salaries and the opportunity costs of the earnings forgone by the students—comprise most of the total financial cost of education. The educational system may therefore quite accurately be treated by the economist as a dynamic process of manpower flows.

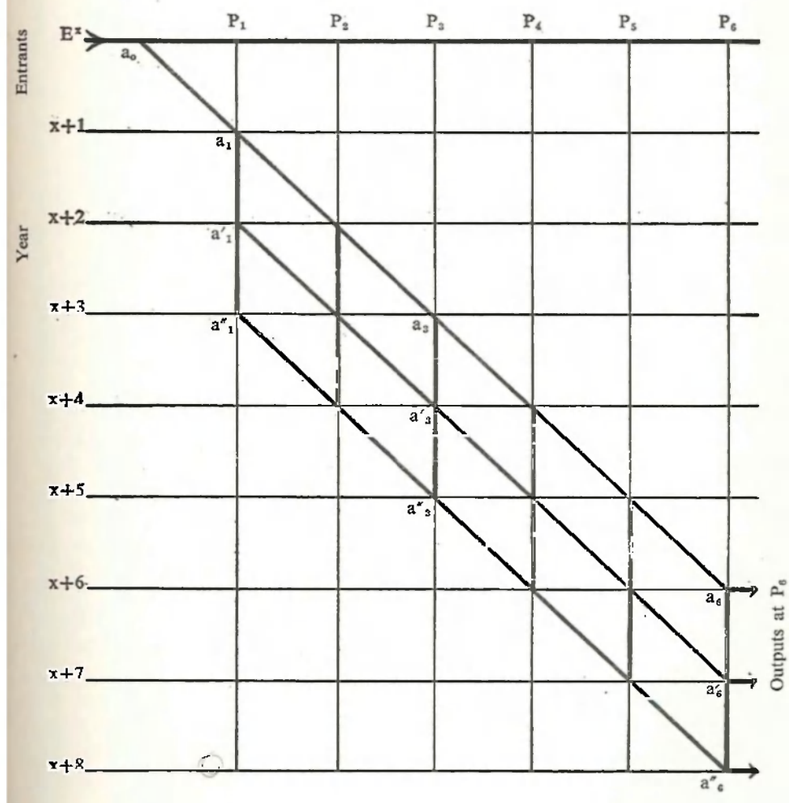
The main lines of flow are very simple. A student enters the system in the lowest class and generally moves up one class each year. Sometimes he may repeat a class and delay moving up a year. At some point he leaves the system either because he has completed the full course or because he has dropped out part way along it. In a national system of education, the path of an individual's progression is repeated many times over, with students starting in different years, progressing to different points, repeating at different places and dropping out at different levels.

The progression of any person along the school system depends on an interaction between the structure and capacity of the system and the individual—between the "supply" of the system and the "demand" the individual makes upon it. But whereas for any individual the chance of advancement depends very much on his capabilities and preferences relative to the capabilities and preferences of his fellow students, the progress of the student body as a whole is almost entirely given by the availability of places, and thus by the global structure of the system. It is true, of course, that not all available places are usually filled and the reasons for this are taken up in different sections of this study. But the scarcity of facilities in most developing countries means that the capacity of the school system is the dominant factor in determining the quantity of manpower flowing along the system, by setting a maximum to the initial intake and to the numbers who can go forward at crucial points within the system.

Between the crucial points set by capacity, consistent causes will be operating to impede the steady flow of students along the stream. Even though capacity is available, there will be a steady wastage due to "drop-out" and a consistent backwash in the flow of students due to "repetition". Both are much less important in the developed countries where drop-out is forbidden by laws of compulsory education (and basic schooling is free) and repetition is either unnecessary (because sufficient places are provided at the next stage of education)[1] or out of favour (because the authorities prefer automatic promotion and "streaming" instead of holding back students

1. This of course does not apply to the higher levels of education in the developed countries where both drop-out and repetition may be important.

DIAGRAM II—1
PROGRESSION OF NEW ENTRANTS THROUGH PRIMARY SCHOOL SYSTEM



to ensure that they really have mastered the content of the course for the particular year). But in developing countries short of facilities, at low levels of subsistence, charging school fees and lacking legal compulsions, drop-out and repetition are often considerable.

At first sight, it might appear that drop-out and repetition, being largely influenced by individual circumstances, are beyond prediction. In fact, however, for a large body of students, the average rates are

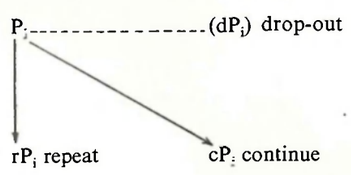
fairly constant from year to year. Where variations occur, they are mainly the result of major changes in the structure of the system or gradual trends in social and economic attitudes towards schooling The major changes are usually changes in the supply conditions—expansion of secondary capacity, variations in school fees, revisions in examination and repetition policy and so forth—which can be taken account of when making predictions.

It is thus possible to estimate likely rates of continuation, repetition and drop-out. From a manpower point of view, these rates are the key to understanding (and planning) the flows of manpower within a school system. They are essential to any projections and plans which attempt to link inputs with outputs in an education system.

For a detailed analysis of a whole system, the rates of continuation, repetition and drop-out for each class and for each year must be specified. The algebra is dull and trivial—the calculation being the sort that becomes meaningful when based on the data of an actual country and used to forecast the results of future developments. Thus the algebraic model of the flow system is relegated to the appendix.

Continuation, repetition and drop-out can be illustrated with the aid of Diagram II—1. Promotion to a higher class is measured by a movement to the right, successive years by a movement downwards. Thus a new entrant to the system, entering in year t, and gaining promotion at the end of each year, neither repeating nor dropping out, would trace out a career represented by the path a_0,a_6. In contrast a student who repeated once at the end of the third class, would follow a path shown by a_0,a_3,a'_3,a'_6.

Given rates of continuation, repetition and drop-out the full range of school careers of a group of entering students can be determined. If, for instance, the proportions of those who continue, repeat and drop out are c, r and d, the outcome at any junction of the system would be as represented below. (P_i is the total number enrolled in all "i"th classes of the system. Because continuation, repetition and drop-out are the only possibilities open and mutually exclusive, $c+r+d=1$).



The effects of continuation, repetition and drop-out on a cohort of students entering the system in any particular year is the full "spread" of careers shown in Diagram II—1. A certain proportion of students carry straight through to the highest class. At each junction, others branch off into repetition or drop out. The higher the rates of repetition and drop-out, the larger the proportion of students deflected on to an indirect progression or an early demise, and the smaller proportion carrying straight through.

One related characteristic may be mentioned here. In a school system without repetition or drop-out, the average age in each class will be simply one year greater than the average age in the previous class in the previous year. Repetition acts to raise the average age in each class according to the proportion of repeaters in the system. Providing the chance of repeating or dropping out is independent of the age of students, average age and repetition rates will be strictly associated.[1] The average age of the class would then depend on two factors: the average age of the students at entrance, and the rates of repetition since. For typical rates of repetition the average age in any class would not be raised by more than a year, if that. High average ages are thus usually the result of over-age at entry, rather than events afterwards.

Finally the picture may be expanded to show the effects on a continuous stream of entrants. This is done in Diagram II—2. Without repetition, the flows of students would be parallel and separate. But with repetition, a great deal of overlap develops, as the entrants in any one year spread out across several classes. In practice, the spread is unlikely to overlap more than three classes, for the proportion of students repeating three times or more is usually very small.[2] Thus in any one class it is unlikely that there will be students from more than three entering cohorts. But within all classes and at all levels of a school system, there may be persons who entered the system over a 20-year period, at different stages of their school careers. Thus the one-year dimension of the school pyramid covers a 20-year dimension of manpower flows. This is the key point to be unscrambled in any manpower approach to education planning.

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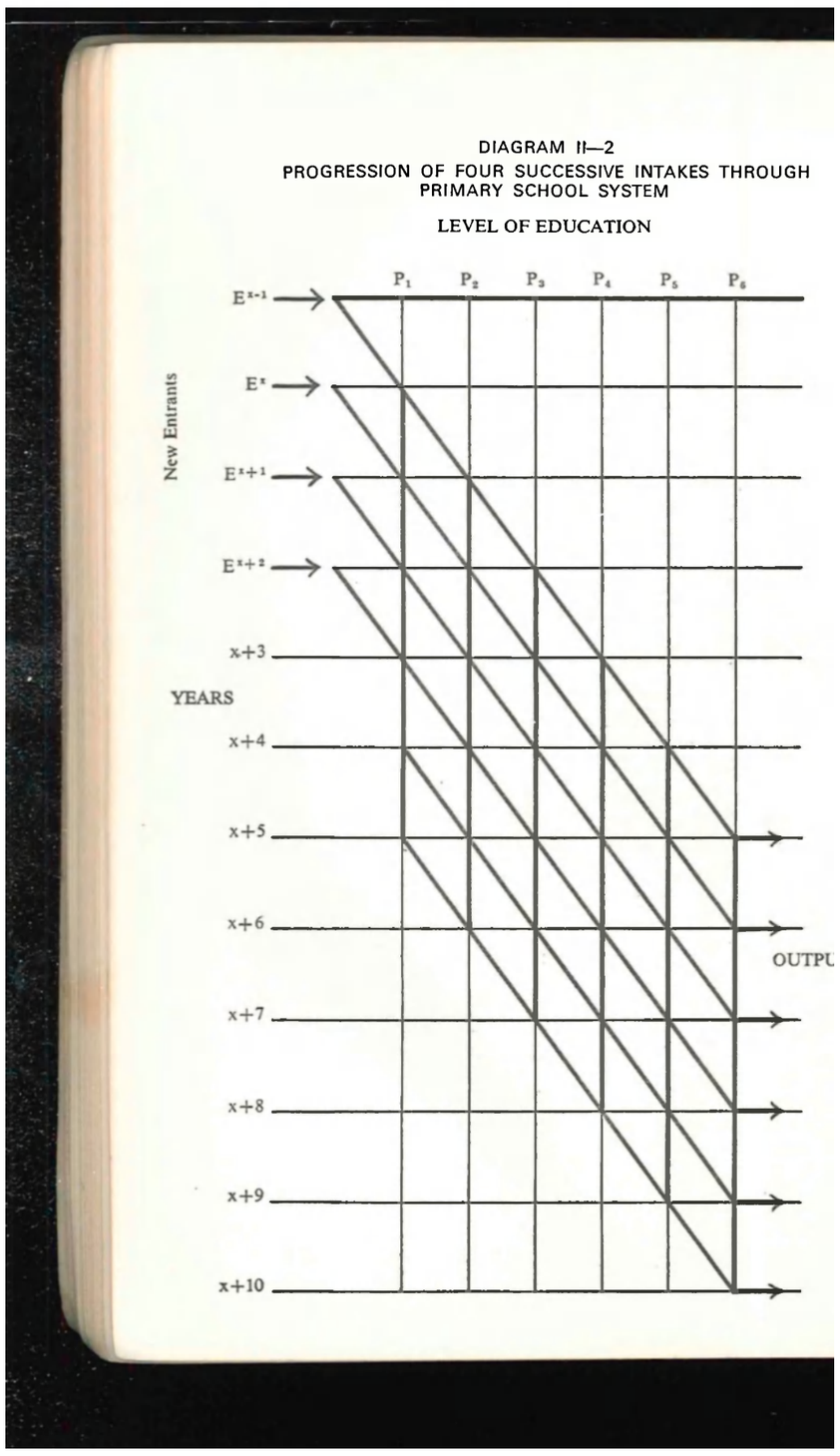
1. This carries the further implication that differences in the average age of classes could be used to estimate the rates of repetition.
2. There are three reasons for this:
   (i) the order of magnitude of persons repeating three times is r^3 which for typical rates of r will be only one or two per cent or less.
   (ii) the probability of drop-out rather than repetition usually rises when a student's age greatly exceeds that of the class average.
   (iii) repetition more than twice is often forbidden or discouraged.

DIAGRAM II—2

PROGRESSION OF FOUR SUCCESSIVE INTAKES THROUGH PRIMARY SCHOOL SYSTEM



The basic point to be realized is that the manpower flows form the human—and central—core of an educational system. They determine the dynamic relationships between enrolments in one year and enrolments in the next, and so to a large extent give the growth of the system a life of its own. And it is the manpower which is important.

Not merely are these flows inherent in the structure of the educational system, they are usually the most consistent pattern available for planning. Efficient planning must attempt to preserve this consistency, so that arbitrary changes neither block groups of students in their rise, nor create new school places which no students are available to fill. Manpower should be the focus.

V. Measurements of Manpower Flows and their Relation to the Profile

The major difficulty in maintaining this focus on manpower flows is that educational measurements are usually framed in terms of the size and structure of the educational system as it exists at the moment—on what may be called the educational pyramid, for convenience. This preoccupation with the present pyramid is of course very understandable. The pyramid is what exists at the moment, whereas the flows are in part past history, in part future projections. Furthermore, the pyramid represents the educational system with which administrators are currently concerned, for which policy decisions have to be taken and from which expenses arise. All the rest is either past or future, and as such practical men are less concerned with it.

There is thus a dichotomy between the planner's main concern and the administrators, and this will require careful watching if the proper focus of planning is not to be submerged in the preoccupations with administration.

This is in part a matter of interpretation and emphasis. But it is more than this. The statistical data that are collected, being focused on the pyramid, are often insufficient to identify the flows. Occasionally (usually for technical and vocational courses outside the main academic stream) enrolments are not even broken down by level. But more often, it is because other information is missing.

Fortunately, the broad lines of flow can be constructed providing information on enrolments is available which is (a) comprehensive, (b) broken down by year of schooling, (c) available for several successive years. All of this is usually part of the data about the school pyramid. This leaves information on repetition as the main

omission, but here it may be possible to obtain information from a sample survey.

The key manpower measures of an educational pyramid are the following:

Total enrolments at each main level—P, S, and H, the total enrolments in primary, secondary and higher institutions.

The total population in each eligible age group—A_p, A_s, A_h the number of children eligible for primary, secondary, etc., schooling.

The number of teachers—T(P), T(S), the number of teachers for primary and secondary schools.

Each of these measures can be specified in more detail and with further subdivisions where necessary. Thus primary enrolments can be specified by individual classes, secondary enrolments by type of study (academic, technical, teacher training, etc.), higher enrolments by subject of study. Age groups can be broken down by sex, and by district or by urban and rural areas. Teachers can be grouped by qualification, length of experience, age and so forth.

That these measures are not by themselves adequate for judging the changing flows within the system or of outputs can be seen very readily. Total enrolments may be growing because (i) the number of entrants is (or has been) increasing, (ii) the rate of repetition is increasing, (iii) the rate of drop-out is decreasing.

Total enrolments as a proportion of the eligible age group can be increasing but the proportion of children getting to school be falling. This could follow if (i) the number in the eligible age group rose faster than initial enrolments or (ii) the rise in enrolments were mainly or entirely the result of decreasing rates of drop-out or increasing rates of repetition. Thus neither true output nor coverage can be determined without knowing the manpower flows.

In the last resort, there is no adequate alternative to producing a manpower flow chart and setting up permanent procedures to obtain the necessary information. But in the short run, or when making comparisons with systems in other countries for which only pyramid data are available, flows can be estimated from data on the pyramids, if enrolments are known for two successive years, and some estimate of repetition is available.

But this indirect approach would be unnecessary, if the need to plan education in terms of manpower flows were generally accepted. A flow chart of *students*, rather than of places, would then become a basic tool in educational planning. Information on repetition and drop-out would then be in every-day use and thus collected as part of the basic statistical returns. The trends in these rates would then

be projected by ministries directly concerned, and perhaps more easily strike the right balance between evidence and assumption.

Besides the need to link flows with the educational pyramid the links between the flows and stocks of education must be established—that is, the education profile. If the manpower flows are fully identified, this task is obviously straightforward. But in addition, a simple direct relationship exists between the education profile and a modified form of education pyramid, which can be shown without the need to articulate fully all the manpower flows.

Enrolments at each level minus all repeaters at that level ($P_i^t - R$) gives the number of persons attaining each level of education for the first time. This enrolment divided by the total population in the age group corresponding to the average age of the class,[1] defines an enrolment ratio. These enrolment ratios for all levels of the school system give an educational pyramid, which traces out the increment of educational attainment for that year. This is linked with the age-education profile as shown in Diagram II—3.

The dynamic relationship between this education pyramid and the profile has been mentioned briefly in Chapter 1. Each year, the pyramid shifts to the right, tracing out the level of educational attainment among the younger groups of the population, adding an increment to the education profile of the whole population. At the left-hand end, the contours of the profile continue generally unchanged, although their significance in terms of the absolute numbers each year declines, as mortality takes its toll of the upper age groups.

From year to year, the school pyramid itself is likely to be changing. At many levels, the pyramid may be expanding, due both to an expansion of enrolments (relative to eligible population) and to a decline in repetition.

At the same time, a decrease in repetition will be narrowing the interval between each section of the pyramid: in addition, the whole pyramid may be shifting further to the right, due to the effects of lowering the average age of school entry. All of this will be leaving its traces on the education profile of the country.

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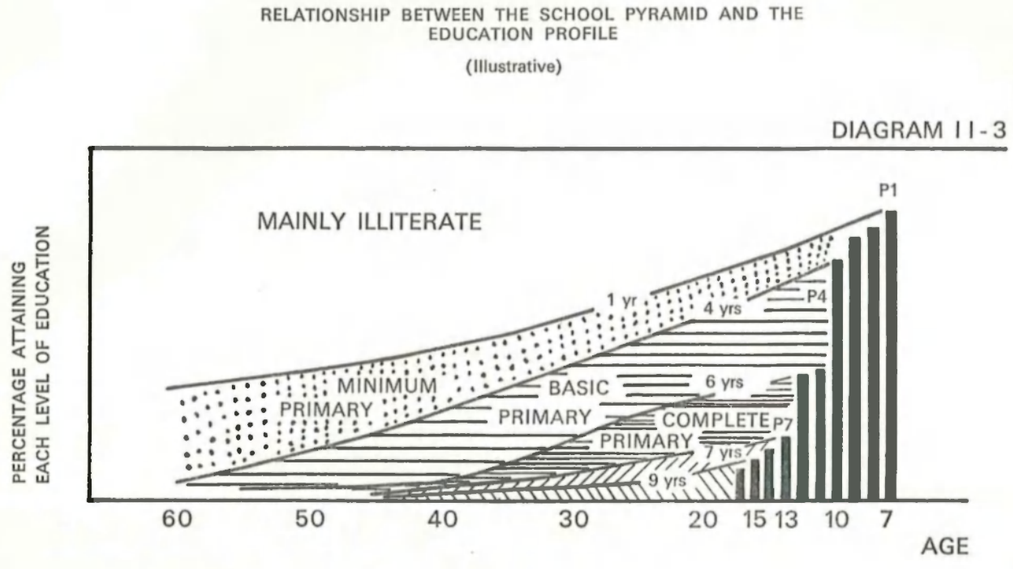
1. Or less accurately, the official age corresponding to that level of schooling. Note however that whereas errors in estimating the average age of the class make little difference, neglect of repetition introduces an error in the increment to the profile in direct proportion to the rate of repetition. If the profile is defined in terms of number of years schooling instead of the level of schooling reached, a more complicated relationship is involved and repetition is still important.

RELATIONSHIP BETWEEN THE SCHOOL PYRAMID AND THE EDUCATION PROFILE

(Illustrative)

DIAGRAM II-3



VI. The Costs of Education and the Limitations on Expansion

(1) *Manpower Restraints*

The educational system has been treated in the previous sections as predominantly a matter of manpower flows. Expansion of the school pyramid and thus of the coverage of education is a matter of expanding the flows of manpower, drawing more students and teachers into the educational system. With rapid expansion of the school pyramid, the profile itself begins to change, even if more slowly than the pyramid, until the levels of educational attainment in the whole population resemble more closely those of the now more developed countries.

The limitations on the speed of this expansion will be largely economic constraints; the increasing costs of education measured in terms of the additional manpower and finance needed to provide for the new schools. Both forms of restraint may be illustrated from the variables and relationships already introduced.

The manpower restraints can be seen most easily from Diagram II—3. Expansion of the education pyramid requires additional students and additional teachers, the latter in some proportion to the students (given by the desired teacher-pupil ratio). Primary entrants are drawn from the pool of school-age children and at higher levels from the supplies of students already enrolled in the lower classes. The teachers are drawn from the stocks of educated persons indicated by the more educated sections of the age-education profile.

As was shown in Chapter I, the long-standing backwardness of secondary education in Africa has resulted in extremely small stocks of persons with secondary or higher education and in relatively small flows of schoolchildren within the secondary levels. Both account for secondary education being the manpower bottleneck to expansion. This can be seen from Diagram II—3. Expansion of the educational system at higher levels requires additional students—and is therefore limited by the shortage of students already within the pipeline (indicated by the narrow apex of the education pyramid). Expansion of the system at secondary levels is hindered by a shortage of teachers. The students are plentiful (indicated by the relatively wide proportions of the primary sections of the pyramid) but the teachers are in scarce supply. Expansion at senior secondary levels thus has to rely predominantly on teachers from abroad. In terms of manpower, therefore, it is not surprising that the dominant

constraint at secondary levels is the shortage of teachers and at higher levels the shortage of students.

At primary levels there is usually little scarcity of manpower. Any lack of trained teachers can usually be remedied in a few years or, less satisfactorily, by-passed by using untrained primary school leavers as pupil teachers. This also can be demonstrated from Diagram II—3. The students required for primary expansion are available from the pool of school-age children not yet enrolled: their teachers can be trained from the relatively large numbers of primary school-leavers. Thus the bottleneck to expansion at primary levels appears not as a shortage of men, but a shortage of finance. The shortage of secondary educated manpower appears as the constraint on finding staff for teacher-training and better qualified teachers and thus improving the quality of education.

(2) *Recurrent Costs*

Because manpower is the basic input of education, the financial costs of education are primarily the costs of manpower. In most African countries, salaries account for 80 per cent or more of the recurrent costs of primary schooling. At higher levels the percentage is less, but not if the opportunity costs of the students are included. In other words, at all levels of education total manpower costs comprise the overwhelming proportion of total recurrent costs.

The financial costs may therefore be derived "by putting a price on the head" of each unit of manpower involved. Total salary costs of (say) primary schooling will be the product of T(P), the number of primary teachers, and W, the average primary teacher's salary (including fringe benefits, etc.). Total recurrent costs will then be total salary costs times (1+k) where k is the proportion that non-salary costs bears to total salary costs.

Total recurrent cost (C_1) can thus be written:[1]

$$C_1(P) = T(P) \cdot W(1+k)$$

and expanded to become

$$C_1(P) = P \cdot t_p \cdot W(1+k)$$

or

$$A_p \cdot p \cdot t_p \cdot W(1+k),$$

where A_p is the total number of the population in the primary school age group, p is the primary enrolment ratio defined as the proportion of the primary age group enrolled in school and t_p is the primary teacher-pupil ratio.

1. The original derivation of this formulation can be found in Svennilson, Edding and Elvin, *Targets for Education in Europe in 1970*, Policy Conference on Economic Growth and Investment in Education, Washington, 1961 (O.E.C.D. Paris).

Recurrent cost may also be shown in relation to G.D.P. by dividing each side of the formula by the identity

$Y = A.y,$ where Y is G.D.P., A is total population and y is *per capita* G.D.P.

$$\frac{C_1(P)}{Y} = \frac{A_p}{A} . p . t_p . \frac{W}{y}(1+k)$$

From this formula, the proportion of G.D.P. going to recurrent expenditure on primary education is seen to depend on five factors:

$\frac{A_p}{A}$, the proportion of school-age children in the total population.
p , the primary enrolment ratio.
t_p , the teacher-pupil ratio.
$\frac{W}{y}$, the average teacher's salary as a multiple of *per capita* income.
$(1+k)$, the proportion of total costs to salary costs.

(3) *Capital Costs*

In addition to recurrent cost which is mainly identified with manpower, education involves considerable capital expenditure, mainly on construction. At this level of analysis there is little that can be said in detail. The number of classrooms required is a direct function of total enrolment and average class size. At primary levels, average size is usually very close to the average pupil-teacher ratio. At secondary levels teachers are often allocated in some fixed proportion (say, $1\frac{1}{3}$ or $1\frac{1}{2}$: 1) to each class and therefore class size is proportionately greater than the pupil-teacher ratio. As a first approximation, therefore, we have the demand for buildings at primary levels, B(P), given by the following relationships:

$B(P) = P . t_p . U_{pc},$ where U_{pc} is the unit cost of a primary classroom.

If teachers' houses are also part of the usual school construction, the equation would read:

$B(P) = P . t_p . (U_{pc}+U_{ph}),$ where U_{ph} is the unit cost of a primary teacher's house.

C_2, capital expenditure in any one year is, of course, a function of the increment in gross demand and thus

$C_2(P) = \triangle P . t_p . (U_{pc}+U_h).$

There are considerable economies of scale in school construction. Generally for both classrooms and schools, the larger the capacity the cheaper the cost per student. The average class size is therefore of great importance for determining the total capital costs of expansion, even when the increase in total enrolments (P) is fixed. It goes without saying that the unit costs are highly influenced by the construction standards adopted.

At the secondary level, a much wider range of buildings is required, many of which are not directly related to class size. Some, like classrooms and dormitories, are needed in proportion to total enrolments; other, like the administrative buildings and laboratories, are not and thus provide great opportunities for economies of scale. More relevant, therefore, than a measure of class size is to relate the capital costs of secondary education to school size. This could be expressed in an equation, but at this level of analysis it is more meaningful to summarize the main issues involved. These are:

(*a*) That there are considerable economies of scale to be derived from double or triple streaming schools.

(*b*) That a large proportion of the capital costs of a new school must be incurred in the first year, *before* enrolments have fully built up. Capital expenditure may therefore lead by several years the build-up of enrolments.

(*c*) That unnecessarily high standards of construction and design appear in practice to be considerably more important than optimum size in explaining variations in costs at all levels.

Obvious as these comments may seem, it should be noted that in much education planning estimates of costs are made on a *per student* basis rather than by directly costing the physical resources involved. This procedure obscures the possible alternatives (for instance, the effects on the costs of primary education of varying the pupil-teacher ratio) which a costing in terms of a number of units of manpower or buildings would make clear.

Finally, the dynamic influences on capital costs may be mentioned. It seems that in many countries building standards are subject to strong upward pressures, from demonstration effects and the ambitions of people who want to build better than before. Architects, ministry officials, contractors and politicians all too easily are inclined to press for higher standards of *construction*, often with little serious thought as to whether it would raise standards of *education*. In fact, it frequently results in lowering the quantity of educational facilities provided, and doing nothing to raise the quality of education. This is especially obvious over the long run, for once

the standards of building have been raised, it is extremely difficult to return to the former level.

While this is no doubt true in many sectors of developing countries, it is particularly important with educational building. This follows because schools are a basic unit, produced many times over and involving a large proportion of the capital budget. There is thus great scope for savings. Secondly, schools are often in the forefront of a development programme and thus set a standard to be followed elsewhere. Many students get their first glimpse of modern standards from life at school. If the school buildings start with a style totally above what will be generally possible in the economy for many years ahead, it can develop attitudes which will frustrate general development and foster an elite.

APPENDIX

An Algebraic Model of Flows within the School System

Mathematical models are increasingly being developed to analyse and plan educational systems. Most of the models developed to date are quantitative and macro though a few focus on qualitative and micro problems. Some of the macro-quantitative models confine themselves to the basic flows of students outlined in the last chapter but many go far beyond this, both in the complexity and comprehensiveness of their analysis of the educational system and in linking the educational system with the rest of the economy. For further details, the literature must be referred to directly. A short introduction includes a bibliography and useful classification of many of the recent models can be found in Hector Correa, "Mathematical Models in Education".(1)

The algebraic model which follows is confined to the basic flows of students in order to establish the relationships between them, the education pyramid and the age-education profile.

1. Published in M. Blaug, ed., *Educational Planning, The World Yearbook of Education 1967* (London: Evans 1967).

Consider an algebraic model of flows within the school system composed of the following elements. (A summary of the notation is given at the end of the appendix).

Students

P — the number of all students in primary schools, classes (say) 1–6.

P_i is the number in the i^{th} class.

Thus $P = \sum_{i=1}^{6} P_i$

S — the number of all students in junior and senior secondary schools, classes (say) 7–12.

Using the same notation as before

$$S = \sum_{i=7}^{12} S_i$$

H—the number of students in higher education (say) years 1–5 after secondary. Thus

$$H = \sum_{i=13}^{17} H_i$$

R—the number of "repeaters", students enrolled in any class in which they have previously been enrolled. Thus R_i^{t+1} are the students in class P_i^{t+1} who were also in P_i^t.

Teachers

T—the total number of teachers within the education system of whom T(P) teach primary classes, T(S) teach secondary classes, etc. Where necessary, the teachers are classified by qualification; thus T_j is the total number of teachers who themselves have completed j years of education, of whom (for example) T_j (P_i) teach primary class i.

Ratios

By relating these numbers of students to the total eligible school population, various enrolment ratios may be derived. Let A_a be

the number of persons aged a years and $A_{a1\text{-}a}$, the number aged a1 to a2 years inclusive.

The UNESCO unadjusted enrolment ratios are then

$$\overset{v}{p} = \frac{P}{A_{5\text{-}14,}} \qquad \overset{v}{s} = \frac{S}{A_{15\text{-}19}} \qquad \overset{v}{h} = \frac{H}{A_{20\text{-}24}}$$

and the adjusted enrolment ratios, for courses of the length specified, would be

$$\hat{p} = \frac{10}{6}\,p; \qquad \hat{s} = \frac{6}{5}\,s \text{ and } \hat{h} = h.$$

Because of the variation in the ages of children starting school, and the effects of repetition, the above ratios only approximately indicate the proportions of the various age groups who attend school. A better, but still inadequate, ratio is enrolment in any given class (say P_i) in relation to the single age cohort corresponding to the appropriate age of that class.

Thus $p_i = \frac{P_i}{A_{a+i}}$ where a+1 is the official age for starting school (and the official age is therefore (a+i) in P_i)

The number of teachers may be related to the students by means of the teacher-pupil ratios. (Note that these are expressed as the reciprocal of the more common pupil-teacher ratios).

Thus

$t_i = \frac{T(P_i)}{P_i}$ for each class separately, or

$t_p = \frac{T(P)}{P}$, $t_s = \frac{T(S)}{S}$ and $t_h = \frac{T(H)}{H}$ for the different levels of education.

Time

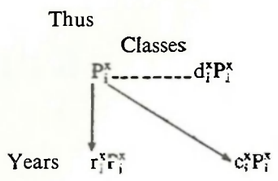
Each of the variables and ratios introduced is likely to vary from year to year. The specific school year to which each refers will therefore be indicated, when necessary, by a suffix x.

Thus $p_i^x = \frac{P_i^x}{A_{a+i}^x}$

is the enrolment ratio of the i^{th} class in year x in relation to the population cohort aged (a+i) years.

Consider enrolments P_i^x in the i^{th} class along the system. At the end of year x, a proportion c_i^x of the students continue into the $(i+1)^{th}$ class, a proportion r_i^x repeat the class and a proportion d_i^x drop out.

Thus



$r_i^x p_i^x$ is the number of repeaters;
$d_i^x p_i^x$ is the number who drop out from the system.

As these three courses of action are taken to be mutually exclusive and all embracing, we have

$$d_i^x + r_i^x + c_i^x = 1, \text{ for all } i$$

The complete set of (d_i, r_i and c_i)'s for any year x determine the relationship between the educational pyramid of year x and that of year (x+1). This relationship may be interpreted as the rates of continuation, repetition, and drop-out inherent in the existing structure of the educational system. This measure may be contrasted with a succession of rates, say,

$$(c_1^x, r_1^x, d_1^x; c_2^{x+1}, r_2^{x+1}, d_2^{x+1}; c_3^{x+2}, r_3^{x+2}, d_3^{x+2} \ldots)$$

which would correspond to the rates relevant to an individual starting school in year x. In other words, the opportunities for education facing any particular group of school entrants is not the overall shape of the school pyramid at the time they enter school, but the relationship between the complete succession of pyramids during the whole of their school career. This of course introduces a further complication whenever repetition is prevalent. Different persons of the same group of entrants may face different educational opportunities, if (through repetition) some lag behind at a time when the pyramid is rapidly expanding. They may then face a better chance of promotion after repeating than they did before.

If the rates of repetition, continuation and drop-out are identical for all groups of students in the same class, regardless of whether some have previously repeated, then the possible paths which the E^x new entrants will take during their school career are shown in Diagram II—2. A proportion ($c_1 \ldots c_{i-1}$) of E^x will continue through the system without repeating, reaching class i in year x+i aged a+i. A smaller proportion, ($r_1+r_2 \ldots r_i$) ($c_1 \ldots c_{i-1}$) will repeat once, at some stage of their school career, completing class i in

year (x+i+1) aged ($\bar{a}$+i+1). A yet smaller proportion ($r_1(r_1+r_2+\ldots r_2)+r_2(r_2+r_3+\ldots r_i)+\ldots r_i^2$) ($c_1 \ldots c_{i-1}$) will repeat twice, completing class i in year (x+i+2) aged ($\bar{a}$+i+2). Inspection of the diagram will show that if repeating up to n times in a school career is allowed, the proportion of E^t completing class i after repeating n times is

$$(c_1 \ldots c_{i-1}) \sum_{j \geq k \geq \ldots \geq n=1}^{i} r_j r_k \ldots \quad r_n$$

who will complete the class in year (x+i+n) aged ($\bar{a}$+i+n).

If repetition is permitted twice at most, the range of possibilities is shown in Diagram II—1. A decreasing proportion of the original entrants, E^x, will reach the i^{th} class in successive years (having repeated increasing numbers of classes). These proportions are purely a function of the rates of repetition. This follows from having assumed that the rates of continuation, repetition and drop-out (c, r and d) were identical for all groups of students, regardless of whether some had repeated previously. If, however, a student who has repeated previously is less likely to continue, the proportions of those continuing who never had repeated would be higher than the average rates of continuation. (In Diagram II—1, the rates of continuation, c, along the direct path a_1a_6 would be greater than the rates c′, c″ along the lower paths a'_1,a'_6; a''_1, a''_6, etc.). The proportion of students reaching P_i without repeating would then be increased relative to the total of all students reaching P_i. The average age of all persons reaching P_i would also fall. If, in addition, the chance of drop-out rises, the larger the number of previous repetitions, the proportion of those reaching the i^{th} class after n repetitions will be increased relative to the number with (n+1), for all n.

For the reasons given in Chapter II the proportion of students repeating three times or more within their school careers is usually very small. Because of this, repetition more than twice will be neglected in what follows. Thus, along the path a''_1,a''_6 the rates of repetition are zero ($r''_i = o$) the rates of continuation unchanged (c″) and the rates of drop-out increased to $d''_i = 1 - c''_i$.

The total number of entrants E^x reaching P_i is then

$$(c_1 \ldots . c_{i-1})\, E^x \,.\, (1 + \sum_{j=1}^{i} r_i + \sum_{j \geq k = 1}^{i} r_j . r_k)$$

The results obtained for a single group of new entrants, all of the same age, may now be applied to continuing intake of new

students, who enter the school system in successive years at a variety of different ages. A typical intake in year x might be composed as follows:

Year of entrance	x
Total number of entrants	E^x
Average age at entrance	$\bar{a}^x$

Total enrollment in the i^{th} class in year $(x+i)$ will now be the proportion of E^x who reach P_i without repeating, the proportion of E^{x-1} (the entrants into the system in year $^{x-1}$) who have repeated once, and the proportion of E^{x-2} who repeated twice. Thus

$$P_i^{x+i} = (c_1 \ldots c_{i-1}) \left\{ E^x + E^{x-1} \sum_{j=1}^{i} r_j + E^{x-2} \sum_{j \geq k = 1}^{i} r_j . r_k \right\}$$

of whom the number enrolled in class P_i for the first time (non-repeaters in P^{x+1}) are

$$P_i^{x+i} - R_i^{x+i} = (c_1 \ldots c_{i-1}) \left\{ E^x + E^{x-1} \sum_{j=1}^{i-1} r_j + E^{x-2} \sum_{j \geq k = 1}^{i-1} r_j . r_k \right\}$$

$$= c_{i-1} \; P_{i-1}^{x-1-i-1} \quad \text{as expected.}$$

The average age of class P_i^{x-1} would then be

$$\frac{\bar{a}^x E^x + E^{x-1}(1 + \bar{a}^x) \sum r_j + E^{x-2}(2 + \bar{a}^{x-2}) \sum r_j . r_k}{E^x + E^{x-1} \sum r_j + E^{x-2} \sum r_j . r_k}$$

which depends on $\bar{a}$, E, and r but is independent of c.

By considering the series of first-time enrolments in the i^{th} class over a number of years, the total number of persons born in a particular year and who attain the i^{th} level of education will be counted. In this respect $\sum_{x_2}^{x_1} (P_i^x - R_i^x)$ will be an approximation to the number of persons born between the years $(x_1 - i - \bar{a})$ and $(x_2 - i - \bar{a})$ who attain the i^{th} level of schooling. The wider the interval between x_1 and x_2, the more accurate the approximation, because only at the ends of the interval is the coverage of the two measures different. Because of this, an age-education profile, constructed from a continuous series of annual enrolment data, can reproduce very closely the actual coverage of schooling among each age group of the population (even though the profile is built up from data based on

the year in which students were enrolled rather than their age when at school). It is true that at times of rapid school expansion a profile constructed like this will tend to overstate slightly the coverage of schooling among the older school age groups and to understate it among the younger. But this will be offset to some extent by the tendency for the average age of school entry to decline. It should be noted however that neither of the two errors affects in total the estimated number of persons attaining the i^{th} level of school, but simply attributes some of them to the wrong age group.

The final stage is to convert $(P_i^x - R_i^x)$, the estimate of the number of persons born in a particular year attaining the i^{th} level of education for the first time into an enrolment ratio. The problem is to choose the best estimate of the age group from which they are drawn. Under the assumptions of the model, the interval between the average age of each class will be slightly greater than one year, depending on the rates of repetition. If this interval (measured in years) could be subtracted from the average age of the class, the resulting total would be (i-1) years greater than the average age at which the class entered school, and thus provide an estimate of $\bar{a}$. In practice, the effects of repetition on average age usually make less than a year's difference in total and (in absence of data) adjustments for any lengthening of the interval in ages between classes may be neglected.

However, differences between the official age of starting school and the actual average age at entrance are likely to be more important. These can be allowed for, if in converting $(P_i^x - R_i^x)$ to an enrolment ratio, the denominator is chosen as the single population cohort, $A^x_{\bar{a}+i}$ (persons $\bar{a}+i$ years old in year x). As explained above, the numbers in the cohort equal to the observed average age of the class $P_i^{\bar{i}}$, is a fairly close (within less than a year) estimate of this.[1]

1. Although, as this will systematically over-estimate the appropriate age, the size of the cohort will be under-estimated and thus the enrolment ratio (of which the size of the cohort is the denominator) will be slightly, but systematically, overestimated.

Key to Notation

Symbol:

P	*Number* of Students at Primary level.
S	Students at Secondary level.
H	Students at Higher level.
R	Repeaters—number enrolled who were in the same class in the previous year.
E	Entrants into primary school.
T	Teachers.
$A_{a1\text{-}a2}$	of total population in age group a_1 to a_2 years
a	*Age of entry to school* Official.
$\bar{a}$	Average age.
t	Teacher-pupil ratio.
p	*Ratios of* Primary enrolment (to total population in eligible age group)
s	Secondary enrolment.
h	Higher enrolment.
r	*Rates of* repetition.
c	continuation.
d	drop-out.
C_1	*Costs of* education: recurrent expenditure.
C_2	capital expenditure.
Y	*G.D.P. or National Income.*
y	*per capita Y.*
W	*Average teachers'* wage or salary.
k	*Proportion* of non-salary costs to total salary costs.

N.B.
1. Suffixes i and x are used with most symbols, i to identify the level by (year) of the class and x the date (calendar year).
2. P., S., H. are used in brackets to identify the level of schooling: thus T (P) and C_1 (P) are the number of teachers and recurrent expenditure at *primary* level.

Chapter 3

A CASE STUDY OF EDUCATIONAL EXPANSION: UGANDA

Chapter 1 has shown the age-education profiles for several African countries and contrasted them with profiles of countries in other continents more advanced in educational development. Chapter 2 discussed the manpower flows in relation to the profiles and the educational systems which over time have created them. Chapters 3 and 4 provide the data which can give life to the manpower approach. Chapter 3 follows the expansion of the educational system in one country—Uganda—over the last 35 years, drawing attention to trends in the flows and uses of manpower and showing how they have affected the profile. Chapter IV discusses the limitations to rapid educational expansion in the light of experience elsewhere in Africa.

I. The Experience of Uganda: A General Outline

1. *Economic Background*

Uganda is an agricultural country of about 91,000 square miles, lying on the equator in East Africa, about 800 miles inland from the Indian Ocean. Its population numbered over 7,000,000 in 1962, and was mainly African, drawn from over 20 tribal groups, speaking seven major languages. Uganda became independent in 1962 and under the present political structure is divided into a number of traditional kingdoms, and into four major regions. About ten per cent of the African population are recent immigrants from other countries. The non-African population numbered 96,000—about 80,000 Asians, 11,000 Europeans and nearly 5,000 Arabs and others. The African population has recently been increasing by about two and a half per cent per year. The non-African population has grown faster—more than five times since 1931 (when Asians numbered 13,000 and Europeans 2,000), nearly half this growth having occurred since 1948.

The economy is predominantly agricultural, two-thirds of Gross Domestic Product being derived from farming and over 90 per cent of exports being agricultural. Cotton and coffee produce more than 60 per cent of all export revenue, and together are the major determinants of G.D.P. The subsistence sector is still large

and agricultural diversification is slight. *Per capita* income was estimated to be about £23 in 1962, higher than Tanzania's lower than Kenya's.[1]

Economic growth between the 1930's and mid-fifties was considerable, encouraged by rising export prices during the war years and, afterwards, during the Korean war boom. Then for nearly a decade growth was slow. G.D.P. in real terms rose by only 26 per cent between 1954 and 1962, and *per capita* income hardly changed. This was largely the result of declining export prices, though it also reflected the stagnation of cotton output (in part because growers switched to producing coffee) which until 1965 never regained the level of 1938 production. Although G.D.P. since 1962 has risen rapidly, in 1965 only about 228,000 of the African population were in wage-earning employment, a figure which had changed little for a decade, and therefore represents a declining proportion of the total labour force. About 40 per cent of all wage-earners were employed in the public service, and a somewhat higher proportion of graduate-level manpower.

2. *Institutional Background*

In Uganda, as in many other African countries, educational enterprise owes its origin to the Christian missions who for nearly 50 years were responsible for all schooling in the country.[2] Its unco-ordinated beginnings were summarized by the Phelps Stokes Commission in 1925: "An educational system which branches out into the whole protectorate has been brought into being by missions in co-operation with the native chiefs but without any supervision from the colonial government and, until recently, without any government financial support."

By 1925, the missions could report a total of 157,000 children in school and of these about 18,000 were attending central schools. The Phelps Stokes Commission, however, considered that most of these were of very poor quality and that 500 would be a liberal estimate of those who had attained the third or fourth standard.

The year 1925 introduced new developments in Ugandan education. A Department of Education was set up and the first

1. Recent evidence suggests that Gross Domestic Product in Uganda has been undercounted by ten per cent or more in the monetary sector. See *Work for Progress, Uganda's Second Five Year Plan 1966-71* (Government Printer, Entebbe, 1966), p. 10.

2. Prof. E. B. Castle, in his book *Growing Up in East Africa* (Oxford, London, 1966) rightly emphasizes that traditional society in East Africa had its own forms of education, in operation long before the arrival of Europeans. The implications of this for that form and content of modern schooling is well brought out in his book.

Director of Education was appointed. The Department assumed general responsibility for the direction and control of education, though the ownership and management of schools remained almost entirely with the missions. District Boards of Education were started and also a Central Advisory Council of African Education. In the following year an Advisory Council for Indian Education was created.

Thenceforward, education developed within a more organized framework. Government training for teachers was started in 1927. A year later, post-secondary education was initiated at Makerere,[1] which until then had been concentrating on technical courses. Throughout the 1930's, government aided and inspected education —usually organised and administered by the missions—expanded and assumed an ever more important place in the whole system.

In 1940, the Thomas Education Committee reviewed the situation and drew up a programme for 1941 to 1945. Owing to the war, many of the recommendations were not implemented and in 1946 a new Development Plan was published.

Three educational commissions visited Uganda between 1947 and 1951 and made recommendations. In 1952, a major educational (the de Bunsen) report was prepared laying the guidelines for developments over the next decade. The World Bank Mission in 1961 made further recommendations, some of which were tentatively embodied in the Five Year Development Plan (1961/2–1965/6). In 1963, the Castle Commission was appointed to make recommendations for the future of Ugandan education. Their report has been published and incorporated within subsequent plans of the Ministry.[2]

Non-African education in Uganda was started after African, though here again missions or private agencies made the first moves. By 1920 a number of private schools for Asians were already in existence, and when the Department of Education was created, grants in aid were paid to them. In 1932, a Government Indian

1. From 1938 onwards Makerere developed as a post-secondary higher college, self-governing with independent finance, with obligations to the three territories of East Africa. In 1949 Makerere was admitted to special relationship with the University of London and arrangements made for candidates to take London external degrees. After Uganda obtained independence in 1962, it was natural that the independence of the university would follow. Thus in 1963, the University of East Africa was created with Makerere College forming one part, and the Royal College in Nairobi and the University College in Dar es Salaam the other two. University education is not covered in this Chapter. Guy Hunter's, *Education in a Developing Region: a case study of East Africa* may be referred to for details.

2. For a critique of its purely qualitative approach, see E. R. Rado and A. R. Jolly, *op. cit.*

school was started in Kampala and another in Jinja the following year. Two Goan schools were started about this period. There were also several private schools for Europeans, but no government school was started until 1939. Even after this, although several European schools existed, many European children continued to study abroad, most in Kenya, but some in England and elsewhere. Government assistance in the form of subsidies was paid in many of these cases. No European secondary schools were established.

After the Second World War, further schools for non-Africans were started and various development plans guided expansion.

Since 1957, it has been government policy to proceed toward the integration of the school system and to abolish racial divisions. Schools have become "predominantly" rather than "exclusively" those of a particular racial group, and gradually the degree of predominance has decreased, particularly at secondary level.

The constitutional changes which culminated in the Independence of Uganda in 1962 involved considerable changes in responsibility for administration and control of education services. Responsibility for the administering of primary education was given to the Kingdom governments, Regional Administrations, and urban authorities. In one Kingdom, Buganda, responsibility for most forms of secondary education was handed over as well.

Thus many individuals within government as well as in mission and private agencies have had a part in formulating educational policies and in building the Ugandan school system into its present form. The following study is solely concerned with the quantitative and global record of developments, though it should be stressed that the author is under no illusions about the insufficiency of this record by itself. Other parts of the story can be found in the annual education reports, in numerous government and private documents,[1] in a number of research papers of the East African Institute of Social Research[2] and in the full history of Ugandan Education which some Ugandan has yet to write.

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1. A few of these are listed at the end of this study. The most complete bibliography available is J. J. Shields, *A Selected Bibliography on Education in East Africa, 1941–61* (Makerere University College, Kampala, 1962). But see in particular Guy Hunter, *op. cit.*, and Peter Williams, *Aid in Uganda: education*, (Overseas Development Institute, 1966). The curriculum of the Uganda school system until 1961 is summarized in *Education in Uganda*, U.S. Department of Health, Education and Welfare (U.S. Government Printers Office, Washington, D.C.) prepared by Professor David Scanlon.

2. A number of major research studies were conducted during 1962–65 on different aspects of the school systems in Uganda. See in particular, research papers and reports by Jonathan Silvey (on aptitude testing and educational selection), Sheldon G. Weeks (on the social setting of urban day schools), P. E. Phipps (on the reading habits of educated adults), B. A. Phipps (on the teaching profession in Uganda) and H. C. A. Somerset (on secondary school leavers).

3. *The Present Educational System*

The system of education in existence in 1964 is shown in Diagram III—1 and is described below.[1]

The basic Primary course lasts six years, although there have been increasing pressures to make the Junior Secondary course which follows it into an integral part of primary education (and the complete course is to be reduced to seven years after 1966).[2] At the end of Primary VI, children reach the Primary Leaving Examination, after which some go forward to Junior Secondary schools, a few enter vocational training and most leave school forever. Two years later, those who continued after Primary VI reach the Junior Secondary examination, which narrows the school pyramid still further. There are only places for less than half the pupils finishing the eighth year to continue, and most have to drop out. Of those who find places, the majority stay in the main academic stream, and the others join teacher training, technical or farm schools on vocational courses. Recently, a few have entered a modified form of secondary academic course. The main academic stream continues until the twelfth year, terminating with the school certificate examination. If successful, most of these students can continue into various forms of post-secondary education. The best proceed through higher school certificate to university education. Others after secondary school join teacher-training or departmental training courses (agricultural, police, veterinary, etc.), start local university courses in certain subjects (Fine Arts, Land Development, Architecture and Domestic Science), or begin university courses abroad (especially in the United States where normal entry is equivalent to good school certificate levels.) A few enter employment at this stage, though many of these find further training in their new jobs.

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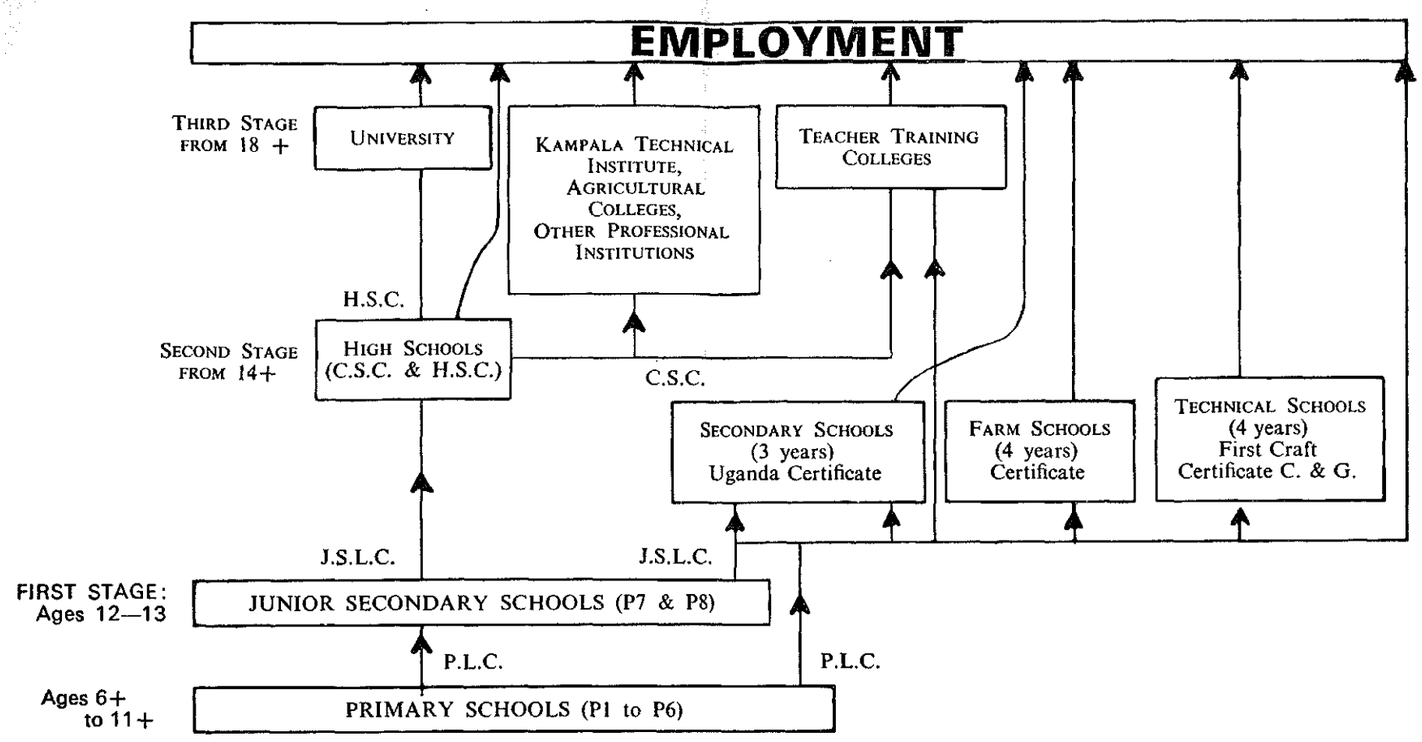
1. Since 1925, there have been many changes, both in the length of different sections of the system and in what each is called. Thus post-primary academic classes, for example, originally formed years 7 to 9 and 10 to 12 of the system, and now form years 7 and 8 and 9 to 12. They have been called successively: Intermediate A and B schools. Upper middle and Junior Secondary schools, and Junior Secondary and Senior Secondary schools. In the descriptions and later sections of the chapter, current terms and definitions (as given below) are used. Whenever there has been a change in the length of some course, enrolments have been separated into the years of schooling they represent, and allocated between levels according to current definitions. While this procedure is not entirely satisfactory, it is unambiguous and accords with that used for constructing the profiles.

2. See, for instance, *Education in Uganda*, The Report of the Uganda Education Commission, 1963.

THE SCHOOLS STRUCTURE IN UGANDA

DIAGRAM III-1



Notes:
1. By 1967, Primary and Junior Secondary Schools will be combined into a single seven-year course.
2. As expansion proceeds, the proportion of students entering teacher training and vocational schools from Junior Secondary schools increases, while the proportion from Primary 6 decreases.
3. Departmental and Industrial Training Schemes, e.g. Schools of Hygiene, Railway Training School (Nairobi), have not been included in this diagram—they provide an additional vocational training for a small proportion of children after the second stage of education.

P.L.C. = Primary Leaving Certificate
J.S.L.C. = Junior Secondary Leaving Certificate
C.S.C. = Cambridge School Certificate
C. & G. = City and Guilds
H.S.C. = Higher School Certificate

II. The Changing Characteristics of Ugandan Education

Developments in the organization and structure of the educational system in Uganda have been accompanied by changes in the flows of students within the system at each period. The outputs from these flows have already been shown in the age-education profile of Uganda, given in Chapter I. In this present section, the flows themselves are analysed, with emphasis on the long-run trends. The analysis centres on the key measurements of flow introduced in Chapter II, although additional data is introduced when available. At the end, the flows within the present system are given in some detail.

1. *Enrolments*

Tables III—1, III—2, and III—3 present the enrolments in Uganda schools at five-year intervals since 1928. Table III—1 refers only to African enrolments, Table III—2 to non-African and Table III—3 to the total of III—1 and III—2. Because Africans form the vast majority of all students, attention will mainly be concentrated on Table III—1, with comments on the other tables only when some difference is important.

Four features between 1928 and 1963 shown in Table III—1 are particularly striking. First, there was extremely rapid expansion at all levels of aided education. Primary enrolments, for instance, rose from under 13,000 to over 450,000 and senior secondary enrolments from under 200 to nearly 8,000. Secondly, there were remarkably consistent rates of expansion in the general streams of education (primary, junior secondary and senior secondary). Although fluctuations in teacher training and technical and vocational training have occurred (including higher-level enrolments at Makerere) these were largely the result of war-time conditions, and overall expansion has been considerable. In part the steady rate of expansion in aided schools is the result of only showing enrolments at five-year intervals (although even the annual series reveal few setbacks). This is all the more remarkable considering the fluctuating fortunes of the country over the period—the years of depression in the early 1930's, the war years a decade later, the prosperity during the Korean war boom followed by declining commodity prices in the late 1950's. Furthermore, not only economic circumstances, but policies and administration have greatly changed over the period. Independence brought its own challenges and problems: the pressing need for high-level manpower and the strains of a change-over in administration at the time when overseas investors were

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TABLE III—1

TOTAL AFRICAN ENROLMENTS IN UGANDAN SCHOOLS (excluding unaided secondary level enrolments) 1928–1963

	1928	*1933*	*1938*	*1943*	*1948*	*1953*	*1958*	*1963*
PRIMARY—aided	12,832	18,012	47,621	71,732	141,979	196,578	317,879	451,186
unaided	224,435	229,582	258,537	—	80,578	82,673	134,576	—
total	237,267	247,594	306,158	—	222,557	279,251	452,455	—
JUNIOR-SECONDARY (years 7–8)	(2,318)[a]	(1,521)[a]	802	1,369	2,935	5,764[c]	11,844	34,868
SENIOR-SECONDARY (years 9+)	(193)[a]	(263)[a]	280	693	1,443	1,850[b]	5,610	7,702[f]
Total Secondary (years 7+)	(2,511)[a]	(1,784)[a]	1,082	2,062	4,378	7,614[c]	17,454	42,570
TEACHER TRAINING	374	1,647	831	918	1,870	2,791	4,057	4,029[h]
TECHNICAL AND VOCATIONAL	410	543[d]	1,148	162	1,788	3,977	4,585	3,385[b]
MAKERERE	92	117	168	114	222	—	—	—
Annual average percentage rates of increase								
PRIMARY—aided	7	21	9	15	7	10	7	
unaided	—	2	—(− 11)[e]	—	1	10	—	
total	1	4	—(− 3)[e]	—	5	10	—	
JUNIOR-SECONDARY	(−8)	(−12)	11	16	18	13	24	
SENIOR-SECONDARY	(6)	(1)	20	16	6	20	7	
Total Secondary	(−7)	(−10)	14	16	15	15	14	
TEACHER-TRAINING	34	−13	2	15	8	8	−(0)	
TECHNICAL AND VOCATIONAL	6	16	−32	62	17	3	−6	
MAKERERE	5	8	−8	14	—	—	—	

Source: 1928–1958 Annual Reports of Education, Uganda. 1963: Ministry of Education, Uganda.

N.B.—Current definitions of each level of education are used. Enrolments in earlier years are classified according to the number of years of schooling represented by each level.

[a] No breakdown available between aided and unaided
[b] Est. figures for 1952, from de Bunsen Report (p. 71)
[c] May include a few unaided enrolments; refers to 1952
[d] Excludes 4.409 enrolled in mission schools in "special classes," some of vocational type.
[e] Ten year average
[f] Includes secondary modern and higher certificate enrolments
[g] Includes both upper and lower middle schools, corresponding to years (5–6) and (7–8) respectively
[h] Total enrolments, possibly including a few of other races

TABLE III—2

NON-AFRICAN ENROLMENTS IN UGANDAN SCHOOLS (excluding unaided secondary enrolments) 1928–1963

	1928	*1933*	*1938*	*1943*	*1948*	*1953*	*1958*	*1963*
INDIAN[a]								
PRIMARY TOTAL	608	936	2,450	3,712	5,904	9,027	15,195[d]	14,641[c]
JUNIOR SECONDARY	—	—	89	—	—	1,443	3,051	4,247
SENIOR SECONDARY	—	—	50	—	—	824	1,846	3,307
Total Secondary	—	—	139	482	991	2,267	4,897[b]	7,554[c]
EUROPEAN TOTAL	—	23	31	65	142	521	1,083	811

Source: 1928–1958 Annual Reports of Education, Uganda. 1963: Ministry of Education, Uganda.

[a] Including Goan
[b] Excluding 83 teacher trainees
[c] Including all non-Africans and non-Europeans
[d] Includes 372 unaided enrolments

TABLE III—3

TOTAL ENROLMENTS IN UGANDAN SCHOOLS AT PRIMARY AND SECONDARY LEVEL. ALL RACES (excluding unaided secondary level enrolments) 1928–1963

	1928	*1933*	*1938*	*1943*	*1948*	*1953*	*1958*	*1963*
PRIMARY—aided	13,440	18,971	50,102	75,509	148,025	206,126	333,785	466,562
unaided	224,435	229,582	258,537	—	80,578	82,673	134,948	—
total	237,875	248,553	308,639	—	228,603	288,799	468,733	—
SECONDARY—junior (years 7–8) ..	(2,318)	(1,521)	891	—	—	6,884[a]	14,895	39,163
senior (years 9+) ..	(193)	(263)	330	—	—	2,554[a]	7,456	11,037[c]
total (years 7+) ..	(2,511)	(1,784)	1,221	2,544	5,369	9,438[a]	22,351	50,200
TEACHER-TRAINING	374	1,647	831	918	1,870	2,791	4,140	4,029
VOCATIONAL AND TECHNICAL	410	543[d]	1,148	162	1,788	3,977	4,585	3,385
Average percentage rates of increase								
PRIMARY—aided	7	21	9	14	7	10	7	
unaided	—	2	—(−11)[b]	—	1	10	—	
total	1	4	—(− 3)[b]	—	5	10	—	
SECONDARY—junior (7–8) ..	(−8)	(−10)	—	—	—	14	21	
senior (9+)	(6)	(5)	—	—	—	20	8	
total	(−7)	(−7)	16	16	15	15	17	
TEACHER-TRAINING	34	−13	2	15	8	8	−1	
VOCATIONAL AND TECHNICAL	6	16	−32	62	17	3	−6	

Source: Tables III—1 and III—2 to which refer for notes and original sources.

N.B.—Current definitions of each level of education are used. Enrolments in earlier years are classified according to the number of years of schooling represented by each level.

[a] 1952
[b] Ten year average
[c] Including higher certificate and secondary modern enrolments
[d] Excluding 4,409 Africans enrolled in mission schools

hesitant about placing full confidence in the country's future. Yet, through all this, educational expansion continued.

The third feature of Table III—1 is the small size of secondary and technical enrolments in comparison with primary. This has been true at all periods and, in spite of aided secondary enrolments growing at roughly twice the rate of aided primary, it remains true today. Although Uganda's situation is typical of many African countries, the small proportion of secondary (and within secondary, of technical) enrolments sharply contrasts with educational systems of the more developed countries.

The final feature, especially important in Uganda, is the large enrolments in unaided schools, particularly at primary level but in recent years at secondary level also. "Unaided" schools are those which receive no financial support from government and in most cases are uninspected. For the latter reason, statistics of these schools are often unreliable, and for many years (including the most recent) are not even available. This is a serious omission as can be judged by comparing the enormous size of enrolments in unaided primary schools with those in aided schools during the 1930's. Indeed, unaided enrolments at this period appear so large that serious doubt must be cast on their meaning.[1]

Unaided enrolments are also important at the secondary level, but have had to be omitted from Tables III—1, III—2 and III—3 through lack of consistent and reliable data. In 1953, for instance, the Ministry put the total of unaided African secondary enrolments at 2,433, or nearly a third of aided secondary enrolments in the general stream. In 1958, the Ministry put the figure in Junior Secondary schools alone at 6,855, or nearly three-fifths of the corresponding sided enrolment. In 1956, one of the few years for which published figures have been given for both junior and senior levels, the junior enrolments were said to be 4,381 and the senior

1. This is not to suggest that the figures should be dismissed as purely fictitious. There are three things to be said in their favour: the figures are plausibly consistent from year to year, are given in some detail (i.e. with breakdowns by sex, mission, numbers of teachers, etc. even in the 1930's) and are enlarged upon with some descriptive commentary in the annual education reports. (See, for instance, page 17 of the Annual Report, 1938). On the other hand, their sheer magnitude is such that, if true, the majority of Ugandan children in the 1930's would have had some basic schooling; and if the education was effective, the majority of Ugandan adults would now possess a basic education. This does not accord with results obtained in the 1959 census, when adults were asked what level of schooling they had reached.

611. The true figure may well have been higher then,[1] and almost certainly has grown since.

There has been a clear tendency for the proportion of girls to increase, rising from barely one in seven at primary level in 1928 to over one in three in 1963 (See Table III—4). At both junior and senior secondary levels, the proportion of girls has always been lower than at primary (and lower in senior secondary than in junior). But here also the proportion has risen steadily from a bare three per cent in 1938 to over 23 per cent in 1963.[2]

The proportion of females enrolled in teacher training and vocational courses has always been higher than in other forms of post-primary education. Females have formed about a third of all teachers trainees since the 1930's. Because rates of wastage and retirement were higher among women than men, the proportion of female teachers employed has been lower than in training. Even so, the proportion of female teachers exceeded the proportion of girls enrolled in primary school until post-war years.

In relation to planning, two initial points may be made at this stage.

(*a*) Enrolment data must be comprehensive for educational expansion to be properly assessed or plans to be made in terms of the profile. The omission of data on unaided schools makes interpretation of the whole system difficult.

(*b*) The increasing proportions of female enrolments affects the profiles more than the flows of manpower. The increasing proportion of female students in Uganda has meant that the education profile of the female population has grown more rapidly than the male profile—as can be seen by comparing Diagrams I—2 and I—3.

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1. A significant proportion of these enrolments are likely to be pupils from other countries, particularly from Kenya and Tanzania which have stricter government regulations regarding unaided private schools. The 1960 Annual Report stated the matter as follows:

"Uganda is the one territory in East and Central Africa which permits the existence of a substantial number of private schools: as a result, large numbers of rejects from the state-financed system in other territories come to Uganda for education in such schools. The legal, administrative and professional problem here is the extent to which schools meeting the needs of such children should be controlled; the Uganda government has taken a very liberal attitude in this matter and tries to hold a reasonable balance" (p. 22).

Unaided schools in Uganda have been studied in some detail by Sheldon Weeks whose, EAISR papers should be consulted for further information.

2. Somewhat surprisingly, the proportion of girls in the unaided schools appears to have fallen over the last 30 years, from about a third of total enrolments to just over a quarter. This unexpected trend may be the result of including enrolments in catechumen classes with school enrolments in the early years. If so, it reflects more a tightening of statistical definition than a retrograde change in the attitude towards female education.

TABLE III—4

PERCENTAGE GIRLS ENROLLED. AFRICAN EDUCATION (excluding unaided secondary education)

	1928	*1933*	*1938*	*1943*	*1948*	*1953*	*1958*	*1963*
PRIMARY—aided	14	19	22	21	23	24	29	35
unaided	34	38	33	—	32	25	28	—
JUNIOR SECONDARY (years 7–8) ..	(40)[a]	(16)[a]	3	9	15	—	18	24
SENIOR SECONDARY (years 9+)	(1)[a]	(0)[a]	0	5	7	—	17	19
Total Secondary (years 7+) ..	(37)[a]	(13)[a]	3	8	12	10	18	23
TEACHER-TRAINING	33	6	39	39	34	33	35	34
VOCATIONAL	—	—	24	—	26	26	15	14

Source: Calculated from 1928–1958 Annual Reports of Education, Uganda. 1963: Ministry of Education Data.

[a] Includes some unaided schools

2. *Continuation, Repetition and Drop-out*

As Chapter 2 made clear, total enrolments expand for two different reasons. Total enrolments grow if the total number of school entrants grows (with rates of continuation, repetition, and drop-out unchanged) or if the number of entrants remains constant but the rates of drop-out decrease. These represent the extreme alternatives, and many intermediate combinations are possible. In Uganda, an increase in new entrants and a decrease in wastage occurred together, and the expansion in total enrolments is due to both.

Tables III—5 and III—6 give the evidence on continuation (and drop-out) available. As data on repetition were first available in 1964 the *true* rates of continuation cannot be calculated for earlier years. Tables III—5 and III—6 thus show the *apparent* rates. The true rates of continuation would be higher than those shown and to the extent that repetition has declined over the years, the true rates of continuation would have increased more rapidly than Tables III—5 and III—6 indicate.

Furthermore, the rates of continuation given refer to the continuation of students at every level between the two years shown. As explained in Chapter 2, the rates applicable to any single stream of students are not the whole set of continuation rates at any one time, but the rates given by a whole succession of education pyramids, from the time when the students enter to the time when they leave school.[1] Because in Uganda enrolments have been steadily increasing, the rates of continuation facing any group of school entrants have in fact been greater than those "implied" by the structure of the education system in any particular year.

Even allowing for these imperfections in the data the rates of continuation have risen remarkably. In 1938/9, the educational system allowed for only two-thirds of the Africans entering primary school to reach Primary class 2, and only a third Primary 3. In 1961/2 it permitted nearly two-thirds to complete Primary 6. This means an enormous gain in the efficiency of the school system. In the 1960's roughly three-quarters of all entrants completed four years of schooling; 20 years before, about a quarter.

The improvements have occurred at several different points in the school system. There were dramatic rises in the numbers continuing after Primary 4 and Primary 6, as shown in Section (a)

1. Note that the full succession of rates can however be estimated—where not known directly—using a set of continuation rates at intervals, such as are given in Tables III—5 and III—6. Probably the easiest way is a graphical method to interpolate the rates during the intermediate years.

of Table III—5. At many points within the secondary levels, the apparent continuation rates increased less than at primary, which may seem surprising in view of the more rapid growth of total secondary enrolments. This is largely explained by the large increase in secondary enrolments caused by even a modest increase in continuation rate from primary to junior secondary entrants. The decline in continuation from eighth to ninth year reflects higher continuation rates at lower levels and the shortening of junior secondary to end at the eighth year.

TABLE III—5

APPARENT RATES OF CONTINUATION AMONG AFRICANS IN THE UGANDA SCHOOL SYSTEM FOR SELECTED YEARS BETWEEN 1938/9 AND 1961/2

(*a*) **Continuation between classes:** enrolment in each class as % of enrolment in previous class during the previous year (excluding non-academic secondary education)

Class or year of schooling		*1938/9*[a]	*1943/4*[a]	*1947/8*[b]	*1954/5*	*1959/60*[b]	*1960/1*[b]	*1961/2*[b]
Primary	2	66.7	69.0	75.9	73.4	84.3	87.3	85.6
	3	48.8	79.1	69.2	58.9	92.6	97.9	95.3
	4	71.1	80.4	78.6	92.9	90.3	96.1	91.3
	5	44.6	70.3	69.1	77.5	83.1	89.7	86.2
	6	79.6	72.8	77.9	92.8	92.3	99.3	98.9
	7	47.7	37.1	25.7	24.4	26.9	33.4	32.9
	8	69.1	72.8	77.8	91.8	89.2	90.9	87.8
	9	63.0	80.2	81.0	96.3	36.7	22.8	19.4
	10	83.3	44.2	29.3	36.5	23.9	47.0	79.7
	11	29.4	79.2	81.0	95.7	95.0	96.8	101.9
	12	—	74.4	96.7	86.6	94.5	92.5	103.6

(*b*) **Implied continuation within the school system at the date shown**

Year								
	1	100	100	100	100	100	100	100
	2	66.7	69.0	75.9	73.4	84.3	87.3	85.6
	3	32.6	54.6	52.5	43.2	78.1	85.4	81.6
	4	23.2	43.9	41.3	40.1	70.5	82.1	74.5
	5	10.3	30.8	28.5	31.1	58.6	73.6	64.2
	6	8.2	22.4	22.2	28.8	54.1	73.1	63.5
	7	3.9	8.3	5.7	7.0	14.6	24.4	20.9
	8	2.7	6.1	4.4	6.5	13.0	22.2	18.3
	9	1.7	4.9	3.6	6.2	4.8	5.1	3.6
	10	1.4	2.1	1.1	2.3	1.1	2.4	2.7
	11	0.4	1.7	0.9	2.2	1.0	2.3	2.7
	12	—	1.3	0.8	1.9	1.0	2.1	2.8

Source: Computed from enrolments given in *Annual Reports of Education*, Uganda.

[a] Excluding unaided sub-grade schools
[b] Aided schools only
[c] Rates for years 7–12 based on 1956/7 data.

TABLE III—6

APPARENT RATES OF CONTINUATION AMONG ASIANS IN UGANDA SCHOOLS[a] FOR SELECTED YEARS BETWEEN 1938/9 AND 1960/1

(*a*) **Continuation between classes:** enrolment in each class as % of enrolment in previous class during the previous year (excluding non-academic secondary enrolments)

Year of schooling	*1938/9*	*1949/50*	*1954/5*	*1959/60*	*1960/1*
2	63.0	66.2	73.1	100.0	87.8
3	83.5	102.4	107.8	96.2	103.3
4	76.2	113.9	116.9	97.4	91.8
5	84.7	90.0	94.3	92.5	92.2
6	67.0	110.7	95.0	91.8	90.7
7	44.6	47.9	85.0[b]	87.0	89.3
8	91.7	92.9	34.6	83.6	92.2
9	70.7	103.8	66.9	64.2	58.9
10	92.0	41.2	60.2	97.9	88.0
11	60.0	78.4	112.7	111.9	78.8
12	—	76.2	87.2	89.1	74.6

(*b*) **Implied continuation within the school system at the date shown**

Year 1	100	100	100	100	100
2	63.0	66.2	73.1	100	87.8
3	52.6	67.7	78.8	96.3	90.7
4	40.1	77.1	92.1	93.8	83.3
5	33.9	69.4	86.8	86.8	76.8
6	22.7	76.9	82.5	79.7	69.7
7	10.1	36.8	70.2[b]	69.4	62.2
8	9.3	34.2	24.3	57.9	57.4
9	6.6	35.5	16.2	37.2	33.8
10	6.0	14.6	9.8	36.4	29.7
11	3.6	11.5	11.0	40.7	23.4
12	—	8.7	9.6	36.3	17.5

Source: Computed from enrolments given in *Annual Education Reports*, Uganda.

[a] Aided schools only, except for a few unaided primary pupils included in 1955 figures.

[b] Rates for years 7–12 based on 1956/7 data.

Drop-out is the result of a number of factors:[1] mainly, of course, the availability of schools, places, and facilities, but also of attitudes towards schooling, the level of school fees, and such. Often several causes operate together. For instance, it is fairly clear that wastage at the major points—the end of Primary (sixth year) and Junior Secondary school (eighth year)—mainly results from insufficient places at the next level. It is less clear that this is so at other points

1. See Albert Maleche—"A study of wastage in primary schools in Uganda", East African Institute of Social Research, Kampala, *Conference Papers, December 1960*, for a discussion of the possible causes of drop-out in Uganda.

of the system; many primary classes are under-enrolled, and pupil-teacher ratios vary widely between classes. On the other hand, the mere availability of empty places is insufficient evidence for arguing that wastage shows lack of interest towards schooling, unconnected with school organization. Excessive school fees may be the major cause of drop-out and the combination of low population densities and poor siting of the schools may cause under-enrolment.

Drop-out was considerably lower in non-African schools, as Table III—6 shows. The proportion of Asians continuing to each level of the school system has always been much larger than the proportion of Africans. As in the African system, the proportion of Asians continuing has generally risen over the years, though less than in the African system which offered more room for improvement. Table III—6 also suggests that in recent years there has been some decline in the rates of continuation, which may be due to the 1957 decision to merge the separate school systems. Promotion became more competitive. There is some evidence that competition acted largely in favour of the Africans. For example, the Ministry of Education stated in 1953:

"Consideration will shortly have to be given to the standard of admission to the senior secondary schools. For many years a bare pass in the junior secondary leaving examination has not been regarded as good enough in itself to qualify for admission to African senior secondary schools. On the other hand for the Asian pupils a bare pass in this examination has always ensured a place in a senior secondary school."[1] This opinion is reinforced by the fact that Africans consistently obtained higher pass rates in the school certificate examination. The rates of progression among the different racial groups are likely to become more similar as integration proceeds.[2]

For the most recent year, the educational system has been considered as a whole and a single rate of apparent continuation has been calculated. This is shown as column (1) of Table III—7 which refers

1. *Annual Report on Education*, Uganda, p. 47. There was a dramatic improvement in the Asian school certificate results in 1964, related no doubt to the tighter selection procedures introduced at entry to the secondary school.

2. For the reasons given earlier, it is not clear whether separate rates of continuation for different groups of persons within an integrated system can fairly be used as a commentary on the structure of the school system. For instance, it is possible to contrast the rates of wastage for males and females in Uganda education. But unless it can be shown that the system operates in favour of one group or another (by reserved places, differential school fees, scholarships or entrance policies, and such), it is hardly reasonably to attribute the differences in wastage to differences of the system (supply differences) rather than to differences in the attitudes or capabilities of the different groups of students (demand differences).

to the year 1963/4. The improvement in rates of continuation in the combined system over that in the African system alone may be noted. The improvement is, of course, very largely the result of including places in former Asian schools (in 1964 still largely occupied by Asians), although some part of the improvement stems from the rapid expansion of junior and senior secondary schooling in the last four years.

In addition, Table III—7 gives the true rates of continuation and drop-out calculated by using the rates of repetition available in 1964 for the first time on a national basis in Uganda. The way repetition tends to exaggerate both the apparent proportion who continue and the apparent proportion who drop out is clearly shown. The first exaggeration can by seen by comparing columns (1) and (3) (in Section "a") and the latter by columns (2) and (5). The cumulative effect of this distortion is indicated in Section "b" of Table III—7 which shows the progression within the school system implied by the various rates of continuation and drop-out.

TABLE III—7

APPARENT RATES OF CONTINUATION AND DROP-OUT AND TRUE RATES OF CONTINUATION, REPETITION AND DROP-OUT IN THE UGANDA AIDED SCHOOL SYSTEM 1963/4

(a) *Year of schooling (End of Year)*	*Apparent rates of*		*True rates of*		
	continuation (1)	*drop-out* (2)	*continuation* (3)	*repetition* (4)	*drop-out* (5)
1	81.9	18.1	75.4	12.9	11.7
2	96.6	3.4	88.6	8.9	2.5
3	93.7	6.3	86.1	8.6	5.3
4	92.6	7.4	83.9	8.6	7.5
5	100.9	-0.9	83.2	10.0	6.8
6	41.6	58.4	40.3	18.9	41.8
7	87.5	12.5	86.9	3.5	9.6
8	24.6	75.4	28.0	0.8	71.2
9	99.3	0.7	—	—	—
10	98.6	1.4	—	—	—
11	101.4	-1.4	—	—	—

(b) Progression within the school system implied by its structure in 1963/4. (outcome of a 100 students starting in year 1 with apparent and true continuation rates as shown above).

1	100	100
2	81.9	75.4
3	79.1	66.8
4	74.1	57.5
5	68.6	48.2
6	69.2	40.1
7	28.8	16.2
8	25.2	14.1
9	6.2	3.9
10	6.2	—
11	6.1	—
12	6.1	—

Source: Computed from enrolment data and from 1964 returns on repetition obtained from Ministry of Education, Uganda.
— = not available.

Diagram III—2 represents more adequately the progression implied by the current system in Uganda. Of a hypothetical 1,000 entrants into the school system, as existing in 1963/4, the numbers continuing, dropping out and repeating are as shown. Thus 754 of the original entrants will be in Primary 2 in the second year, whilst 129 will repeat in Primary 1. Of the 754, 668 will be in Primary 3 in the third year and some will repeat Primary 2. These repeaters will be joined by others just promoted from Primary 1 (which they repeated), making a total of 164 in Primary 2 in year 3. The pattern is similar for later years and higher classes, the enrolments shown referring in each case to the number of the original 1,000 who are in each class in the year given.

At higher levels, the most likely danger is not that rates of continuation will be too low but that disproportionate rates of expansion will lead to an absolute shortage of students—and thus excess capacity—even when all available students have gone forward. To some extent, this occurs at most levels in secondary schools where because of drop-out the upper classes are often four, six or even ten short of full enrolment: over a national system, this can lead to a ten or 20 per cent under-utilisation of facilities. But at the main points of transfer between levels of the system the shortfall of students can be much greater. Table III—8 shows the key junctions in the Uganda system from 1961 to 1966. At several levels there is an absolute shortfall, leading to excess capacity over much of the period.

At the School Certificate level, the shortfall is in respect of adequately qualified students. Under-utilisation of facilities and a shortage of students at the key entry points at higher levels, far from being unusual is typical of the educational systems of many African countries. Some of the causes and remedies are discussed in the following Chapter. But note that the major cause is the neglect of planning in terms of flows of students. The most important resource needed for education—the student—is neglected through preoccupation with buildings, places, teachers, finance. This is a further demonstration of why education should be planned in terms of manpower.

It is interesting to note the effect of varying the number of times a pupil is permitted to repeat. Section "b" of Diagram III—2 shows the percentage of original entrants who would complete the eighth year of schooling if the present system were unchanged except for varying the number of repetitions allowed. If no repetition were permitted only 14 per cent of original entrants would reach the eighth year. Allowing each student to repeat once during his school career

TABLE III—8

FLOW ANALYSIS OF STUDENTS AT KEY JUNCTIONS OF EDUCATION SYSTEM IN UGANDA (1961–2 actuals; 1963–66 estimates)

	1961	*1962*	*1963*	*1964*	*1965*	*1966*
Students in Junior Secondary 2	11,000	14,200	16,400	17,600	20,000	22,000
for whom places next year in Senior Secondary/or equivalent	3,600	4,000	4,750	5,240	5,860	6,160
Output to economy at end of year	7,400	10,190	11,660	12,360	14,140	15,840
Students in Senior Secondary 4	1,300	1,450	2,000	2,100	2,400	2,700
of whom likely to obtain Gr. I or II S.C. pass (a)	630	700	950	1,000	1,100	1,340
for whom places next year on courses requiring Gr. I or II S.C.	600	760	1,130	1,220	1,180	1,220
Surplus or Deficiency (-) of candidates with Gr. I or II	30	—60	—180	—220	—80	120
of whom likely to obtain Gr. III S.C. pass	314	350	425	500	550	625
for whom places next year on courses requiring Gr. III S.C.	139	213	192	198	197	198
Surplus of candidates with Gr. III S.C.	175	137	233	302	353	427
Overall surplus or deficiency of candidates with S.C.	205	57	53	82	273	547
Output to economy at end of year (including S.C. failures)	561	457	678	682	1,023	1,282
Students in pre-university classes (b)	130	185	360	510	770	840
of whom likely to qualify for university entrance	81	122	232	315	477	484
for whom places in East African universities (a)	147	165	228	271	273	273
Surplus or deficiency of university candidates	—66	—43	4	44	204	211

Source: Working Table prepared by Development Planning Section, Uganda, 1963.

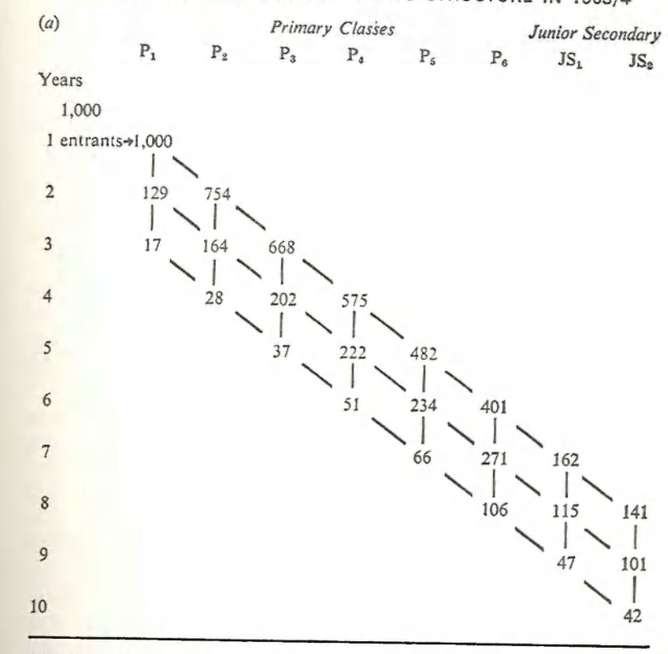
(a) omits places in universities abroad, and thus deficiency (line below) is an underestimate.

(b) Higher Certificate (upper sixth form in secondary schools) and third year in Kampala Technical Institute.

S.C.=School Certificate.

DIAGRAM III—2

PROGRESSION OF 1,000 STUDENTS THROUGH THE UGANDA SCHOOL SYSTEM AS IMPLIED BY ITS STRUCTURE IN 1963/4



(*b*) Effect of varying the number of times repeating is allowed (assuming rates of repetition are constant and unrelated to whether a person has previously repeated).

	Maximum times repeating allowed			
	None	*Once*	*Twice*	*Three times*
Percentage of entrants completing eighth year of schooling	14	24	28	29
Of these, percentage reaching eighth year with				
no delay	100	58	49	48
1 year's delay	—	42	36	34
2 years' delay	—	—	15	14
3 years' delay	—	—	—	4
Totals	100	100	100	100
Increase in average age of eighth year class (years)		.42	.66	.74

Source: As Table III-7

would raise this percentage to 24 per cent, and allowing repetition twice would raise it to 28 per cent.

The choice is not, of course, as simple as this, except when repetition uses places which otherwise could not be filled. In most cases, the extra places need not be wasted, because intake or continuation rates can be raised, because spare places can be used in other classes, or because, with proper advance planning, the places need never have been built in the first place. In the first two cases, the choice resolves itself into finding the best use of the extra places, judged (since costs may be presumed equal) in terms of the relative chances of success of repeaters and non-repeaters.[1]

Section "b" also shows the average delay and increase in average age in reaching the eighth class, under various rules about repetition. As two repetitions are effectively the maximum in Uganda at present, the three stream spread shown in Diagram III—2 corresponds fairly closely to the actual situation.

A number of points may be underlined in reference to planning:

(*a*) The most important conclusion is that high rates of drop-out are one of the facts of life in most developing countries. Although drop-out may follow a decreasing trend—and such trends should be encouraged—it is unrealistic to ignore the fact that (as in Uganda recently) only about three-quarters of school entrants will complete six years of general schooling, possibly less than a quarter eight years and less than one in 20, 12 years. In many school systems (as in Uganda over most of the past 35 years) the proportions will be very much lower.

The implications are several. As regards the syllabus and form of instruction, it surely follows that these should be designed in terms of the length of time most students will be in school, not in terms of some hypothetical school course which only one in 20 (because of the capacity of the system) will be able to complete. When the chance of promotion at key points is so small, there is an obvious absurdity in structuring education as a preparation for an ever more competitive chance to complete the full course—when the system itself dictates that not more than two or three in 100 shall do so.[2]

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1. See page 125, para 4.

2. To some extent this point is generally accepted, as regards for instance the need for the primary course to be complete in itself. But one wonders whether the same approach is not applicable elsewhere. At other points in the system, attention is often concentrated on policies to reduce drop-out to the neglect of revising the syllabus to take into account the inevitability of some drop-out.

The implication for quantitative projections is that rates of drop-out and repetition are quantitatively important *within* the main levels of education as well as at the key junctions between them.[1] Calculations which ignore this make the implicit assumption that repetition and drop-out are zero and the rate of continuation is 100 per cent. This is frequently done, especially within secondary levels, and leads to over-estimation of output and to under-utilised facilities.

The third implication is that long-run projections must take into account trends in the rates of drop-out as well as the rates themselves. The changes in the Ugandan rates since the War have been very large, yet this 20-year period is no longer than the proper horizon for educational planning.

(*b*) Without comprehensive data—i.e. data on enrolments in all schools—and data on repetition, the true rates of progression along the school system cannot be known. Ignoring repetition tends to overstate the proportion of students who continue.

(*c*) In the typical situation where enrolments expand while wastage declines, the growth in total enrolments overstates the *increase in* the coverage of education.

(*d*) Repetition deserves an important place in policy making. At present Ugandan rates, over half the students in Primary 8 could have repeated once (about an eighth of the class repeated twice) and average age could have been raised by about two-thirds of a year.

3. *Enrolment Ratios*

While enrolments have been growing, population has been growing too. The full significance of educational expansion can only be judged when measured against the increasing numbers of eligible schoolchildren.

Information on the growth of African populations is of course very sketchy, and Uganda is no exception. Between 1920 and 1948, it is estimated that the "increase in East Africa of the African population was not more than half per cent rising to one and a half per cent per annum", though this figure rests on very weak evidence. Since the Second World War there have been two censuses

1. There are three reasons for this belief. It represents the typical informed comment heard in the Ministry of Education, and it corresponds with the preliminary findings of Mr. H. C. Somerset in his sample study of Standard VIII leavers. It also fits well with section (b) of Diagram III—2 which suggests that the proportion of three-time repeaters who would complete six or eight years of schooling is sufficiently small to be neglected.

and the evidence is firmer: the natural rate of increase of population in Uganda was estimated as 2·2 per cent and the total increase between 1948 and 1959 at two and a half per cent somewhat higher on account of the immigration from neighbouring territories.[1]

These rates of population growth are far below the rates of growth of enrolments. But to judge the increase in coverage of schooling, allowance must be made for that part of the growth of enrolments accounted for by falling rates of drop-out and repetition. First-year enrolments less repeaters indicate the actual number of new school entrants and this number in relation to the appropriate age group gives the coverage of schooling. The results of this calculation for Uganda have already been given as the age education profile in Chapter I. Reference to Diagrams I—2 and I—3 will show how enrolments at all levels and for males and females have grown more rapidly than population for most of the last 30 years.[2] The simultaneous increase in continuation which has occurred can be seen on the age-education profile as the increasing proportion of persons reaching the higher levels of education relative to the total enrolled.

The levelling off of the first-year enrolment ratios in aided schools during recent years is sufficiently important to be discussed separately. The data on population by single age group and of the ages of first-year pupils is somewhat approximate and the enrolment ratios must be interpreted accordingly.[3] Even so, it seems that the proportion of boys starting aided school remained virtually static between 1958 and 1962,[4] and at a level several per cent below that attained during the mid-fifties (about 70 per cent). During the same period, however, the proportion of girls starting school has risen steadily and also the proportion of both girls and boys attaining higher levels of schooling. The constant or even declining proportion of boys able to find places in the aided schools may well have caused

1. See J. C. Martin, "Estimates of Population Growth in East Africa" and "Population Census, Estimates in British East Africa", *Essays on African Population* ed. K. M. Barbour and R. M. Prothero (1961), also J. G. C. Blacker, "Population Growth in East Africa", *Economic and Statistical Review* (Nairobi, East Africa High Commission), September, 1963.

2. It should be remembered however that the age-education profiles are plotted in terms of the age cohorts of the present population, not the years in which the pupils were enrolled. To ascertain the enrolment ratios in any particular year, allowance for the age of pupils in the class in question must be made (according to the age assumptions explained in Chapter II) using the reverse procedure to that required to construct the profile from enrolment ratios.

3. Nor was data on repetition available for earlier years, and it had to be estimated.

4. If, as is likely, the average age of entrance has been declining, the proportion of boys starting school may actually have been declining.

unaided enrolments to increase. The education report for 1960 noted that "There has been a noticeable increase in the number of private schools over the last three years", but the report seemed to link this with a "change in the attitude of parents towards sending young children to school" as evidenced by "the growth of privately owned infant schools in and around Kampala".[1] The net result may just be that the total proportion of boys attending both types of schools increased, but not by very much.

In reference to planning, two points will be made.

(*a*) There is a clear need to express enrolments in terms of the enrolment ratios of individual classes and individual age groups. Unless this is done, the changing coverage of schooling is not known. As recently in Uganda, decreasing rates of drop-out and repetition can easily account for the faster growth of enrolments over the growth of population. Although the possibility of this happening may be understood, its quantitative significance may not always be realized. The construction of an age-education profile would make clear what is happening.

(*b*) As with continuation and repetition, the omission of data on private schooling is disastrous for comprehensive planning. The coverage of schooling, and thus the number of eligible children left out of school, is unknown without the basic information on private schooling.

4. *The Numbers of Teachers and Their Qualifications*

Unpaid students and paid teachers form the bulk of the manpower involved in an educational system. The relative numbers of each are indicated by the pupil-teacher ratio, which is therefore of crucial importance for determining the financial costs of expansion. If, to take an extreme example, the pupil-teacher ratio is expanding *pari passu* with an expansion in enrolments, in terms of teachers, expansion is costless. As, in fact, the opportunity cost of pupils at the lower levels of the educational system can largely be neglected, the total recurrent cost of this sort of expansion at primary level would be very small.

The changes in the pupil-teacher ratios in Uganda over the period since 1928 are shown in Table III—9. Three points are worth noting. Firstly, the number of pupils per teacher within the academic stream of aided schools has steadily increased. The pupil-teacher ratio in the aided primary system was about 22 in the early 1930's,

1. *Op. cit.*, p. 21.

around 30 in the early 1950's and currently stands at nearly 37. In other words, at primary levels a significant part of the total increase of enrolments since the 1930's has been provided for by giving teachers larger classes. It is noteworthy that a considerable part of the increase in class size has occurred since Independence.[1]

At secondary levels, the picture is largely the same: the doubling of the pupil-teacher ratio since 1938 means that the expansion has been achieved with only half the number of teachers that would have been required if the 1938 ratios had been maintained. Most of this gain has been made in the junior secondary schools, where the pupil-teacher ratio has risen faster than in senior secondary.

The second point from Table III—9 is that pupil-teacher ratios in the teacher training and technical schools have hardly changed over the last 25 years. It is true that ratios in teacher training have fluctuated slightly, but always below that of the senior secondary schools. In the vocational schools there are less than ten pupils for each teacher, markedly less than in any other form of primary or secondary education. The relative changes in the pupil-teacher ratios mean that teacher training and vocational schooling have become relatively more expensive than academic education.

The final point of Table III—9 is the small size of all the pupil-teacher ratios, judged both by international standards and by the size of class which the Ministry treats as desirable. Comparisons with other African countries are given in the following chapter, but class enrolment in relation to Uganda policy may be considered here. Both junior secondary and primary schools are based on a class of 40, with one teacher per class and, where possible, one supernumerary headmaster to a "full primary school" (six primary classes and two junior secondary classes together). This would imply a pupil-teacher ratio of 35.5, far above what has been achieved most of the time in Uganda. In the first four years at senior secondary levels, the planned class size has recently been increased from 30 to 35, though the teacher-class ratio is still $1\frac{1}{2}$:1 (the possibility of reducing it to $1\frac{1}{4}$:1 has been considered as also the possibility of increasing the size of higher certificate classes). But for the period when the intended pupil-teacher ratio was between 18.5 and 21,[2] the ratio achieved was between 16.6 (in 1958) and 18.3 (in 1963).

It is, of course, difficult to achieve an overall average near the intended figure unless some schools exceed this figure. There will

1. The fall in the pupil-teacher ratio in unaided primary schools probably arises, in part, from the unreliability of the data: much of the decrease would be accounted for if enrolments had been overstated in the 1930's and in 1948.
2. Strictly these are the ratios for senior secondary schools without higher certificate classes. Including the latter would lower the average slightly.

TABLE III—9

PUPIL-TEACHER RATIOS—AFRICAN EDUCATION (excluding unaided secondary education)

	1928	*1933*	*1938*	*1943*	*1948*	*1953*	*1958*	*1963*
PRIMARY—aided	22.1	22.6	23.9	—	27.6	31.0[b]	31.4	36.9
—unaided	37.0	32.6	40.4	—	38.6	25.8	28.7	
total	36.2	31.7	37.8	—	31.6	29.3	30.6	
JUNIOR SECONDARY[c]	—	(13.3)[a]	—	—	—	—	25.1	27.2
SENIOR SECONDARY	—	(14.6)[a]	—	—	—	—	16.6	18.3[b]
Total Secondary	(21.1)[a]	(13.5)[a]	12.7	—	18.2	—	23.0	24.2[b]
TEACHER-TRAINING	11.3	17.3	10.5	—	11.8	—	16.1	14.7
VOCATIONAL	—	—	10.7	—	9.6	—	9.6	9.7

[a] Includes some unaided schooling
[b] Including Asian and European
[c] After 1966, Junior secondary will become an integral part of the primary educational system.

Source:—Calculated from 1928–1958 Annual Reports of Education, Uganda. 1963: Ministry of Education, Uganda.

always be some schools below optimal enrolment, because they are located in sparsely populated areas, because of drop-out in the upper classes, or some other cause. Yet Uganda seems to have been plagued with the problem of classes below the optimum size more severely than other countries. The World Bank Report suggested that at primary levels this was partly the result of different missions establishing rival schools in the same area. Others have attributed it to high rates of wastage resulting from an inability to pay school fees, or from the allegedly more dispersed population of Uganda—though overall population densities and rates of urbanization do not appear significantly different from other African countries with much higher pupil-teacher ratios. At any rate, there are a number of ways to deal with small classes without lowering the pupil-teacher ratio (some of which are elaborated in Chapter V) and a test of economic efficiency and economy is how skilfully these are chosen and implemented in each context. The need for dealing with this would be given far more serious attention if it was generally realized that higher pupil-teacher ratio could bring financial savings of 20 per cent in costs per student.

The total number of teachers in the primary schools has grown from about 1,100 in 1929 to nearly 13,000 in 1963: in all forms of secondary schools the number has grown from under 100 in 1938 to over 2,700 in 1963. Tables III—10 and III—11 show the numbers and qualifications of teachers in the aided schools over the period.

The qualifications of the teachers have also been improving, although in some respects less than was possible.[1] Table III—11, for instance, shows that after a tremendous increase in the proportion of trained primary teachers between 1929 and 1938, the post-war proportion reached 96 per cent and has actually dropped three per cent since. This is largely the result of declines in the output of teachers which have occurred on two major occasions just *before* a rapid increase in primary school expansion (See Table III—I). After growing at an average of 15 per cent per year from 1943 to 1948 the rate of increase of teacher training enrolments fell to eight per cent during the five years prior to the de Bunsen plan,[2] which increased the growth of primary school enrolments to ten per cent per year. Because the length of the teacher training course was increased at the same time that the growth in enrolments declined, a total drop in the annual output of primary teachers occurred between 1946 and 1950. A decade later total teacher training enrolments actually fell (between 1958 and 1963), and annual output in 1961 and 1962

1. See page 96 Para 2.
2. *African Education in Uganda* (Entebbe, Government Printer, 1953).

TABLE III—10

TEACHERS BY QUALIFICATIONS IN AIDED SCHOOLS IN UGANDA
ALL RACES, 1929–1963

	1929[a]	*1938*	*1949*	*1953*	*1958*	*1963*
In Primary Schools						
Graduate—trained		7	4	16	77	7
—untrained	15[b]	20	11	10	44	3
Completed						
Secondary—trained	61[b]	100	76	88	245	450
—untrained	113[b]	56	86	123	225	15
Not completed						
Secondary—trained	266	852	5,113	6,279	9,779	11,392
—untrained	682	152	105	130	403	857
Total	1,137	1,187	5,395	6,646	10,773	12,724
In Secondary Schools (All Types[c])						
Graduate—trained		9	71	97	382	461
—untrained	3[b]	23	37	94	97	109
Completed						
Secondary—trained	5[b]	48	200	264	628	1,049[d]
—untrained		9	22	54	72	101
Not completed						
Secondary—trained		9	143	280	334	904
—untrained			10	2	6	77
Total	8	98	483	791	1,519	2,701

[a]Non-European education only
[b]Europeans
[c]Includes Junior Secondary, Senior Secondary, teacher training, Kampala Technical College and Junior Secondary Technical Schools
[d]Includes 35 technical teachers.

Source: 1928–58 *Annual Reports of Education*, Uganda. 1963: Ministry of Education, Uganda.

was less than half that of 1956–60. This again occurred immediately before a tremendous increase in Primary 1 enrolments (in 1963).

"Training" has, of course, many meanings and the quality and training of primary school teachers has made large advances. Improvements in the type and length of the primary training courses have been more substantial than the statistics reveal. For example, the earliest "vernacular" teachers[1] had only two years of schooling plus two years of teacher training (although it should be realized that this type of training was very short-lived.) "Vernacular teacher" training during the 1930's involved six years of primary schooling followed by two years of teacher training. In 1938, this was replaced by the "primary teacher" training course, at first a two-year course after nine years of schooling but recently increased to a four-year

1. See for a brief description, *Report of the Uganda Teachers' Salaries Com-*
m [illegible] pp. 5–54.

course. Thus, although the lower section of Table III-11 shows a declining proportion of primary teachers with a completed secondary schooling the level of basic education and the length of training of the non-secondary teachers has greatly improved. It is nevertheless regrettable, and largely unnecessary, for there to have been any untrained teachers at all.

TABLE III—11

PERCENTAGES OF TEACHERS BY QUALIFICATION IN AIDED SCHOOLS IN UGANDA—ALL RACES, 1929–63

	1929	*1938*	*1949*	*1953*	*1958*	*1963*
Percentage trained						
Primary schools	29	81	96	96	94	93
Secondary schools (all types)	—	67	86	81	88	89
Percentage of total teaching force at each level of qualification						
PRIMARY SCHOOLS						
Graduate	1	2	—	—	1	—
Secondary	15	13	3	3	4	4
Incomplete secondary	84	85	97	97	95	96
	100	100	100	100	100	100
SECONDARY SCHOOLS (all types)						
Graduate	—	33	22	24	32	21
Secondary	—	58	46	40	46	43
Incomplete secondary	—	9	32	36	22	36
	—	100	100	100	100	100

Source: Table III—10 to which refer for notes.

At secondary level the proportion of trained teachers rose from two-thirds of all teachers in 1938 to over four-fifths after the War. It has remained about this level since. But although some improvements have been made in teacher training, the trends are less satisfactory than in primary. While the percentage of trained teachers has risen, their average level of basic education appears to have declined. For example, the proportion of graduates fluctuated between a quarter (in the early 1950's) and a third (1938 and 1958) but recently declined to scarcely a fifth. Most of the lowering in teacher qualification has probably occurred in the junior secondary schools and the senior secondary schools have suffered little, if at all.

The majority of graduate teachers are and have been expatriates, employed in Uganda for varying lengths of time. These have been recruited under a number of systems, ranging from the traditional channels of the colonial service to the "Teachers for East Africa"

scheme (started in 1961) under which new graduates, newly trained teachers or experienced teachers from England and the United States have been recruited for East Africa on short-term assignments. The numbers of expatriates in relation to local teachers is given as Table III—17 in the following section on the costs of education.

As regards planning, one point needs to be heavily underlined. Better trained teachers are the indispensable requirement for raising educational standards in the schools. Although the quality of teacher training has been raised, the output of primary teachers has often fallen at crucial stages before an expansion of school enrolments. This has occurred several times in spite of under-utilization of facilities and decreasing pupil-teacher ratios in the training colleges. This is tantamount to sabotage of educational standards in the schools.

Its avoidance requires:

(*a*) Long-term plans, with teacher training fully co-ordinated with and preceding school expansion.

(*b*) Ambitious plans for upgrading the whole of the existing teaching force, in addition to raising the quality of the teachers coming out of the colleges (which affects less than ten per cent of the teacher-training force each year).

III. The Costs of Ugandan Education

1. *Total Expenditure on Education*

The expansion of aided education in Uganda has been accompanied by an expansion in public expenditure on education many times greater. In current prices, Government expenditure on education has risen over one thousand times since 1922. As Table III—12 shows, education currently takes between a quarter and a third of all government revenue as opposed to a mere one per cent in 1922. This tremendous increase is in part due to the extremely low levels of expenditure in the early years, when most schools were unaided. It also reflects the general rise in government spending which resulted from the post-war commodity boom. During the 15 years from 1948 to 1963/4, central government revenue rose fourfold. Over the same period total government expenditure on education rose nearly 20 times, reaching an estimated £9.6 million in 1963/4. But whereas expenditure on education has risen steadily, government revenue has increased around a fluctuating trend. The financial year 1958/9 marked the high point of the cycle, with revenue exceeding that of the three following years. In 1962/3 revenue started to

rise again and sustained by higher export prices increased by roughly two-thirds in the next two years.

Table III—12 shows only part of the total expenditure on education, omitting the contribution of the missions and other voluntary agencies and private expenditure on education in the form of school fees, contributions to school building funds and voluntary work. Although important, these items, with the exception of fees, have accounted for a diminishing proportion of total expenditure in recent years. Thus, Table III—12 probably overstates the increase.

TABLE III—12

GOVERNMENT EXPENDITURE ON EDUCATION IN UGANDA
1922–1963/4 Selected Years
(£ thousands)

Year	Expenditure by: Central Government	Expenditure by: Local Government[a]	Total	Central Government Total Revenue	Expenditures by Central Government as percentage of revenue
	(1)	(2)	(3)	(4)	(5)
1922	8.2	—	8.2	820.4	1.0
1928	49.6	8.2	57.8	1,519.2	3.1
1933	71.6	16.5	88.1	1,350.1	5.3
1938	109.2	21.9	131.1	1,746.6	6.1
1943	152.0	30.5	182.5	(2,410.0)	6.3
1948	410.1	49.2	459.3	6,405.0	6.4
1953	2,181.7	161.2	2,472.9	17,735.0	12.3
1958/9	4,590.4	842.4	5,432.7	24,105.6	19.4
1960/1	5,185.6	848.0	6,033.7	22,337.2	23.2
1963/4	[b]	[b]	9,600[c]	35,226	[b]

[a] Excluding block grants from Central Government.
[b] Not available.
[c] estimate.

Source: 1922–53; Annual Reports on Education, Uganda.
1958/9–60/1; Annual Abstract of Statistics, Uganda.

The relative contributions of central and local government to education have altered very little over the years. Local expenditure formed slightly over a seventh of all public expenditure in 1928 and slightly under in 1960/1. The proportion has at times varied more widely than this, as in the early 1950's when local government's contribution lagged slightly. Moreover, the expenditure for which local government is *responsible* is now many times greater, because of the large transfers made by central government towards local government expenditure. Nevertheless out of revenue raised locally the local governments in 1960/1 contributed over £800,000, about a fifth, to education. For every level of government, Ugandan education has become an extremely expensive activity.

Information on who has financed the expansion of recent years in not complete. Expenditure on private schools is not fully known, nor is expenditure by the voluntary agencies. Nevertheless three new features emerge about who has financed the rapid increases of recent years. First, the role of the missions and other voluntary agencies is important but diminishing. In 1949, the voluntary agencies controlled over a fifth of recorded expenditure on aided education, in the mid-fifties over a quarter, but in 1959/60 less than a twentieth. Part of the changes merely reflect the poor quality of the statistics, but there is little doubt that " . . . in the post-war years the resources of the Christian Missions have dwindled and their share of the cost of grant-aided schools is now comparatively small."[1] The voluntary agencies however run a network of subgrade primary and religious school without government assistance; to some extent, the decline in recorded expenditure by the voluntary agencies after 1957 may represent a shift of expenditure from their aided to their unaided schools. (This is the period during which the number of unaided schools has increased considerably.)[2]

The second feature is the large contribution from development funds during the 1950's. In total, a sum of £8 million was set aside from the African Development Fund in 1953 to cover the cost (from 1953 to 1960) of all development arising out of the de Bunsen Report on educational development. A further £2 million was set aside to cover the development of technical education for Africans. These development funds were obtained from accumulations of the cotton and coffee price assistance funds built up during the Korean war boom in commodity prices. The funds were spent on other development projects in addition to education, and heavy expenditures together with the gradual decline in commodity prices at the end of the 1950's meant that most of the funds has been exhausted by 1962.

The third feature of the period is the increase in revenue derived from school fees. During 1950, for example, fees in government schools alone totalled nearly £28,000. Again information is not complete. Nevertheless the increases in later years are clearly indicated; revenue from school fees rose from about a quarter-million pounds in 1954/5 to well over half a million in 1959/60. At present, fees at the Primary and Junior Secondary level vary greatly, between schools, classes and between sexes, from as low as ten shillings a year in some Primary I classes to as much as 250 shillings in Junior Secondary boarding schools.

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1. *Annual Report of Education*, 1957.
2. *Annual Report of Education*, Uganda, 1960, p. 21.

In the Senior Secondary schools fees have always been higher. Even in the 1930's, when sub-grade mission schools were free and some elementary schools charged only a shilling, fees in the junior secondary day schools ranged from 12 to 48 shillings, and in secondary boarding schools, such as Budo, up to 430 shillings per year. At present, fees in aided senior secondary schools are in the region of £30 per annum for boarders and about £17 for day students.[1] In private senior secondary schools, fees may run as high as £45 per annum, for educational facilities which in most cases are considerably inferior.[2]

In passing, two comments may be made about the operation of school fees over the years. The first is that, although all fees have risen, fees in the primary schools appear to have risen proportionally more than in the secondary schools. Secondly, the increases in fees at almost all levels have been modest in comparison with the increasing costs of education or the increasing monetary income of the country (judged by increases in export revenue). Neither of these comparisons is necessarily a reason for raising fees further or, indeed, for not working towards their complete abolition. But it is important to realize that education to the student and his family has become relatively cheaper, and that persons at secondary level have benefited most.

2. *The Breakdown of Educational Expenditures*

(a) By Racial Groups

Although public expenditure on all forms of education has risen rapidly over the years, public expenditure on Indian and European education has risen considerably more than expenditure on African education. In 1933 (Table III—13) public expenditure on Indian education comprised seven per cent of total expenditure on education and expenditure on European education one per cent. During the following 25 years, expenditure on Indian education rose 130 times, on European education nearly 300 times and on African education 48 times. Thus by 1958/9 expenditures on predominantly Indian schools comprised 16 per cent of all government expenditure on education and expenditure on predominantly European schools over six per cent. During the same year total aided enrolments numbered nearly 345,000 Africans, 20,000 Indians and just over 1,000 Europeans.

1. *Working Party on Secondary Schools Costs*, Uganda, 1964, p. 6.
2. *The Report of the Uganda Education Commission*, 1963, p. 60.

TABLE III—13

GOVERNMENT EXPENDITURE[a] ON AFRICAN, INDIAN AND EUROPEAN EDUCATION IN UGANDA
1922–58/9 Selected Years
(£ thousands)

Year	*African*	*Indian*	*European*	*Total*
1922	8.2	—	—	8.2
1928	55.3	2.5	—	57.8
1933	80.8	6.2	1.1	88.1
1938	118.1	11.1	1.9	131.1
1943	156.0	18.6	7.9[b]	182.5
1948	400.8	49.4	9.1	459.3
1953	2,033.9	315.9	123.1	2,472.9
1958/9	3,940.2	812.8	323.7	5,076.7

[a]Includes local government expenditures on African education.
[b]Includes 3.9 contributed to European school building in Kenya.

Percentages of Total Expenditure

Year	*African*	*Indian*	*European*	*Total*
1922	100	—	—	100
1928	96	4	—	100
1933	92	7	1	100
1938	90	8	1	100
1943	86	10	4	100
1948	87	11	2	100
1953	78	16	6	100
1958/9	78	16	6	100

Source: *Annual Reports of Education*, Uganda.

(b) By Level of Education

It is obvious from the previous section that a breakdown in expenditure between the different levels of education will only be meaningful if first separated by racial groups. This has been done in Table III—14 which shows expenditure on African education according to the different types and levels of schooling, for selected years between 1929 and 1958/9. The figures up to 1953 refer to public expenditure only and in 1958/9 include expenditure from fees and by the voluntary agencies (totalling about £750,000).[1]

The general picture is largely as would be expected in a system where secondary enrolments have grown more rapidly than primary and both have grown more rapidly than teacher training and technical enrolments. The increases in expenditure follow a similar pattern to the aided enrolments shown in Table III—1 This is particularly clear in the pre-war years, although the trend continues after the war. Expenditure on technical education and to some extent on teacher training has at times risen rather faster,

1. Certain other minor variations are mentioned in footnotes to the tables.

relative to enrolments, but this is largely explained by fluctuations in enrolments and pupil-teacher ratios and by the special character of these schools and the equipment they require.

TABLE III—14

EXPENDITURE ON AFRICAN EDUCATION IN UGANDA
1929–1958/9 Selected Years
(£ thousands)

	1929	*1938*	*1949*	*1953*	*1958/9*
PRIMARY	42	47[c]	191	511	1,931
SECONDARY	5	15	81	202	904
TEACHER-TRAINING	9	17	46	145	352
TECHNICAL	15	10	14	123	419
OTHER[a]	8	30	16	111	252
Total Recurrent	79	—	347	1,096	3,919
Construction	34	[b]	23	677	775
Total Expenditure	112[c]	118	371	1,773[d]	4,694

[a] Administration, scholarships, post-secondary education.
[b] Construction expenditure included under sub-heads of recurrent expenditure.
[c] Includes 13 from local funds and 42 from development loan funds.
[d] Includes expenditure from Colonial Development Fund.
[e] Excluding public expenditure on non-African education (12) assumed to be entirely spent on primary education.

Source: Financial Tables of *Annual Reports of Education*, Uganda.

3. *Analysis of the Rise in Expenditure*

Two factors more than any others account for the increases in expenditure which have occurred: enrolments and teachers' salaries. The large increases in African enrolments have already been shown in Table III—1. Increases in teachers' salaries (shown in Table III—15) have also been considerable. The typical primary teacher entering the aided school system after training after World War II would receive £45 per annum; in 1964, after the latest salary rise, he would receive £189, about four times as much. Similar increases have occurred for more qualified teachers. Changes on this scale go a long way towards explaining why total expenditure on education has increased so much, both in money and in real terms. Over a period (1947-64) when the cost of living little more than doubled, if that,[1] the typical teacher's salary rose four or five times.

1. As measured by the Kampala (European) cost of living index. An African index is not available for the same period, though the index of retail prices in African Markets in Kampala recorded a *decline* from 1954 to 1962 of 29 per cent, compared with an *increase* in the European index of 27 per cent over the same eight years. See the Uganda Government *Annual Statistical Abstract* and Table 4, page 15, of *The Real Growth of the Economy of Uganda, 1954–1962*, Statistics Division, Ministry of Planning and Community Development, April 1964.

The increases in salaries may be separated into two components; the rise in the salaries of each grade of teacher, and the greater proportion of teachers in upper grades of the service, as teacher training has improved and upgrading courses been introduced.

Table III—15 indicates part of the first component, by showing the improvements in the starting salaries for newly qualified teachers of various grades. In addition, of course, the average remuneration of teachers already in the service rises each year as they receive increments to their original salary. These increments have usually been between four and six per cent of the starting salary since 1953, although in the 1930's they were as high as 12 per cent for the lowest-grade teachers. Thus, even when the scales were unaltered, salaries tended to drift upwards by several per cent each year due to the annual increments. This was particularly important before 1947, when the service was young and retirements and replacements offset little of the annual addition in increments. Even at present, the service is predominantly comprised of young teachers (the average age of male primary teachers in 1963 was 32.5 years, and over 83 per cent of all teachers were under 40 years old),[1] and this will remain true for many years.

The second component of the rise in the average teacher's salary has been the continual upgrading of the service as a whole. In the 1930's, the output of grades C teachers from the training colleges was gradually replaced by grades A and B, which in turn was replaced by the output of "Vernacular" teachers in 1939. One year before, a small output of better trained "Primary" teachers had emerged. The output of "Primary" teachers expanded relative to "Vernacular" teachers until 1954, when the last major batch of Vernacular teachers emerged and (in 1956) the flow of Primary teachers greatly increased. At present, there is talk of raising the entry to the training colleges to school certificate level, and already a few such teachers are in training for primary schools.[2] A similar trend in the upgrading of entry standards and the improvement (often lengthening) of the training courses has occurred at higher levels of the system. Improvement of this sort is desirable, and, indeed, essential if the standards of instruction in the schools are to be raised. But the usual economic consequence of raising standards is that salaries are raised too. And, in Uganda, it is the salaries that have risen the faster.

1. The fact that female teachers, who tend to leave the service when they marry, have never formed more than about a quarter of the total teaching force sets a further limit on the amount by which the incremental drift in salaries can be offset by retirements and replacements.
2. See the Castle Commission Report, *Education in Uganda* 1963, p. 45.

TABLE III—15

INCREASES IN STARTING SALARIES OF LOCALLY RECRUITED MALE TEACHERS IN UGANDA 1926/30 to 1964
£ per annum

Starting Salaries	*1926/30*	*1939*	*1947*	*1949*	*1953*	*1954*	*1956*	*1960*	*1964*
Vernacular ..	15[a]	15[a]	24	34.8	45.6	66.6	77	114	132
Primary ..	—	33.6	45.6	60	78	108	117.5	150	189
Junior-Secondary	57[b]	57[b]	74.8	102	130	204	235.5	300	300
Senior-Secondary[c]	—	—	90	153	230	498	576	612	612
Graduates—Pass	—	—	—	—	—	647	678	768	768
Hons	—	—	—	—	—	693	726	828	828
Index of starting salaries 1947=100									
Vernacular ..	63	63	100	145	190	278	322	477	554
Primary ..	—	74	100	132	172	237	258	330	416
Junior Secondary	76	76	100	136	173	272	312	400	400
Senior Secondary	—	—	100	170	255	550	640	678	678

[a] A, B grade teachers.
[b] Old type Makerere teachers.
[c] New type Makerere teachers.

Source: Compiled from data supplied by Ministry of Education, Uganda.

N.B. dates refer to the year when new salaries were first introduced. The starting salaries shown remained in force until the next year of change.

The result mentioned already is that the typical newly trained teacher in Uganda today is a "Primary teacher" earning £189 whereas in the 1930's he would have been a "Vernacular" teacher earning £15. Of the twelvefold increase in the costs of employing new teachers (and thus of cost of teachers for expansion), however, over two-thirds of the increase must be attributed to increases in teacher salary levels in general, and less than a third to upgrading the quality of teachers.

Evidence is not sufficient to permit a detailed comparison of increases in teachers' salaries with salary changes in other occupations, although it appears that the increase in teachers' salaries was slightly above the general average.[1] Furthermore, and in spite of what is often said, the rate of wastage of primary school teachers in Uganda has been surprisingly low, hardly two per cent per annum

1. Unfortunately data on salary increases in other occupations is scanty and mainly limited to data on sectoral changes in average earnings which do not differentiate between different levels of skill. Over the eight-year period 1955–62 average African earnings doubled, an increase of nearly 11 per cent per year. Over the last four years of the same period, European earnings increased by about five per cent per year and Asian earnings by about two. The largest increases amongst Africans were in mining and local government (20 and 14 per cent) and the smallest in services and construction (both seven per cent). See E. R. Rado, "The Real Income of Uganda—1954–62", *Economic Development Research Paper No. 40*, 21.7.64 (East African Institute of Social Research, Kampala, Uganda), mimeo.

among male primary teachers and about three per cent for Junior Secondary teachers. Even among local secondary teachers, who can find alternative occupations with little difficulty, the rate of wastage has been ten per cent or less.[1]

Table III—16 brings together the arguments of the last few pages, by showing the total effect of the various factors accounting for the increases in the costs of primary education, and their relative importance. During the 20-year period from 1938 to 1958 the costs of aided African primary education rose nearly 40 times, about four times over the first decade and nearly ten times over the second. Most of this increase can be explained in terms of three key variables.

Over the whole period, the most important factor was the eightfold rise in the levels of teacher salaries. The sevenfold rise in enrolments was nearly as important. The steady decline in the teacher-pupil ratio was a compensating factor, but not sufficient to offset more than a 5–10 per cent of the great increase engendered by the rise in enrolments and salaries.

That these three variables do not tell the whole story is made clear by the "unexplained residual" shown in Table III—16.[2] The equation of recurrent expenditure, introduced in Chapter II, linked total expenditure (C_1) to five variables: A_p p, t, W and k. The product of A and p is simply total enrolments (P), and thus in terms of our present variables the equation would read

$$C_1(P) = P.t_p.W.(1+k)$$

Variations in k, the non-salary component of educational costs, probably account for much of the unexplained variation in expenditures, but it would not be correct to attribute all the residual to this. There is a strong likelihood that the basic data on expenditure is not complete, especially since certain expenditures on education are outside the field of central and local government. In addition, the increase in salaries is based on an index of teachers' starting salaries (for want of better information). Nevertheless, there is little doubt that Table III—16 represents the major trends.

Perhaps the most interesting comparison is between the experience of 1938 to 1949 and that of 1949 to 1958. The economies obtained by reducing the teacher-pupil ratio have been similar in each

1. Five- and ten-year annual averages based on a sample survey by Fred K. Kamoga: *Wastage among teachers in Buganda*, EAISR Papers, December 1963. Although this study referred to Buganda, the picture in the rest of the country is probably much the same.

2. It is perhaps fortunate that a residual exists: otherwise, the explanation in terms of the three key variables for the whole period might be given more credence than it deserves. The perfect, 100 per cent explanation (i.e. in terms of the three variables) over the period 1938–58 should be treated as statistically fortuitous.

TABLE III—16

ANALYSIS OF INCREASES IN RECURRENT EXPENDITURE ON AFRICAN PRIMARY EDUCATION, 1938–58

African Primary Education	*1938–49*	*1949–58*	*1938–58*
Change in recorded recurrent expenditure:[b]	4.1	9.7[a]	39.6[a]
Change in key variables:[b]			
P—primary enrolments	3.2	2.1	6.7
t—teacher-pupil ratio	.87	.88	.76
W—teachers' salaries	1.6	4.9	7.8
Percentage of variation in expenditure explained by key variables:	110%	92%	100%
Percentage of Increase in Expenditure Attributable to Each Variable			
P—Increase in enrolments	+84	+31	+51
t—Decrease in teacher-pupil ratio	−10	−5	−7
W—Increase in teachers' salaries	+33	+71	+55
−Unexplained residual	−7	+3	—
	100	100	100

[a] 1958 expenditure is average of 1957/8 and 1958/9.
[b] Number of times increase.
Source: Computed from data in Tables III—2 and III—14 and from *Annual Reports of Education*, Uganda.

period. But in the first period, enrolments increased by nearly twice as much as salaries and, in the second, salaries by over twice as much as enrolments. In the final section of this chapter, where the changes in the educational system are related to changes in the economy as a whole, the reasons for this are suggested. But for the moment, note the important result: in the post-war years, although expenditure on African primary education rose by well over twice as much as in the previous decade, the increase in enrolments was scarcely two-thirds of that of the earlier period. The difference is almost entirely accounted for by a succession of salary increases. However justified in keeping teachers abreast of others in employment, these increases have greatly increased the cost of education and thus limited the amount which could be done with the money at the disposal of the Ministry. Nor did the trend of salary increases stop after 1958. Further revisions followed in 1960 and in 1964.

The experience at primary levels is the extreme, and at secondary levels enrolments have risen faster (See Tables III—1 and III—2) and salaries more slowly (Table III—15) than primary, at least since 1949. Yet even at the secondary level, salaries rose over sixfold between 1947 and 1956, although they have increased little since. Salaries for graduates and expatriates have risen by nearly 15 per cent since 1956, slightly more than for less qualified senior secondary teachers who received a larger increase between 1954 and 1956.

4. *The Cost of Education in Terms of Manpower*

In Uganda, the aided educational system alone involves well over half a million Africans in full-time activity, over 20,000 Asians and about 2,000 Europeans. Most of these are students, and the majority of these are in primary school and below working age, at least by the standards of the monetary sector.[1]

Before considering other characteristics of this manpower, it is worth being impressed by the sheer magnitude of the number of persons involved—one in 14 of the whole country, two and a half times total wage and salary employment, over seven times the total number employed in the rest of the public sector. It takes little imagination to sense the enormous effort involved and, indeed, the potential of this force for development. Through education and beyond it, many persons are involved in the system who could be organized to make an impact on the country's economy, Already they are organized for schooling. Could not the organization be expanded for development?

About 15,000 full-time teachers were involved in the school system. Table III—10 showed their number and their qualifications. Their numbers have grown considerably: graduate teachers from 18 in 1929 to 590 in 1963; other teachers with a completed secondary education from 179 in 1929 to 1,601 in 1964. In a country short of education persons, these numbers represent a significant proportion of the total "stock" of the country's educated manpower. Furthermore, even though the rest of the teachers had less than a complete secondary education, their training and position have often qualified them to be leaders in the local community and their numbers have made them a large and important group in the whole country—less than 300 in 1929, but over 12,000 in 1963.

A large fraction of the graduate teachers, and teachers at secondary level, have always been expatriates. Table III—17 shows how their numbers and proportions have changed between 1955 and 1963. Although expatriates formed 85 per cent of all graduate teachers in 1963 the proportion of local teachers was rising and is likely to increase. There has also been a striking increase in the proportion of local teachers with secondary qualifications rising from scarcely

1. There is however some evidence that the opportunity costs of primary students in the agricultural rural areas are not negligible. For example, in areas where young boys are responsible for herding cattle is their absence at school often keenly felt. This is often cited as one cause of drop-out at primary levels.

TABLE III—17

NUMBER OF EXPATRIATE AND LOCAL TEACHERS WITH GRADUATE AND SECONDARY QUALIFICATIONS: ALL UGANDA SCHOOLS (AIDED)
1955–63 Selected Years

	1955	*1957*	*1960*	*1961*	*1962*	*1963*
GRADUATE TEACHERS—expatriate	—	—	549	551	604	515
—local	—	—	31	35	32	75
total	354	539	580	586	636	590
TEACHERS WITH COMPLETED SECONDARY EDUCATION						
—expatriate	493	504	730	723	683	177[a]
—local	139	237	760	910	970	1,424[a]
total	632	741	1,490	1,633	1,653	1,601
Percentage expatriate						
Graduate:	—	—	95	94	95	85
Secondary:	78	68	49	44	41	(30)[a]

[a] Doubtful figures, probably due to a change in definition or misclassification.
— = Not available.

Source: Compiled from data in Annual Reports of Education and from Ministry of Education, Uganda.

20 per cent in 1955 to about 60 in 1962.[1] Even so, the *number* of expatriate teachers has declined little, if at all, and will increase if secondary school expansion proceeds rapidly.

The economic cost of expatriate teachers is in large part the foreign exchange they consume (unless they are paid or subsidized from abroad). While in the country, they consume a high proportion of imports, and when they leave they make financial transfers requiring foreign exchange. This is, indeed, a component of the costs of education which is appropriately measured in money terms and at senior secondary and higher levels of education such measures are important.

Nor should the influence of expatriate salary rates on local salaries be forgotten. Expatriate scales, set by the standards of countries for more developed, act as a magnet to draw up local scales far in excess of the levels the developing countries can really afford. The wider the differentials between the two scales, the more dissatis-

1. As noted in a footnote of Table III—17, the data for 1963 is somewhat odd and probably indicates a change of coverage or definition. The figures should therefore be treated as tentative. The large increase in the number of local secondary-qualified teachers between 1957 and 1960 is mainly the result of the expanded programme of junior-secondary teacher training.

factions and tensions. Yet the higher the local scales, the more unemployment.

The importance of measuring the cost of *local* manpower in terms of the quantities of manpower used as students and teachers is strikingly shown in Table III—18. In 1963, somewhat over half (between 49 and 59 per cent) of all persons whith a school certificate or a complete secondary education obtained in Uganda were engaged in full-time education and so outside the directly productive labour force. About a seventh (between 14 and 17 per cent) of the stock were employed as teachers and over one-third (between 35 and 42 per cent) were students. In other words, of the total output of the Uganda secondary schools since the 1930's (when school certificates were first "produced") less than half was available during 1963 for productive activity in the country. Indeed, the proportion appears to have

TABLE III—18

USE OF LOCALLY EDUCATED MANPOWER IN UGANDA EDUCATIONAL SYSTEM
1955–63 Selected Years

Total Stock	*1955*	*1957*	*1960*	*1963*
Numbers having completed secondary[d]	2,271	3,507	6,621	10,622
of which with school certificate[d]	1,625	2,564	5,039	8,762
Numbers Engaged in Full-time Education				
Teachers—graduate or equivalent	—	—	31	75
completed secondary school	139	237	760	1,424[e]
total teachers	139	237	791	1,499
Students—higher certificate classes	—	—	209	653
technical studies	60	79	75	183
departmental training	40[a]	94[b]	166[b]	150[a]
teacher-training	173	218	344	406
study abroad	336	757	898	1,750[c]
University of East Africa	190	256	384	570
total students	799	1,404	2,076	3,712
Grand Total in Full-time Education	938	1,641	2,867	5,211
Estimated percentage of total stocks used in full-time education				
school certificate holders	58	64	57	59
persons who have completed secondary	41	46	43	49

[a] Estimated figure.
[b] Incomplete figure.
[c] January 1964.
[d] After allowing for mortality.
[e] Doubtful figure—See Table III—17.

Source: Compiled from data given in *Annnal Reports of Education* and from Ministry of Education, Uganda.

changed little over the last eight years, and may be expected to remain large for some years ahead. This represents a heavy burden at a time when the country is pressed by the needs of Africanization and of development.

A large proportion of the students engaged in further study are of course being trained for specific jobs or receiving graduate education. When their training is completed they will be available to relieve the present shortages. In this respect, their withdrawal from the present production is largely an investment in manpower for the future. But as with all investments, returns must be weighed against costs.

5. *Capital Expenditure*

Just as recurrent expenditure on education in Uganda largely arises through the money costs of one item—teachers—so capital expenditure largely goes on the construction of buildings. Equipment is of second importance for costs. At primary levels in the past the work and cost of construction has mainly been the responsibility of bodies outside central government—the missions, local government and local communities. Government has regulated and approved the building programmes, at least if it was to accept responsibility later for the recurrent expenses arising from the new school.

Prior to developments of the early 1950's school buildings were largely built by direct labour, and were of simple construction. These buildings gave good service and there was little maintenance. Expansion from 1952 to 1957 gave great impetus to school construction but often with little concern for future maintenance; many buildings were hurriedly built, of shoddy materials and poor designs. These buildings were often costly, with faults in construction which resulted in high maintenance costs. After 1957 school construction activity declined for several years although from 1962/3 there was a sharp revival of work.

The tremendous acceleration in school building in the early 1950's greatly increased expenditures on construction as shown in Table III–19. Expenditure reached a peak during 1957, fell sharply until 1961 and rose thereafter. The decline in expenditure was brought by economies forced on the Ministry by the decline in world export prices and thus in Uganda revenue. Indeed, the decline in expenditure would have been sharper still if it were not for the accumulated reserves on which it was possible to draw for several years.

TABLE III—19
CAPITAL EXPENDITURE ON SCHOOL CONSTRUCTION IN UGANDA, 1949–64/5
(£ thousands)

Year	*Total Recorded Expenditure*
1949	21
1950	51
1951	108
1952	385
1953	837
1954/5	1,121
1955/6	982
1956/7	943
1957/8	1,001
1958/9	612
1959/60	568
1960/1	467
1961/2	469[a]
1962/3	848[a]
1963/4	1,313[a]
1964/5	2,043[a]

[a] Central Government expenditure only 1961/2–64/5.

Source: 1949–1961/2, Annual Reports of Education, 1962/3–4/5 Uganda; Annual Statistical Abstract, 1965.

At this level of analysis there is little that can be said about the construction programme that is neither too detailed to be of general interest nor too general to be illuminating. Two points from Uganda experience however bear on the more general economics of education and may be illustrated from Uganda's secondary school building programme.

Economic analysis directs immediate attention to the possibility of economies of scale, in school building as in other things, and to the question of optimum size. Particularly when heavy capital expenditure is involved, as with the halls, the classrooms and dormitories and the laboratories of a modern secondary school, increasing the number of pupils in each class, and the number of streams of classes, can significantly reduce per student costs. In Uganda, a Working Party on Secondary School costs in 1964 investigated this possibility in some detail, showing how the *per capita* costs of laboratories, buildings and such would fall as the number of classes and class size were increased. The full report enlarged on its conclusions in some detail but three major points may be noted.[1]

1. Many conclusions of the report have now been implemented. Particularly significant is the reduction in costs per place in the new standard plans for secondary schools. See *Work for Progress, Uganda's Second Five Year Plan*, p. 136 (Government Printer, Entebbe, 1966).

First, even without allowing for changes in class size, there are considerable economic benefits in increasing the number of streams, both for capital and recurrent expenditures. Double streaming for example can reduce the per student cost of a senior secondary school by 15 or 20 per cent. Secondly, the marginal cost of additional streams is not always, somewhat curiously, a steadily declining function: although the average cost of streams in total decreases as the number of streams increases, there are humps in the average cost curves of both capital and recurrent teacher costs. Thirdly, although non-economic disadvantages of larger schools are often stressed, there are also certain advantages, for instance, the opportunities in larger schools of employing more specialist staff.

But Ugandan experience strikingly confirms the view that the gains from building to more optimal size can be far outweighed by the gains from revising the general standards of school construction. The point is brought home by a simple comparison of secondary school construction costs—in Kenya, Tanzania and Uganda. Estimates in 1964 of the three territories put the total capital costs per secondary school place in a double stream school as follows:

	Day School	*Boarding School*
Kenya	£170	£225
Tanzania	—	£400
Uganda	£200	£700

Not only were the *estimated* costs at a boarding school in Uganda nearly three times higher than in Kenya, but (as the Working Party on Secondary School Costs reported) *actual* building costs in Uganda at that time were at least £200 greater than those estimated and thus larger than Kenya's by over three and a half times.

This is not the place for a detailed analysis of all the reasons for the difference. A certain percentage could be attributed to higher building costs in Uganda, arising from the cost of local materials and the additional distance that imported materials must be transported from the coast. Some part of the difference was due to cost cutting procedures in Kenya—such as omitting ceilings from the classrooms and garages from the teachers' houses—about which Uganda had differences of opinion. But the major part of the difference was the result of a basic contrast in size and standards of construction and design.[1] In brief, in one country it was the

1. A comparison of the plans for the main school buildings (excluding teachers' houses) suggests that costs per place in July 1964 were 3.35 times higher in Uganda than in Kenya. The difference can be explained in terms of three factors: building costs in Uganda were 73 per cent higher than in Kenya; the area per pupil was 67 per cent greater in the Uganda designs than in those of Kenya; the higher quality of finish in Uganda accounted for the final 16 per cent, by which Uganda's costs exceeded Kenya's.

tradition to build a style of secondary school costing £200,000, and in the other a much cheaper style costing £55,300.

The moral of these vast differences in cost is neither intellectually subtle nor of much academic interest. It is however of the greatest practical importance for the future of secondary education in Uganda, as indeed in Africa. To quote again the Working Party's Report:

At present levels of costs and incomes, one new school place is 40 to 45 times the national income *per capita*. A new school for 480 pupils costs the annual earnings of over 19,000 Ugandans.

IV. Analysis and Conclusions

The experience in Uganda well illustrates the economic mechanism at work when education expands in a developing country heavily dependent on primary products. Two elements need to be distinguished.

First, expansion of the real resources used in educational activity tends to take place in *cumulative* terms. Popular pressures for universal schooling make for larger first-year enrolments. Educational pressures to reduce wastage and improve quality and the economic and political needs for high-level manpower accelerate the growth of total enrolments and make it cumulative. Each year a larger quantity of manpower is absorbed into the educational system, both in total and in the high levels of manpower used in the advanced classes.

The second element concerns the economic setting in which expansion takes place. The economy fluctuates in accord with the fortunes of the country's exports in world markets and the nature of the agricultural season. The financial priority given to education varies with the political importance it receives. In Uganda, rising exports carried the economy to new heights during the Korean war boom as cotton and coffee prices soared, raising tax revenue and accumulating vast reserves in the development funds. At first, political leadership under Governor Hall urged that these funds should be husbanded and channelled not into education, but into productive investment, diversification and industrialization. Reins were placed on the education budget, and plans for expanding enrolments were restrained. In 1952, however, there was a change of governor and a change of policy. The new governor, Sir Andrew Cohen, urged that social and economic development should go together. The education budget was increased, the de Bunsen Committee's recommendations accepted, and an ambitious plan for expanding education at all levels prepared, to be financed by £10

million of the price assistance fund, accumulated during the Korean war boom.[1]

In retrospect, the surprising feature of these new plans and greatly enlarged educational budget, was how little they appear to have raised the overall trend of expansion, judged by total enrolments. The rate of primary expansion after 1953 (See Tables III-1 & 2 was slightly higher than before, and, of course, absolute enrolments increased enormously. Senior secondary expansion accelerated from a rate of six to 20 per cent per annum. And it is true that a considerable programme of capital construction was implemented at least while the boom years lasted. But, as has been mentioned, the largest part of the increase in expenditure went to increasing salaries and much of the capital expenditure went to increasing building standards rather than capacity.

In fact, educational expenditure and enrolments, judged by Ugandan experience, appear to be more independent than often thought. In Uganda, the growth of aided enrolments has largely followed a general trend of expansion accepted and planned within the Ministry, with the state of the government budget making it easier or more difficult to finance. At times when government revenue has been shrinking, it has been accepted that the proportion devoted to education must rise, although some economies have been made in capital expenditure. Enrolments have continued to grow. In times of boom, expansion has proceeded sometimes at faster rates, but the increased revenue has made possible a more lenient attitude towards pressures for salary increases. Thus during the 1930's and the war years, salary scales were virtually unchanged, with only a mild upward drift arising from annual increments and the increasing proportion of teachers trained to higher levels. After the war, expansion continued at much the same rate but there were no less than seven increases in the salary scales, four during the major period of boom and one after the recent coffee price rise. The net result was that expenditure increased much more rapidly after the war than before, but enrolments followed the former trend. The largest fraction of the increased educational budgets has gone to pay teachers more rather than to pay more teachers.

This is not to suggest that education develops free of economic pressures. But the strength of popular demands and the institutional framework of education is such that it is usually often easier to

1. See the study prepared by Prof. David Walker for an excellent analysis of the interplay between economic and political forces over this period in Uganda. United Nations, *Planning for Social and Economic Development in Uganda* (New York, United Nations E/Cn.5/346/Add 9, 18 April, 1962), mimeo.

accept the educational structure which has developed, and to pay the recurrent costs involved, than to cut the size of the system to fit each year's budget. This does not apply, however, to plans for expansion which—having to absorb the brunt of every fluctuation in economic circumstance—may therefore be exceptionally subject to reversals of policy. This can have disastrous effects on a system which for co-ordinated development requires plans to be made ten, 15 and 20 years ahead.

Perhaps the clearest example of finance affecting educational expansion in Uganda occurred in 1948, just after the first round of post-war salary increases. Under the government's revised development plan, the original allocation for educational development from 1947–56 was increased to take account of recent salary increases and increments to come. So little remained for future primary expansion that "it became necessary for government to consult with school owners in order to impose some limit to the rapidly increasing output of the Teacher Training Centres. The final decisions reduced output much below the figure which both the Department and school owners had hoped to see".[1] Some of the excess capacity in teacher training was used to lengthen the training course and some teachers were trained outside the quotas. But the total output of primary teachers fell from 665 in 1947 to 569 in 1948, 470 in 1949 and to 367 in 1950.[2]

Subsequently, following the rapid expansion in exports and the change in political leadership referred to above, there was a change of policy, a larger budget for education, an increased output of teachers and a rapid programme of primary expansion. But the damage was done. The demand for teachers ran ahead of the supplies being trained and the proportion of untrained teachers increased. The quality of primary education for some years thereafter was unnecessarily below what it might have been.

The economic mechanism in reverse is clear in experience after 1957, when the export prices of cotton and coffee went into serious decline. By this time, enrolments had grown considerably, but were still under the cumulative pressures to expand further (especially encouraged by the need for high-level Africans as Independence drew near). Salaries had risen to new levels and increments sustained the upward drift. Thus at a time of falling government revenue,

1. *Annual Report of Education*, Uganda, 1948, p. 9.
2. Figures include both "primary" and "vernacular" trained teachers. Most of the decline occurred in "vernacular" training. Outputs of "primary" teachers in the same years was 94, 101, 135 and 112, the latter figure suggesting a drop in the 1949 intake. Data from Ministry of Education records.

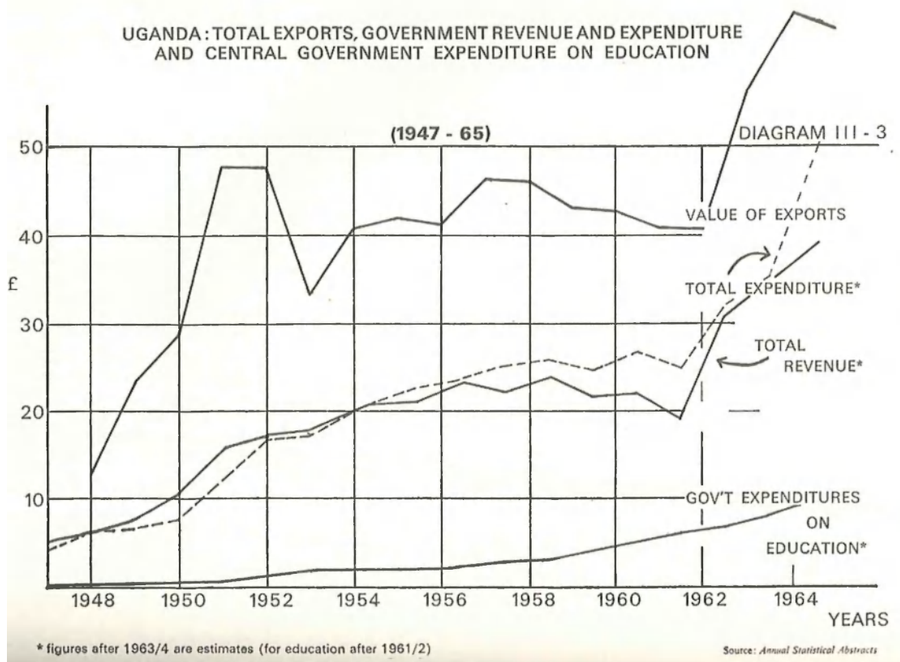
shown in Diagram III—3, recurrent expenditure on education (and on certain other items) continued to increase.

The axe of economy was turned to the capital budget, but even reducing this by over half could not offset the rise on recurrent account. Educational expenditure as a proportion of total government expenditure rose to over a quarter. As a proportion of government revenue. it rose even higher. In spite of economies by other

UGANDA : TOTAL EXPORTS, GOVERNMENT REVENUE AND EXPENDITURE AND CENTRAL GOVERNMENT EXPENDITURE ON EDUCATION

(1947 - 65)

DIAGRAM III - 3



* figures after 1963/4 are estimates (for education after 1961/2)

Source: *Annual Statistical Abstracts*

Ministries and a reduction in government employees, total government expenditure far exceeded total revenue.

The government's budget went into deficit and the accumulated reserves fell. After these had been reduced to low levels, the Government increasingly turned to loans from overseas. In addition, pressures from the mounting costs of education were eased somewhat by shifting more of the financial responsibility on to local government. To a large extent, this increased burden was met by increasing the block grants made to the local governments but, in addition, the local governments themselves raised more in taxes.

After 1962, the position eased somewhat following increases in both the quantity and price of coffee exports and expansion of cotton exports beyond the peak level established in the 1930's. Export earnings increased by about 60 per cent in two years and central government revenue by over 20 per cent in both 1962/63 and 1964/65. With respect to education, however, the underlying mechanism continued to operate, though now in the upward cycle. Enrolments expanded, broadly with the long-run trend in primary and junior secondary, though considerably faster in senior secondary. But with the easing of the revenue position, much of the additional expenditure on education went into raising teacher salaries and embarking on a school building programme, larger than ever before (emphasising particularly secondary school construction). Public expenditure rose to new heights, reaching an estimated £9.2 million in 1963/4 and around £11 million in 1964/5[1]—and continued to rise even when export earnings and government revenue turned down in 1965.

Future export and revenue prospects are inevitably uncertain though, hopefully, as the Uganda Plan assumes, export earnings will continue to expand by, on average, four per cent or so a year. Increasing aid from abroad can raise the availability of foreign exchange rather faster. But there is doubt that the mechanism which has operated to raise education's costs in the past 30 years must be changed, if educational expansion is to be continued.

The government is clearly aware of this need for structural change of this sort. The Second Five Year Plan contains the outline of an incomes policy in which increases in lower incomes (of the level of primary school teachers) would be limited to two and a half per cent per year and incomes above £600 (of the level of senior secondary and graduate teachers) would be pegged to present rates,

1. These estimates include local government expenditure. Educational expenditures shown in Diagram III—3 include only central government expenditure (including estimates of that spent by local governments but financed from block grants from central government).

individuals only gaining increases through promotion to higher grades instead of from higher rates within the same grade. If implemented, such a policy could have enormously beneficial effects in keeping the financial costs of education within bounds. Furthermore, the Plan refers to the possibilities of taking in more pupils and using school buildings more intensively, so reducing the capital costs of schooling. At university level, recurrent costs per pupil could be brought down by enlarging departments to an economic size, and reducing pupil-teacher ratios.

Some of these changes are possible with only minor variations in the existing organisation. Others may appear more radical. But when comparisons are made with other countries, many apparently radical ideas seem rather commonplace and obvious. And some of their ideas would save an enormous amount of the money at present spent on education. Indeed the financial limitations on educational expansion are much less rigid than other supposed. The next chapter presents some comparative evidence on these points.

Chapter 4

LIMITATIONS ON THE RAPID EXPANSION OF EDUCATION

I. Introduction

Two considerations usually set the upper limit when planning educational expansion in Africa: the shortage of finance and/or a feeling that there is some maximum to the rate of school expansion which can be achieved. Many officials in the Ministries of Education spend their lives trying to squeeze the educational programme within the available budget, and the belief that finance is the main restraint to expansion is strengthened by this continuing experience. In most African countries, as in Uganda, recurrent expenditure on education has risen year by year: in many, the proportion of Government expenditure going to education has also risen continuously and has reached record heights in recent years. Independence in many cases accelerated these trends often to the point where—it is said—the financial limit has been reached.

The second widely held belief is that the country has approached some rate of expansion which cannot reasonably be exceeded. Schools and enrolments in most countries of sub-Sahara Africa have been expanding rapidly—at much faster rates than typical of other continents. During the 1950's secondary enrolments almost everywhere in Africa rose even faster than primary, again often accelerating as independence approached. Enormous increases since the pre-war years have been succeeded by further rounds of larger intakes and record entries at examinations. New schools have been built including prestigious higher-level institutions. Thus, however low enrolments may appear by outside standards, most African countries can look back on a record of rapid growth with considerable sense of achievement. In these circumstances, officials in the Ministries of Education easily acquire the impression that expansion has not only been rapid but about as rapid as was possible under the circumstances. Any programme of faster expansion—it is said—would have exceeded the limits of teacher recruitment, the construction capacity, or administrative organisation, and lead to a severe decline in efficiency and in the standards of education.

However justified these beliefs may seem when judged by experience in any individual country, comparative data from a number of African countries lead to different conclusions. There are large differences between countries in both rates of educational expansion and expenditures on education, both absolutely and relative to

available resources. In the light of these differences, is it reasonable to accept the notion of absolute limitations on educational expenditure or expansion? This chapter considers these questions.

Before turning to them, a general comment on the value of comparative data is in order. A number of studies have produced figures of African education, comparing enrolments at each level of education, and in relation to the relevant age groups. Such studies have obvious interest and for certain purposes are important. But in essence most of these studies concern the shape and size (relative to total population) of the educational pyramids at an instant of time. Unless in addition there is some knowledge of the stock of education in each country—its education profile—its stage of economic growth, its needs for manpower and the non-economic objectives of its educational policy the significance of differences in the educational pyramids are difficult to assess.

In contrast, differences in the rates of educational expansion are less difficult to interpret at least as a commentary on what is possible rather than what is desirable. The experience of expansion in one country can throw much light on the process of expansion in another, even though objectives and resources may differ. Thus comparative data on the expansion of the school systems, particularly over long periods and when accompanied with details of changes in cost components, may be more useful than snapshot comparisons at an instant of time.

II. Physical Limits to the Rate of Expansion

1. *Comparative Rates of Expansion in African Countries*

Far from there being any "natural" rate of expansion of schools and enrolments, experience shows that a wide variation in rates exists. Enrolments in different African countries in the 1950's grew at average rates between three and 26 per cent per annum at primary levels and between five and 31 per cent at secondary levels. The average growth rates in the upper quartile of the 40 or so countries for which data are available was 18 per cent per annum at primary levels and 21 per cent at secondary. In contrast, the average growth rates in the lower quartile were only six and nine per cent respectively. At higher levels, expansion was even faster. These variations in rates of growth are very large when put in terms of the total increase they represent over a ten-year period: a difference, at primary levels between enrolments increasing by a third or a half to enrolments increasing by ten or 12 times.

Nor were the faster or slower rates of growth confined to any one region of Africa. On average, the rates of expansion at both primary and secondary levels were rather higher in West Africa than elsewhere. This was true in both the French- and English-speaking areas. Expansion in Southern Africa at both levels was rather slower than elsewhere. But there were many exceptions to this pattern, as in Liberia where primary enrolments expanded by less than five per cent and in Congo (Brazzaville) where secondary enrolments increased by under eight per cent per annum. In contrast, the annual average rate of primary expansion in Swaziland exceeded nine per cent and Malawi's rate of secondary expansion nearly reached 24 per cent. Other variations in rates of expansion are shown in Table IV—1.

Just as the faster rates cannot be linked to any particular region of Africa, neither can they be simply related to the particular size or shape of the pyramid which existed at the beginning of the decade. For instance, the fastest rate of primary expansion in West Africa was in the Ivory Coast where enrolments rose by 23 per cent per annum to reach nearly 240,000 by 1960. This rapid rate of expansion was particularly impressive, since it is measured from a base of reasonable size: primary enrolments in 1950 in the Ivory Coast were over 32,000—comparable with enrolments in more than half the countries in the region.

The most rapid rates of expansion at secondary level are also not those of countries starting from the smallest base. Although in Malawi a rapid rate of secondary expansion was partly the result of very small enrolments in 1950, the high rates of secondary expansion in Nigeria, Sudan, Cameroon and the Ivory Coast all started from enrolments considerably larger than existed in most countries at the beginning of the decade.

It is true, of course, that rapid expansion at rates far exceeding those of population growth can only persist in countries where enrolment ratios are initially low. Rapid expansion means that an even larger proportion of the school-going age groups is being absorbed into the school system. Obviously, this can only continue until all schoolchildren are enrolled, after which expansion must drop to the rate of population increase. In fact, the rate of expansion is likely to decline before this point is reached because of the increasing difficulties of enrolling more children, withdrawing them from other activities, and changing social patterns. Nevertheless, in most African countries today, this ultimate limit is largely irrelevant particularly at secondary level, where hardly five per cent of the eligible age group is enrolled in school.

There is one dominant conclusion to be drawn from this

TABLE IV—1

EDUCATION IN AFRICA—RATES OF GROWTH 1950–60 AND SITUATION AROUND 1960

(Excludes South Africa)

	Population			Literacy	School Enrolments			Pyramid Ratios		Adjusted Enrolment Ratios			Breakdown of Secondary Level Enrolment			Average Rate of Growth of Enrolments (1950–60) (average per cent increase per annum)			Pupil–Teacher Ratios					Public Expenditure on Education	
	Total in 1960 (millions)	Per Cent Under 15 Years	Per Cent Rate Annual Increase[w]	Per Cent of Adult Population Literate Around 1950[w]	Primary (000's) 1960/61	Secondary (000's) 1960/61	Total Higher in Africa and Abroad	Ratio Per Cent Secondary/Primary	Ratio Per Cent Higher/Secondary	Primary	Secondary	Higher	General	Vocational	Teacher Training	Primary	Total Secondary	Higher	Primary	Secondary General	Secondary Vocational	Secondary Teacher Training	Total Secondary	Higher	Percentage of Total Public Expenditure	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
NORTH AFRICA																										
Algeria	10.8	41	1.6	15–20	788	118	11,210	15	10	56	8	1.4	69	30	1	9[x]	7	6	38[x]	—	—	—	—	20	27.5[n]	2.1
Libya	1.2	38	1.9	5–10	140[c]	12[c]	1,041	9[c]	9	78[c]	8[c]	1.2	77[c]	7[c]	16[c]	21[c]	31[c]	66[d]	33	15[c]	7[c]	12[c]	13[c]	13[d]	—	—
Morocco	11.6	45	3.0	10–15	796	96[d]	3,927	11	4	54	5	0.5	69	30	1	12	11[q]	13[d]	—	—	—	—	—	30[d]	18.1[a]	2.5
Sudan	11.8	47	2.8	5–10	318	70[d]	3,737	19	5	14	6	0.4	93	5	7	9	28[d]	21[d]	41	22[d]	12[d]	8[d]	21[d]	5[d]	10.1	1.4
Tunisia	4.2	42	1.8	15–20	449	57[d]	4,523	13	8	71	12	1.4	74	24	2	11	5[d]	4[d]	—	—	—	—	—	15[d]	—	—
U.A.R.	25.9	43	2.4	20–25	2,663	597[d]	95,000	21	16	68	17	5.0	75	22	3	7	13	10[d]	39[d]	19[d]	13[d]	9[d]	17[d]	27[d]	13.5[n]	2.1
North Africa Reg. Total	65.7	43	2.4	14–19	5,154	950	119,438	18	13	52	12	2.5	75	22	3	9	13	—	39	19	13	9	17	—	—	—
WEST AFRICA																										
Cameroun	4.1	29	0.8	5–10	415[c]	15[c]	1,111	4[c]	7	69[c]	3[c]	0.4	61[c]	30[c]	9[c]	9	23[c]	—	—	—	—	—	—	—	10.3[n]	2.1
Congo (Brazzaville)	0.9	42	3.3	1–5[u]	115	8[d]	280	5	4	95	5	0.5	69	31	—[s]	11	8	—	60	—	—	—	—	—	21.8	5.4
Dahomey	1.9	—	2.8	1–5[u]	89	6[d]	395	7[d]	7	31	2	0.3	81[d]	10[d]	9[d]	10[d]	17[d]	—	38[d]	31[d]	12[d]	23[d]	26[d]	—	20.7	5.1
Gabon	0.4	29	0.8	1–5[u]	57	4[d]	131	5	3	87	5	0.4	77	7	16	11[d]	12[d]	—	46[d]	19[d]	9[d]	21[d]	18[d]	—	16.7	4.2
Gambia	0.3	31	0.7	5–10	8[b]	2[a]	48	24[b]	2	17[b]	6[a]	0.2	94[b]	2[b]	4[b]	8[c]	13[c]	—	27[c]	28[a]	17[a]	11[a]	25[a]	—	11.2[n]	2.7
Ghana	6.8	45	4.1	19–23	483[l]	179[l]	2,061	37[l]	1	49[l]	22[l]	0.4	95[l]	3[l]	2[l]	10[f]	9[b]	14[f]	31[f]	30[l]	—	11[l]	28[l]	6[f]	18.0	4.5
Guinea	3.0	41	4.3	1–5[u]	79[c]	11[d]	448	8[c]	4	18[c]	1[c]	0.2	66[c]	19[c]	15[c]	18	27[d]	—	61	35[d]	30[d]	23[d]	32[d]	—	14.8	3.7
Ivory Coast	3.2	45	4.4	1–5[u]	239	14	1,002	6	7	50	2[c]	0.4	74	10	16	23[c]	24	—	42[c]	—	—	—	—	—	14.3	2.5
Liberia	1.3	—	—	5–10	55[b]	3[b]	701	6[l]	22	29[b]	3[b]	0.8	81[l]	14[l]	5[l]	5[h]	13	21	31[h]	13[b]	—	6[b]	—	—	—	—
Mali	4.1	43	2.1	1–5[u]	55[c]	4	271	6[d]	7	11[c]	0.7	0.9	44[c]	33[c]	23[c]	9[c]	11	—	—	—	—	—	—	—	19.7	1.6
Mauritania[x]	0.7	—	—	1–5[u]	11	0.9[a]	48	6[d]	5	10	0.5	0.1	97[d]	—	3[d]	18[d]	18[d]	—	21[d]	18[d]	—	25[d]	18[d]	—	14.4	3.6
Niger	2.9	43	4.1	1–5[u]	21[c]	1.0	62	5[c]	6	5[c]	0.3	0.03	60[c]	7[c]	33[c]	15[c]	19	—	41[c]	15	7	—	—	—	9.8	1.8
Nigeria	35.1	40	1.9	10–15	2,806[a]	201[a]	5,430	6[b]	3	44[a]	5[a]	0.2	81[b]	3[b]	16[b]	10[g]	19[g]	21	29[g]	21[a]	17[a]	14[a]	20[a]	8[m]	—	—
Senegal	3.0	41	5.1	1–5[u]	106[c]	12	951	10[c]	8	25[c]	3	0.5	4[c]	19[c]	7[c]	12[c]	16	25[d]	35[c]	—	—	—	—	10[d]	10.7[n]	2.0
Sierra Leone	2.5	—	2.6	5–10	86	10[d]	399	11[c]	4	20	3[c]	0.2	82[c]	11[c]	7[c]	15	11[d]	3[d]	—	20[d]	13[d]	8[d]	18[d]	6[d]	15.4[n]	2.5
Togo	1.4	45	1.8	5–10	103	7[d]	255	5	4	48	3[d]	0.2	83	12	5	10	19	—	60	—	—	—	—	—	19.1	2.0
Upper Volta	4.4	42	4.4	1–5[u]	57	3	125	5	4	11	0.6	0.05	50	21	29	15	21	—	47	21	16	22	20	—	14.7	2.0
5 English speaking countries	45.9	41	2.3	11–16	3,438	395	8,639	11	2	42	7	0.25	87	4	9	10	14	—	29	26	17	13	23	—	—	—
12 French speaking countries	30.9	40	3.3	2–6	1,347	86	5,079	6	6	32	2	0.25	69	19	12	13	19	—	37	25	16	22	25	—	—	—
West Africa Reg. Total	75.9	41	2.7	7–12	4,785	481	13,718	10	3	39	5	0.25	84	7	10	11	15	—	31	26	17	13	23	—	—	—
CENTRAL AFRICA																										
Central African Republic	1.2	40	1.7	1–5[u]	68	3	76	5	3	37	2	0.1	48	41	11	13	14	—	58	26	38	—	—	—	17.4	2.1
Chad	2.6	43	1.7	1–5[u]	73	1[c]	93	3[c]	10	19	0.4[c]	0.05	76[c]	24[c]	—[s]	26	21[c]	—	—	—	—	—	—	—	11.7	1.5
Congo Kinshasa	14.2	35	2.2	35–40	1,461[c]	52[c]	1,147	4[c]	2	72[c]	3[c]	0.1	27[c]	31[c]	42[c]	5[c]	14[c]	18	40	11[c]	19[c]	25[c]	17[c]	3	—	—
Ruanda-Burundi[t]	4.9	—	2.1	5–10	264	6	270	2	5	36	1	0.08	22	42	36	10	9	—	39	12	13	15	13	—	—	—
Central Africa Reg. Total	22.9	37	2.1	23–28	1,866	62	1,586	3	3	56	2	0.1	28	32	40	7	14	—	40	12	19	24	14	—	—	—
EAST AFRICA																										
Ethiopia	20.0	—	1.6	1–5	177	9	1,808	5	20	5	0.5	0.1	66	23	11	10	18	26[d]	—	—	—	—	—	5[d]	12.9	2.9
Kenya	8.1	53	3.4	20–25	781[b]	29[a]	972	4[a]	3	56[b]	5[b]	0.2	73[a]	13[a]	14[a]	8[g]	11[c]	15[m]	43[g]	16[a]	15[a]	15[a]	15[a]	6[m]	15.2[n]	4.0
Mauritius	0.7	44	2.2	50–55	118[a]	25[a]	771	21[b]	3	100[a]	25[b]	1.6	98[b]	1[b]	1[b]	6[g]	18[g]	8[g]	35[g]	22[a]	—	14[a]	22[a]	3[g]	11.6[n]	3.5
Reunion	0.3	42	3.1	35–40	72[b]	3	—	3	—	89[v]	7[v]	—	72	19	9	4	11	—	33	—	13	—	—	—	—	—
Somalia	2.1	—	1.2	1–5	24	2	262	9	13	10	0.6	0.2	49	41	10	15	19	73	—	17	—	13	12	9	7.8[n]	2.2
Tanzania (mainland)	9.2	53	1.8	5–10	451[b]	23[a]	688	4[b]	3	25[b]	3[a]	0.1	76[b]	16[b]	8[b]	9[j]	9[g]	—	48[j]	21[a]	28[a]	11[a]	21[a]	—	17.0	2.2
Uganda	6.7	41	2.5	25–30	532[b]	39[b]	660	7[b]	2	54[b]	5[b]	0.1	80[b]	12[b]	8[b]	9	14	14[g]	31	22[b]	9[b]	11[b]	18[b]	7[g]	25.2[n]	3.9
Zanzibar	0.3	33	1.2	5–10	20[b]	2[a]	350	8[b]	17	33[b]	7[b]	1.6	83[b]	10[b]	7[b]	9[k]	13[j]	—	29[k]	18[a]	11[a]	8[a]	16[a]	—	13.1[n]	—
East Africa Reg. Total	47.4	49	2.1	9–14	2,175	132	5,511	6	4	25	3	0.15	80	12	8	8	13	—	39	20	14	13	18	—	—	—
SOUTHERN AFRICA																										
Angola	4.8	39	1.6	1–5	105[b]	13	—	13	—	9[v]	3[v]	—	60	38	2	24	13	—	35	18	13	23	15	—	—	—
Lesotho[z]	0.7	46	1.3	50–55	145[a]	3[a]	100	2[b]	3	100[a]	5[b]	0.2	58[b]	25[b]	17[b]	5	10[g]	20[g]	57	23[a]	8[a]	13[a]	16[a]	4[g]	25.5[n]	—
Botswana	0.3	37	1.4	20–25	35[b]	0.8[b]	17	2[b]	2	51[b]	2[b]	0.07	84[b]	4[b]	12[b]	8	15	—	32	21[b]	7[b]	9[b]	17[b]	—	11.4[n]	—
Mozambique	6.5	40	2.0	1–5	416[b]	15	—	4	—	26[v]	2[v]	—	22	74	4	10	5	—	95	16	24	24	22	—	—	—
Zambia[z]	2.4	—	2.4	20–25	288[b]	6[a]		2[b]		60[b]	3[a]		50[b]	28[b]	22[b]	6	17[c]		50	18[a]	9[a]	11[a]	14[a]		10.4	1.2
Malawi[z]	2.8	—	2.2	5–10	287[b]	3[a]	655	1[b]	1	51[b]	2[a]	0.1	47[b]	24[b]	29[b]	3	24[g]	8[o]	39	20[a]	10[a]	13[a]	15[a]	4[o]	6.2	1.0
Rhodesia[z]	3.6	—	3.1	20–25	484[b]	41[a]		8[b]		100[b]	8[a]		89[b]	4[b]	7[b]	8	14[c]		38	—	15[a]	14[a]	—		9.5	1.2
Swaziland	0.3	42	2.5	15–20	34[b]	2[b]	14	5[b]	—	66[b]	8[b]	0.08	90[b]	5[b]	5[b]	9	16	—	34	16[b]	9[b]	12[b]	15[b]	—	15.9[n]	—
Southern Africa Reg. Total	21.4	39	2.1	9–14	1,794	84	—	5	1	67	5	0.1	67	25	8	8	13	—	47	18	16	14	17	—	—	—
Madagascar	5.4	39	2.5	30–35	405	28[d]	2,203	5	8	56	4[d]	0.3	91	4	5	7	7[d]	16	70	22[d]	13[d]	17[d]	21[d]	6	5.1	0.8
Africa Total	238.7	41	2.4	11–16	16,179	1,737	142,456	9	8	51	7	0.9	76	17	7	9	13	—	37	21	14	13	17	—	—	—
No. Countries Included	44	34	43	44	44	44	41	44	41	44	44	41	44	44	40	44	44	22	35	31	28	30	28	19	35	26

NOTES

[a] 1961.
[b] 1960.
[c] 1959–60.
[d] 1961–62.
[e] 1951–61.
[f] 1950–59.
[g] 1950–61.
[h] 1953–60.
[i] 1955–61.
[j] 1952–60.
[k] 1953–61.
[l] 1959.
[m] 1956–61.
[n] 1962.
[o] 1956–60.
[p] 1954–59.
[q] 1957–58.
[r] 1950–56.
[s] Included in general education.
[t] Territories declared independent countries, Rwanda and Burundi in 1962, but separate data are not available.
[u] French West and French Equatorial African average.
[v] Unadjusted enrolment ratio.
[w] Regional averages are weighted by total population.
[x] Public schools only.
[y] Regional averages weighted by 1960 enrolments, leading to some upward bias.
[z] African enrolments only.

SOURCES AND NOTES

Population (cols 1–3)
Department of Economic and Social Development, E.C.A., United Nations, August 1963.
N.B. Rates of growth and percentages of population under 15 years of age refer to the most recent periods for which data were available.

Literacy (col. 4)
UNESCO. *World Illiteracy at Mid-Century* (UNESCO, Paris, 1957).

School Enrolments (cols. 5–6)
From working Tables made available by UNESCO, Paris. Certain other data from UNESCO. *Statistical Yearbook*, 1963 (UNESCO, Paris). (*col. 7*)
UNESCO *The Development of Higher Education in Africa*, Table I, pp. 226–7.
N.B. Data refer to total number of African students (by country of origin) enrolled in institutions of higher education at home or abroad.

Pyramid Ratios, (cols. 8–9)
Calculated from columns (5–7).

Adjusted Enrolment Ratios (cols. 10–12)
From UNESCO working Tables. Data refer to enrolment at each level as a percentage of some fraction of total population aged 5–14 years, the fraction corresponding to the duration of schooling.

Breakdown of Secondary Enrolment (cols. 13–15)
From UNESCO working Tables.

Average Rates of Growth of Enrolments, 1950–60 (cols. 16–18)
From UNESCO working Tables.

Pupil-teacher Ratios (cols. 19–24)
From UNESCO working Tables.

Public Expenditure on Education (cols. 25–26)
UNESCO, *The Financing of National Plans of Education: Review of Recent Trends in Expenditures for Education in Africa* (UNESCO, Paris).
UNESCO/AFMIN/5, 10th February, 1964, mimeo.

N.B. Regional and National averages in every case refer only to countries for which data are available and given in the Table.

analysis of comparative data. The growth of school enrolments in Africa has and can vary widely from country to country; absolutely, as an annual percentage rate and relative to the population of school age. Providing there are students yet to be enrolled, the idea that countries are physically prevented from expanding education above a certain rate is not supported by African experience.

This conclusion is reinforced by more detailed evidence of expansion over the long period. As two examples, Tables IV—2 and IV—3 show the expansion of school enrolments at five-year intervals in Zambia since 1936 and in Ghana since 1913. In both cases, the rates of expansion show considerable variation both at different periods of time and between different levels of education. Neither the absolute increases, nor the percentage rates of increase have been particularly steady. As in Uganda, primary and general secondary education have expanded rapidly. Over the long run, teacher training and vocational education have also expanded but with considerable fluctuations. In general, the rates of expansion have fluctuated more in Ghana and Zambia than in Uganda, as may be seen by comparing Tables IV—2 and IV—3 with Tables III—1 and III—3.

Experience in Ghana and Zambia also confirms that enrolments can continue to expand at rates much faster than population growth for many years, providing of course that enrolments have not absorbed all the eligible schoolchildren. (That this point has not yet been reached was shown in their education profiles given in Chapter 1.)

Furthermore, enrolment ratios in individual classes have not expanded at equal rates, any more than the enrolment ratios of different levels of education. Indeed, in Ghana, Uganda and Zambia it is evident from the age-education profiles, and from the declining rates of wastage between classes, that enrolment ratios in the higher classes at both primary and secondary levels have been growing faster than in the lower. This tendency is probably typical of most countries in Africa, although within countries there may be areas (particularly rural) where the pattern may be different. It thus provides a further reason for rejecting any concept of some maximum rate of school expansion, even in areas where most eligible children are already enrolled in the initial primary classes.

2. *The Effects of Expansion on the Standard of Education*

Even if it is accepted that there is no physical limit to the rate of quantitative expansion, it is often argued that there are qua-

TABLE IV—2

ZAMBIA

AFRICAN EDUCATION: GROWTH OF ENROLMENTS IN GOVERNMENT AND GOVERNMENT-AIDED SCHOOLS
1936–1963

	1936/7	*1941/2*	*1946/7*	*1951/2*	*1956/7*	*1961/2*	*1963*
Annual Enrolments							
LOWER PRIMARY	27,579	79,920	125,107	123,144	170,945	239,156	265,722
MIDDLE PRIMARY	1,834	4,824	10,977	19,977	23,639	42,133	56,428
UPPER PRIMARY	264	1,056	2,969	4,413	8,829	17,404	21,235
SECONDARY	—	35	143[a]	405	1,198	3,794	7,050
TRADES AND VOCATIONAL	246	590	—	805	1,700	1,428	605[b]
TEACHER-TRAINING	189	407	563[a]	678	1,068	1,211	1,251
Rates of Growth—Annual percentages rates of increase							
LOWER PRIMARY	24	9	0	7	7	5	
MIDDLE PRIMARY	21	18	7	10	12	14	
UPPER PRIMARY	32	23	8	15	15	11	
SECONDARY	..	33	23	24	24	35	
TRADES AND VOCATIONAL	19	..	..	16	—4	—35	
TEACHER-TRAINING	17	7	4	10	3	2	

.. = Not available.

[a] Includes enrolments in unaided schools.

[b] The decline in 1963 is not quite as severe as that suggested in Table IV—2, because enrolments for the half-year July–December 1963, were unusually low. This was partly because of uncertainties over future policy, but also because a number of courses due to begin in July 1963 were postponed until January 1964. In addition the homecraft courses, which had enrolled nearly 400 students annually, were transferred to the Department of Community Development and were no longer included within Ministry statistics.

Source: Ministry of African Education *Annual Reports,* 1937 to 1963.

TABLE IV—3 GHANA

GROWTH OF ENROLMENTS IN GHANAIAN SCHOOLS—ALL RACES, 1913–1962/3

	1913[d]	*1918*[d]	*1922*[d]	*1928*	*1933*	*1938*	*1943*	*1948*	*1953*	*1958*	*1962/3*
Primary—aided[a]	15,898	26,453[g]	33,275[g]	34,121[g]	43,573[g]	60,569[g]	69,082[g]	139,898	372,379	455,053	801,081
—unaided	4,895[c]	—	—	—	12,119	25,951	44,349	97,089	3,303	15,967	—
total					55,692	86,520	113,431	236,987	375,682	471,020	
Middle—aided[b]	2,711	(h)	(h)	(h)	(h)	(h)	(h)	47,844	88,600	125,313	204,888
—unaided	—							1,818	3,836	14,488	—
total								49,662	92,436	139,801	
Secondary—aided	51	43	78	325	552	951	—	2,225	6,066	10,423	25,921
—unaided								2,052	2,377	2,773	
total								4,277	8,443	13,196	
Teacher Training—aided	—	150	200	464	410	491	588	1,606	2,939	4,055	6,400[f]
Technical[e] and Vocational—aided	—	45	178	438	316	131	—	216	1,178	2,826	3,300[f]
—unaided									751	2,153	
total									1,929	4,979	
Annual average percentage rates of increase											
Primary—aided	6[g]	—	5[g]	7[g]	3[g]	22	22	4	12		
—unaided				16[g]	11[g]	18[g]	—49	37			
total				9[g]	6[g]	21	10	5	—		
Middle—aided							13	7	10		
—unaided							13	30	—		
total							13	9	—		
Secondary—aided							22	11	20		
—unaided							3	3	—		
total							15	9	—		
Teacher Training	7	15	—2	4	4	22	13	7	10		
Technical-Vocational —aided	40	16	—7	—19			40	19	3		

[a] Aided primary enrolments in previous years were as follows: 1908—12,506; 1903—11,361; 1898—11,181; 1893—7,350; 1888—4,003; 1887—2,799.
[b] 1908—2,383; 1903—1,442.
[c] 1912.
[d] Excluding schools in the Northern Territories.
[e] Includes enrolments in junior trade schools.
[f] Provisional.
[g] Including middle school enrolments.
(h) included in primary enrolment.

Source: Annual Education Reports, Ghana.

litative limits. With rapid expansion—it is said—the quality and standard of education inevitably must fall. This is partly what is meant by arguing that faster rates of expansion are not possible in "an orderly manner".

It is difficult to find adequate data on changes in the "quality" of education. Within English-speaking countries some comparisons may be made at secondary levels using the pass rates in the Cambridge School Certificate examination. This examination is set and marked on a uniform basis for a number of countries. The figures in Table IV—4 give the examination data for recent years together with some measures of the relative rates of school expansion at secondary level. Two points may be noted:

TABLE IV—4

SCHOOL CERTIFICATE EXAMINATION PASS RATES[a] AND RATES OF SECONDARY EXPANSION AND ENROLMENT RATIOS, 1956–62

Selected Years and Countries

	Rates of Expansion of S.C. Entries	*Secondary Enrolment Ratios Around 1960*	*Percentage Entrants Passing Cambridge School Certificate Examination*				
			1956	*1957*	*1960*	*1961*	*1962*
Uganda: Africans	12		85	74	83	76	78
Asians	18		58	48	56	54	48
East Africa (total)	18	4.1	65	69	63	59	58
Gambia	4	5.5	—	47	50	67	—
Ghana	11	22.0	65	74	—	64[b]	63[b]
Mauritius	10	24.7	36	38	33	40	44
Nigeria	16	4.6	68	70	64	67	59

[a] Excluding private candidates.
[b] West African School Certificate examination (from Ghana, Ministry of Education Report 1960–62, p. 18).

Source: *Annual Reports*, University of Cambridge Local Examination Syndicate. Enrolment Ratios: Unpublished UNESCO data.

First, although examination pass rates have fluctuated, there appears to have been some association between a fast rate of expansion and some fall in pass rates. East Africa and Nigeria, where examination entries have expanded most rapidly, have had declining pass rates although not recently in Uganda. Gambia and Mauritius, where expansion has been four and ten per cent per annum respectively, show increasing pass rates. But the variations are small and not always clear.

Secondly, the data are highly aggregated and their meaning is thus difficult to interpret. The East African data, for instance, refer to persons of different races and nationalities and the propotions of each group in the total of school certificate candidates has been changing rapidly. The number of African candidates has been increasing most rapidly and because they are the most highly selected students and have usually had the highest pass rates, the aggregated data do not reflect the several different trends.

Even if data were available, there are major difficulties in interpreting the evidence. For example, at least four reasons may be distinguished why educational standards may fall if enrolments are rapidly increased.

1. A larger intake into the schools may lower the standards of entering students simply because only the less academically successful children of each age group are left to be enrolled.
2. Larger enrolments may mean a larger and less efficient school system becuase less capable persons have to be trained as teachers, less adequate buildings used for schools, or because it leads to larger classes and because administrative problems get out of hand.
3. Rapid expansion may lead through administrative disorganization to a programme so hurried and large that the next stages must always be undertaken before the experience of the previous ones has been properly digested.
4. Expansion too rapidly implemented may create demands for students and teachers which run ahead of supplies already within the pipeline; crash training for teachers, and "acceleration" courses for students may be used to correct the numerical imbalance causing quality to fall.

The first two reasons imply that much of the decline in educational standards following expansion may be the result of the expansion rather than its rapidity. It is not obvious why, given proper planning in advance, a faster rate of expansion need lower standards more than a slower rate which brings the same resources into use less quickly. After all, the basic problems of starting and running a new school which assail the new headmaster and his staff will be little affected by the number of other new schools being started at the same time. Further, the new schools and teachers can only indirectly affect the standards of existing schools. Perhaps the one major difference is in the ability of the Ministry of Education to cope with a rapidly expanding administrative structure.

It might however be that newer schools are less efficient than

old ones during, say, the first five years of their existence because they take time to "shake down" and get established. If so, the average standard of education might vary inversely with the rate of expansion. This follows because a higher rate of expansion would mean a larger proportion of new schools relative to established ones. The average standard of education would then fall even if standards in the new and old schools remained completely unchanged. This however is simply an example of the familiar marginal and average relationships and any fall in the educational standards resulting from this cause is not properly attributed to the direct effects of expansion. Nonetheless, it shows the difficulties of interpreting the connection between the rate of expansion and effects, if any, on the standard of education.

In the present African context, there is indeed some risk of overstressing the connection between expansion and standards. The first two factors, for instance, are of little importance. When so small a proportion of the age group is involved, the danger of scraping the barrel of natural talent is surely exaggerated, either in finding students or in recruiting persons suitable for training as teachers. For the reasons given above, the third factor is also less important especially if educational plans give full attention to the need for efficient administration and supervision.

A gross imbalance between the different levels of education, the fourth factor, could however lead to a fall in the standard of education. This happens, for instance, when intake at university level is pushed beyond the available number of students graduating from the secondary level. This indeed could be one result of a too rapid programme of educational expansion. Another result is possible, however: the under-utilization of facilities. Indeed, in Africa, higher educational institutions have usually preferred quality (maintained by under-utilizing facilities and catering only for the better students) to full enrolment.

In any case the fourth factor sets no absolute limit to the rate of expansion or establishes any necessary connection between expansion and standards. It simply directs attention to the need for co-ordinating the numbers of students and teachers already within the educational pipeline with those required in the plans for expansion. Providing such plans are fully co-ordinated, the effect on quality of the *rapidity* of expansion can be minimal. Indeed, the moral is that the standard of education can best be maintained —or even increased—by educational plans made well in advance.

The need for long-range planning is particularly important to ensure sufficient numbers of qualified students at the higher levels of

education. There are many examples in Africa of countries which have not co-ordinated expansion plans at the different levels of education, with the result that upper secondary schools and universities have found themselves with spare capacity and insufficient students to enrol. The lack of co-ordination is largely attributable to three causes. In the first place, the gestation period for producing university entrants is long, often longer than the time needed to produce primary or even secondary teachers, especially when the latter are recruited abroad. Planning ahead to ensure sufficient students thus needs a longer horizon than planning ahead to provide sufficient teachers, though note that both must be done in terms of manpower. Secondly, at the higher levels of education, responsibility for the different institutions is usually divided. Universities stoutly defend their independence and at lower levels boards of governors are often outside Ministry of Education responsibilities. Thirdly, in times of rapid political change, educational policy is frequently changed also. All this makes co-ordination more difficult and explains why so frequently it is not achieved. Plans for expansion run ahead of the supply of qualified entrants.

When this happens, institutions are faced with the choice of lowering entry standards to obtain sufficient students or maintaining standards and under-utilizing their facilities.

In fact, the natural incentive of most institutions in this situation is to maintain standards by restricting entrance to only "fully qualified" students. This leads to half-used classrooms and under-enrolled classes—in countries starved of educated manpower, the educational equivalent of poverty midst plenty. But all this is unnecessary. Providing plans are made well in advance and co-ordinated, there is no reason why rapid expansion should lead to unused facilities. But the responsibility for co-ordination must rest clearly with some central authority: the individual institution cannot achieve this on its own.

Whereas individual institutions are usually in a position to maintain standards by accepting only well-qualified students, they often have no choice but to accept under-qualified teachers. The top institutions can usually hold out for the best of the bunch and those relying on expatriate teachers have a fairly wide choice. But most primary and lower secondary schools, and often the lower vocational and trade schools, have to take what is available, i.e. the products of the local teacher-training establishments. Often the standard of these establishments, and thus their products, is far below what it might be. A major reason is of course that the whole

country is short of educated manpower and has to make do with low-level qualifications. But there are other less valid reasons: the sudden expansion programme which requires teachers before there is time to train them; the under-utilized facilities for teacher training because of the fear that more teachers might be trained than could be employed; an extravagance in construction standards, that makes sufficient teacher-training facilities appear impossibly expensive. Or, simply, a lack of co-ordinated planning which requires pulling in untrained teachers to make up for under-estimating future needs. As with the under-utilization of facilities, most of this lowering of teacher standards is unnecessary. Providing plans are made well in advance and co-ordinated, rapid expansion should lead to little falls in standards, if any. The key problem is that rapid growth requires detailed sequential planning. The preparation and supervision of such a plan depends on the educational authorities. Even if they are already hard pressed, it should be realized that their efforts are crucial to the *standards*, as well as the administration of the system. There is a real danger that preoccupation with the administration of salaries or school construction takes time and effort which would be better spent elsewhere. The detailed planning and co-ordination of flows of students and teachers would pay high dividends in terms of the quality of education achieved.

In summary, three major conclusions emerge:

(1) The idea of an absolute limit to the rate of educational expansion which can be achieved is not helpful. The problem is to plan a co-ordinated development of students, teachers and buildings.

(2) Rapid rates of expansion in themselves need not involve a fall in educational standards nor the under-utilization of facilities. Both their outcomes are largely unnecessary providing there exists strong effective co-ordination between institutions requiring secondary and higher educated students and providing there exists a detailed sequential plan, covering at least ten years. Conversely, if standards fall or if facilities are under-utilized the first inquiry should be made in the Ministry of Education headquarters to see whether it has properly fulfilled these two functions.

(3) In the present African context, the standard of education is usually less the result of the rate of expansion than of the inadequate preparation and supervision of the teachers and the lack of co-ordinated, long-run planning.

III. Financial Limits to the Rate of Expansion

1. *Comparative Expenditures on Education in Africa*

In most African countries, as in Uganda, expenditures have grown steadily, from low levels in the 1920's and 1930's to annual expenditures of several millions by 1960. In Ghana, for instance, government expenditure on education was only £14,000 in 1908 and only £58,000 in 1918. But by 1928, under the stimulus of rising exports and the direction of Governor Guggisberg, educational expenditure had reached £199,000. During the decade of depression and fluctuating exports which followed, educational expenditure rose little, and at first actually declined. But during and after World War II the upward trend was resumed, accelerating during the Korean war boom in commodity prices. By 1962, educational expenditure in Ghana reached £23,000,000.

In Zambia expansion was even more rapid. Starting with annual expenditures of less than £15,000 in the late 1920's, recurrent expenditures on African education had doubled by 1933, fell for three years under the influence of the depression, but resumed their rapid climb in 1937, reaching £41,000 in 1938, £300,000 in 1948, £1,865,000 in 1958 and an estimated £3,200,000 in 1962.

This experience is not exceptional. Over a five-year period beginning about 1957, educational expenditure more than doubled in 19 countries of sub-Sahara Africa (out of 32 for which data is available) and tripled in six of them. Over the same period, the annual percentage increase in the educational budget was less than five per cent in only two of the 32 countries (Mauritius and Tanzania) and exceeded ten per cent in 26. In 12 countries, educational expenditure rose between 20 and about 30 per cent per annum.

Such increases are considerable by any budgetary standards. Although the period has been one where all expenditure has risen rapidly, the growth in educational expenditure exceeded that of total government expenditures in almost all the English-speaking countries and in half the French—in 21 of the 32 countries. Thus the proportion of the government budget going to education has risen in the majority of sub-Saharan countries. Educational expenditure in 1962 in these countries took between a tenth and a quarter of all government expenditure, as compared with 1957 when it took a twentieth to a fifth.

In the light of this experience, it may seem absurd to argue that finance is not the bottleneck to further educational expansion. Wherever education has expanded, educational expenditure has risen more rapidly and in most cases taken a larger share of the total

budget. It seems obvious, therefore, that planners in the Ministries of Education will be under increasing pressure to economize and to consider that plans for future expansion are primarily dependent on the availability of further finance.[1]

Nevertheless, for two reasons, this view is misleading. In the first place, the proportion of total resources devoted to education varies widely from country to country. In spite of the rapid increases, public expenditure on education still averaged little more than three per cent of gross domestic product in 1962—2.8 per cent in 13 French-speaking countries and 3.4 per cent in 11 English. All but five spent less than four per cent and 12 spent less than three per cent. By international standards,[2] these proportions are not high, and the lower proportions are very small. In terms of monetary product (excluding subsistence production) the percentage would be higher, but even so, it is difficult to believe that the proportions are excessive. Indeed, the Addis Ababa Plan recommended African countries to expand the proportion of gross domestic product going to education; to four per cent in 1965, five per cent in 1970 and six per cent by 1980.

The second reason why current levels of educational expenditure set no absolute limits to future expansion is more fundamental. Unit costs—expenditures per student—vary widely from country to country, at all levels of education and for both recurrent and capital expenditures. Mauritania, Niger, and Senegal, for instance, spend five times as much, or more, educating a primary student as Lesotho Malawi or Kenya. At secondary level, expenditures may be ten times greater than at primary, with a such larger absolute range of variation.[3] The result is that equal expenditures in different countries buy widely differing amounts of education.

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1. Indeed it is not only national planners that have seen the problem in this way. The Addis Ababa Conference on Education in 1961 placed considerable emphasis on the problem of cost (based on somewhat dubious cost estimates) and treated the availability of finance and foreign aid as the dominant condition for achieving the Plan. A major criticism of the Plan (Balogh, "The Problem of Education in Africa, *The Centennial Review*," Vol. VI, No. 4, 1962) was based on the excessive size of the financial budget involved, pointing out that its requirements of foreign aid exceeded the total inflow of foreign aid into Africa in earlier periods. Neither the Plan nor Balogh's criticism gave much attention to the probable availability of the manpower and physical resources required, in distinction to the finance and foreign exchange required to pay them at current rates.

2. See, for instance, UNESCO *Statistical Yearbook 1963*, Table 21. (UNESCO, Paris, 1964).

3. Data from *Final Report, Meeting of African Ministers of Education*, Paris, UNESCO/ED/191. Appendix Table VI.
Also *The Financing of National Plans of Education: Review of Recent Trends in Expenditure for Education in Africa* (UNESCO, Paris) UNESCO/AFMIN/5, 10 Feb., 1964, mimeo.

The basic reason for these differences is the wide variation in the component costs of educational expenditure. Pupil-teacher ratios at primary level (shown in Table IV—1) vary between 21 and 95 and at secondary levels between 12 and 32. The averages of the lower and upper quartiles are 28 and 58 in primary and 14 and 26 in secondary. These variations alone account for student costs in some countries being double what they are in others.

A second major component of unit costs is the average level of teachers' salaries. In terms of available resources, all salaries are much higher than in the developed countries. In the United States and England primary teachers' salaries start at about one and a half times *per capita* national income. In 1961 the starting salary of even the lowest trained primary teacher in Ghana was nearly three times *per capita* GDP and in Uganda nearly six times[1] (See Table IV—5). The result is that the marginal costs of primary expansion, in terms of GDP was in Ghana twice that of the developed countries, and in Uganda four times. Even this calculation assumes identical pupil-teacher ratios which, in fact, were lower in Ghana and Uganda than in England or the United States, making the unit costs of education even more expensive relative to local resources.

The extremes of African salary scales are well known, and teaching salaries fit the general picture. Although primary school teachers earn a mere pittance by Western standards, graduate teachers in secondary schools and above often receive salaries higher than in European countries. The result is that African salary differentials, in teaching as elsewhere, are among the widest in the world (much wider, for instance, than in Asia where senior salaries are only about half that of their European counterparts).

These large differentials mean that the higher salaries absorb a very much larger proportion of available resources than in the developed countries. A senior secondary school teacher starts at less than two and a half times *per capita* income in England, at seven times in Ghana and at 27 times in Uganda. Graduates in Ghana and Uganda earn even more. It is particularly noteworthy that the difference between Ghanian and Ugandan teachers' salaries (at all levels) in relation to available resources arises more because of differences between their levels of *per capita* income than through differences in absolute salaries. This in itself suggests that salaries

1. Of course, salaries in most other occupations are also high in terms of *per capita* income. But the point is not that teachers are better off than other *employed* persons, but that in terms of available resources, all employed persons earn a disproportionately large share. There is little doubt that the relative salary level is in large part responsible for the low levels (and slow growth) of total employment.

TABLE IV—5

STARTING SALARIES OF TEACHERS IN UGANDA AND GHANA AS A A MULTIPLE OF PER CAPITA GROSS DOMESTIC PRODUCT, 1955–61
Selected Years

		1955[a]	*1957*	*1959*	*1961*
Uganda	*per capita* GDP (£)	23.8	23.7	22.9	23.0
	teachers' salaries as a multiple of *per capita* GDP				
	Vernacular	2.8	3.3	5.0	5.8
	Primary	4.6	5.0	5.1	8.2
	Junior Secondary	8.6	9.9	10.3	13.0
	Senior Secondary	21.0	24.3	25.2	26.6
	Graduate—pass	27.2	28.6	29.6	33.4
	hons	29.1	30.6	31.7	36.0
Ghana	*per capita* GDP (G£)	56.5	59.0	66.6	72.0
	teachers' salaries as a multiple of *per capita* GDP				
	Unqualified Primary	1.5	1.7	1.5	2.0
	Cert. B. Primary	2.0	2.5	2.3	2.8
	Middle School (Cert A)	2.7	3.2	2.9	3.5
	Senior Secondary	7.6	7.8	6.9	7.0
	Graduate	10.6	10.5	10.2	9.5

[a] for Ghana data, 1957.
Sources: GDP and population:
Uganda—*1963 Statistical Abstract*
Ghana—*1962 Statistical Yearbook* (pop. figures interpolated assuming 3% rate of growth).
Salaries:
Uganda—Tables III—15
Ghana—data supplied by Ministry of Education, Accra.

are more strongly influenced by standards (and standards of living) set outside the country than they are by the level of output within it. This view is supported by the rapid growth of salaries relative to the growth of output. Over a 30-year period in Ghana, while export revenue increased 15 times, the starting salaries of teachers increased between four and six times (the faster rate corresponding to the lower salaries). But since 1952 exports increased by scarcely a third but teaching salaries (except at the highest levels) almost doubled.

In Uganda and other countries where exports and domestic product have risen more slowly than in Ghana—or even fallen—salaries in relation to *per capita* income have increased even more rapidly. Thus the starting salaries of primary vernacular teachers in Uganda more than doubled (in terms of *per capita* GDP) between 1955 and 1961, and salaries of junior and senior secondary teachers by a half to a quarter. Unlike Ghana, where the relative cost of a graduate declined, the rise in salaries so exceeded the rise in GDP in Uganda that the cost of a graduate in terms of local resources rose 24 per cent.

The fact is that in primary producing countries, where export revenue fluctuates widely, the connection between the level of salaries and national product can be very tenuous, for all the reasons mentioned in the introduction. When export earnings rise, government revenue increases and the reins on expenditure are loosened. Pressures for salary increases are treated more favourably and increases awarded. But salary scales are sticky, and once an increase is conceded, it is unlikely to be taken away, whatever happens subsequently to export earnings and government revenue. (Indeed, the annual increments embodied in the revised salary scale will lead to an upward creep in average salaries.)

The third component of educational expenditure is that of capital costs. Here there is little to add, except to repeat that costs per place vary between wide extremes in various countries. In times of economy, there will be a reduction of the total programme. Unfortunately this usually means an attempt to economize by building less, not by curtailing standards of construction. Construction standards, like salaries, are subject to a ratchet mechanism (as explained in Chapter II): there are always pressures to raise them, but seldom pressures to bring them down.

2. *The Effects of Fluctuating Revenues*

Because of these ratchet mechanisms in some of the cost components of education, total expenditure on education (C) usually fluctuates less than national income (Y). Often, as in recent years, C follows a rising trend with Y rising slowly or even falling. The net result is that $\frac{C}{Y}$ (the proportion of national income going to education) changes more sharply than either C or Y taken separately.

The working of the ratchet mechanisms can be shown by referring once again to the basic equation for expenditure.

$$\frac{C}{Y}=\frac{C_1+C_2}{Y}$$

$$\frac{C_1}{Y}=\frac{A_p}{A}.p.t\,\frac{W}{y}.\ (1+k)$$

where C_1 is recurrent expenditure on education and C_2 capital expenditure. A_p is the population of school age and A total population; p is the enrolment ratio, t the teacher-pupil ratio. W is the average teachers' salary; y is *per capita* income and k the proportion of non-salary costs to salary costs. A and A_p are given, W subject to the ratchet; p and t, determined by educational policy, tend to follow longer trends. For these and other reasons also C does not adapt

easily. The result is that as Y (income) fluctuates, y (*per capita* income) fluctuates in parallel, and C_1, as explained, often fluctuates more sharply than either.

$\bar{Y}$

Thus if C rises sharply or Y falls sharply, or both, the financial burden of education becomes intolerable and some adjustment may be forced through a change in educational policy. Yet of the two variables, C ought to be more amenable to policy than Y, at least in the short run. Short-run fluctuations in Y, arising from fluctuations in export prices and in local production of export crops, are usually beyond government action.

The different possibilities can be illustrated by contrasting the changes in educational policy made by the Ghana and Uganda governments in response to falling export proceeds and government revenue. In Ghana the inter-war years were characterized by great instability. Export earnings touched peaks of £12.3 million in 1920, £14.2 million in 1927 and £16.2 million in 1937 and troughs of £6.5 million in 1921, £7.7 million in 1931 and £11.4 million in 1938. Government revenue largely fluctuated in accord with export earnings.

Educational finance, although following a rising trend, shifted between extremes of stringency and comparative affluence. Government allocations to the missions and programmes of capital construction were adjusted to fit the variations in total expenditure on education. But the major adjustments were also passed on to the teachers by altering their salaries. Minimum salaries were first prescribed in 1920 and certain incentives provided to all missions which paid them. A new salary scale was introduced in 1924, but it proved too burdensome for the missions, so in 1927 (the next peak in export earnings) government grants to missions were increased. By 1930, both missions and government had been hit by "the acute financial crisis." Some educational staff were dismissed and, in March 1931, teachers' salaries were reduced by up to a third, the largest cuts affecting the most recently recruited. The 1931 salary scale, apart from a minor amendment in 1936, remained in force until 1947.

In most years of this period, Ghanaian enrolments continued to rise, although the rate of increase fluctuated, following fairly closely the fortunes of the economy with a lag of one or two years. The lag probably indicates the practical and bureaucratic delays in adjusting educational policy to changing financial conditions, though it may also have arisen through a lag in the response of parents to the increased difficulty of finding school fees. In other words, in

addition to adjustments in the level of salaries (and the fraction of them that government was prepared to finance), government expenditure on education in Ghana was related to total resources by varying the rate of educational expansion. In Uganda, economic fluctuations over the inter-war period were less severe than in Ghana and enrolments expanded more steadily. Teachers' salaries remained at the levels fixed in 1931 or before and the budgetary allocation to education was steadily increased.

In the post-war period, however, teachers' salaries rose rapidly and, particularly at times when exports and revenue were growing little, placed an increasing burden on government. Some of the policies this led to were mentioned in Chapter III: heavier reliance on revenue from school fees, reductions in school construction, an increasing part of the recurrent costs of primary schools being placed on the Kingdom and district governments. At the same time Central Government extended a strict control over expansion by allocating development grants (and accepting subsequent responsibility) only for those development schemes which it approves.

The economic effects of the different responses to falling export revenues can be analysed with the aid of the basic cost equation.

$$\frac{C}{Y}=\frac{C_1+C_2}{Y} \qquad \text{where } \frac{C_1}{Y}=\frac{A_p}{A}\cdot p.t.\,\frac{W.}{y}\,(1+k)$$

As $\frac{C}{Y}$ rises, economies are often first made by cutting C_2, capital expenditure. Inasmuch as this reduces expenditure on imports, in line with the fall in exports, the move is appropriate. But later attempts to reduce C_1, recurrent expenditures, may be unnecessarily restrictive. Essentially only four items can be varied: p; t; W and k. All will reduce total expenditure, but the effects on foreign exchange and other economic resources will be different. If W is reduced (as in Ghana in 1931), the same quantity of manpower is used in the schools but it is paid less. Foreign exchange is saved but manpower (in education, if not the rest of the economy) is not left idle. If p is reduced, either by cutting enrolments or severely restraining their growth, fewer teachers are required and some manpower may be unemployed. A better alternative is to leave p unaltered but reduce t, only in this case the change in the teacher-pupil ratio may also affect the quality of schooling. k, as is shown in the following chapter, can make only marginal differences to total costs, although it can have a large effect on the standard of education.

In countries with unemployment or under-employment, reducing p or t instead of reducing W cuts government expenditure, imports and thus the use of foreign exchange but wastes manpower which could otherwise be usefully employed. Even when there is a scarcity of manpower at the higher levels of education, a reduction in primary school enrolments for economic reasons is particularly inappropriate, providing there are unemployed school-leavers who could be used as teachers. Reducing p is especially absurd when simultaneously accompanied by an increase in t, as when teacher-trainee enrolments were reduced in Uganda for fear of having a surplus of trained teachers later. This is a waste of educational resources by any test.

Yet the pressures to which education officials are subject are such that changes in p, t and even k are easier to make than changes in W, and just for this reason are more likely to be made. The institutional structure tends to maintain wages, regardless of falling incomes in the export sector and unemployed manpower elsewhere. The expansion of p is often limited by forthcoming supplies of trained teachers, the supplies being given by teacher training plans made at an earlier period. The chance of giving teachers longer training is foregone, not through lack of facilities, but for lack of finance or fear of lack of finance with which to pay them when qualified at a higher level. Even k may be squeezed by policies which leave missions, local authorities, or the students themselves responsible for non-salary expenditure. At each turning, some decisions are easier than others, and regardless of differences between financial and economic costs, the easier are usually taken.

Part of the problem arises because p, t and k are directly subject to Ministry control but W is not. Although there are ways to reduce the level of teachers' salaries below the general level, by bonding, using voluntary teachers and so forth[1] the resulting inequalities easily lead to dissatisfactions and to a poor quality of applicant for teacher training. Indeed, teachers' salaries and prospects have often been poorer than those in government or industry, attracting only the less successful to teaching careers. Ideally, the problem of teaching salaries must be tackled as part of a comprehensive wages policy. This is perhaps the major reason why education policy must be part of national economic planning.

A comprehensive policy towards wages and incomes involves much more than just the salaries of those with education. A growing gap between rural and urban living standards rising consumer im-

1. Pages 154-6, See Chapter VI.

ports and a tendency for real wages to race ahead while employment stagnates are common experience in many African countries. These are symptoms of other inadequacies in the present wage structure which also require action, quite apart from the large differentials associated with education. Yet it is the salaries of the educated class which are of most importance for education. And the harsh conclusion is that unless the growth of educated salaries is controlled and in many cases their level reduced, educated people may find it increasingly difficult to get jobs and the financial costs of education may well be the bottleneck to its further expansion. This seems a high price to pay in comparison with the costs of a policy for wages and incomes.

In summary, three conclusions may be drawn about the nature of the financial limitation on educational expansion.

1. Comparison of different countries shows wide differences between both absolute and relative educational budgets and even more between the amount of education purchased for a given expenditure.
2. Because financial constraints often misrepresent the true economic scarcities (and surpluses) of educated manpower used in the school system, educational plans may be disastrously affected by attempts to prune the financial costs of education, which concentrate on finance and ignore what is happening to manpower or imports.
3. The major cause of this economic misallocation lies in the nature of the economic forces at work—the ease with which the educational authorities can alter p and t, the manpower variables of the system, compared with their difficulty in influencing W. Educational policy need not however be restrained by finance, especially in the long run. It is possible to increase the financial allocation to education and, by means of a wages and incomes policy, to restrain the growth of salaries relative to the national income. In this respect, educational expansion itself contributes to general salary adjustments. By increasing the number of educated persons seeking jobs, it may strengthen the forces making for a revision of the general salary structure.

Chapter 5

OPTIMIZING STRATEGIES FOR EDUCATIONAL EXPANSION

I. The Problem in Formal Economic Terms

Educational expansion is only one of the many desirable items on the agenda of developing countries. The priority which education is given, the resources allocated to it instead of to other activities and its place in the sequence of development can only be adequately decided in the light of the alternatives. This is the traditional economic problem: the use of scarce means to attain alternative ends. It involves weighing the costs of various lines of action against the relative benefits to be derived from each.

With education, there are two particular difficulties which beset all attempts to measure its value against the value of alternatives: the difficulty of finding acceptable measures of educational output and the difficulty of determining the amount of education required as investment. The latter is the non-consumption component of educational demand and arises because education is an essential preparation for the labour force. In this respect, part of the demand for education is indirect, derived from the need for educated manpower in order to help create the other goods and services wanted.

The problem of measuring educational output can only be resolved in practical terms. In the face of the innumerable writings and opinions on the purposes, value and effects of education it would be vain to imagine that it is possible to devise a single acceptable, comprehensive measure. Philosophical, psychological, sociological, political, religious and other viewpoints—many unquantifiable, ambiguous and contradictory—need to be taken into account.

Unsatisfactory as it may seem, a simple quantitative measure of education based on the length of schooling measured in years may well be one of the most generally acceptable measures. Its very simplicity may be the basis for its acceptance as a compromise by persons of widely differing interests and preferences.

Similarly, a "practical" solution, however unsatisfactory in theory, must at present be sought to the second problem, by educational planners in the less developed countries. There is little doubt that education is important for development, yet, in spite of many attempts, it is not possible to calculate its returns as investment with precision. Countries turn to manpower studies, in order to provide some quantitative estimate of the needs of high-level manpower. Such studies are valuable, although inevitably

based on a number of assumptions. But the need for some of the assumptions reflects the crudity of available information on the connection between economic and educational development and further research may lead to a better understanding of the relationship. At present, the feasibility of measuring the marginal effects of using more resources in education and less resources elsewhere is extremely limited. While consideration must be given to the needs for high-level manpower when formulating an educational plan, the precise effects on future production of increasing or decreasing the educational plans by some increment are never known exactly.

II. Partial Strategies of Optimization

Even in the absence of unambiguous social objectives, and some way of assessing their relative costs of achieving them (both necessary to determine an "ideal" programme of educational expansion and an overall optimum in the allocation of resources), a strategy of partial optimization may be followed, aiming to achieve some agreed programme at minimum cost.

In practical terms, this sub-optimizing strategy is directed towards producing a given educational programme as cheaply as possible (or, alternatively, to obtain the maximum programme for some given expenditure). It does not attempt to deduce from economic principles what the ideal programme (or expenditure) should be.

A strategy of partial optimization is justified not because it is logically complete, but because it is operational—enabling policy makers to adopt a rigorous evaluation of optimality in areas where it would not be feasible if both output *and* cost were in the melting pot together. By maximizing output for a given expenditure or minimizing cost for a given output as separate operations, the need to put a money value on a complex pattern of educational output is avoided.

Even the limited objective of partial optimization is not beyond criticism, for it depends crucially upon the assumption that the educational benefits are "favourably" distributed. Even a larger education output for a given cost may be less desirable than a smaller output, if the benefits accrue to a narrower section of the population.

It is for instance quite possible for an increase in total school enrolments to be accompanied by a shrinking number of individuals enrolled,[1] i.e. if children are staying longer at school and first-year

1. This in fact was the implication of a recommendation by the Castle Commission in Uganda that enrolments should be held at a constant proportion of the age group at the same time as wastage was being reduced.

enrolments are decreasing. The situation is then analogous to a rise in the total wage bill when the number employed is falling. Distribution of educational benefits thus raises similar welfare issues as the distribution of economic gains. In practice, this probably gives a slight edge to the strategy of minimizing cost for some specified output over the alternative strategy of maximizing output for some given expenditure.

III. Optimizing Output and Cost Components

In terms of this strategy, the educational system will be operating efficiently when output is produced as cheaply as possible. Output in this context can be interpreted as comprehensively as one wishes. Almost always, what is meant by educational output includes some concept of quality as well as quantity, even if only implicit. The reference to quality can under this strategy be made as detailed as definition and measurement permit. In fact, and in what follows, a "practical" definition will be used. Any change in the organization or costs of the educational system *which is judged by those responsible for national educational policy* as involving no *essential* change in educational output, will be taken as such.[1] This formulation, though loose, is logically appropriate to a strategy which is operational. The formulation will be sufficient to draw attention to the economic choices which policy-makers should and could consider.

The optimum, defined in terms of some output at minimum cost, can be reached by two approaches. A given budget can be allocated so as to maximize output, or a target output can be produced with a minimum of resources. Each approach could of course lead to a different sub-optimum, and in the absence of a comprehensive rule for weighing educational progress against progress in other sectors, there is no *economic* basis for choosing between them. (Thus the strategy is one of partial optimization.) In practice, the optimum chosen will be determined by whether the planners work in terms of given budgets, or target outputs. The usual case will probably be somewhere between the two extremes, at least in the early stages of decision-making. The final stages, involving somewhat finer adjustments in the balance of resources used, would be best approached by minimizing cost for some given output. Thus educational targets in the early stages would be set after considering a range of possible outputs and approximate costs. Once the targets were agreed, the

1. Prof. Clark points out that, given differences of opinion, the criterion could become ambiguous. Possibly, he suggest, the criterion should be that as costs or numbers change, quality should be assumed unchanged unless there is objective evidence from tests, three-quarters majority opinion of headmasters, etc.

resources needed to achieve them would be allocated so as to minimize total costs.

The optimal balance in allocating resources can be illustrated from the two equations for costs given in Chapter II. C_1 refers to recurrent costs and C_2 to capital costs; both for illustration are written in the form applying to primary education.

$$C_1 = A_p \cdot p \cdot t_p \cdot W_p \cdot (1 + k)$$
$$C_2 = \underline{\wedge} A_p \cdot p \cdot t_p \cdot (U_{pc} + U_{ph})$$

As a close approximation, we may consider the optimization strategies for each equation as separate from the other. To some extent they are linked—a saving in construction costs, for instance, may necessitate a larger expenditure on tuition materials. But such case are likely to be of minor significance, providing C_2 is taken to refer to all constructive costs, including both initial expenditures and maintenance.

The important decision about whether to build at high initial cost anticipating low maintenance costs, or *vice versa*, is then entirely included within the optimization of C_2, rather than within both C_1 and C_2. In this respect, the optimal strategy for C_2 will involve much the same considerations as an optimal strategy for construction activity in general. The tendency to build to elaborate standards, justified on the grounds that "although initially more expensive, it will save maintenance costs in the long run", will be treated as suspect. In a few cases, no doubt, the balance of the argument will favour higher standards of construction. But this needs critical examination in the context of countries short of capital and short of the physical resources needed for construction. Where interest rates are high, and plans for economic growth ambitious, the appropriate balance is likely to emphasize cheap buildings of short life, rather than the opposite. The conventional economic criterion based on minimizing initial plus discounted recurrent costs is an appropriate basis for choice.

The optimization of recurrent costs, however, raises more specific issues, whose significance is given by the equation for C_1.

$$C_1 = A_p \cdot p \cdot t_p \cdot W_p \cdot (1 + k)$$

In economic terms, the educational system will be operating efficiently if the partial derivatives of cost and output, with respect to every variable in the equation, are equal. In non-algebraic terms, this means that the system would be operating at economic efficiency if any change meant that:

(i) the increase in total savings which would be obtained by reducing any one variable would be outweighed by the additional costs of increasing the other variables sufficiently to keep *output* constant.
or
(ii) the gains in output obtainable by increasing any one variable are less than the losses which would result from decreasing the other variables sufficiently to keep total *costs* constant.

An example may make clear the way this test of efficiency operates. Quantitative output could be kept constant, providing that any decrease in the number of teachers was accompanied by a decrease in the teacher-pupil ratio. Suppose that the education authorities agreed that with certain (costless) changes in the teacher-training syllabus, not only the quantity, but also the quality of output could remain substantially unchanged for up to 25 per cent decreases in the teacher-pupil ratio. Under these circumstances, test (i) for efficient operation of the school system would be as follows: Could the staff be persuaded to teach longer hours or larger classes (and cope with any other changes resulting from a lower teacher-pupil ratio) by any increase in their salaries less than an amount (20 per cent) which would exactly offset the decrease in the teacher-pupil ratio.[1]

If so, the teacher-pupil ratio should be reduced to reach efficiency. If no compensating change in t or W was profitable, the system (at least in this respect) is operating efficiently.

Note that the test puts the question in a practical form which could easily be considered by policy-makers. To reach full efficiency, every pair of variables would have to be "balanced", by weighing the advantage of making cost- or output-compensating changes in each. This procedure would involve fewer balances than might at first appear. For although there are many ways to implement a lower teacher-pupil ratio (for instance, by giving teachers larger classes, shorter vacations, more teaching periods per week, one-class rural schools, etc.) economic efficiency would be assessed simultaneously for all such policies; i.e. it can be evaluated in terms of an optimal teacher-pupil ratio, rather than in terms of all the various policies which could implement it. It is of course true that this can only be done with reference to the actual changes in educational policy which change in any variable would represent. The procedure would be focused by working in terms of the variables of the recurrent cost equation.

1. An increase of 20 per cent in any variable offsets a 25 per cent decrease in another.

Table IV—1 gave the actual values in African countries of some of the variables in the recurrent cost equation. Very large differences exist between the size of the crucial variables in African countries. More important, the data shown indicate the relative importance of variations in each variable. The variations which are found in k are relatively small, and probably offer little opportunity for major savings. In contrast, the variations which exist in the teacher-pupil ratios suggest that in many countries they are far from optimal.

Some of the educational policies represented by each of the variables are indicated in the following, together with some indication of the range of variation which is possible.

A_p, The age range of persons eligible for (primary) school:

Although the age distribution of the population cannot be influenced in the short run, the size of the eligible age group can be varied in two ways:

(i) by altering the length of the basic (primary) course of schooling and

(ii) by raising the age of entry.

The first can be the source of considerable variations, as for instance in East Africa, where a reduction from eight to seven years in the basic primary course will reduce the total number in the eligible age group by nearly ten per cent.

But (ii) is also an important variation to consider. By postponing the time when the effective age of entry is lowered from, say, seven to six, the less developed countries might reduce the increase in their eligible school-aged populations by possibly five per cent.[1]

p, the enrolment ratio: This is of course directly linked to the level and pattern of output desired from the school system though this can be altered even if p remains constant. The main choice, for a given p is between enrolling many of the eligible age group for a short period (e.g. for less than the full course) or fewer students for the whole course. In terms of the model introduced in Chapter II, this choice is between relatively low continuation rates and many entrants or the opposite.

Repetition, in this context, becomes a quantitative factor related to quality of output. Repetition in the first six primary classes in Uganda in 1964, for instance, increased total enrolments by about 11 per cent. It might well be preferable to incur some additional cost and eliminate repetition for instance by improving teacher training in order to save perhaps 11 per cent in

1. Depending, of course, on the shape of the population pyramid. If the population is growing very rapidly, the numbers in each successive age group could differ by more than five per cent, and the reduction in eligible school population would be greater.

the costs of primary schooling. Automatic promotion, already the practice in many countries, might well be adopted in others, if the economic costs (as well as the educational disadvantages)[1] of repetition were more precisely known.

t_p: The importance of the teacher-pupil ratio in determining the level of total costs derives from the large variations between the average ratios in different schools, district and countries. Whereas relatively "large" changes in the other variables usually involve variations of ten to 20 per cent, the teacher-pupil ratios between different areas of the same country can easily vary by 100 per cent or more. Variations of this magnitude cause differences of a similar order in total costs. Optimal decisions about the teacher-pupil ratio are therefore of major importance. The variations in the actual ratios of different African countries (shown in Table IV—1) indicate that there are many opportunities for gains in this respect.

The teacher-pupil ratio is the product of two other ratios: the teacher-class ratio and the class-pupil ratio. (The class-pupil ratio is simply the reciprocal of the number of pupils per class). At primary levels, the former is often unity and no distinction need then be made between the teacher-pupil and the class-pupil ratio. At secondary and higher levels, however, the two need to be distinguished to consider the full range of policies.

Much of the variation in the average number of pupils at different levels is the result of circumstance rather than decision. An optimal arrangement can only be attained by weighing the costs of introducing a new class size against the savings made in the total costs of education.

In some cases, average class size would be improved simply by better siting of new schools. This is often the case when schools are built privately or by mission agencies who at the best may lack co-ordination and at the worst may be acting competitively.

Where the density of school-child population is low, other policies must be considered. At secondary levels, a low density usually reflects the small proportion of children who obtain entrance to secondary school, and thus come from a wide area. In this case there is usually no alternative but to have a boarding school, though its additional costs should be weighed against the possibility of school bus service, especially in peri-urban areas.

At primary levels, a low density of child population often

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1. See A. Douglas Milne, "Automatic Promotion in Northern Rhodesia", *Overseas Education*, Volume XXIX, No. 2, July 1957.

arises because of a low density of total population.[1] Here boarding schools or a bus service would be costly measures, far outweighing any savings to be made by lowering the teacher-pupil ratio. But there are other ways to lower the teacher-pupil ratio without having boarding facilities: the teacher-pupil ratio may be lowered by decreasing the number of teachers per class or by increasing class size. The former can be done by making one teacher responsible for several classes, reaching in the limit the one-teacher, one-room school catering for all primary classes. Such schools are common in the rural areas of many Latin American countries, but less in Africa. Alternatively, average class size can be increased by restricting entry to the beginning class to every other year. A rural primary school would then teach only odd-numbered classes one year, and even numbered the next. Average class size could be doubled in this way.

Naturally there are strong (and conflicting) opinions among educationalists about the wisdom of such moves. But it needs to be repeated that the benefits of lowering the teacher-pupil ratio need to be weighed against the disadvantages. It may well be that the considerable savings effected by new policies in this direction would be to provide for a sufficiently higher standard of teaching materials and level of supervision that the educational disadvantages would be outweighed. But seldom is the problem discussed in these terms.

Often average class size decreases in the higher classes of the primary or secondary level, not through policy but because of wastage between classes. To the extent that it is due to individual drop-out, the rate of continuation could perhaps be increased by the selective award of scholarships. Or initial enrolments in the first class could be raised slightly, so the subsequent enrolment in later classes more nearly approached that desired. Where a high proportion of schools are close together, some consolidation of the upper classes may be possible. The choice between these three remedies could again be made by assessing the costs and benefits of each by means of the cost equation.

The teacher-class ratio at secondary and higher levels can be varied considerably, sometimes with little change in the effective ratio. In Uganda, for instance, it has been the custom to allocate staff to secondary schools in the proportion of one and a half

1. As population grows and as urbanisation proceeds, the problem of the low density rural areas is likely to diminish. But it would be mistaken to imagine that this will remove the need for special solutions to this problem, at least for many years ahead.

teachers per class[1]. By synchronizing the overseas leave of expatriate teachers with the long vacations of the schools, the actual ratio could be reduced to 1½:1 without any change of the ratio during term time. Even if this were initially unpopular with the teachers, the benefits of introducing it must be weighed against the costs. As before, it may be nearer the optimum to raise the salaries or "perks" of the secondary teachers in order to gain support for policies involving lower teacher-pupil ratios.

W: The average teacher's salary is broadly the result of four factors: (i) the distribution of teachers among the different salary grades, (ii) the relative levels of each of these grades, (iii) the level of teachers' salaries in relation to other salaries throughout the country, and (iv) the general level of all salaries in relation to total resources, (say) *per capita* income.

(i) In most countries, entry to the different salary grades is based on qualification and experience, with other allowances for such things as additional responsibility. Experience will be closely correlated with the number of years since qualifying and with age. Thus, neglecting immigration, and the loss of teachers to other occupations, the distribution of teachers among the different salary grades will follow the pattern of graduations from the teacher-training colleges over past years[2]. At secondary and higher levels, where many teachers may be recruited from abroad, the qualifications of teachers will be more the result of recent recruitment policy.

(ii) At any one time, the relative levels of the various grades of teachers are usually determined according to some scale devised and approved by some government body. Higher salaries will probably be paid to teachers with higher qualifications and longer experience, and the differentials will usually bear some relation to differentials elsewhere in the economy. At the higher levels, salaries will be greatly influenced by the level of expatriate salaries, and thus to salaries in the more developed countries.

There are of course good reasons for some salary differentials in favour of persons with higher qualifications, if only to encourage those with less than these qualifications to acquire them. But the effect of these differentials, particularly when applied in a developing country where the

1. *The Report of the Working Party on Secondary School Costs* (Ministry of Education, Kampala, 1964), mimeo.
2. Including, of course, upgrading and refresher courses.

whole service may be upgraded quite rapidly, is to lead soon to higher salaries all round. Differentials then act as a lever not only to raise individual salaries but gradually to jack-up the whole structure—which the ratchet mechanism then holds at its new level. The most unfortunate feature of this process is that the fear of it happening often inhibits Ministries from planning widespread upgrading programmes even though the opportunity and facilities may exist. This is clearly the worst of both worlds.

Standards must be raised, faster then salaries. Difficult though it is, the only lasting solution is a general and periodic revision of the whole salary structure, directly or by inflation. The assumption that when everyone's qualifications rise salaries should rise too is far from justified in a developing country.

(iii) To a large extent, the relationship of the teacher's salary to salaries in occupations requiring comparable qualifications will be given by the relative attractiveness (and other non-salary benefits) of teaching as a profession and the ease of finding alternative work. This is, of course, a subject of many different opinions, and different evaluations. In practice, teachers' salaries tend to be rather lower than those in many comparable occupations. A survey of sub-Sahara Africa found, not surprisingly, that in practically all of the countries "teachers expressed the view that they were not well paid".[1]

Because total employment is rising slowly, if at all, in these countries,[2] a low level of teaching salaries does not usually cause the supply of teachers to fall below requirements, especially at primary levels. In fact, wastage from the profession is often lower than comments from dissatisfied teachers might suggest. But low salaries may mean that the better qualified persons are attracted into other professions, leaving for teaching only those who have failed to achieve anything better.

(iv) For a number of reasons—particularly the effect of expatriate salaries at the higher levels and minimum wage legislation at the lower levels—salaries at all levels in the developing countries are much higher in relation to *per*

1. *Survey of the status of the teaching profession in Africa*, World Confederation of Organisations of the Teaching Profession. WCOTP, New York. 1961, p. 6.

2. Ghana is one of the few African countries where employment has increased fairly steadily in recent years.

capita income than in developed countries. As shown in Chapter 4, this cause all services in developing countries to be more expensive in relation to the available resources.

To some extent the first three factors are within the power of the education authorities to change in the short run, and so can be treated as part of optimization. Factor (iv) is largely a matter of a national incomes policy, and will be considered in Chapter 6. The key point in optimizing with regard to factors (i), (ii) and (iii) must be to prevent the various salary differentials appearing so fixed that quality improvements are held back through fear of *increasing* future financial expense.

Apart from a long-run incomes policy, two approaches are possible. First, there are various ways to reduce salary costs in the teaching service at least for a short period. These range from enlisting voluntary teachers to some form of "bonding", in which students are only accepted in secondary school (and later, teacher training) on condition that they teach for some specified period afterwards. During the period of bonding, salaries can be somewhat below the market rate.

The second approach is to treat attendance on upgrading courses as part of the basic obligations of the teaching service rather than the means to a higher salary grade. For instance, the award of normal annual increments might be made dependent on the teacher improving his qualifications. The essential point is to prevent the upgrading of the service as a whole becoming the means to raising the whole level of salaries.

$(1+k)$: The proportion of non-salary costs to salary costs (k) is fairly small in many African countries, at least at the primary level. (k) is of the order of one-quarter, which means that even changes in k of up to 50 per cent will only vary (1+k), and thus total costs, within a margin of ten per cent.

There is some evidence to suggest that the potential savings from this quarter are often exaggerated to the detriment of the standards of instruction. Inadequate supplies of the basic tuition materials can severely handicap the progress of the students, resulting in poor examination performance and a less effective schooling[1]. Often the system of grants encourages this. In some countries, for example, central government pays some fraction of teachers' salaries at primary level, but nothing else. The regional

1. *The Report of the Working Party on Secondary School Costs* (Ministry of Education, Uganda, 1964, mimeo) presents some interesting evidence showing a close correlation between exam success rates in different schools and the amount of expenditure on books and tuition materials.

authorities, pressed for funds, are more likely to skimp on expenditures, solely their own responsibility. In many cases in Africa, therefore, optimization may require an increase of k rather than a reduction.[1]

IV. The Method of Optimization

As explained previously, optimization involves weighing the costs and savings of making changes in the educational system while keeping output constant, or weighing the gains and losses in output of changes which maintain costs constant. The formal method of doing this would be to take the variables of the recurrent cost equation in pairs, and consider the net advantage in costs (or output) of making compensating changes in each in a way which keeps output (or costs) constant. Other things being equal, those combinations which minimized costs (maximized output) would be chosen.

To some extent this is already done in educational planning. New projects are put forward but only receive approval after enrolment in each class has been increased or economies in construction or recurrent costs introduced. This is indeed a start at optimization. But the process needs to be comprehensive and systematic, and particularly concentrated on those variables which the recurrent cost equation shows to be of major importance.

Optimization can only be made comprehensive and systematic if a regular procedure is adopted within the Ministry of Education and the planning authorities to review the educational structure of the country, assessing optimality by asking the sort of questions outlined earlier.

In some areas, the opportunities for improvement may be so obvious that changes can be made on the basis of available information. In others, where the variations under considerations are marginal, it may be more difficult to judge whether the outputs of programmes with different costs really are equivalent or (if outputs are being maximized for a given cost) which pattern of output was the most desired. At this point, detailed research is needed, not merely on an *ad hoc* basis but to provide a continuing evaluation of the educational system. Such research, in its economic aspects,

1. Prof. Castle in his *Growing up in East Africa* elaborates on the educational importance of supplying each primary school classroom with a cupboard which can be locked in which teaching material can be preserved. This was strongly recommended in *Education in Uganda*, the Commission Prof. Castle headed. Changes of this sort cost little in comparison with the costs of changes in teachers' salaries or pupil-teacher ratios, yet may do much to raise teacher morale and the standard of teaching.

needs to be concentrated on those parts of the system which offer most potential for optimization; again judged by means of the cost equations.

The need for research increases as the adjustments towards optimization become more marginal. This is likely to occur, if early changes are successful. It will become increasingly the case, as optimization proceeds.

In the balancing of variables needed to achieve optimality, some comparisons are largely quantitative, some largely qualitative, others both. The first group are likely to be the easiest to evaluate and the last the most difficult. An example of the first would be the decision between two ways of spending more on education: the rates of remuneration of teachers (W) could be increased while maintaining a constant enrolment ratio (p), or the enrolment ratio could be increased but salaries held constant. The educational differences between these two policies are lately quantitative.

In contrast, the choice of an optimal teacher-pupil ratio in relation to non-salary expenditure would be mainly qualitative. If output targets are already fixed, it may be held that the disadvantages of lowering the teacher-pupil ratio (t) would have to be offset by raising expenditure on special equipment and teaching aids (k). This decision would be mainly the result of judgements about the qualitative effects on teaching and output. Optimization would thus involve balancing these qualitative considerations.

Decisions about repetition policy involve both qualitative and quantitative comparisons. As shown earlier, the economic effect of repetition is to lower output from a given total enrolment. The usual justification of this is that it maintains standards. The decision about lowering the proportion of repeaters at each level thus involves a judgement between the quantity and quality of output.

In making the comparisons needed to approach optimality, certain other considerations are relevant.

Generally speaking, a lower value of any variable is more satisfactory if the dispersion around the average is less. A high average pupil-teacher ratio is more acceptable, providing there are few classes with enrolments far above the average. Teachers may be prepared to continue at lower salaries providing the differentials between them and teachers with slightly higher qualifications are not excessive. Similar examples could be given in connection with variations in p and k.

Minimizing cost should not be done purely in terms of market prices, which, as shown earlier, tend to understate the true burden of items with a large component of imported materials and to over-

state the economic cost of less skilled manpower. In this way, variables like (k) may well be given too much weight in the balancing process and others like (W) too little. There is no simple remedy to this difficulty, which applies in part to other sectors of the economy as well. In theory a system of shadow pricing could be devised, which would correctly reflect the true scarcities of each factor of production. The cost equations would then be optimized using these shadow prices. But in many cases shadow pricing is not likely to be possible and market prices will have to be used.

Chapter 6

LONG-RUN EDUCATIONAL PLANNING

I. Introduction

The essential difference between optimization in the short run and planning in the long run is that the range of variables involved in the latter is much larger. Optimization seeks to make the best use of a given set of factors. Long-run planning is concerned with creating new supplies of factors, and thus changing the economic context in which the whole process of development takes place.

The clue to both the theory and practice of long-term planning is to spot which key elements of the economy are inter-related, and how. Obviously the longer the planning horizon, the greater the inter-relations. Because of the long gestation period within the educational pipeline, educational planning has to consider effects 15 or 20 years ahead. This is now widely accepted. But if education plans are to make major changes in the education structure of the whole population, planning horizons for a comprehensive strategy must be even longer. The length of this period means that several major elements of the economy are directly inter-related with education, though usually omitted from educational planning as practised at present. They must be considered together when formulating policy.

The five inter-related elements are the following:—

1. The existing supplies of locally educated manpower.
2. The supplies of imported manpower.
3. The structure of the educational system.
4. The wage structure in the whole economy.
5. The demand for manpower in the economy.

(1) and (2) at any time determine the educational structure of the total supply of labour available for employment. (3), the educational pyramid, determines the incremental additions to the supplies of labour and the educational demands for manpower required as students and teachers. (4), the wage structure, is the result of many factors, but within the present context, of (5), the level of demand in the economy in relation to the supplies of the different sorts of educated manpower and the supplies of capital and other factors of production.

(1) and (2) are represented by the education profiles of the local and total populations respectively, and (3) by the educational pyramid. (4) is the link between these profiles and (5) the rest of the economy.

The dynamic inter-relationships of the four elements are highly important for planning education. The flows from the educational pyramid (3) slowly build up the stocks of local manpower (1) as indicated in Chapter 2. The manpower needs of an expanding school system must be supplied from (1) or (2), students always from (1) but teachers from either. The wage structure determines the financial cost of the educational system (3) and acts as an incentive to draw manpower from (1) into the labour force and from abroad into (2) and thence into the labour force.

Chapter 2 has shown that changes in the educational pyramid (3) make only marginal changes in the profiles (1) and (2). Thus, in the short run, the wage structure (4) may appear largely independent of educational outputs: it only influences the level of teachers' salaries and thus the costs of the school system. The relationship thus operates largely in one direction.

In the long run, however, expansion of the school pyramid will make major changes in the education profiles of the population and labour force. By changing the supplies of educated manpower in relation to the other factors of production, educational expansion will influence the wage structure, as well as the wage structure influence the costs of education. Long-term planning must take both relationships into account.

The relationship between increasing supplies of educated manpower and the premium accorded to education in the wage structure is highly complex. Many other factors are at work in addition to the simple interplay of supply and demand. Most important is the slowness with which wage levels respond to changing conditions. Instead of wage levels falling, large numbers of the newly educated may be left unemployed. Arthur Lewis[1] has explained this phenomenon in terms of absorptive capacity.

> "The main limitation on the absorption of the educated in poor countries is their high price, relatively to average national output. In a country where most people are illiterate, the primary school graduate, whose only skills are reading and writing, commands a wage much higher than a farmer's income. A university graduate who, in a rich country, commences at a salary about equal to a miner's wage may, in a poor country, receive five times a miner's wage. In consequence, all production or provision of services which depends on using educated people is much more expensive, in relation to national income, in poor than in rich countries. The poor countries

1. W. A. Lewis, "Education in Economic Development," *Social and Economic Studies*, Vol. 10, No. 2, June 1961.

may need the educated more than the rich, but they can even less afford to pay for or absorb large numbers.

"In the long run the situation adjusts itself because the premium of education diminishes as the number of the educated increases. Either the educated have to accept less or else they are unable to resist the pressures which cause the wages of the less educated to rise faster than their own. . . .

"As a result of this process, an economy can ultimately absorb any number of educated people. It follows that it is erroneous, when making a survey of the need for skilled manpower, to confine one's calculation to the numbers that could be absorbed at current prices. One ought to produce more educated people than can be produced at current prices because the alteration in current prices which this forces is part of the process of economic development. On the other hand, this adjustment is painful and fraught with political dangers. Like all social processes it requires time for relative smoothness".

The net result is that for long periods the premium accorded to education in the labour market may be out of touch with the supplies and demands for high-level manpower (particularly that needed for accelerated growth). Thus the market signals may be misleading and the costs as well as the apparent returns of education may be grossly misrepresented.

In this situation, there seems little doubt that the phenomenon Arthur Lewis describes contains the kernel of the appropriate strategy for educational expansion in the poorer countries, at least in Africa where wage levels are relatively high. Education should be expanded a step ahead of the growth of capital and the rest of the economy. This, at least in the long run may help to lower the cost of educated manpower in relation to capital and the other factors of production. This strategy will mean that a high proportion of the manpower needed by the educational system for its own expansion can be drawn from local supplies in the period before other demands increase.

However appropriate this strategy of expansion in terms of the real supplies of manpower available, it does not follow that the financial cost of this manpower—the wage structure—will fall into line and make the strategy of rapid expansion possible. For this reason in the long run the wage structure must be treated as a policy variable, to be planned and guided along with the educational system and the economy.

No policy maker has of course complete control over the structure of wages, and in many countries the degree of influence may

still be small. Yet, in African economies, there are three reasons for expecting a major increase in the supply of educated manpower to lower the premium education receives in the labour market. First, there are the internal market forces, which, for all their weaknesses, operate to some extent. Secondly, there are the high expatriate salaries which at present act as a magnet to the rest of the salary scale, drawing up the local salaries of top-level manpower in the name of non-discrimination and the salaries of less qualified manpower in order to narrow differentials. If the number of local men in the higher echelons is markedly increased, the proportion of expatriates will decrease and national pressures for reducing salaries at their higher levels may stand more chance of success. Finally, there are the mounting political pressures of the unemployed educated—until now in Africa largely primary school-leavers, but increasingly those with low-level secondary qualifications. To the extent that their demands for employment gain political importance, political pressures for a revision of the salary structure may increase.

Since the relationship between the supplies of educated manpower and the salary structure is complex, policy making will require skilful judgement about the strength and importance of the social and political forces as well as the economic factors. For instance, even though wages may be far removed from real opportunity costs, consistent policies cannot be framed entirely in terms of shadow prices without regard to finding the money to pay the wages bill. Either the salary or tax structure must be altered to fit the economic opportunity costs or going wage rates must be paid. In other words, if the economic, or social, or political forces maintaining the existing wage or tax structure are too strong to be altered —in the short run—then the unwillingness or the inability to break these forces represents the relevant constraint. In terms of *this* opportunity cost the economy may already be pushed to the margin[1].

In the long run the balance of forces can be changed. This will require deliberate planning in areas where economic planners have not often ventured. It will require judgement about non-economic forces. "Where fundamental social change is necessary for development, it is possible that by producing educated numbers

1. But before an apparent financial constraint is rationalized in these terms, one needs to be sure that the alternatives have been fully explored. It may well be that many countries have not adopted employment creating wage and income structures because they have not realized the extent to which employment and the wage structure were connected, or the possibilities for action. The introduction of wage and incomes policies is always difficult but, politically, the risks of allowing employment to continue to stagnate may be greater than the risks of tackling the wage structure.

far in excess of absorptive capacity one may ultimately create a new situation in which a revolutionary increase in absorptive capacity has occurred".[1]

It should by now be apparent that long-run educational planning, at the national level, involves a great deal more than is often realized. It requires far-sighted assessments of the changes in the economy and the lines along which development will take place. The economic aspects have been emphasized in the above, but educational planning must in addition give full weight to the importance of other non-economic objectives.

Thus, although in the short run the educational system can be optimized within some given structure of costs (following the procedures outlined in Chapter 5) in the long run the optimal path of educational expansion can only be determined with reference to other long-run trends in the economy. This follows because the future costs of education, as well as the future returns, will depend on factors which may change in the meantime. In spite of many difficulties and uncertainties, long-term planning is unavoidable—if only because of the long gestation periods needed to produce educated manpower.

II. Formulating a Long-run Strategy for Educational Expansion

Any comprehensive long-run strategy of educational expansion must take account of the inter-relationships discussed in the previous section. Naturally they form only part of the strategy—many social and political questions are also involved. But it may help to clarify the approach if the various practical steps in formulating a long-run educational plan based on these principles are outlined: the estimation of demand, the calculation of what this means in terms of educational expansion, the issues of choice.

In preparing a plan to this procedure, prime attention must be given to the manpower involved—not only future demands for different types of manpower but the supplies available to serve as teachers and students while the educational system expands. Targets and plans to fulfil them need to be worked out in terms of the necessary flows of manpower. Comprehensive manpower budgets for selected years ahead need to be prepared, not merely to ensure consistency between policies influencing the supply and demand for different types of manpower but, in addition, to provide a basis for deciding whether the implied uses of manpower are socially and politically acceptable. (Is the country willing to continue employing expatriates in the civil service? If the alternative is doubling the

1. W. A. Lewis, *op. cit.*

participation rates among educated women is this socially acceptable or even possible?)

It is misleading at this stage to emphasise the *financial* costs of achieving long-run educational plans, particularly if based on present unit costs. Planning too rigidly in terms of current money costs—instead of real resources—will leave unexplored a wide range of options. In contrast, planning in terms of manpower will take account of the bulk of the real resources essentially required (the teachers and students) and permit the remainder, mainly construction and foreign exchange, to be treated more flexibly.

This approach embodies some important assumptions and it will be well to make them clear. It assumes that:

(1) On the recurrent side, the level of wages is a key determinant of the cost of education. In the long run, several major possibilities—bonding, taxation, wage policies, national service, the use of voluntary teachers, etc.—exist for manipulating the financial and foreign exchange costs of the manpower needed in education. In contrast, manpower needs are inescapable. Long-run planning should therefore start with the manpower needs and treat the wage level as a policy variable determined in relation to overall manpower and employment targets and the availability of foreign exchange, etc.

(2) On the capital side, the cost of education is largely the cost of buildings, which, in turn, generally reflect standards of construction which are expected rather than required.

(3) Both changes in the wage level and changes in the standards of school construction if planned wisely need have only small effects on the standard of education.

(4) If wage levels and construction standards are at each stage of development brought into line with the resources of the country, it is possible for education to be paid for financially within acceptable proportions of the nation's financial and foreign exchange resources.

These are the underlying assumptions for arguing that, in the long run the lack of finance need not set an absolute constraint on education expansion and that financial costs can be made low enough to fit within an acceptable budget. Once this approach is accepted, it follows that planning should start by judging what is possible and desirable in terms of the manpower needed, not its financial cost. The argument cannot, of course, be pushed to extremes. It is not suggested, for example, that the financial costs can be reduced to nothing but simply reduced to an acceptable level below the burden

of manpower costs. In essence, this view is that at lower levels of education, developing countries with widespread unemployment would be able economically to provide the amount of basic education they want, if only they can adjust wage levels and construction standards accordingly. In the long run, dynamic planning should assume that this will be done, if only because the alternative is perpetuation of *general* unemployment and vast inequalities.

A manpower approach has other advantages also. It directs attention to the major issues—the use of real resources and to the need to get to grips with the wage level in order to increase absorptive capacity. This latter problem is no longer hidden as a financial problem of apparently excessive costs of education. It emerges as a major economic problem, the need for developing countries to relate wages and standards to their resources as well as the need for the developed countries to increase, by aid, the supply of these resources. What is not fair is to sacrifice educational expansion without realizing it is a refusal to face the wider problem of raising employment and absorptive capacity throughout the whole economy.

III. The Demand for Educated Manpower—Formulating Long-run Targets by Manpower Planning

Manpower planning usually begins with a detailed plan of the various demands for educated manpower at several future dates.

The essence of this technique is a rigorous distinction between stocks and flows. Instead of formulating educational targets in terms of numbers of students at different points of time, manpower planning begins with the number of educated persons needed to achieve certain objectives and works back to the numbers of students which must be enrolled to produce the required future stocks. Fundamental to this approach is the assumption that schooling is a means to an end: not necessarily an economic end—the demand for educated persons may be for political, social or any other reasons—but an end in the sense that the purpose of schooling is to become educated rather than to enjoy the process of schooling for its own sake.

While there are inevitably a few exceptions to this assumption, there seems little doubt that its emphasis is much nearer the truth than the opposite assumption that schooling is wanted solely for its own sake rather than for the eventual benefits it brings. It is therefore somewhat surprising that it has taken so long for the manpower approach to become an accepted basis for educational planning. The long delay is probably explained by the general absence of national planning (until recently) and from the obvious and necessary

fact that demand for education almost always takes concrete form as a popular demand for school places—the individuals themselves, rather than the nation, seeing beyond the schooling to the benefit it will bring them later. Part of the slowness to plan education in terms of its long-run benefits is also due to the difficulties of correctly estimating long-run needs.[1]

1. *Demand I: Future Economic Needs for Skilled and Educated Manpower*[2]

Although largely beyond the scope of this book, it will be useful to outline briefly the problem of estimating future manpower demands for economic development. The first stage is to project the economic needs for manpower, of various sorts of skills and education levels, at certain dates in the future. This projection resolves itself into three steps:

(1) Projecting the future level and structure of economic production.
(2) Deriving from (1), the level and composition of employment.
(3) Deriving from (2), the required composition of education and skills in the labour force.

The first, in itself, is a major task, made easier or more difficult according to whether the country has formulated long-run economic objectives and the extent to which it is prepared to pursue them actively. If the country has a comprehensive long-run development plan, (1) can be based on the objectives and projections of the future plans, rather than, for example, on a simple extrapolation of past trends.

The second and third take one to the heart of manpower planning, and introduce techniques and problems far beyond this present study. Three points, however, are worth making. The first is that national forecasts of manpower needs are little different in principle from forecasts by managers of firms when deciding how

1. This was, for example, the reason given by the Robbins Commission (*op. cit.*) in England for its hesitancy to base its proposals on long-run manpower plans. But if schooling is primarily wanted for its long-run benefits, ignoring long-run estimates only hides the real issues rather than solves them. Difficult or straightforward, explicit or implicit, some estimates of the long-run demand for educated manpower must be made.

2. This section relies heavily upon the detailed analysis of R .G. Hollister, "The Economics of Manpower Forecasting", *International Labour Review*, 1964, which should be referred to for a detailed discussion of the technical problems involved. See also C. A. Moser and P. R. G. Layard, "Planning the scale of Higher Education in Britain: some statistical problems", *Journal of the Royal Statistical Society*, December 1964. A systematic account of the various steps in manpower and educational planning is given in H. S. Parnes, *Forecasting Educational Needs for Social and Economic Development* (Paris, O.E.C.D. 1962).

many employees of each sort are required for a given level of production. It is basically a question of what is to be produced, how much, how and by whom. Secondly, although factor substitution can have important effects, there is some evidence that the possibilities for substituting capital for labour or one level of educated manpower for another, are more limited at the higher levels of skills and education that at the unskilled levels.[1]

Thirdly, manpower forecasting based on manpower-output ratios is almost the exact analogy to investment planning by means of capital-output ratios. In spite of a number of theoretical objections, the use of capital-output ratios has been widely accepted and has demonstrated its broad practical value as an operational planning tool.

In many respects, it is easier to defend the use of high-level manpower-output ratios than capital-output ratios. Both assume that strong economic forces exist which tend to eliminate non-productive uses of either capital or skilled manpower, so linking each more closely with output. At first sight it may seem that these forces will operate more effectively with physical capital, where usually investment is only undertaken if it leads to a profitable increase in output, than with educated manpower, which often contains an additional non-productive consumption element. But, in fact, just as investment in physical capital is increasingly being disaggregated in order to distinguish the heavy investments in "non-productive" uses like housing, so the consumption element in human capital can to a large extent be eliminated by working in terms of required education among the employed labour force.[2]

Once this is done, the relationship between output and educated manpower may well be closer than between capital and output. To start with, skilled and educated manpower is available in marginal units rather than indivisible lumps, is more transportable

1. See E. R. Rado and A. R. Jolly, "The Demand for Manpower—an East African Case Study", *Journal of Development Studies*, Vol. 1, No. 3, April 1965. A good deal of research is being undertaken in this field. For some results see P. R. G. Layard and J. C. Saigal, "Educational and occupational characteristics of manpower: an international comparison", *British Journal of Industrial Relations*, July 1966.

2. Although there still remains the problem of isolating the consumption element among the *employed* labour force, there seems no reason to suspect that progress cannot be made in this area, especially since at the *micro* level job analysis, organization and methods and manpower utilization studies have already produced accepted techniques for determining essential requirements for education and training.

The essence of the problem is to apply these micro-techniques at the macro level when projecting future needs, a problem which is in principle no different from the sort of problems which arise when using capital-output ratios to project future needs of physical capital.

and can be hired and fired more easily. A firm can therefore adjust the quantity of skilled manpower it employs more closely and continuously in relation to production than its stock of physical capital. (Physical capital is probably under-utilized to a greater extent than educated manpower is unemployed). In the second place, educated manpower is more flexible and adaptable than physical capital. Educated manpower can usually be retrained fairly quickly whereas unwanted physical capital almost always has to be scrapped. Finally, educated manpower is alert to its own opportunities, and so is not only able to shift to its most profitable occupation, but has a continuing, personal incentive to do so.[1]

One of the major arguments in favour of manpower planning is the practical possibility of encompassing the range and a good deal of the subtlety of different types of human capital within a limited number of acceptable measures. The level of education, the different occupation groups, the major form of professional training are all quantifiable to a degree which the range of physical capital is not. It is comparatively easy to organize a survey of skilled and educated manpower, along the lines of a national census, whereas censuses of physical capital have to date only rarely been held. In developing countries, a manpower survey is usually the necessary background for building up a reliable base for making future forecasts.

Using the present manpower position as a base, the estimated growth of demand can then be carried forward to give a forecast of future needs.

As with any forecasting, the accuracy of the future estimates for manpower will depend on the nature of the national economy. In a strictly free-enterprise economy, the forecasts would be limited to analyses based on detached research, making more or less accurate predictions about what will happen in the future. In economies with administrative controls for influencing or directing future development, the forecasts can become ever nearer to being an integral part of a consistent, comprehensive plan, in which the plans for manpower are regularly derived from the administrative system and serve as a blueprint for administrative action. At the extreme of a fully planned economy, the accuracy of the manpower forecasts depends on how well the plan has been constructed and how closely it is being implemented.

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1. It is true of course that when the wages structure is inappropriate, occupations which are most profitable for the individual may not be most profitable for the community. But this problem of course applies also to the allocation of physical capital. The argument here is not that manpower-output ratios are ideal, but that for several important reasons they may be more stable than capital-output ratios.

Although estimates of manpower demands must be very long-run, the further the horizon the less detail is needed. A graduate takes 16 years or more to produce, but he only specializes completely in the last three or four years, if then. The important point is to make projections to the detail required for meaningful decisions, only refining the perspective projections within the nearer periods.

2. *Demand II: Social and Other Non-economic Needs*

Once the demand for education to meet the needs of the economy has been determined, the demand for other purposes can be added to it. Broadly, the approach is to work out the pattern of demands required for consumption purposes which are not already covered by the demands for the economy.

Usually economic priorities for manpower will exceed non-economic priorities at the higher educational levels, and so determine the quantity of education to be provided. At lower levels, the reverse is generally true, and social and political factors will be the crucial ones. At the national level, the target for education as consumption can usefully be focused using the age-education profile described in Chapter I. As explained there, the profile at any future date is largely given by the profile for certain age groups. A future target profile can be constructed showing the desired stocks of educated persons in the whole population at each level of education. This desired stock can be based on whatever motives enter the considerations of those responsible for making the policy—the need for a literate electorate, the political desirability of offering primary education to all, the social advantage of giving everyone in the population a minimum of education, etc. The advantage of focusing these objectives by means of the profile is that thereby attention is directed to the levels of educational attainment among the whole population rather than merely to the coverage of the school system at a given point of time. In other words, the profile focuses on the desired stock of education rather than on the flows from the school system. Although this is a modest contribution to the difficult problem of formulating the non-economic demand for education at the national level, the distinction between stocks and flows is worth making. Many times educational policies are framed in terms of some desirable level of school coverage in spite of the fact that most of the benefits of education only emerge after a student has left school.

A number of other practical advantages follow from focusing the objective in terms of a target profile and deducing the required developments of the school system rather than treating the school

system as an end in itself. In the first place, the use of the profile draws attention to the need for adult education and other forms of educating and training persons beyond school age. In the developing countries, where education is largely concentrated among the younger age groups, the nation is condemmed to many years of an ill-educated population unless something is done to devise policies to educate those above school age. Secondly, focusing on the target profile avoids the confusions which frequently result in specifying targets in terms of some minimum percentage of students at one level who are to be given places at the next without much reference to the relationship this has to the changing stocks. In times of rapid expansion, this approach can easily lead to nonsensical targets, since at some level of the system a declining proportion must go forward (unless each level is to grow as fast or faster than the one below). Finally, focusing educational targets in terms of the profile helps to focus on the whole problem instead of only on part of it. Admittedly, this is a value judgement in favour of a democratic view of educational opportunity, But there is little doubt that preoccupation with manpower targets and the percentage enrolled at each level has often led planners to miss the impact of the school system on the population as a whole. The use of the age education profile might help to avoid this.

Developing countries typically have large numbers of unemployed in the urban areas and even larger numbers of underemployed and others in the rural areas, waiting on the edge of the labour force for their chance to join in. With this massive unemployment problem dominating the picture, fears will be expressed about increasing the numbers of those with a little education and high ambitions. Pressures arise to concentrate education on a smaller proportion of the population to give useful training to "employable numbers" of the labour force. The argument is usually the difficulty of finding jobs for primary school-leavers and the consequent need to provide the sort of education—be it technical or secondary or university, or simply a radical revision of the primary syllabus—which would fit people for jobs.

There is of course a large element of truth in this warning. The need to adapt every element of the school system—from the syllabus to the building designs—to the needs of the coutry cannot be disputed. Education must prepare a student for the life ahead of him, and for the majority in African countries this means a rural life dependent on agriculture. Yet, in spite of obvious failures in this aim, it is a mistake to imagine that the reason why so many school-leavers do not find jobs is mainly because they have received the

wrong sort of education and not because the economic system is at fault. The educated are unemployed because resources are few and the salary structure is out of step with the economy, rather than because the country needs no more educated persons. Thus, although everything possible should be done to make the teaching more relevant to the countries' needs, a major change in employment of school-leavers depends on economic developments in the whole economy and, in most cases, on a major revision in the salary structure of the country.

The need for a balanced judgement in this regard is particularly important because of the long interval between plans and results in education. Long planning horizons mentioned at the beginning must take account of long-run changes in absorptive capacity. In ten, 15 or 20 years the wage and salary structure—and therefore absorptive capacity—can be very different. As will be argued in the next section, it must be part of the strategy of development, and of educational expansion in particular, to make sure that it will be different.

IV. Supply: Converting Stocks into Flows

The above outline sketched briefly the steps in formulating demand. The next step is to convert the manpower—educational stock targets into a phased programme of enrolments in the various types of educational institutions. In many respects this is the most straightforward part of the exercise. It does not involve any difficult procedures, nor the practical problem of changing accepted thinking which often arise later in attempting to implement the proposals. Providing the required stocks have been measured in terms of the different types of schooling, converting the stocks into required flows is mostly a matter of arithmetical juggling in the light of the different lengths and wastage rates of the appropriate courses. Chapter II has discussed the key elements in this process.

Tinbergen and Correa have developed a planning model for accelerated educational expansion which illustrates some of the main options.[1] On certain assumptions about wastage rates, the length of courses, pupil-teacher ratios, etc., their model develops the required pattern of enrolments at different levels in order to reach a certain stock of educated manpower within two, three, or more six-year time periods. One of the important conclusions which can

1. See J. Tinbergen and H. Correa, "Quantitative Adaptation of Education to accelerate growth", *Kyklos*, Vol. XV (1962), and J. Tinbergen, L. Emmerij, J. Blum and G. Williams, *Planning Models of Educational Requirements for Economic Development* (Organisation for Economic Co-operative and Development, Paris, 1964).

be derived is that it is generally only possible to reach a given manpower target in two periods, if (i) teachers are available from abroad *or* (ii) major changes in the pupil-teacher ratios are acceptable. Within three periods almost any target can be reached without such restrictions.

Although the Tinbergen–Correa model is valuable for elucidating the general features of the problem, its practical uses seem more limited. Few educational plans need to extend in detail more than 20 years and this time is not too long for projections to be built up year by year, rather than in three or four six-year periods as in the Tinbergen–Correa model. The year-by-year approach makes it possible to introduce gradually or at different stages changes in the lengths of courses, in wastage rates and in other crucial variables of the school system. The number of policy variations which can be tried out becomes larger and the whole process is freed from the artificial restrictions of the model, useful as it is for making clear the elements of the choices.

An important step in converting stocks into flows is to estimate the labour force participation rates. Too often this step is simply buried within the arithmetic of manpower planning, without any emphasis on the development of policies to bring participation rates nearer the optimum. In principle, this is a considerable area for economies, by ensuring that manpower once trained is fully used. Not only can it be expected that participation rates in the wage-earning labour force will rise in the course of development, but a forward-looking wage policy can accelerate the rise. Wage policy is also important in providing the incentives to ensure that manpower is used where its skills are most productive.

V. The Problem of Choice

Once the supply implications of the demand targets have been calculated, a decision must be taken whether the costs of the programme are justified by the results to be obtained. Depending on the results of this comparison, the educational programme may have to be reduced or expanded further—and, simultaneously, the rest of the programme of economic development expanded or contracted until balance is achieved.

This is the crucial issue in which, it has been argued, the alternatives are better judged by calculating directly the economic effects of having more or less manpower rather than indirectly through some measures of discounted earnings. On the demand side, meaningful measures of the effects of cutting down (or expanding) the stocks of skilled and educated manpower can be calculated

directly using the techniques of manpower planning to determine the real costs of having less manpower—e.g. the effects on the development plan of having 150 fewer electrical engineers or the political costs of delaying five years the introduction of universal primary education or the social costs of arousing hopes and ambitions among rural youth long before they can be satisfied. On the supply side, the present stocks and the outputs of the school system can similarly be measured in real terms, calculating the cost of using manpower in the school system directly in terms of the loss of production by using manpower as teacher and students in education rather than as "workers" in productive enterprise.

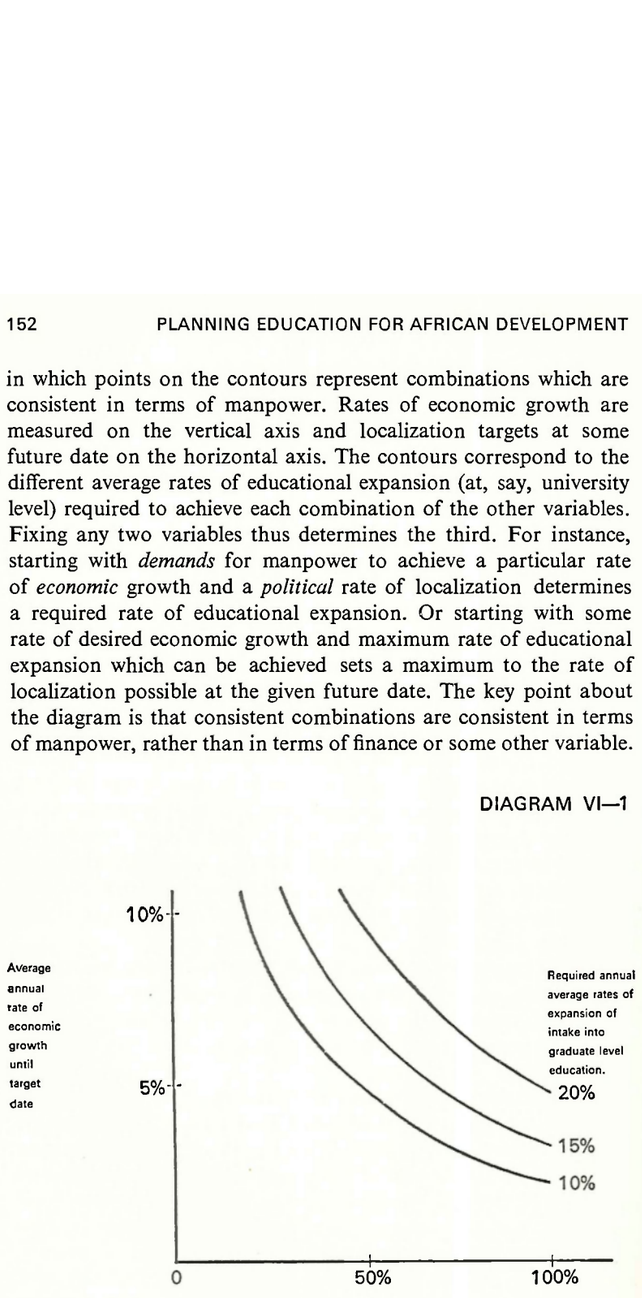
Working the basic calculations in terms of manpower rather than financial costs does not of course prevent the results being stated in terms of whatever values and units are appropriate. If the cost is postponing universal primary education, the delay is no doubt best expressed as a number of years' delay in a political target. If the loss of 150 engineers means slowing the growth of the engineering industry, the cost can be shown directly as the monetary measure of output sacrificed. The distinctive feature of manpower planning is not the final units in which costs or benefits are related to alternatives elsewhere in the economy—which will usually be money values—but the methods of using manpower calculations to determine the effects of changes in the stocks of skilled and educated manpower on changes elsewhere in the economy.

If it is accepted that the fundamental choice as to the size of educational programme must be progammed in terms of manpower, how can this be done? The fundamental components of the choice are the rate of educational expansion and the rate of economic growth: the choice between using manpower as teachers or students and between using them in direct production. In practice, neither is a single homogenous variable but a composite index comprising many possibilities which can be separately varied. For instance, technical education can be expanded, instead of general education or teacher training. And economic growth can be industrial, requiring engineers and technicians and managers, or agricultural, requiring different types of specialists, or social, requiring doctors or housing specialists. These possibilities need to be taken into account. Furthermore, other possibilities are open, in addition to the simple choice of altering the growth of education to fit the growth of the economy (or *vice versa*). In Africa, a particularly important possibility is that of changing the targets for localization by varying the proportion of immigrant skilled labour.

The elements of choice can be illustrated as in Diagram VI—1,

in which points on the contours represent combinations which are consistent in terms of manpower. Rates of economic growth are measured on the vertical axis and localization targets at some future date on the horizontal axis. The contours correspond to the different average rates of educational expansion (at, say, university level) required to achieve each combination of the other variables. Fixing any two variables thus determines the third. For instance, starting with *demands* for manpower to achieve a particular rate of *economic* growth and a *political* rate of localization determines a required rate of educational expansion. Or starting with some rate of desired economic growth and maximum rate of educational expansion which can be achieved sets a maximum to the rate of localization possible at the given future date. The key point about the diagram is that consistent combinations are consistent in terms of manpower, rather than in terms of finance or some other variable.

DIAGRAM VI—1



The choice will depend on the preferences and priorities of the country, and the relative costs and benefits of each line of action. As before, there seems little prospect of reducing the choice to the terms of a simple equation. But there is point in making

clear the issues involved, and formulating as accurately as possible the costs and benefits of the different lines of action. The advantage of posing the issues as in Diagram VI—1 is that it makes clear what the alternatives really are.

In reaching an optimal choice, certain points deserve emphasis:

1. *Concentrated Use of Imported Manpower in the Early Phases of Educational Expansion*

A country always has some choice between gradual expansion of education (and thus of local supplies of educated manpower) which uses only those expatriates already in the country and continues to rely upon them for many years ahead, and a more rapid expansion of education which requires more expatriates in the early phases but reaches self-sufficiency sooner. Expatriates employed in the schools as teachers and in the economy release local men to continue further with their education and so bring nearer the day when dependence on expatriates is no longer necessary. This alternative, however, may involve a very considerable increase in the number of expatriates during the first phases of development, and so demands a politically difficult initial policy in order to reach a long-term goal. There are two good economic reasons for this choice.

First, expatriate salaries, as has been discussed, are an important cause of the upward pressures on local wage rates. The sooner the expatriate element is reduced, the sooner it will be possible to move to wage levels in line with the needs and resources of the country.

The second economic reason is derived from the trends in expatriate and local wages. The high rates of expatriate remuneration are related to the salary levels in the developed countries. Even if the rates of growth of *per capita* income in these countries are slower than in the under-developed, growth starts from a far higher level and the absolute salary increase in developed countries will thus exceed that in most of the under-developed, at least for many years ahead. The differential between the expatriate and local salaries will therefore be *increasing*, so raising the cost of expatriates relative to local teachers. Under these circumstances, any given educational programme will be cheaper if undertaken sooner rather than later.[1] This provides a second economic argument for a "big

1. Even if the differential between expatriate and local salaries is paid by overseas aid donors, the differentials will inevitably cause continuing upward pressures on local salaries levels, thus raising the amount the aid-receiving country has to pay.

push" in the field of secondary and higher education, in order to achieve the earliest possible freedom from dependence on expatriate salaries as well as on expatriate manpower. In Africa the overriding reasons, though, are political, to gain economic and social independence as well as political independence.

2. *The Avoidance of Expansion to a Level which will Need to be Contracted Later*

One danger of planning too mechanically to balance supplies and demands for manpower at some future target date, is that the size of the educational system needed in the build-up phase may exceed what is required later. In particular institutions this may not be wasteful, for the buildings and teachers can be adapted for other purposes later, particularly if the need for this is foreseen. But if excess capacity is likely to be widespread, the costs and benefits of a slower or possibly faster rate of expansion which avoids any "hump" in enrolments, needs to be considered.

In the long run, the expansion of supply should be continuously related to demand along an optimal growth path. In practice, this is best done by calculating not only the demand for manpower at some future date or dates, but calculating also high and low estimates of the rate at which demand will be increasing at the target date. This latter step, though often neglected, is an important consideration if the hump is to be avoided.

3. *Flexibility and Sensitivity*

A third element in choice is the premium to be accorded to plans which are flexible. When forecasting needs so far ahead, margins of error are inevitable. Projections are particulary sensitive to the assumed rates of economic growth,[1] which, as already emphasized, are subject to considerable fluctuations and outside influences in a developing country. The only recourse in this situation is to take account of the range of possibilities and choose options which allow a good deal of adjustment later. In practice, this usually means a relatively greater emphasis on general education and considerable flexibility in short-run specific training and on the job instruction.

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1. See R. G. Hollister, *A technical evaluation of the Mediterranean Regional Project*, DAS/MRP/65.6 (O.E.C.D., Paris), mimeo, 1965.

4. *The Need for a Strategy which is Socially and Politically (as Well as Economically) in Balance*

The emphasis placed on meeting quantitative targets does not mean exclusive preoccupation with manpower for economic needs. At all levels, but particularly at primary and lower secondary, the strategy of expansion must take account of social and political objectives as much as economic ones, narrowly defined. Social attitudes, political awareness, equality of opportunity are some of the more obvious objectives which must be fully considered when choosing a strategy of expansion.

The fact that monetary costs are not rigid but can be manipulated in the ways described, makes it all the more important to consider the non-economic costs of educational expansion when deciding on new plans. Just because financial costs can be reduced does not mean education expansion should be unlimited. The appropriate rate of expansion, at each level, must be judged in relation to changes anticipated elsewhere in the economy. If primary schooling is to be expanded ahead of job opportunities, this should be decided after a conscious assessment of the probable social costs of, say, a more rapid disintegration of the traditional social structure or the political costs of frustrated school-leavers, as well as the economic costs of using manpower in schools rather than for direct production.

As mentioned already, there are many benefits to be gained from universal primary education particularly when it is made part of more general strategy of economic and social development (as the communist countries have done). But the emphasis in planning must be on this *general comprehensive strategy*. Just as it is mistaken to sacrifice expansion simply through shortage of finance (without considering the possibilities of reducing financial costs), so it is mistaken to embark on expansion simply because the finance can be found. The social and political benefits must be weighed as well as the financial—even if one suspects that they will influence the form rather than the ultimate objective of universal education. Too often the case for or against universal primary education is argued simply on the assumed shortage or availability of finance. More important, once it is accepted that financial costs can be manipulated, is to broaden the discussion to consider what sort of universal primary education to have. This is the more difficult question to answer in concrete terms though in principle it boils down, as with other parts of the educational system, to making the targets and phasing part and parcel of a comprehensive strategy of economic and social development.

VI. The Strategy of Bringing Educational Costs into Line with Available Resources

By far the most difficult part of the approach outlined is the practical problem of bringing costs into line with the resources available. The major difficulty is not technical but like so many other difficulties the problem of changing entrenched interests and attitudes. Many developing countries, particularly in ex-colonial Africa, start off with traditionally high standards of school construction, especially at secondary and university level. Historically these were the logical counterpart of providing facilities only for the few. It requires a major revolution in public attitudes to accept that a large programme of school expansion will require lowering the standards of buildings. A revision of standards will often invoke opposition from many quarters: from architects, teachers, administrators and politicians. This opposition will only be overcome when it is generally realized that (i) in most respects building standards are not a fundamental part of the standards of education and (ii) if standards are not related to available resources the total size of the educational programme must be cut.

To get this across and accepted is primarily a problem of politics. Education is too popular and important for national policy towards it to be very far in front of public opinion. If a revision of standards of buildings or anything else is to receive support, a skilful programme to lead public opinion and build up support will be necessary. Timing is essential. The first stage is to get firmly understood and accepted the need for ambitious educational targets. When these are clear, but not before, the ways to achieve them within the resources available can be considered. The separation of these two stages is strategic, rather than logical. Logically, the two stages are factors in the same decision and must be planned together. But in terms of public opinion a phased release of what is being planned may be necessary in order to keep the emphasis on the choices and targets which matter. After it is fully understood that ambitious targets are possible in terms of real resources, it is often easier to ask for, and get, the sacrifices of building and living standards needed to achieve the necessary rate of educational expansion.

It must be admitted that the above strategy, while probably sufficient to make the point regarding standards of buildings, is unlikely to prove sufficient to deal with the level of wages and salaries. Wages and salaries directly affect the standard of living of important—and vociferous—groups within the community. Those who will lose by any control over the level or rate of increase

of post-tax salaries will almost always be louder and better organized than those—the unemployed, the uneducated and the less qualified—who might gain. The battle is far from even.

There are of course a number of ways to pay for additional manpower needed for a "big push" in education. Taxes or school fees can be raised and the increased revenue put to education. If monetary institutions permit, a budgetary deficit can be incurred. If teachers' salaries or the whole wage structure can be revised downwards, larger numbers can be employed with the same expenditure, not only in money terms but in terms of foreign exchange and local resources. The distribution of income throughout the country will be altered (and the pattern of consumption) but the volume of real resources earned as wages can be unchanged. An extreme example of the latter approach would be widespread use of voluntary teachers for primary education. More manpower would then be involved in education but the educational budget would be little increased.

In the long run, the only satisfactory solution will involve some adjustment of the whole post-tax wage structure in relation to national income. Anything less will be a partial answer, perhaps solving the financial problems of the school system but only at the expense of some other sector of government or the economy. It may produce the finance needed for paying teachers, but it will leave the outputs of the school system unemployed, misallocated and frustrated. Or if teachers' salaries alone are reduced, it may lead to a denuding of the teaching service, as teachers leave, particularly the better ones, for more highly paid jobs elsewhere. A major part of the strategy of educational expansion must therefore be directed towards making possible this fundamental readjustment of the wage structure. Educational expansion itself, by enlarging the numbers seeking employment, can strengthen the forces for a salary revision. Harbison, an early pioneer in "human resource development", has frequently stressed that countries must build the incentives needed "to encourage men and women to prepare for and engage in the kinds of productive activity which are needed for accelerated growth".[1] A change of incentives inculcated through the school system could do much over the long run to shift the supply curve of educated labour and make possible a better wage structure.

1. F. Harbison, "The Strategy of Manpower Development", E/CN.14/ESD/5, mimeo (United Nations, New York, 1962). See also Harbison and Myers, *Education, Manpower and Economic Growth* (New York, McGraw Hill), 1965.

But in the short run, a more active policy is needed. Harbison himself added that wrong incentives will not be "corrected by publicity, exhortations . . . but when the system of rewards and status in a modernizing society is changed, and the initiative in making changes must come from the government itself in the form of a complete revision of the entire system of compensation of government employees. The failure of politicians and planners to come to grips with this problem will produce in the newer countries, as it has produced already in Egypt and India, an army of unemployed intellectuals". When so large a proportion of high-level manpower is employed in the public sector, government initiative can do much to implement a better wage structure throughout the economy.

Even if a frontal attack is not politically possible, indirect approaches using a measure of inflation, a calculated deficit or an increase in basic taxes may help. But a revision of the wage structure should be made an important and integral part of development strategy. Policies should be assessed by their effects on the wage structure. Even if a major change is not immediately possible, specific measures should be planned to make it possible in the future.

Educational planning need not wait until employment-creating policies are established before it takes them into account. By means of "bonding" and other arrangements, education can temporarily steal a lead on wage policies elsewhere in the economy—and by so doing create the market conditions of increased supply which make more likely a general move to wage levels consistent with increased employment. Under a system of bonding, all persons completing secondary or higher education would be required to work in government or as teachers for a stated period and at some minimum salary. Bonding has been tried in several African countries, but has often been applied only to teachers or some other section of government employees. As such, it has naturally proved inequitable, unpopular, and has led to second-rate recruits entering the bonded occupations only as a last resort.

Yet, if properly organised and applied universally, bonding can play a vital part in a full strategy of educational expansion. During the initial period, when educated manpower is scarce and educated salaries high, bonding has two beneficial effects. In the first place it helps hold down the cost of the better educated teachers. Educational expansion is thus made cheaper, in terms of finance and foreign exchange. In the second place, by restraining certain salaries of educated persons at the worst period of manpower shortage, it can help prevent the establishment of a general

salary structure which will obstruct later development. (The practical difficulties of reducing any salaries once established, particularly in government, should be borne in mind.) By a judicious choice of the period of bonding, the restrictions could begin to be relaxed after a major increase in the local supply of educated manpower had taken place. Of course, the longer the period of bonding, the greater the gain of this sort, especially if the period were long enough to permit a substantial reduction in the proportions of expatriates employed and the introduction of a general wages and incomes policy. But whatever the period, the gain will be useful.

Not only is it possible for education to lead in expansionist economic policies, it is desirable. If educational planning waits until employment-creating policies are an accepted fact before planning on their adoption, it will be too late. The gestation period needed to produce additional graduates is too long for an expansionist educational policy only to be adopted only *after* employment-creating policies have also been adopted. For this reason, expansionist policies in education must *lead* such policies elsewhere in the economy. Otherwise they will hold back development later.

VII. The Need for Broader Responsibilities in Educational Planning

The economic factors of phased expatriate employment, wage scales, and unemployment are of crucial importance amid the rapid structural change of developing countries, even if they are traditionally little emphasized by educational planners in the more stable conditions of the developed countries.

These factors will only be given their proper place in planning when the administrative structure of government is organized to take account of them and to ensure that manpower and educational planning are fully integrated. Until this is done, educational planning will remain the preserve of one Ministry and manpower planning slip through the fingers of several others. Fortunately, recent work on manpower planning has begun to win recognition for the idea that co-ordination is necessary. The next step is to develop administrative procedures to co-ordinate manpower and educational policy on a regular and continuing basis. This would involve the regular collection of data on the supplies and demands of manpower, a regular assessment of educational and training achievements (judged by "manpower" as well as educational criteria) and systematic procedures for assessing future manpower

and educational needs. In the last resort, the only satisfactory solution can come when there is some form of manpower budget trying in the demands and supplies of manpower with the rest of economic and social planning. This manpower budget would need to be related to a defined policy towards wages and incomes and some body of government charged with responsibility and power to implement it. Only then will education, manpower and employment become integral parts of national development policy.

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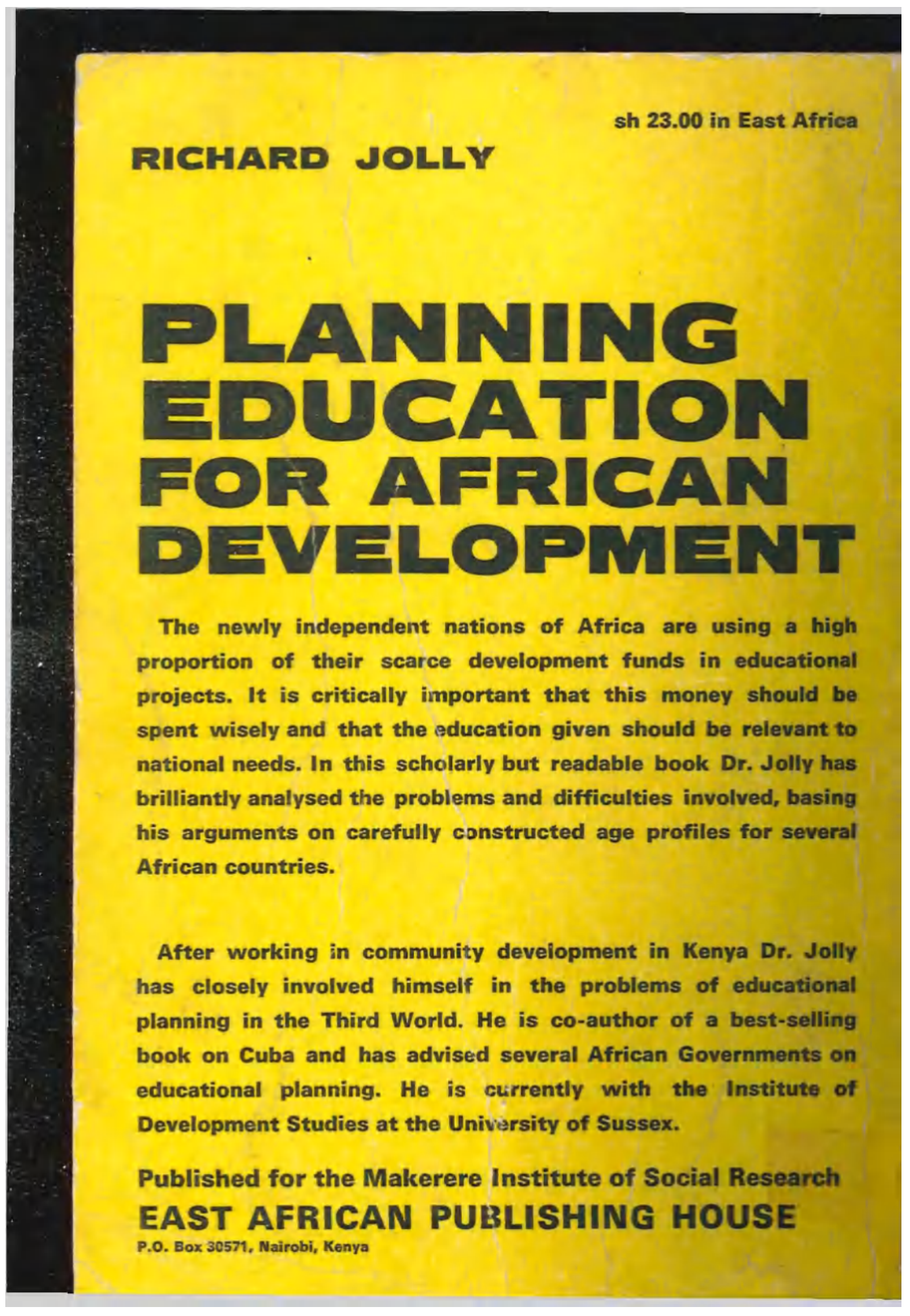
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