UNITED NATIONS

AFRICAN INSTITUTE FOR ECONOMIC
DEVELOPMENT AND PLANNING

D A K A R

NATIONS UNIES

INSTITUT AFRICAIN DE DEVELOPPEMENT
ECONOMIQUE ET DE PLANIFICAITON

D A K A R

TRENDS AND PROJECTIONS OF PRIMARY EDUCATION IN LESOTHO: IMPLICATIONS ON HUMAN RESOURCES REQUIREMENTS

by

Mastory H. MASUPHA

Submitted in partial fulfillment of the requirement for the degree of Master of Arts in economic development and planning at the African Institute for Economic Development and Planning, has been read and approved by:

Thesis Committee

Chief Supervisor _____

Member _____

Member Tetteh A. KOFI

Director of Institute _____ Date 10/11/86

ACKNOWLEDGEMENTS.

I wish to acknowledge the help of my supervisor, Dr. P.K. Quarcoo, who assisted me in the difficult task of reviewing and correcting the manuscript.

Special thanks to the other staff members at IDEP, Dr. A. Owosekun, Prof. Y. Diakite, Dr. Kofi, whose invaluable assistance contributed to the success of this work.

I am grateful to the Government of Lesotho for having afforded me the opportunity to further my studies at IDEP.

CONTENTS

LIST OF TABLES

INTRODUCTION

The purpose of this study is to project the future evolution of primary education in Lesotho over a planning horizon and consider the implications of this growth on future requirements for teachers. With this information, it should be possible to assess the feasibility of attaining the pupil - teacher ratio targets spelled out in the development plans of the country. The Third Five-Year Development Plan 1980-85 (TFYP) set goals for primary school staffing as follows:

- to reduce the pupil teacher ratio from 52:1 to 42:1 and to increase the number of qualified teachers by 50%.[1] These objectives, as the Education sector survey (1982) rightly puts it "imply massive pre. and in-service primary teacher training programme over the plan period."

The study aims to examine the hypothesis that primary school enrolment will continue to rise in Lesotho and this will continue to put pressure on the demand for teachers. In the face of bottlenecks over the supply of adequate number of teachers of the desired quality, the pupil-teacher ratio targets stated in the development plans may not be realized. At best the pupil-teacher ratios over the past years may continue to be maintained.

In this study, an attempt is made to explain the expansion of primary education in Lesotho in terms of a set of macro(e.g. economic and demographic) and other educational policy variables that are capable of influencing it. At the risk of being oversimplistic the relationship between the indicator of educational expansion - the number of students enrolled - is established within the framework of a simple growth model.

The study is presented in five chapters. In chapter 1, a brief review of the socio-economic and educational background to Lesotho is presented. Chapter 2 examines past trends in primary school enrolments, enrolment distribution by sex, wastage (i.e. repetition and drop-outs) and the evolution of the teaching force. Chapter 3 reviews some models used for projecting enrolment

1. The Education Sector Survey, Maseru, 1982.

and the literature on factors likely to explain changes in student flows. In the same chapter is introduced the student-flow model used in this study: its origins and the extent to which it shall be adapted for Lesotho. (Chapter 4 presents the regression results.)

The estimated relationships are used in chapter 5 to generate enrolment projections and the corresponding teacher requirements. The major findings of the study and conclusions are presented in the last section of the same chapter.

CHAPTER 1

KINGDOM OF LESOTHO: A GENERAL OVERVIEW

1.1 SOCIO-ECONOMIC BACKGROUND.

The Kingdom of Lesotho is one of the smallest and least developed countries of Africa, situated in the South eastern part of the continent. The terrain is rugged, soil erosion is extensive and only about 13% of the land is suitable for crop production. The population is mainly rural (about 85%), ethnically homogeneous of Bantu origin, and speaks one common language: Sesotho.

The economy of Lesotho is highly dependent on the Republic of South Africa(RSA). Over half of the male labour force is employed in R.S.A., and their remittances constitute over 40% of Lesotho's GNP. The government derives over 70% of its revenue from the Customs Union formed by Botswana, Lesotho and the R.S.A. Over 90% of Lesotho's imports originate in R.S.A. while exports either end in the R.S.A. or are transferred to the rest of the world through R.S.A. ports.

Women and male children play an unusually important role in the domestic production process. This is attributable to the absence of over half of the male labor force from the country at any point in time. It has been estimated that about 65% of households are managed by women, while a large number of boys assist in the agricultural and pastoral activities.

Despite the economy's limited resource endowment, Lesotho's GNP grew at an impressive average rate of 9% per annum in real terms in the 1970s. Recently, however, because of the detrimental effects of world recession compounded by prolonged drought, and the closing of the only large diamond mine in the country, the rate of economic growth has declined dramatically to an estimated 3% per annum. GNP per capita was estimated at about US $510 equivalent in 1982.

Internal factors influencing the problems faced by the economy include, among others: lack of skilled manpower, a limited resource base which remains largely unexploited, insufficient financial resources, and a high rate of unemployment due to the slowdown of agriculture and industry. Since imports requirements can all the virtually supplied by South Africa, Lesotho does not face a foreign exchange or balance of payments constraint to development. The major constraint to development other than the savings gap, is the shortage of funds in the government sector - the domestic revenue constraint.

The forthcoming Fourth Five Year Development Plan (FYDP) 1985-1990 aims to mobilize efforts towards the development of water as a priority area. It is expected that this would act as an engine for increasing agricultural and industrial production and hence employment. Full employment is however, not a feasible target for Lesotho.

1.2 EDUCATIONAL BACKGROUND

From the early days of Lesotho's history, a pattern of education commonly known as initiation schools became firmly established in the form of traditional Sesotho education. Boys and girls seperately learned cultural values and philosophy, personal and family responsibilities and duties to one's clan and people. Traditional education was compulsory and free. There were no drop-outs from this system, nor a shortage of teachers. Every competent adult served as a model and teacher, while every elderly was a reference library. Examinations were a way for the students to demonstrate their mastery of the skills and knowledge essential to the physical and cultural needs of the community. The skills acquired by boys and girls differed, reflecting the specific roles that they were expected to play as adults.

The traditional system of education continues even today, to a limited extent, but the formal schools have largely replaced the system of learning through precept and example that characterised traditional education. It was with the arrival of the missionaries that the formal schools became established. Education and training

were directed towards the limited employment opportunities in the colonial government administration and in the churches. The requirement for government and church employment were basically numeracy and a knowledge of English. Furthermore, Lesotho's (then Basutoland) role as a labor reserve for South Africa necessitated only basic schooling. Industrial development was not a feasible prospect, so that creation of high or middle level manpower would have been literacy achievements, Lesotho is almost totally dependent on outsiders for skills requiring long-term schooling and training.

The education system of today continues to be a joint venture between the churches and the government. In 1981, the latter owned and operated 97% of the primary and 86% of the secondary schools. It is generally believed that without this joint partnership, Lesotho could not have achieved the high rates of literacy.

The education system consists of seven years of primary education (grades 1-7), five years of secondary education (three years of junior and two years of senior secondary) and four to six years of higher education. The age at entrance into primary school is 6 years, junior and secondary schools at 13 and 16 years respectively and higher education at 18 years.
Both duration and entry ages described above are the official patterns. In practice, however, children often join school after or sometimes before attaining the official school age. These, along with repetition, make for a wide spread in any grade. Primary education is conducted in Sesotho for the first four years and mainly in English in grades 5 through 7.

In all five- year development plans, it has been a stated objective of the government to exert greater control over policies and development of the education system. On the other hand, in seperate policy statements, it has been understood that the government will not"take over" the church schools. The administrative, financial and academic control of the formal education system is vested in the Ministry of Education (MOE).

The MOE trains and appoints teachers, administers examinations, reviews and authorizes curricula, opens and closes schools, inspects the operation of all schools and pays teachers' salaries.

Educational planning is the responsibility of the Planning Unit of the MOE. It is responsible for the preparation of long-term plans and proposals on policy administration of the capital budget and of educational projects. Curricula review and adaptation of syllabi is the responsibility of the National Curriculum Development Division.

Financing of education has traditionally been shared by the government, parents and direct contributions from abroad. Government participation represents over 80% in the form of administration, teachers salaries, student loans and a high share of investment financed mainly through grants and credits from abroad.

1.2.1 ILLITERACY AND EDUCATIONAL ATTAINMENTS.

As far back as 1962, Lesotho was among the only seven countries of Africa which recorded illiteracy rates of less than 50%. (41.4%) According to estimates provided by UNESCO,[2] the evolution of illiteracy rates in Lesotho is expected to decline from the 30-39% range in 1970 to less than 30% by 1990. The progress achieved by Lesotho in terms of the literacy rate is impressive although the absolute number of illiterates is increasing. A notable feature in Lesotho is that the illiteracy rate for women is lower (22.1%) than that of males (45%). Although data on illiteracy by urban and rural population is not readily available, a bias in favour of urban areas can be expected - a pattern that is probably true for Africa as a whole.

According to the 1966 census, the situation with respect to educational attainments of the population aged 25 years and above (adult) was as follows: For this age group, 98.3% had less than secondary education, 1.6% had secondary education and only 0.1% had more than secondary education. The marked concentration in the first category simply implies that alomost all of the population aged 25 years and above had a very low

2. The Development of Education in Africa, UNESCO (1982)

level of educational attainment on the eve of Independence (1966).

1.2.2 EMPLOYMENT AND EDUCATIONAL LEVELS.

Education has a significant role in the social and economic development of a nation. The place of education in the development of Lesotho shall in this sub-section, be highlighted in terms of employment in relation to educational levels. The focus will be on wage employment for which some limited data are available. Thus the contribution of education to the economic development of the country may be reflected roughly in the magnitude of skilled labor within the modern sector. Available information on the level of skills in the private and parastatal sector is presented in table 1.1 below:

Table 1.1 EDUCATION LEVEL OF SKILLED EMPLOYMENT IN THE PRIVATE SECTOR (1980)

	Number of employees (nationals and foreigners.)	percentage of employees constituted by Lesotho Nationals.
Level of education.*		
University degree or equivalent or higher.	254	35%
Post COSC, diplomas or equivalent	454	56%
Form E	1984	89%
Form C	6215	99%
Below Form C	3737	99%
Total (all levels) =	12644	94%

Source: A survey of Employment and Manpower in the Private and Parastatal sector in Lesotho (1980).

*C.O.S.C. refers to the Cambridge Overseas School Certificate.
Form E is the final grade of senior secondary
Form C is the final grade of junior secondary.

Table 1.1 shows that the educational attainment of skilled workers in the private sector was not very high. Out of the total of 12,644 skilled workers, 3737 (79%) had only Form C or below. Only 35% of university holders in the private sector were Lesotho nationals. According to this survey, the main types of workers in the private sector were predominantly sales, production and construction workers.

Information on the distribution of employment by level of education in the government sector is more outdated. (1976). It is shown in table 1.2 below:

Table 1.2 GOVERNMENT EMPLOYEES BY LEVEL OF EDUCATION, 1976

	Number of employees	% of total number of employees
Educational level:		
- Standard 3	2490	16.4
- Standard 7	5693	37.5
- Junior certificate	2552	16.8
- Cambridge Overseas School Certificate (COSC)	1314	8.7
- Vocational Training	32	0.2
- Teacher certificate	2819	18.6
- University degree	273	1.8
TOTAL =	15173	100

Source: Education Sector Survey (1982)

From table 1.2 above, it can be seen that the education level of employment in the government sector was also not significantly high. It can thus be concluded that in spite of progress that has been made in education since Independence (1976),[3] skills levels are considerably low.
The acute shortage of skills manifests itself in the dependence on expatriates for most high-level and professional manpower.

We have in this chapter seen Lesotho as one of the least developed countries of the World. Cynists have listed its resources as "people, water and scenery." Lesotho's prospects for future development largely depend on making optimum use of

3. Details on growth of enrolment are found in chapter 3.

its resources. Lesotho continues to face formidable economic problems: acute shortage of fertile land, soil erosion and backward agriculture, lack of employment opportunities, and a weak industrial base, among others. One of its major resources, people, have low levels of skills. Education of the peoples of Lesotho according to the skills requirements is an imperative development need. The pivotal role of primary education in this regard need not be overemphasised; primary education is the foundation on which many other levels of education are built.

CHAPTER 2

THE DEVELOPMENT OF PRIMARY EDUCATION SINCE 1960: A REVIEW

The purpose of this chapter is to review some of the characteristic features, over the past years, of the development of primary education in Lesotho, with special emphasis on primary school enrolments and the nature and pattern of these trends. The data giving enrolment trends were obtained from official national publications supplemented by UNESCO's estimates. It must be noted, however, that the quantitative expansion of primary education is only one and not necessarily the most important dimension of its development overtime. Increases in primary school enrolments in Lesotho were accompanied by changes in the structure and content, and the management has been strengthened. These aspects of the development of education are, however, beyond the scope of the present study. The emphasis is only on enrolments, involving repetition, drop-outs, and their distribution by sex; also the evolution of the teaching staff and the population pressure on enrolments.

2.1 ENROLMENT GROWTH

The development of enrolment in Lesotho's primary schools between 1960 and 1980 is summarised in table 2.1 The table shows the number of children enrolled and the indices of growth over the twenty-year period. A detailed breakdown of enrolment by various grades(or standards)is presented in the statistical Annex, table 2.

TABLE 2.1. GROWTH OF ENROLMENT IN PRIMARY SCHOOLS (1960 - 1980)

Year/Period	Number Enrolled (thousand)	Index of Growth (1960 = 100)
1960	136.1	100
1965	158.0	116
1970	183.4	135
1975	211.2	155
1980	243.1	179
	Average Annual Growth rate (%)	**Absolute Increase (thousand)**
1960-65	3.029	21.9
1965-70	3.026	25.4
1970-75	2.863	27.8
1975-80	2.853	31.9

Source: TRENDS AND PROJECTIONS OF ENROLMENT BY LEVEL OF EDUCATION AND BY AGE, CSR E-46, UNESCO, 1983.

The table illustrates the considerable expansion of enrolment which has taken place over the five-year periods. Enrolment grew by about 179% between 1960 and 1980. It is noted from table 2.1 that enrolment was maintained at a constant growth of about 3% between 1960 and 1980. A slight slackening of this growth rate to just below 3% is observed from 1970 onwards. When the absolute enrolment numbers are examined, a rising trend is the dominant feature. Enrolments registered an absolute increase of 107 thousands between 1960 and 1980.

2.2 ENROLMENT BY SEX

Table 2.2 below gives the percentage distribution of enrolment between girls and boys, and the extent of disparities between male and female enrolments.

TABLE 2.2 PERCENTAGE DISTRIBUTION OF ENROLMENT BY SEX

(1960 - 1980)

Year/Period	Distribution by sex		
	Female (F)	Male (M)	FM
1960	62.	38	100
1970	60	40	100
1980	59	41	100.
	Average Annual Growth Rates		
1960-70	2.69	3.56	
1970-80	2.69	3.11	

Source: Computed

It is observed from table 2.2 that the representation of girls is greater than that of boys. A considerable recovery has, however, been made by boys. This is noteworthy from the growth rates of boys' enrolment which has been higher than that of girls as reflected above.

A better assessment of enrolment growth can be made when enrolment is related to the relevant population age groups. This is done in the next section.

2.3 TRENDS IN ENROLMENT RATIOS

Two kinds of enrolment ratio, age specific and gross enrolment ratios offer two complementary measures of the development of enrolment in relation to the growth of primary school age population

during the period under consideration. Age specific ratios are purely demographic measures showing the proportion of the 6-11 age group enroled in Primary schools. It is not an adequate indicator of the coverage of primary schools as the 6-11 age group does not even correspond to the official primary school age group. The gross enrolment ratio is a more appropriate indicator of the development of enrolment. This ratio is, by definition, total enrolment irrispective of age, divided by the population which (according to national regulations) should be enrolled in primary schools. The evolution of the age. specific and gross enrolment ratios is presented in table 2.3 below.

TABLE 2.3 AGE SPECIFIC AND GROSS ENROLMENT RATIOS (%)

(1960 - 1980)

	Age specific Enrolment Ratio (6-11)	Gross Enrolment Ratio (6-12)	Difference- (Percentage points)
1960	51.6	97.0	45.4
1965	61.7	99.2	37.5
1970	62.6	101.4	38.8
1975	71.1	102.7	31.6
1980	67.6	104.0	37.6

Source: UNESCO, CSR-E 46, op. cit.

The high magnitude of the difference between the two ratios is noticed from table 2.3. The gross enrolment ratio is, at any time greater than the age group (6-11) ratio. Since the 6-11 ratio does not indicate full coverage of primary school enrolment, for this reason, concentration shall be on gross enrolment ratio in this analysis.

The gross enrolment ratio is often interpreted as a measure of the capacity of a country's education system in terms of the number of spaces available for students. When this ratio has, for example, a value of 100%, it indicates that the number of children enrolled, regardless of age, is equivalent to the population that should be enrolled as per national regulations. In this regard, it can safely be inferred from table 2.3 that Lesotho's primary education has sufficiently created capacity for the school-age population (6-12).

This ratio is not however, without limitations. Gross enrolment ratios mask important features of enrolments. Calculations of gross enrolment ratios are usually based on registrations at the beginning of the year, which may overstate to a considerable extent, the actual attendance during the school year. Another problem is that a part of this capacity is taken up by repeaters. An adequate review must, therefore, necessarily involve some evaluation of these elements of gross enrolments.

Notwithstanding these limitations, gross enrolment ratios remain the precise yardstick in this, as well as other studies, in judging progress made toward Universal Primary Education. This target is said to have been achieved if a country's gross enrolment ratio is 100%. If this is the criterion, the progress that Lesotho has made is noteworthy. Lesotho's primary school capacity is sufficient to enrol all children of primary school going age. This is explained by the fact that Lesotho inherited a relatively developed primary education system on the eve of indipendence (1966) and the governments sustained efforts to build and support new schools thereafter. In spite of this success, Lesotho's system has failed on two important counts: to reduce the levels of drop-outs and repetitions as shall be seen in the next sections.

2.4 ENROLMENT NET OF REPETITION

As discussed in the preceding section, the real implicit assessment of primary education as suggested by the enrolment ratios must be biased downwards as these ratios are inflated by repeaters. The magnitude of this problem in Lesotho is highlighted in this section. Table 2.4 shows total enrolment, the number of repeaters and the enrolment ratios net of repeaters. The enrolment ratio is calculated by dividing column 4 by the population (6-12).[1]

---

1. See statistical Annex, table 4.

TABLE 2.4. ENROLMENT, REPEATERS AND NET ENROLMENT RATIOS

(1972 - 1981)

	Enrolment (all grades, thousands)	Repeaters (all grades, thousands,%)		Net Enrolment (thousands)	Enrolment Ratio (%)
1972	194.0	37.2	19	156.8	82
1973	199.6	38.7	19	160.9	82
1974	205.3	12.7	6	192.6	96
1975	211.2	12.8	6	198.4	96
1976	217.2	10.5	4	200.7	95
1977	223.4	32.4	14	191.0	88
1978	230.0	35.0	15	195.0	88
1979	236.3	37.5	16	222.2	87
1980	243.1	51.2	21	227.9	82
1981	251.1	56.8	23	194.3	83

Source: UNESCO CRS-E 46, op. cit.

The gross enrolment ratios observed in table 2.3 indeed mask the important features that a number of school places is used by repeaters The level of class repetition emerges as a very persistent and serious problem.

Automatic promotion was abolished in the mid 1970s on valid educational concerns. Since its introduction in the early 1970s a deterioration in the quality of education was observed and this manifested itself largely in the decline in the output of the Cambridge Overseas School Certificate (COSC). What remains less clear is 1) the extent to which repetition reduces the academic weakness of pupils even if no special help is given, 2) the causes of repetition, and 3) alternative solutions. The table below is an extract from table 2.4 (column 3). It shows the percentage of primary school enrolment constituted by repeaters.

Year	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
% repeaters	19	19	6	6	4	14	15	16	21	23

Source: table 2.4

The main message conveyed above is the considerable extent of repetition particularly in the later years. Considering that

repeaters use resources which could have been made available to other progressive children implies that increasing attention should be given to this problem.

2.5 THE INCIDENCE OF DROP-OUTS

Drop-outs from the primary school prior to completing the course is another issue of serious concern. It is not only necessary that children enter the first grade of primary education but also that they remain enrolled for a sufficient number of years, if the objective is to make the children literate. School drop-outs are a problem at any level of education, but for the primary level, ceasation of schooling particularly prior to the attainment of literacy is a more serious problem. To illustrate the considerable incidence of drop-outs at the primary level, a progression of cohorts through primary education has been estimated by UNESCO (1980). for several African countries. The table below shows UNESCO's estimates of the survival of cohorts, that is the proportion of a given cohort reaching each grade of the primary system. In constructing this estimate of the holding power of the primary education system, it was assumed that the drop-out, repetition and promotion rates observed around 1978-79 in Lesotho remain stable in the future.

TABLE 2.5. SURVIVAL IN PRIMARY EDUCATION

		PROPORTION OF COHORT REACHING GRADE						
Country.	Year	1	2	3	4	5	6	7
Lesotho	1978	1000	803	717	608	524	440	375

Source: Wastage in Primary and General secondary Education: A statistical Study of Trends and Patterns in Repetition and Drop-out. CSR-E-37, UNESCO,1980.

The table illustrates a relatively high level of drop-outs. It is noted that on an average, only 35% of pupils starting school will reach grade 7. The drop-out rate is particularly high between grades 1 and 2. The low retention power observed above casts doubts on the extent to which the primary education system in Lesotho, in spite of high enrolment ratios, has been able to

deal successfully with the problem of eradicating illiteracy. This observation also leads one to question the significance of high enrolment ratios if a large proportion of children drop-out before even becoming sufficiently literate.

It may be interesting also to observe the proportion of those children who reach the final grade (7) that will proceed to secondary school. In this respect, from a study by UNESCO (1980) on the development on the transition rates from primary to secondary education, it was observed that for most African countries, although the proportion of primary -school leavers proceeding to secondary school is increasing, the general conclusion was that African children entering into primary schools have a relatively small chance of attaining some secondary education. The table below is extracted from the findings of this study by UNESCO.

TABLE 2.6 INTAKE, SURVIVAL AND TRANSITION RATES IN PRIMARY EDUCATION IN LESOTHO: 1978. (%)

Country	Apparent Intake Rate to Grade 1 of Primary Education	Survival Rate to the Final Grade of Primary Education	Transition Rate from Primary to Secondary Education
Lesotho	1.34	0.38	0.45

Source: UNESCO, CSR-E-37 op. cit.

The wastage is therefore, not only prominent within the system, but extends beyond that. It would be instructive to know the causes of wastage. Is it the consequence of failure, lack of admission into the next class, financial limitations or what? Whatever the reason, the problem is acute and deserves attention.

2.6. POPULATION PRESSURE ON PRIMARY EDUCATION

Gross enrolment ratios in Lesotho were examined in Section 2.2. This section compares trends in the two components of enrolment ratios viz: enrolment and the school age population. It follows from the definition of enrolment ratios that if this ratio is to increase, this implies an even greater relative increase in enrolment over and above the school age population. Table 2.7 below summarizes the increases in

population and enrolment both in absolute and relative terms between 1960 and 1980.

TABLE 2.7 INCREASES IN POPULATION (6-12) AND IN ENROLMENT: 1960-80

	Increase in Population		Increase in Enrolment	
Period	Absolute(thousand)	Relative%	Absolute(thousands)	Relative%
1960-65	21.9	2.278	19.0	3.029
1965-70	25.4	2.575	21.6	3.026
1970-75	27.8	2.593	247	2.863
1975-80	31.9	2.604	28.2	2.853

Source: Computed from tables 3 and 4 of the Statistical Annex.

It is noted from the above table that the absolute increase in population is greater than the absolute increase in enrolment, whereas for the relative increases the opposite is true. For the last two periods, however, the relative increases are almost the same. Reference back to table 2.3 will show that no marked increase in enrolment ratios was registered over that period. A partial explanation can be made. Enrolment ratios, apart from the fact that they are already high, have remained almost stable at the relatively higher levels. This is because of the fact that percentage increases in population and corresponding enrolments have more or less kept apace.

As mentioned earlier gross enrolment ratios, however, high, do not necessarily imply that all children of school age are enrolled. Data on non enrolled children aged 6-12 are not available. The picture so far created could probably change if such figures were available, to validate the earlier observation that although capacity had been created it is largely used by repeaters. This capacity could be used by children (non enroled) for whom opportunities to enter school are not available. Several reasons may be provided for the presence of this group. For example, not enough places in schools within their reach; or places may be available but financial constraints may not allow them to go to school, furthermore, they may be children who have not yet entered school but will enter later.

The significance of non - enrolled children is that as

population increases, their numbers may also be increasing unless specific steps are taken to encourage their enrolment. It is thus important not only to know the size of this out-of school population, but also to know reasons for their non-enrolment in order to permit the design of policy prescriptions for reducing their levels.

2.7 TEACHING STAFF IN PRIMARY SCHOOLS

In the preceding sections, an evaluation was made of the evolution of enrolments. As enrolments expand, the increase in teaching force has to keep pace, and the government's obligation with respect to other aspects of educational support also increases. In this section the focus shall be on one of these resource requirements namely, the teaching force.

Table 2.8 provides available data on the total number of teachers and on pupil teacher ratios for the period 1969 to 1981.

TABLE 2.8 NUMBER OF TEACHERS AND PUPIL TEACHER RATIOS

(1969 - 1981)

Year	Total Teaching Force	Percentage Increase	Pupil Teacher Ratio (%)
1969	3583		50:1
1970	3964	10.6	46:1
1971	3877	2.2	49:1
1972	3936	0.03	49:1
1973	3951	4.8	51:1
1974	4139	4.8	50:1
1975	4228	2.2	50:1
1976	4235	0.02	51:1
1977	4304	1.62	52:1
1978	4421	2.7	52:1
1979	4782	8.1	49:1
1980	5097	6.5	48.1
1981	5350	4.5	47:1

Source: Education Statistics - 1981
Bureau of Statistics, Maseru 1982.

While the total teaching force increased by about 49% over the period 1969-81, pupil teacher ratios have been fluctuating. More often, these ratios have been either stagnant or declining. In 1981 the number of students per teacher was almost equal to the number in 1970. Marginal variations from 1978 suggest, nevertheless,

a declining tendency in the number of pupils per teacher, although these remain relatively high.

It was observed in the previous sections that enrolment of girls is higher relative to that of boys. We also note from table 2.9 below that a high percentage of the teaching force is women.

TABLE 2.9 WOMEN AS A PERCENTAGE OF TOTAL TEACHERS

YEAR	1970	1975	1978	1979
%of Women Teachers	60	70	73	74

Source: Development of education in Africa: A Statistical Review, ED-82/MINEDA F/REF.2, UNESCO, 1982.

In table 2.10 below, data on teachers are classified by making a distinction between qualified and unqualified.

TABLE 2.10 THE EVOLUTION OF QUALIFIED TEACHERS: 1972-1981

Year	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Qualified teachers as % of the total	66.5	715	70.6	69.7	70.2	69.1	66.1	64.1	63.6	68.9

Source: Education Statistics - 1981, op cit.

TABLE 2.10 shows that during the latter half of the 1970s, the percentage of qualified teachers entered a declining trend. This trend was broken in 1981 for which the latest data are available. It is, therefore necessary to ascertain whether the trend over the 1980s would follow a declining or rising trend.

In concluding this discussion, a comparison is made between the growth of qualified teachers and growth of enrolments in primary education. Table 2.11 provides the data required.

TABLE 2.11 GROWTH OF QUALIFIED TEACHERS AND ENROLMENT (1972 - 1981) Index of Growth: (1972=100)

Index of Growth : (1972=100)

Year	Qualified Teachers	Percentage Change	Enrolment	Percentage Change
1972	100		100	
1973	108	8	103	3
1974	112	3.7	106	2.9
1975	113	0.89	109	2.8
1976	114	0.88	112	2.75
1977	114	0.0	115	2.67
1978	112	1.75	119	3.47
1979	118	5.35	122	2.52
1980	124	5.08	125	2.45
1981	141	13.7	129	3.2

Source: Computed from tables 2 and 5 of the statistical Annex.

Table 2.11 shows that with effect from 1975 to 1978 enrolment increased proportinately faster than trained teachers. The trend is reversed from 1979 onwards when the number of qualified teachers grew faster than enrolment. The impact of the teaching force on student flows is an important phenomenon, and the present study seeks to investigate, on the basis of past trends this relationship. In so doing, it should be possible to assess the extent to which the teaching force improves or adversely affect student performance.

CHAPTER 3

LITERATURE REVIEW AND METHODOLOGY

This chapter reviews two general approaches often used in describing and projecting student flows through and out of the educational system.[1] These are: "educational input-output" models and "ordinary student flow" models. In this chapter, reference is also made to the general body of theory and empirical studies on the factors likely to influence student flows overtime. Then a model developed by Correa(1969) is introduced and adapted for projecting student flows and the corresponding teacher requirements in the primary education system in Lesotho.

3.1.1. Educational input-output models

Educational input-output models assume the shape of an input-output matrix of an inter-industry accounting system. The main difference between the two is that in their static forms the inter industry input output model assumes a fixed input matrix while the educational version is based on a fixed output or transition matrix. This matrix of transition coefficients is made up of, for example: the drop-out, repetition, promotion, death and other rates.

Two empirical applications of educational input-output models for projecting student flows are by S.Prakash (1971) and M. Muteira(1969) who apply the models to Indian and Portugeese data respectively. The reliability of the estimated student flows is highly criticised because the estimates are based on the assumption of fixed transition coefficients or flow rates.

Another class of educational input-output models is the Markov-chain models. In this case, the transition matrix is partitioned into several sub-matrices with specific characteristics.
These matrices show the probability that students will belong in any one of the transition matrices,. depending on the present state of the educational system. The transition probability matrices are assumed to be fixed, while the state vector varies from period to period. In varying degrees of sophistication, markovion-chain models have been used by, for example, H. Correa (1962) and T. Thonstad(1969) for projecting student flows.

Educational input-output models and their Marko-chain version described above cover the educational system extensively and require considerably detailed data on educational system. Their usefulness to countries like Lesotho where detailed data on the educational system is

1. A basic reference on educational planning models is an OECD manual: Mathematical Models in Educational Planning, OECD, 1967.

not available, is therefore limited. Besides, they are relati complex compared to the other type commonly known as "ordinary student flow" models.

3.1.2. Ordinary student flow models.

Ordinary student flow models as the term suggests, are simplest of educational flow models. They use simple account: relationships to describe the flow of students by applying the transition ratios i.e. the promotion, repetition, drop-out an failure rates. This approach is adopted by R.M. Durstine(196 According to Durstine's model, enrolment between various stag a function of enrolment in the previous stages and the transi coefficients. In applying this approach to three South Ameri Durstine notes that the transition rates tend to be stable cc to the actual observed rates which charge overtime.

Another form of ordinary student flow models is UNESCO's Grade Transition Model(1981). The basic principles remain s to Durstine's, except that the model is disaggregated by gra flow of students between grades as applied to one country, U assumes that the transition coefficients remain constant in

The main weakness of the ordinary student flow models, is that in applying them, the transition rates are usually a be constant and not dependent upon other variables. An impr their application is obtained by assuming that these rates a subject to time trends. A further improvement may be reali: introducing as factors various explanatory variables reflect economic conditions as well as demographic factors. A revi literature on factors likely to affect student flows is mad next section.

3.1.3. Factors influencing enrolment growth

The various studies on the factors expected to influen of enrolment may be classified under the following three br categories emphasising:

- demand factors
- supply factors
- the interaction of both demand and supply factors.

Demand oriented studies

In the studies conducted by G.U. Papi (1969), H. Corr

H. Galper (1969) and H. Brazer and M. David(1962), the most commonly cited factors believed to influence the demand for education include, among others: population increase, increase in per capita income, the price of education and other social factors such as family motivations, urban-rural migration etc. Whereas these authors do not necessarily distinguish between the consumption and investment nature of education, other authors notably T.W. Schults, F. Denison, and G.S. Becker[2] make this distinction. Education is regarded as a kind of investment, and people's desire to enrol in school is linked to the expected return from this investment. Research along these lines is not only voluminous, but has also provoked a lot of controversies. A few such controversies may be cited. These include, among others, the criteria for evaluation - whether the use of the net present value or the internal rate of return, also the extent to which wage differentials represent scocial as against private return.

Supply oriented studies.

The supply of education is generally believed to be one of the most important factors influencing educational expansion. The provision of facilities such as schools, teaching materials and equipment, teachers, scholarships and grants are mostly linked to the supply of education under one umbrella of government expenditure on education. Several studies such as the ones by F. Edding(1969) Lawrence Wolff(1984) and J. Vaizey(1969) find that the major element which influences government expenditure on education is teachers' salaries. They contend, therefore, that the number of teachers may be the most important determinant of educational expansion.

---

2. See for example: the following articles and publications.

T.W. Schultz (1961)(a) 1961(b), 1963), E.F. Denison (1969) and G.S. Becker (1962)

Supply and demand oriented studies.

A typical demand-and-supply analysis of factors governing the expansion of education is done by S. Panitchpakdi(1974). He identifies a set of demand and supply factors, and hypothesises that the growth of enrolments will be a result of the interaction of the demand and supply forces. The demand factors included in his study for Africa, Latin America, Asia and Europe include, among others, attitudes towards education, population and income growth. On the supply side, he considers economic growth, availability of teaching staff and the flow of students from lower levels. The weighted benefits from education appear on both the demand and supply sides. His investigation of the sizes and signs of the coefficients of the variables using regression analysis leads him to a conclusion that they differ greatly from region to region.

Factors influencing new entrants into primary education.[3]

In countries where primary education is strictly compulsory and practically all children of legal age enter school, new entrants into primary schools simply coincide with the size of that population at any point in time. It is often observed also that new entrants into primary schools gradually correspond to the relevant age group.

During the transition period, however, several factors will influence the number of children who will seek to enter primary schools. The literature on this issue lists, among such factors.

- the willingness of parents to enrol their children, this willingness depending for example on the cost of doing so: fees, books, uniform, meals etc.
- accessibility of schools to the population.
- the number of school places available i.e. capacity limitations.
- government regulations on the intake of children outside the official age group.
- number of teachers.

The relevance or irrelevance of any one of these factors depend to a large extent, on the particular situation being considered.

3. See for example T. Thornstad's article in UNESCO (1980)(a).

Factors affecting the transition rates.

To some extent, some transition rates such as the promotion and failure rates depend upon the distribution of abilities among the pupils. But much more important are the rules, regulations and practices of each individual school system as well as general economic conditions. Changes in the transition rates may also be a result of policy, such as when increased public funds to the ducational sector results in increasing the supply of teachers paid from government budget.

Educationalists sometimes classify the causal factors of the transition rates, as they do for aggregate enrolments, into supply and demand factors.[4] By supply factors they mean charges in educational policy regarding the supply of school places, the rules governing promotion, repetition and enforcement of compulsory attendance etc. By demand factors they mean factors influencing the pupils demand for education. The include. for example, income, private costs of education, income loss to the family of having the children in school, future income prospects with more education and so on.

The main problem encountered in introducing relationships between transition rates and most explanatory variables of the types listed above is the obvious difficulty of quanlifying such relationships. Moreover, even if the relationships can be qualified, their stability remains questionable, because they are based on highly unpredictable factors. The empirical investigation of such relationships is usually based on large cross sectional analysis.

In a study conducted by UNESCO,[5] correlation and component analyses were carried out between a selected set of quantifiable variables and the repetition and drop-out rates for a group of developing countries. The variables include the pupil teacher ratio, percentage of GNP spent on education, gross enrolment ratio and the degree of urbanization i.e. percentage urban population. The study concluded that while the level of drop-out is quite closely related to the economic factors governing the demand for and supply of education, the repetition rate depends more on factors internal to the educational system.

We have so far reviewed the various models used for projecting student flows and also some literature on the factors likely to affect student flows. Of the two approaches discussed in sections 3.1.1. and 3.1.2, the approach that is adopted for the study of primary education in Lesotho is an analytical model of the"ordinary student flow" type.

4. see T. Thonstad, op. cit.
5. Wastage in Primary and General Secondary Education,UNESCO, 1980.

As mentioned earlier, ordinary student flow models are simple and easily adaptable. The required data can easily be obtained from national statistics. The model adopted for this study was originally developed by Correa (1969). Correa's model, unlike the other flow models, does not assume constant transition rates but incorporates the effects of population and economic growth on student flows. A brief outline of Correa's model is presented in the next session.

3.2.1. Correa's Model.[6]

Two basic identities define the elements of student flows in and out of the educational system.

$$St = Nt + Rt - Bt - Dt^1 \quad \ldots\ldots\ldots \quad (4 - 12)$$

$$St = Gt + At + R_{t+K} + Dt^2 \quad \ldots\ldots\ldots \quad (4 - 13)$$

where St = total school enrolments at the beginning of any pivotal year t.

Nt = new entrants in the educational system at time t.

Rt = repeaters in educational structure t, coming from the previous structure t-1.

Bt = drop-outs from structure t during and after pivotal year t.

Dt^1 = deaths among students in structure t, before pivotal year t.

Gt = graduates from structure t.

At = drop-outs from structure t during and after pivotal year t.

Rt+K = repeaters from structure t entering the next structure t+K.

Dt^2 = deaths among students in structure t during and after pivotal year t.

superscript 1 refers to the period before the pivotal year t.

superscript 2 refers to the period during and after the pivotal year t.

Educational structures are separated by the number of years that students normally spend to complete a certain level of education.

Eight basic ratios (characteristic ratios) represent relations among the elements in identities (4-12) and (4-13).

$$nt = \frac{Nt}{Nt + Rt} \quad \ldots\ldots\ldots\ldots\ldots \quad (1)$$

$$rt = \frac{Rt}{Nt + Rt} \quad \ldots\ldots\ldots\ldots\ldots \quad (2)$$

$$bt = \frac{Bt}{Nt + Rt} \quad \ldots\ldots\ldots\ldots\ldots \quad (3)$$

$$dt = \frac{Dt}{Nt + Rt} \quad \ldots\ldots\ldots\ldots\ldots \quad (4)$$

$$gt = \frac{Gt}{St} \quad \ldots\ldots\ldots\ldots\ldots \quad (5)$$

6. H. Correa, Quantitative Methods of Educational Planning, 1969.

$$at = \frac{At}{St} \qquad \ldots\ldots\ldots\ldots\ldots\ldots(6)$$

$$rt + K = \frac{Rt + K}{St} \qquad \ldots\ldots\ldots\ldots\ldots\ldots(7)$$

$$d^2t = \frac{D^2t}{St} \qquad \ldots\ldots\ldots\ldots\ldots\ldots(8)$$

To forecst the future evolution of enrolments (St) and its elements, the effects of population and per capita income are considered. Population (P) and per capita income (Y) affect enrolments through their indirect effects on new entrants (Nt) and the characteristic ratios in equations (1) to (8). Population and new entrants are related as follows:

$$Thj = \frac{Nhj}{Phj} \qquad \ldots\ldots\ldots\ldots\ldots (5\text{-}2)$$

where: Thj = the new entrant ratio i.e. the proportion of children age j (usually six years, the new entrants into primary schools in year h.

Nhj = new elementary school entrants of age j in year h.

Phj = population of age j in year h.

Per capita income affects new entrants through its effects on the new entrant ratio (Thj). The concept of elasticity is used to define the relationship such that:

$$e = \frac{\frac{\Delta Thj}{Thj}}{\frac{\Delta Y}{Y}} \qquad \ldots\ldots\ldots\ldots (5 - 22)$$

where: e = elasticity of the new entrant ratio with respect to per capita income.

The numerator represents the growth rate of the new entrant ratio and the denominator represents the growth rate of per capita income.

If "e" has been estimated over the past, and is assumed to remain constant overtime, and the expected income growth rate is known, the future growth rate of the new entrants ratio can be determined, so that

$$\frac{\Delta Thj}{Thj} = e\frac{\Delta Y}{Y} \qquad \ldots\ldots\ldots\ldots(5 - 23)$$

Results obtained from equation (5 - 23) are used to estimate the future values of the new entrant ratio, the growth rate of which follows the geometric pattern:

$$To, \quad To(1+i), \quad To(1+i)^2 \qquad \ldots\ldots\ldots\ldots \quad To(1+i)^t$$

where: To = the base year value of the new entrant ratio

i = the growth rate of the new entrant ratio.

Once the future new entrants ratios are known, the number of new entrants can be projected using the formula in equation (5-2) so that:

$$Nhj = Thj \cdot Phj.$$

The future evolution of the characteristic ratios is estimated by relating their changes to changes in per capita income. Correa's model assumes that the death ratios (d't) and (d^2t) remain unchanged.[6] Elasticities of the characteristic ratios with respect to per capita income are given by the formula:

$$\alpha = \frac{a}{b}$$

where: α = the respective elasticities

a = the growth rate of the characteristic ratios

b = the growth rate of income.

Elasticities of the various ratios with respect to per capita income are estimated over the sample period. Cowen the growth rate of per capita income and once again assuming constant elasticities overtime, the future values of the ratios are estimated. Their growth similarly follows the geometric pattern:

$$CRO, \quad CRO(1+i), \quad CRO\,(1+i)^2 \quad \ldots\ldots\ldots CRO(1+i)^t$$

where: CRO = the bone year value of the characteristic ratio in question.

i = its estimated growth rate.

Two elements of student flows are already known Nt and Rt. Applying the projected ratios to equations defining them, other elements of the student flows can be estimated.

3.2.2. Adaptation of the model.

For the purposes of this study, Correa's model shall be adapted with various modifications and extensions. The aggregated nature of the model would be maintained, although ideally, a disaggregation by grades and sex would have been more useful.

6. Correa argues that these death parameters change relatively little from structure to structure. In addition, such changes as do occur in these ratios do not seem to be meaningfully related to changes in per capita income.

However, considering the enormous computational work that would have been involved, with perhaps very little pay-off, this is not done.

The time unit in Correa's model is 6 years. In this study, time shall be measured in units of one year. The basic equations of the model are not affected when the relationships are considered on a yearly basis. Therefore, our model shall account for pupils at the beginning and end of the year instead of Correa's reference to "educational structures."

Alternative methods for estimating such parameters as elasticities shall be employed to replace Correa's simple, though time consuming, computational approach in his model. The regression method shall be the tool for estimation. This definately should yield more reliable elasticity estimates.

Since available data on Lesotho do not reflect the number of children who die, mortality elements shall be totally ignored, assuming that the death rate at primary schools in Lesotho is negligible.

Instead of indirectly projecting enrolments via the approach adopted by Correa, enrolments in Lesotho shall be projected directly using a forecast regression equation with estimated elasticities with respect to the set of variables to be specified. The same applies to new entrants into primary education. In this study, all characteristic ratios, henceforth referred to as transition rates/ratios, shall be expressed in terms of enrolments.

Perhaps a major departure from Correa's model is the introduction of other factors explaining developments in the educational system. Correa admits that while population and income may be important determinants of student flows, there are other factors. The important fact is that the relevance or irrelevance of any factor differs from situation to situation. In particular, by introducing other factors, the investigation focuses on the student flows in the special context of Lesotho. The choice of variables is based largely on a-priori theoretical and empirical considerations.

With this background in mind, the model is presented below. Any other modification not identified shall be indicated in the course of the presentation.

3.2.3. Basic concepts.

Our basic relationships which describe how enrolment is distributed among various elements are as follows:

$$Et = At + Rt \quad \ldots\ldots\ldots\ldots(1)$$

$$Et = Pt + Dt + Ft \quad \ldots\ldots\ldots(2)$$

where Et = aggregate. enrolments, or total number of pupils enrolled in the primary education system in any particular year.

At = admissions from the previous grades. i.e. the number of children promoted from lower grades.

Rt = the number of children who failed the same grade the previous year, and hence constitute repeaters.

Pt = the number of children who are promoted to the next grades.

Dt = the number of children who do not complete schooling but drop out during the course of the year.

Ft = the number of children who fail at the end of the year; most of these will constitute repeaters of the same grade the following year.

Relationship (1) states that enrolment at the beginning of any year consists of new admissions and repeaters from the previous year. For grade 1, the interpretation remains the same but the relationship shall be stated as follows:

$$E1 = Nt + R1$$

where E1 = enrolments in grade 1

Nt = new entrants into primary schools

R1 = the number of children repeating grade 1.

relationship (2) describes what happens to students enrolled at the end of the year. Some of them will leave the school system before completing (drop-outs) while the rest will complete. Completers may either be promoted to the next grade or fail; some of the failures becoming repeaters of the same grade the following year.

This exposition is an admitedly very limited description of what actually happens in the school system. A much more detailed

description would, for example take into account different types of drop-outs i.e. intra-year drop-outs, failures who drop-out and passers who drop-out. A distinction could also be made between three types of repeaters namely; repeaters among intra-year drop-outs, repeaters among failures and repeaters among passers. These are not only finer details which provide for a richer description, but they cannot be included because the data requirements are considerable and unavailable.

From the student flow relationships defined in identities (1) and (2) the following transition rates/ratios are defined:

$$at = \frac{At}{Et} \quad \text{(the admission rate)}$$

$$rt = \frac{Rt}{Et} \quad \text{(the repetition rate)}$$

$$pt = \frac{Pt}{Et} \quad \text{(the promotion rate)}$$

$$ft = \frac{Ft}{Et} \quad \text{(the failure rate)}$$

$$dt = \frac{Dt}{Et} \quad \text{(the drop-out rate)}$$

These rates necessarily satisfy the following restrictions:

$at + rt = 1$ and

$Pt + dt + ft = 1.$

Thus, not all transition rates may be determined; some may be derived purely as residuals.

3.2.4. The forecasting model.

Having defined the basic concepts of the model, the next step is to show how this model would be used for projecting the future evolution of student flows on which to base requirements for teachers. The approach, as mentioned earlier, is to relate some of the elements in the educational system to various causal factors. These elements include the aggregate enrolment, new entrants, and the transition rates. The functional form of the relationships is assumed to be non-linear.

Variations in student flows may be affected by several factors. Among these are: population growth, economic progress, and a wide spectrum of other factors including government policy, fee structure, physical structures, to mention a few. In general, therefore, the relationship may be stated as follows:

$$St = f(P,Y,f)$$

where St = student flows in general, including all elements; these include enrolments, new entrants, the transition patterns etc.

P = demographic variables

Y = economic variables

f = other factors such as government policy, fee structure, physical structure, etc.

The growth of population, through its effects on the growth of the school age population, causes upward movements of students flowing in and out of primary education. Empirical evidence also supports the existence of a relationship between the spread of education and the development of an economy. Generally speaking, government policy, as reflected by, among other things, expenditure on education, various rules and regulations, provision of facilities and teachers etc. has an impact on student flows.

In this section, we shall define the relationships between enrolments new entrants and the transition rates on one hand and some elements of the broad categories mentioned above in the specific context of the primary educational system in Lesotho.

(1) <u>The enrolment function</u>.

Our analysis for Lesotho does not strive to distinguish between purely supply or demand factors. It shall also bypass the controversies over whether the demand for education is consumption or investment motivated. For our analysis the most relevant factors included in the enrolment function shall therefore be economic growth, population growth, availability of teachers and schools as well as government expenditure on education. Thus the relationship is specified as follows:

$$Et = Et(Pt,Yt,Tt,SCt,Gt)$$

where Et = enrolment

Pt = population of the primary school age group in Lesotho i.e. 6-12 years.

Yt = per capita GNP

Tt = number of teachers

SCt = number of schools

Gt = government recurrent expenditure on primary education.

(ii) The new entrants function.

In the case of Lesotho, we have limited ourselves to income, population growth, availability of schools and teachers, so that the new entrant function is defined as:

$$Nt = Nt\ (Yt,\ P1t,\ Tt,\ SCt)$$

where: Nt = new entrants into primary schools

P1t = the population 6 - 9 years

Tt = number of teachers

Sc = number of schools

It may be noted that the official entry age into primary schools is six years, but in practice, children often go to school at a later age, hence the population variable covers the 6-9 age range.

(iii) The functions for transition rates

In this study, the following are the relationships which are assumed to explain transition rates in Lesotho. They are specified as functions of selected social, economic and institutional factors.

- the promotion rate (p)

$$p = p(PTR,\ Yt,\ Qt)$$

- the drop-out rate (d)

$$d = d(PTR,\ ER,\ Yt,\ U,\ R7)$$

- the repetition rate (r)

$$r = r(PTR,\ ER,\ Yt,\ U,\ R1,\ R7)$$

where the definitions of the variables are as follows:

p,d, and r = the promotion, drop-out and repetition rates respectively.

PTR = the pupial teacher ratio.

Yt = income per capita

Qt = number of qualified teachers

ER = the gross enrolment ratio

U = the percentage of urban population in total population

R7 = repetition rate in grade 7

R1 = repetition rate in grade 1

In the foregoing discussion, all functional relationships have been defined in general form only. For the purpose of carrying out the empirical investigation in this study, the functional forms of these relationships are

assumed to be non-linear. The forecasting model therefore, has the following five equations:

$$Et = A P_t^{\alpha_0} Y_t^{\alpha_1} G_t^{\alpha_2} \frac{1}{I_t}^{\alpha_3} SC_t^{\alpha_4} \quad (3.1)$$

$$Nt = A Y^{\beta_1} P^{\beta_1} \frac{1}{T}^{\beta_2} SC_t^{\beta_3} \quad (3.2)$$

$$P = A PTR^{\gamma_0} Y_t^{\gamma_1} Q_t^{\gamma_2} \quad (3.3)$$

$$d = A PTR^{\delta_0} ER^{\delta_1} Y_t^{\delta_2} U^{\delta_3} R7^{\delta_4} \quad (3.4)$$

$$r = A PTR^{\eta_0} ER^{\eta_1} U^{\eta_2} R1^{\eta_3} R7^{\eta_4}. \quad (3.5)$$

The exponents in these non-linear equations represent elasticities of the variables Et, Nt, p, d and r with respect to the variables included in the equations. These elasticities shall be estimated over the sample period (1970 - 1981). By making the obvious over-simplification that these elasticities will remain constant in the future, they will be used to project the future evolution of the variables in question.

It must be noted, however, that for forecasting purposes, it will be possible to apply only some of the elasticity parameters in view of data limitations.

In terms of aggregate enrolments (Et) the parameters to be applied for projection purposes are and
For new entrants (Nt), the parameters Bo and B1 shall be used. The transition rates shall be projected using only their elasticities with respect to the pupil teacher ratio (PTR). Projections based on such selected parameters, therefore, assume that the effects of other variables are held constant.

3.2.5. Forecasting the demand for teachers

The projected enrolment which corresponds to the output of the methodology described in the previous section (3.2.4(i) shall be converted into the demand for teachers. A simple method shall be used. The conversion factor used shall be the pupil-teacher ratio which represents the desired staffing pattern according to the objectives of the Lesotho Development Plans. Since by definition.

$$PTR = \frac{Et}{Tt} \quad \ldots\ldots\ (3.6)$$

where: PTR = the pupil teacher ratio
Et = enrolments
Tt = number of teachers

Projections for teacher requirements will then be a simple matter of dividing enrolment projections by the desired PTR, therefore:

$$Tt = \frac{Et}{PTR} \qquad \ldots\ldots(3.7)$$

Two scenarios would be investigated. The first scenario shall be based on the target pupil-teacher ratio (42:1).
The second one shall assume that the pupil teacher ratio of 1981 (47:1) is maintained.

CHAPTER 4

ANALYSIS OF THE REGRESSION RESULTS

Following the methodology described in the previous chapter, the results are presented in this chapter. The estimated model is only a means to an end. Apart from the important clues that the estimated coefficients provide, they represent tools for projecting in the next chapter, student flows and consequently teacher requirements. The discussion provided here centres around the signs and sizes of the estimated coefficients in relation to the theoretical assertions and a priori expectations made.

The chapter is presented in four sections. Section 4.1 is a general overview of the results. The remaining three sections 4.2 to 4.4 present and discuss in detail the estimated relationships for aggregate enrolments, new entrants and the transition rates.

4.1. GENERAL OVERVIEW

Tables 4.1 to 4.5 present selected regression results obtained during the process of estimating the relationships explaining enrolment, new entrants and the transition rates (i.e. the promotion, drop-out and repetition rates) under different specifications of the dependent variables. The model estimated explains each of these relationships as functions of some causal factors. As stated in section 3.2.2. of chapter 3, Correa's (1969) two variable model is extended to include the effects of varibles other than per capita income in explaining the behaviour of student flows overtime. The model is based on an assumed non-linear relationship between student flows and the factors under consideration. Although the estimated elasticity coefficients are to be used mainly for generating forecasts, their interpretation has wider implications in terms of assessing educational policy.

It should be appreciated on the onset that the results are, to a large extent, dependent on the reliability and accuracy of the data used.[1] Shortcomings of educational, demographic and economic data are a common phenomenon and therefore not a perculiar feature in this particular study.

1. A brief discussion on data sources and application is provided in Appendix 2

For forecasting purposes, the elasticity coefficients are likely to be more valuable if they are valuated using the most recent data. Owing to data limitations, however, all equations are estimated over the period 1970-1981 unless otherwise stated).

The theory of statistics provides various useful indices of analysing the results of regression estimates. Before interpreting and discussing these regression results, their statistical properties shall be examined and evaluated. The evaluation shall focus on the adjusted coefficient of determination (R^2), the Durbin Watson statistic (DW), the t- and F - statistics. Recall that the R^2 measures the explanatory power or goodness of fit of the relations; DW measures the degree of serial correlation; the t-statistics reported here measure the 5% significance level of various regression coefficients; and the F-statistics measure the joint significance of the explanatory variables in the regression.

In spite of the relatively small sample size - 12 observations, most of the characteristics of the regression results are satisfactory. Generally speaking, the behaviour of student flows is adequately explained by the independent variables. Most of the coefficients of the "best" estimated functions are reliable and significant. Nevertheless, the coefficient estimates and the statistical properties of the results vary with the various forms of different equation specifications. These will be shown in the forthcoming sections which present details of the regressions.

4.2. ENROLMENT

Table 4.1 presents 6 selected regression results from relationships explaining enrolment. The variables used in the estimation process are:

- school age population 6 - 12 years (Pt)
- GNP per capita (Y_t)
- number of primary school teachers (T_t)
- government recurrent expenditure on primary education (Gt)
- number of primary schools (Sc)

Based on the adjusted coefficient of multiple determination ($\bar{R}^2$), all the equations satisfactorily explain the variation in the dependent variable (Enrolment). The $\bar{R}^2$ values are, in most cases, close to unity (.99).

TABLE 4.1

SELEC D REGRESSION RESULTS FROM EQUATIONS PLAINING

PRIMARY SCHOOL ENROLMENT IN LESOTHO* (1970-1981)

	INTERCEPT	Pt	Pt(-1)	Yt	Yt(-1)	Gt	Tt	Sc	$\bar{R}^2$	Dw	F
1.	-0.48 (1.4)	0.52 (3.2)		0.08 (2.7)			0.32 (4.8)		.99	1.7	778
2.	-0.575 (5.479)		1.14 (25.3)		-0.008 (1.2)		-0.01 (0.54)		.99	2.1	9574
3.	-8.579 (2.85)	0.60 (4.5)		0.05 (1.6)		0.03 (1.4)	0.18 (2.1)	1.3 (2.7)	.99	2.1	840
4.	-2.175 (2.66)		1.09 (21.3)		-0.005 (0.44)	-0.001 (1.7)	-0.001 (0.44)	0.27 (2.14)	.99	3.0	13367
5.	-1.04 (4.5)	1.20 (43.1)		.0.03 (3.06)					.99	1.9	5881
6.	-0.88 12.25		1.19 (59.9)		-0.02 (3.3)				.99	2.5	49105

The variables are defined as follows:

Pt = School age population (6 - 12)

Yt = per capita income

Gt = government recurrent expenditure on primary education

Tt = number of teachers

Sc = number of schools

*absolute values of t-statistics in parentheses.

which is indicative of the strong explanatory power of the regressions. It can therefore be stated that the estimated regression equations account for 99% of the variation in enrolment, and only 1% remains unexplained.

According to the t-tests, most of the estimated coefficients are significant at the 5% level of significance. The t-statistics associated with individual coefficients are often greater than 2 or sufficiently close to that, except the coefficients of the lagged income variable ($Y_t(-1)$) as seen from equations 2 and 4. It is noted from the same equations that whenever the lagged income effect is considered, the teacher coefficients which are otherwise positive and significant in the other equations, assume negative values associated with insignificant t-values.

The DW tests for autocorrelation observed from equations 4 and 6 suggest the presence of negative serial correlation. Observing the rule of thumb that when there is no serial correlation the DW will be close to 2, the remaining equations satisfy this condition in varying degrees.

The F-values are generally higher than the critical values associated with a 5% level of significance and the relevant degrees of freedom. This allows us to reject the null hypothesis that all coefficients of the explanatory variables are jointly insignificant.

All things considered, equation 1 may be considered as the "best" relation for explaining and projecting primary school enrolment over the planning horizon in Lesotho. The favourable features of this equation are the considerably high degree of $\bar{R}^2$, significant coefficients throughout, high F-value a DW value sufficiently close to 2. The equation is on ordinary least square regression corrected for serial correlation using the Cochrane. Orcutt transformation technique.[1]

1. While equation 1 represents the best equation for explaining and projecting enrolment, data limitations over the planning horizon require that an alternative, equation 5, would be applied for forecasting enrolment. See chapter 5(section 5.1). Notice that the statistical properties are as good.

Thus:

$$\text{Log } Et = -0.48 + 0.52 \log(Pt) + 0.08 \log(Yt) + 0.32 \log(Tt)$$
$$(1.4) \quad (3.2) \qquad (2.7) \qquad (4.8)$$

where the absolute values of the t-statistics are shown in parenthesis.

It is necessary at this stage to examine the role of individual variables in explaining enrolment.

4.2.1 The role of population.

The term population is used here to refer to the primary school age population. This is the total number of children aged 6-12, corresponding to the age range for primary education in Lesotho. The results suggest that enrolment is not only positively related to the population element, but population has consistently proven to be predominant in explaining primary school enrolment in Lesotho. In all the equations, the relatively larger coefficients indicate a relatively larger effect of population growth on enrolment compared to the effects of other variables. The population effect is more pronounced when it is lagged. This seems to indicate the existence of a time lag between population and the influx of enrolees into primary education.

Theoretically, demographic factors are believed to have a major impact on educational growth. According to the findings of this study, this theoretical viewpoint is confirmed in the case of Lesotho. It is a generally held view that once primary education has reached all children in the relevant age group, enrolment will follow an uncomplicated path, namely, the demographic path of population growth. In the case of Lesotho, it can be inferred from the lagged population coefficients that enrolment is nearly catching up with population growth. The elasticity coefficients for this variable are greater than unity, implying that population growth (lagged) will result in about the same increase in enrolment. The lower coefficients of the Pt variable confirm the incidence of late entry into primary education. The positive elasticity of enrolment with respect to population conclusively suggests that as population grows in Lesotho, the demand for education increases.

4.2.2. The role of income (Yt)

A large amount of empirical evidence supports the existence of a mutually positive relationship between educational growth and

economic progress.

According to our results, this assertion can neither be endorsed nor rejected. Whereas the unlagged income effect is predominantly positive (except in the case of equation 5), its lagged impact is negative in all equations. The reliability of all the lagged income coefficients, save equation 6, cannot, however, be established owing to the insignificant coefficients. We shall therefore concentrate on the positive relationships which are in most cases associated with significant coefficients.

Even though a positive relationship is confirmed between enrolment and income, the regressions do indicate that enrolment is not very responsive to changes in economic progress. The income elasticities show persistently low values throughout, alomost stable at 0.08. On the whole, income plays an inferior role in explaining enrolment compared to several other variables. This observation is contrary to the superior role accorded to the income variable in Correa's (1962) work.

Enrolment in primary education is indeed not a consequence of economic changes. In Lesotho, primary education owes much of its origins to the missionary era, at a time when the economy was not even growing in the strictest economic sense. As far back as then, parents were already sending their children to school.

A pessimistic interpretation of the minor influence of income on education can be made in terms of income distribution. If we accept the view that education is one of the elements that generates equitable income distribution, it can be concluded from these results that the contribution of economic progress in this regard is only marginal in Lesotho.

4.2.3. <u>The role of teachers.</u> (Tt)

The teacher variable also shows a significant positive influence on enrolment. (We are ignoring here its negative influence as reflected in equations 2 and 4, since the coefficients are insignificant). Although the effect of teachers on the number of children who enrol in primary schools is slightly less than the population effect, it is superior to the income effect.

The economics of education suggest that in countries where the shortage of teachers is acute, one would expect a high elasticity of enrolment with respect to teachers. It is further said that this elasticity tends to decrease in time after education becomes more advanced, with less scarcity of teachers.

The teacher elasticity in our results are relatively low. If the number of teachers is considered one of the appropriate measures of the supply of education, it can tentatively be concluded from the relatively low coefficients that in spite of other supply limitations capable of hindering primary education in Lesotho, the teacher supply bottleneck is not serious.

Educators often associate a better quality of education with the availability of qualified teachers. This being so, the rosy impression given in the above paragraph becomes questionable. In chapter 2, table 2.10, we noted that in Lesotho the proportion of unqualified teachers is not negligible. The model was estimated using the total teaching force, most of whom are unqualified. This simply means that the implicit shortage of teachers in Lesotho seems to have been covered up by hiring unqualified teachers.

It may be useful to elaborate on this point and examine the implications. We may look at primary education as one industry which, in the process of production, variable is the most critical. According to our best estimated equation (1), the production function being postulated is:

$$Et = A \quad P \quad Y$$

$$= A \cdot P \quad Y \quad T$$

Since $$\alpha_2 = \frac{\frac{\Delta E}{E}}{\frac{\Delta T}{T}} = \frac{\Delta E}{E} \cdot \frac{T}{\Delta T} = \frac{\Delta E}{\Delta T} \cdot \frac{E}{T}$$

thus, $$\frac{\Delta E}{\Delta T} = \frac{E}{T}$$

These relations can be interpreted as follows: The term $\frac{\Delta E}{\Delta T}$ represents

the marginal productivity of teachers, whereas $\frac{E}{T}$ (the pupil teacher ratio) represents the average productivity per teacher.

In economic theory, the marginal productivity of an input indicates that input's degree of abundancy or scarcity. If the marginal productivity is high, the amount of the input used is small because it is scarce and vice versa. From the above formulation, the marginal productivity of teachers is the product of the elasticity coefficient ($\alpha 2$) and the pupil-teacher ratio ($\frac{E}{T}$).

The regression results for Lesotho in this context indicate that $\alpha 2$ is found to be low (0.32), at the same time, the observed pupil teacher ratios are relatively high. The product of the lower weighted $\alpha 2$ and $\frac{E}{T}$ is likely to be a relatively lower marginal productivity relative to the average. The point we are driving at is that large scale use of unqualified teachers may have resulted in the relatively lower marginal productivity of teachers in Lesotho.

We can further relate the teacher elasticity $\alpha 2$ to the acceleration principle in capital theory, and examine the implications. The acceleration principle links the accelerated increase in investment to production. Analogously, this principle in education requires that the national production of teachers has to be expanded at a faster rate in order to bring about a certain increase in enrolment.[2] In this context, the accelerator elasticity is the inverse of the teacher elasticity 2. The negative relationship between the two means that the lower the teacher elasticity 2, the higher the accelerator elasticity.

In the case of Lesotho, the reforce, the relatively low value of $\alpha 2$ (0.32) means that the accelerator elasticity is relatively very high: $\frac{1}{0.32} = 3.125$. Generally speaking, therefore, it means that it requires a greater acceleration (about 3 times) in enrolment of teachers to generate the enrolment of a unit of primary school pupils. Since the emphasis must be on trained teachers, this therefore, requires an acceleration in the expansion of teacher-training colleges to meet the rising demand for enrolments in primary education.

2. In other words, a one unit increase in production requires a more than one unit increase in investment, if the acceleration principle holds. See. S.K. Moorthy et.al.(1968).

4.3 NEW ENTRANTS. (Nt)

The evolution of new entrants in primary schools in Lesotho is examined in relation to a set of variables more or less similar to those related to aggregate enrolment. The population variable (P1) is redefined to correspond to the primary school entry group. Although this age group is efficiently 6, the problem of late entrants had to be considered. P1 thus refers to the age group 6-9, assuming that new entrants are expected in the primary education system when they belong in this age range.

Table 4.2 presents regression results for relationships between new entrants and the following variables:

- GNP per capita (Yt)
- Population 6-9 years (P1)
- Number of teachers (Tt)
- Number of schools (Sc)

In equation 1, the independent variables explain more than 60% of the variance in new entrants. However, the estimated coefficients are jointly unreliable since the F-value (1.7) is too low. In equation 2, the Sc variable (number of schools) has been excluded. The goodness of fit improved and the three coefficients are significant, but the DW value is nearly 3 (2.9) which indicates the presence of negative serial correlation. Taking into consideration a possible lagged income effect (equation 3), the goodness of fit improved tremendously to .99, there was also a high F-value(1087) and a good D.W. (2.0) In spite of all these improvements which could have otherwise rendered equation 2 a best estimate, the lagged income coefficient is associated with a very poor t-statistics (0.64). Finally, new entrants were related to population and income seperately (equations 4 and 5) In these simple regressions, the coefficients are significant but the explanatory power is lower.

All things considered, equation 2 was finally selected as the "best" estimate. Apart from the high D.W value, the goodness of fit is high. The three variables income (Yt), population (P1) and teachers (Tt) together explain more than 70% of the variation in new entrants. The coefficients are significant both individually and jointly, as reflected by the t and F-values. Consequently the new entrant relationship is represented by the following equation.

TABLE 4.2

REGRESSION RESULTS FROM EQUATIONS

EXPLAINING NEW ENTRANTS*: 1972 - 1980

	INTERCEPT	Yt	Yt(-1)	Pl	Tt	Sc	R^2	Dw	F
1.	- 19.6 (0 .24)	1-2 (2.5)		-5.6 (2.3)	2.7 (2.3)	3.4 (0.43)	.63	2.1	1.7
2.	3.7 (1.7)	1.1 (2.6)		-5.7 (2.1)	2.8 (2.1)		.71	2.9	5
3.	- 0.26 (0:62)		0.06 (0.64)	0.74 (37.7)			.99	2.0	1087
4.	2.3 (4.3)	0.32 (2.7)					.50	2.4	7.8
5.	- 0.10 (0.05)			0.769 (2.2)			.40	2.0	5.

*absolute values of t-statistics in parentheses.

where:

Yt = income per capita

Pl = number of children aged 6-9

Tt = number of primary school teachers

Sc = number os primary schools.

$$\text{Log } Nt = \underset{(1.7)}{3.7} + \underset{(2.6)}{1.1} \log(Yt) - \underset{(2.1)}{5.7} \log(Pl) + \underset{(2.2)}{2.8} \log(T)$$

According to the above relationship, new entrants are highly responsive to income, population and teachers. The respective elasticities (1.1, 5.7 and 2.8) are all greater than unity, compared to the elasticity coefficients of aggregate enrolment with respect to these variables. According to our "best" estimate for enrolment in section 4.2, these elasticities are all less than unity(0.08, 0.52 and 0.32 respectively) It can be concluded, therefore that the effects of population growth, economic progress and teachers are greater on the number of children entering primary schools for the first time.

We note, however, that new entrants are negatively related to the relevant population age group. A one percent increase in the 6-9 year old population leads to a 5.7 per cent decline in the number of children who seek to enter primary schools for the first time. If we link a growing population to a growing demand for primary education, the negative relationship leads us to conclude that educational authorities in Lesotho have been running short of supply capacity, and consequently cannot keep pace with the growing demand.

Judging from the high elasticity of new entrants with respect to teachers (2.8), one aspect of the supply bottleneck is unequivocally confirmed; recalling from section 4.2.3. that an acute shortage of teachers is generally associated with high teacher elasticity. If indeed the shortage of teachers is so acute at the grass-root level, any growth of enrolment in Lesotho is a meaningless expansion of education with some deterioration in its quality.

4.4. THE TRANSITION RATES.

This section presents the results obtained for the transition rates, sometimes referred to as the"characteristic ratios". These are the drop-out, promotion and repetition rates. Recall that each of these rates is defined as a ratio with respect to enrolment; see chapter 3, section 3.2.3.

The transition rates are each related to a limited number of key demographic, economic and educational variables. Admitedly, these rates are characterised by exceedingly complex relationships but not all of these could be taken into account. In the analysis which follows, the choice of

variables was limited by data availability. The regression results are found in tables 4.3, 4.4 and 4.5.

4.4.1 General Observations

The following main observations are made from a general overview of the results presented for the transition rates in tables 4.3, 4.4 and 4.5.

(a) the role of per capita income is highly significant compared to the minor role it played in enrolment equations of tables 4.1. The sizes and signs of the coefficients, however, differ from rate to rate.

(b) The three variables: pupil-teacher ratio (PTR), total teachers (Tt) and qualified teachers (Qt) evidently have important roles in any equation in which they have been considered. As a rough comparison, most coefficients are greater than their counterparts observed in the enrolment equations. From this it can be inferred that the importance of teachers manifests itself in the way they affect the internal efficiency of primary education.

(c) The effects of the transition rates on one another are confirmed. For example, the variable R7 (the repetition rate in grade 7) has a considerable effect on the drop-out rate as can be seen from the coefficients associated with R7 in table 4.3.

In general, the variables selected to explain the transition rates have yielded satisfactory results in terms of the significance of the elasticity coefficients and the explanatory power of the regressions. The signs of the coefficients remain consistent throughout although quite often they are contrary to logical expectations. Results for individual rates are briefly discussed in the next sections.

4.4.2. The Drop-out Rate (table 4.3)

The four equations in table 4.3 are generally characterised by highly significant coefficients as seen from the t-values associated with them. According to the DW tests, there is a problem of negative serial correlation in equations 1 and 2. Equation 4 has more significant coefficients, a higher F value and a stronger explanatory power than equation 3. Equation 4 was therefore, selected as the"best" estimate for explaining the drop-out rate and projecting

TABLE 4.3 REGRESSION RESULTS FROM EQUATIONS

EXPLAINING THE DROP-OUT RATE*

1972 - 1981

	INTERCEPT.	PTR	ER	YT	U	R7	$\bar{R}^2$	DW	F
1.	42.95	-7.2	-13.7	3.8	-1.5	1.2	.99	2.7	8.4
2.	(5.399)	(6.7)		(15.1)	(16.6)	(8.4)			
2.	37.4	-6.5	-12.4	3.6	-1.4	0.97	.99	3.5	1265
	(5.5)	(13.9)	(13.8)	(37.2)	(37.2)	(8.5)			
3.	-9.1	-0.23		2.26	-1.3	1.0	.97	1.8	100
	(7.8)	(2.8)		(7.4)	(7.4)	(2.8)			
4.	-1.1	-0.26		0.67	-1.1	1.5	.99	1.7	540
	(1.4)	(7.6)		(2.0)	(11.6)	(10.3)			

TABLE 4.4 REGRESSION RESULTS FROM EQUATIONS

EXPLAINING THE PROMOTION RATE* (1972-81)

	INTERCEPT	PTR	YT	QT	$\bar{R}^2$	DW	F
1.	1.14	0.62	-0.27		.99	1.8	101
	(3.17)	(102.0)	(3.2)				
2.	0.88		-0.25		.43	1.9	7
	(1.96)		(2.26)				
3.	-162.28			20.2	.70	1.8	22
	(4.8)			(4.8)			
4.	-174.9		-5.2	24.9	.70	2.05	11
	(4.8)		(2.2)	(4.5)			

*absolute values of t-statistics in parenthesis

where:

PTR = the pupil teacher ratio

ER = the gross enrolment ratio (enrolment ÷ school age population)

U = urban population as % of total population

Yt = income per capita

R7 = repetition rate in grade 7

Qt = number of qualified teachers.

it over the planning horizon. The drop-out rate is thus explained by:

$$\text{Log } r = \underset{(1.4)}{-1.1} - \underset{(7.6)}{0.26} \log(PTR) + \underset{(2.0)}{0.67} \log(Yt) - \underset{(11.6)}{1.1} \log(U) + \underset{(10.3)}{1.5} \log(R7)$$

where:

r	=	the drop-out rate
PTR	=	the pupil teacher ratio
U	=	urban population as a percentage of total population
Yt	=	income per capita
R7	=	the repetition rate in grade 7.

The drop-out rate is found to be negatively related to the pupil teacher ratio (PTR) the enrolment ratio (ER) (not included in our best estimate) and the urbanization variable (U). On the other hand, this rate is positively related to income (Yt) and the repetition rate (R7).

Among the four variables that appear in our best estimated equation (3) the pupil teacher ratio and the repetition rate are decision variables and therefore can be influenced by the government. The other two variables Yt and U are not amenable to educational policy manipulation.

The negative relationship between the pupil - teacher ratio and the drop-out rate is rather puzzling. One would have expected that a fall in the pupil teacher ratio caused by an increase in the number of teachers would reduce the drop-out rate. But what is observed is a negative relationship. The positive relationship between the drop-out rate and income per capita is also strange. Parents' inability to meet the cost of education due to the problem of supply of finance can be expected to cause higher dropping out and vice versa. In this case, children whose parents cannot afford, for example, the necessary books, can be expected to fail frequently and may ultimately drop-out from the school system, or they may simply be withdrawn from school for this particular reason i.e. financial problems.

Our contrary results seem to suggest that increasing per capita is achieved at the cost of withdrawing children from school. In the case of Lesotho, we should remember that employment in South Africa requires only the basic ability to read and write. Once boys acquire this minimum requirements, they usually leave primary schools

prematurely to work in South Africa. Workers remittances from South Africa contribute largely to increasing incomes. Our results therefore reflect the reality of the situation in Lesotho; this is so, because as it can be noted from the statistical Annex, table 9, male (boys) drop-out rate is higher than that of girls.

The results also confirm the generally held view that repetition causes dropping-out. The failure rate in Lesotho is highest in the final grade (7).[3] The positive relationship between the two rates implies that children who failed the final grade tend to drop-out the following year while they are repeating the same grade. To put it more clearly, since the failure rate is highest in grade 7, the percentage of chilren repeating is consequently highest in the same grade. These children eventually drop-out before the end of the year.
The aggregate drop-out rate therefore, would be expected to be highly influenced by the failure rate in grade 7 as is observed, since failure causes repetition and the repeaters tend to drop-out.

Obviously, with the growth of urbanization, more children enrol in urban schools. Absence of men in Lesotho(migrant workers in South Africa) demands active participation of children in the production process in the form of land cultivation. Since this demand is greatest in the rural areas, naturally the tendency for children to be withdrawn from schools for these reasons declines as urbanization takes place, hence the drop-out rate also declines.

4.4.3 The Promotion Rate. (Table 4.4)

The promotion rate was related to the following variables. the pupil-teacher ratio (PTR) income per capita (Yt) and the number of qualified teachers (Qt). Equations 1 to 4 are generally characterised by favourable statistical properties, except for the low R^2value for the second equation. For forecsting purposes, equation 1 was selected as the "best" estimate. Consequently our promotion function is::

$$\text{Log } p = 1.14 + 0.62 \log(PTR) - 0.27 \log (Yt)$$
$$(3.57) \quad (101.7) \qquad (3.2)$$

3. see statistical Annex, table 8.

where p represents the promotion rate and PTR and Yt are as defined above.

Once again one would have expected a positive relationship between the promotion rate and income (Yt) assuming that children are more likely to be promoted when rising incomes permit increasing purchases of school supplies. Also, it would have been logical to expect a negative relationship with the pupil-teacher ratio (PTR) as it may be difficult for a teacher to cope with a large number of pupils, most of whom are likely to fail at the end of the year.

Table 4.3 shows results contrary to these logical pressumptions. a fetched explanation which may not be too irrelevant under the circumstances in Lesotho may be offered for the income effect observed. Perhaps as a result of irregular attendance in a situation where children contribute to increasing national production, their performance at the end of the year is adversely affected. As mentioned earlier, it is mostly boys whose attendance is irregular in this respect. In fact their promotion rate is lower compared to that of girls. This is observed from the figures on the promotion rate by sex in the statistical Annex, table 9.

With regard to the pupil-teacher ratio, it may not be surprising that a decrease in the ratio decreases the promotion rate. A fall in the pupil-teacher ratio caused by increasing the number of teachers, most of whom are unqualified, will naturally have negative effects on the children's performance. The conspicous positive impact of qualified teachers (Qt) on the promotion rate testifies to this. The tendency, therefore, to resort to the use of unqualified teachers, as our results rightly imply, is definately not beneficial to the performance of the children.

4.4.4. <u>The Repetition Rate</u> (table 4.5)

The repetition rate(r) was related to the following variables:

- The pupil teacher ratio, (PTR)
- the enrolment ratio i.e. total enrolments as a % of the school age population (ER)
- the repetition rate in grade 7 (R7)
- the repetition rate in grade 1 (R1)
- income per capita (Yt)
- degree of urbanization (U)
- total teaching force (Tt)

TABLE 4.5 REGRESSION RESULTS FROM EQUATIONS

EXPLAINING THE REPETITION RATE*, 1972-1981

(1972 - 1981)

	INTERCEPT	PTR	ER	Yt	U	R1	R7	Tt	$\bar{R}^2$	DW	F
1.	395.2	18.5	-69.1	4.7	3.8	0.11	-3.4		.89	2.3	12
	(0.30)	(2.0)	(0.30)	(-0.92)	(2.4)	(0.30)	(2.8)				
2.	1334.6	9.4	-284	-0.44	4.8	0.08	-1.7		.93	3.1	19
	(0.41)	(0.62)	(0.70)	(0.06)	(2.1)	(0.12)	(0.82)				
3.		5.4		-0.001	5.4	-0.15			.99	2.9	345
		(27.2)		(36.1)	(33.2)	(4.0)					
4.	-2835.2	40.8	636	18.2		-1.3	1.8		.87	3.2	10.9
	(4.2)	(7.4)	(8.1)	(8.7)		(1.8)	(0.65)				
5.	37.2	16.4		-4.3	2.4				.46	2.8	3.3
	(2.2)	(1.8)		(2.3)	(2.9)						
6.	37.3	17.0		-6.0	2.9				.89	2.8	20.0
	(2.2)	(4.8)		(7.4)	(8.9)						
								6.9	.52	1.7	4.0
								(2.7)			

7. *absolute values of t-statistics in parentheses.

Where:

ER = enrolment ratio
Yt = income per capita
U = % urban population
R1 = repetition rate in grade 1
R7 = repetition rate in grade 7.
PTR = the pupil teacher ratio.

The first equation in table 4.5 has a good R^2, a satisfactory DW and a high F-value. The t-statistics associated with three of the six variables are, however, extremely poor. These are the income (Yt), enrolment ratio (ER) and grade 1 repetition rate (R1). Equation 2 is the Cochrane Orcutt transformation of the ordinary least-square regression of equation 1. Even though the R^2 and the F-statistics improve, the number of insignificant coefficients increases to four, and the DW is even higher (3.1).

An exclusion of two variables, the enrolment ratio and the repetition rate as is done in equation 3 increases the explanatory power of the regression, improves the t-and F-statistics tremendously, but the DW remains unfavourable. In the next three equations 4,5 and 6, the coefficients are generally significant except in the case of the R7 coefficient of equation 4. All things considered, equation 6 appears to be the "best" among all the seven equations. All the coefficients are significant individually and jointly and the goodness of fit is sufficiently high. Our estimated function is therefore:

$$\text{Log } r = \underset{(2.2)}{37.3} + \underset{(4.8)}{17.0} \log(PTR) - \underset{(7.4)}{6.0} \log(Yt) + \underset{(8.9)}{2.9} \log (U)$$

The repetition rate was related to the same set of factors as its close associate, namely the drop-out rate. According to our best estimate, the repetition rate is more responsive (in absolute terms) than the drop-out rate is to changes in the pupil teacher ratio (PTR) income (Yt) and the growth of urbanization.

However, the effects of these variables on the repetition rate are opposite to their effects on the drop-out rate.

The positive effect of the pupil teacher ratio on the repetition rate follows directly from the effect of this ratio on the promotion rate. If a reduction in the ratio does not improve, but instead reduces the promotion rate, it will consequently increase the number of children repeating the following year.

CHAPTER 5

STUDENT FLOWS PROJECTIONS AND THE HUMAN RESOURCE REQUIREMENTS

Having estimated the functions explaining enrolments, new entrants and the various transition rates in the previous chapter, the results are used in this chapter to generate projections for the varibales over the period 1985 - 1990.

The outline of this chapter is as follows: There are three sections. Section 5.1 presents the projections for enrolments(5.1.1) new entrants (5.1.2), transition rates (5.1.3) and sub-section (5.1.4) summarizes the future student flows corresponding to the student indentities defined in chapter 3, sub-section (3.2.3).

Section 5.2 deals with the estimation and forecasting of human resource (teachers) requirements dictated by the projected enrolments. Supply and demand for teachers are also compared and the balance assessed. Section 5.3 presents reflections on the objectives of the study and reviews the major findings in relation to the objectives. Conclusions are accordingly drawn and specific policy prescriptions made.

5.1.1. Enrolment projections

The regression results for various enrolment relationships are presented in chapter 4, table 4.1. For projection purposes, equation 5 in that table is applied. In this relationship, enrolment is specified as a function of population(Pt) and GNP per capita (Yt) It is stated as follows:

$$Et = A \; P_t^{\alpha_0} \cdot Y_t^{\alpha_1}$$

hence $\log E_t = \text{Log } A + \; o \; \text{Log } (P_t) + \alpha 1 \; \text{Log } (Y_t)$

from equation 5 of table 4.1

$$\text{Log } E_t = -1.04 + 1.2 \log(P_t) - 0.03 \log (Y_t)$$

For 1990, income projections are based on a publication from the Central Planning Office (CPDO), 1982, in which economic prospects for Lesotho in 1980 and 2000 are projected under different scenarios and assumptions.[1] The scenario in case 23 of Model 1 is applied here. According to this scenario, GNP in 1990 will be 643.866 million maloti.

1. Options for the Lesotho Economy in the year 2000, CPDO, Maseru, 1982

The school age population projections were obtained from the World Bank projections [2] based on two fertility scenarios, according to which the following is expected.

	Constant fertility	rapid fertility decline
total population	1.8 million	1.7 million
school age population	326 thousands	326 thousands

For our purposes therefore:

$$P1990 = 326$$

$$Y1990 = \frac{643.866}{1.8} = 357.7 \approx 358$$

Using log transformations where base e = approximately 2.718 thus, log Y1990 = 5.88 and log P1990 = 5.787.

$$\therefore \quad \text{Log } E_t = -1.04 + 1.2(5.787) - 0.03(5.88)$$

$$= 5.725856$$

$$E1990 = e^{5.725856}$$

$$= 306 \text{ thousands}$$

The evolution of enrolment between 1981 and 1990 will be extrapolated assuming a simple geometric progression.[3]

$$E1990 = E1981 \ (1 + i)^t .$$

Thus the growth rate of enrolment between the two periods is given by:

$$i = \sqrt[t]{\frac{E1990}{E1981}} - 1 = \sqrt[g]{\frac{306}{251.1}} - 1 = 0.022$$

implying a 2.2% growth of enrolment per annum.

---

2. Cost Effectiveness of Education in Lesotho, World Bank, 1984.

3. Enrolment growth is usually assumed to follow a geometric progression. J.D. Chesswas (1969) for example contends that since the growth of enrolment is closely related to population growth and population is generally assumed to take a geometric progression, it would be sensible, therefore, to expect the expansion of enrolment to follow the same kind of growth. Also, the past trends in enrolment growth in Lesotho seem to follow this exponential or geometric pattern. (see statistical Annex, table 2). Thus the assumption made here is plausible.

Enrolment projections calculated above are based on the assumption of constant fertility. A sensitivity test was performed and enrolment projected also on the assumption of rapid fertility decline. Under this scenario, projections for the school age population remain unchanged, but the total population changes from 1.8 to 1.7 million. Thus the per capita income varible (Y1990) assumes the new value 378. The implied level of enrolment for this new scenario of rapid fertility decline[4] is:

$$E1990 = 306.7 \text{ thousands.}$$

By extrapolating enrolment in the same manner as we did for the first scenario, we obtain $i = 0.0225$, which implies a 2.25% growth of enrolment annually.

Results from the projections of enrolment under the two fertility scenarios are presented in a summary form as follows:

TABLE 5.1 THE EVOLUTION OF ENROLMENT UNDER TWO FERTILITY SCENARIOS

	SCENARIO 1 (CONSTANT FERTILITY	SCENARIO 2 RAPID FERTILITY DECLINE
Enrolment 1990	306 thousands	306.7 thousands
Absolute increase 1981 - 1990	54.9 thousands	55.6 thousands
Growth rate 1981-1990 (%)	22.0 %	22.1 %
Annual growth rate(i) 1981 - 1990 (%)	2.2 %	2.25 %

Source: computed

It can be noted from the above table that there is only a marginal difference between enrolment projections based on the two fertility scenarios. A comparison with past trends as observed in chapter 2 table 2.7 is made in table 5.2 below. For this comparison the data are presented on a five yearly basis. Over the period 1980-1990, refer to scenario 1 and for a complete series of enrolment and population see table 5.3.

4. Under the rapid fertility decline scenario,

$$Y1990 = \frac{643.866}{1.7} = 378$$

TABLE 5.2. TRENDS IN ENROLMENT AND POPULATION GROWTH 1960-1990

	Absolute increase in enrolment (thousands)	Annual growth rate of enrolment -6 (%)	Annual growth rate of school-age population(%)
1960 - 1965	21.9	3.0	2.7
1965 - 1970	25.4	3.0	2.7
1970 - 1975	27.8	2.9	2.7
1975 - 1980	31.9	2.9	2.7
1980 - 1985	30.9	2.4	2.9
1985 - 1990	32.0	2.2	3.8

Source: Computed from tables 2.7 and 5.3

The picture that emerges is that while the absolute increase in enrolment level is rising, enrolment is increasing at a declining rate throughout the period 1960-1990. Between 1960 and 1980, the pattern of enrolment growth will slow down and finally may approach that of the population of school age. There is a clear turning point after 1980. Over the period 1980-90, enrolment growth rate falls far below the growth rate of the school age population. This finding suggests that the number of children not benefiting from primary education would most likely be increasing during the planning horizon.

Table 5.3 below illustrates the apparent gap likely to prevail between enrolment and the legal school age population as suggested by the projections. The enrolment and population growth rates used to compute the series are 2.2 and 3.8 respectively.

TABLE 5.3 THE GAP BETWEEN ENROLMENT AND SCHOOL AGE POPULATION (thousands) 1981 - 1990

	School Age Population[a]	Enrolment[b]	Difference
1981	232.2	251.1	-18.9
1982	243	256	-15.0
1983	254	262	-12.0
1984	260	268	- 8.0
1985	270	274	- 4.0
1986	280	280	0
1987	291	286	5.0
1988	302	292	10.0
1989	314	299	15.0
1990	326	306	20.0

a. Extrapolated from the World Bank projections
b. Extrapolated using the growth rate i = 2.2 p.a.

It appears from table 5.3 that if all school places were used efficiently, (i.e. no repetition) the number of averaged children would gradually decline until universal primary education is achieved in 1986 when enrolments equal school age population. From 1987 onwards, enrolment not only falls below the school age population, but the gap tends to widen. If available places continue to be used largely by repeaters, along with high drop-outs, there is a serious threat to Lesotho's ability to achieve universal primary education in the true sense where all legal age children entering school complete it successfully.

5.1.2. New entrants projections

The concept of new entrants as earlier mentioned refers to children entering primary school level for the first time i.e. admissions into grade 1 of primary education.

The regression result for new entrants (Nt) as a function of the 6-9 age population (P1) is represented by the following equation from chapter 4, equation 5 of table 4.2.

$$\text{Log } N = -0.10 + 0.769 \log (P1)$$

In 1990 UN projections estimate P1 would be 239 thousands.[5]
Thus the solution for the new entrant equation in 1990 becomes.

$$N = 62.1 \text{ thousands}^{6}$$

The implied average annual growth rate during the period 1981-1990, following the procedure in subsection 5.1.1. above is given by: $i = 2.6\%$.

Unlike the case of the aggregate enrolment function where it was possible to estimate the function under two demographic scenarios, projections for P1 are only available under one scenario, i.e. the medium variant. Assuming once again that the growth of new entrants follows a geometric pattern, projections between 1981 and 1990 are presented in table 5.4.

---

5. Demographic Indicators of countries, U.N. 1982.

6. $$\begin{aligned} \text{Log } N &= -0.10 + 0.769 \text{ Log } (239) \\ &= -0.10 + 0.769\ (5.5) \\ &= 4.1295 \\ N &= e^{4.1295} \\ &= 62.1 \text{ thousands.} \end{aligned}$$

TABLE 5.4. PROJECTIONS FOR NEW ENTRANTS, 1981-1990

(thousands)

	New Entrants	Population 6-9	New Entrant Ratio(%)
1981	49.5	183.0	27
1982	51.0	189.0	27
1983	52.0	194.0	27
1984	53.0	200.0	27
1985	55.0	206.0	27
1986	56.0	212.0	26
1987	58.0	219.0	26
1988	59.0	225.0	26
1989	61.0	232.0	26
1990	62.0	239.0	26

It would be difficult to accurately reflect the number of children in the age group 6-9 who are not in school. This is so because the difference between new entrants and the size of the population 6-9 includes repeaters, drop-outs and finally those who have never entered school. The new entrant ratio can however be calculated. By definition, this ratio represents the proportion of the population P1 which is admitted into grade 1. Between 1981 and 1985, this ratio averages around 27% and slightly declines to 20% during 1986-1990. (Column 3, table 5.4). A falling enrolment ratio only supports the earlier assertion that the number of children enrolled in grade 1 is likely to increase the future period covered by our projections.

5.1.3. Projections for the transition rates (characteristic ratios)

In projecting the transition rates, their elasticities with respect to the pupil - teacher ratio (PTR) variable shall be used. By so doing, a simplifying assumption is made that the effects of the other variables are held constant. Projections are made for only the promotion (P_t) drop-out (d_t) and repetition (r_t) rates, while the admission (a_t) and the failure (f_t) rates shall be determined as residuals.[7]

---

7. Recall from chapter 3, sub-section 3.2.3 that the transaction rates satisfy the following restrictions:
(i) $Pt + dt + ft = 1$ and
(ii) $at + rt = 1$

thus, as implied, at and ft are determined as residuals.

The government's objective of reducing the pupil teacher ratio to 42:1 shall be assumed to be effective, and shall therefore be used in the projections over 1980-1990. According to this objective, the annual decline in the pupil teacher ratio will be:

$$i = \sqrt[t]{\frac{PTR1990}{PTR1980}} = \sqrt[10]{\frac{42}{48}} = -1.326\%$$

Let symbol E used below denote the elasticity of each of the transition rates with respect to the pupil-teacher ratio.
Thus for each ratio (CR):

$$E = \frac{\frac{\Delta CR}{CR}}{\frac{\Delta PTR}{PTR}}$$

Note that in terms of this definition, the objective of reducing the pupil teacher ratio to 42:1 implies that

$$\frac{PTR}{PTR} = -0.01326$$

(1) <u>The promotion rate</u>. (p)

From chapter 4, equation 1 of table 4.4, the promotion rate elasticity with respect to the pupil teacher ratio is given by:

$$EP\ PTR = 0.62$$

thus $$\frac{\Delta P/.\ PTR}{P/\ PTR} = 0.62$$

Given that $$\frac{\Delta PTR}{PTR} = -0.01326$$

$$\therefore \frac{\Delta P}{P} = (-0.01326)\ (0.62)$$

$$i = -0.822\%$$

where i represents <u>DP</u> here and later all other growth rates of the transition ratios.
Assuming that the promotion rate grows in a geometric pattern from its bone year(1980) value of 68%, its growth overtime follows the path:[8]

$$P_{1980}-P_{1990} = PO,\ PO(1+i),\ PO(i+i)^2 \ldots\ldots\ldots PO(i+i)^{10}$$
$$= .68,\ .668,\ .663,\ .657,\ .652,\ .647,\ .642,\ .637,\ .631,\ .626$$

8. Using Correa's assumption in chapter 3, section 3.2.1
For details of the computations yielding the growth series for the transition notes (promotion, drop-out, rapetition) see Appendix 3.

(ii) The drop-out rate (d)

The procedure for projecting the drop-out rate follows the same pattern as the one used for projecting the promotion rate.

thus, $d_{1980-}d_{1990} = do, do(1+i)^2 \ldots\ldots\ldots\ldots do(1+i)^{10}$
$= .086, .0863, .0866, .0869, .0872, .0875, .0878, .0880, .0884, .0887, .0890.$

(iii) The repetition rate(r)

In the same manner as in (1) and (ii) above:

$$r_{1980-1990} = r_o, \; ro(1+i), \; ro(1+i)^2 \ldots\ldots ro(1+i)^{10}$$
$$= .23, .178, .138, .107, .083, .064, .050, .038, .030, .023, .018$$

Projections for the promotion and the drop-out rates show that they will not change significantly over the period 1980-1990. Accordingly, the government's objective of reducing the pupil teacher ratio may not improve the holding power and the internal efficiency of primary education. However, there will be a considerable decline in the number of children who constitute repeaters, as shown by our projections for the repetition rate in section 5.1.3 (iii) above.

5.1.4. The student Flow Elements 1985-1990

The projected transition or student flow rates for the period 1985-1990 are presented in table 5.5 below. They include the promotion (p), drop-out (d), failure (f), repetition (r) and admission (a) rates. Note that a =(i-r) obtained as a residual, f=1-(p+d) similarly obtained as a residual.

TABLE 5.5 PROJECTED TRANSITION RATES %

1985 - 1990

	(p)	(d)	(f)	(r)	(a)
1985	0.652	0.0875	0.261	0.064	0.936
1986	0.647	0.0878	0.265	0.050	0.95
1987	0.642	0.0880	0.270	0.038	0.962
1988	0.637	0.0884	0.275	0.030	0.97
1989	0.631	0.0887	0.280	0.023	0.977
1990	0.626	0.0890	0.285	0.018	0.982

Applying the rates in table 5.5 to the projected enrolment figures under scenario 1, the student flow elements are obtained and presented in tables 5.6 and 5.7. For every year:

Promotions	(P_t)	=	$p.\ E_t$
drop - outs	(D_t)	=	$d_t\ E_t$
Failures	(F_t)	=	$E_t - (P_t + D_t)$
Repeaters	(R_t)	=	$(r_t\ E_t)$
Admissions	(A_t)	=	$E_t - R_t.$

TABLE 5.6 PROJECTED STUDENT FLOWS (thousands)

1985 - 1990

(Relationship $E_t = P_t + D_t + F_t$)

		1985	1986	1987	1988	1989	1990
		(All Grades 1-7)					
Aggregate Enrolment	(E_t)	274	280	286	292	299	306
Repeaters	(R_t)	17.5	14	10.9	8.76	6.877	5.508
Admissions	(A_t)	256.5	266	275	283.24	292.123	300.492
		(GRADE 1)					
New Entrants	(N_t)	55	56	58	59	61	62.

5.2 REQUIREMENTS FOR TEACHERS IMPLIED BY THE ENROLMENT PROJECTIONS

In this section an attempt is made to translate the enrolment projections into requirements for teachers. The methodology shall be a straightforward calculation based on some assumptions about the coefficient for the pupil teacher ratio over the planning period 1985-1990.

The Third Five-Year Development Plan (1980-85) set goals to reduce the pupil-teacher ratio to 42:1 Calculations for teacher requirements are made under this option. Difficulties may be encountered, however, in reducing the pupil teacher ratio to this level, since a falling pupil-teacher ratio automatically results in rising costs per student. In view of this, a second option shall be adopted and this is based on the assumption that the actual ratio for 1981 (i.e. 47:1) is maintained.

The enrolment levels are divided by the alternative pupil-teacher ratios (i.e. 42 and 47) to obtain the corresponding number of teachers. This calculation follows from the definition of the pupil teacher ratio (PTR):

$$PTR = \frac{\text{Enrolments } (E_t)}{\text{Number of Teachers } (T_t)}$$

thus, $T_t = \frac{Et}{PTR}$

For any year, under option 1,

$$T_t = \frac{Et}{42}$$

and under option 2,

$$T_t = \frac{Et}{47}$$

TABLE 5.8. TEACHER REQUIREMENTS

1985 - 1990

	Enrolments(Et) (thousands)	Number of Teachers Required (Tt) Option 1	Option 2
1985	274	6523	5829
1986	280	6667	5957
1987	286	6870	6085
1988	292	6952	6213
1989	299	7119	6361
1990	306	7286	6510

Table 5.8 shows an upward rising trend in the number of teachers required in primary schools. The figures can also be expressed as additions to the teaching force necessary each year; this should more directly reflect changes in demand for teachers. To do so, account shall be taken of losses from the teaching force which also need replacement. The Education Sector survey (1982) estimates an attrition rate of 5% per annum in the teaching force.

TABLE 5.9 REPLACEMENT REQUIREMENTS AND ADDITIONS TO STOCKS

(option 1)

	Enrolment (thousands)	Teacher Requirements	Replacement	Additions to existing stocks
1985	274	6523	319	142
1986	280	6667	326	144
1987	286	6810	333	143
1988	292	6952	340	142
1989	299	7119	348	167
1990	306	7286	355	167

(OPTION 2)

1985	274	5829	285	127
1986	280	5957	291	128
1987	286	6085	298	128
1988	292	6213	304	128
1989	299	6361	311	148
1990	306	6510	318	149

The sum of the last two columns in table 5.9 gives requirements for newly trained teachers every year to replace losses and meet additional requirements dictated by enrolment growth. A summary of these demand figures is presented in table 5.10 below.

TABLE 5.10 DEMAND FOR NEWLY TRAINED TEACHERS

(1985 - 1990)

	OPTION 1	OPTION 2
1985	461	412
1986	470	419
1987	476	426
1988	482	432
1989	515	459
1990	522	467
TOTAL:	2926	2615

THE SUPPLY OF TEACHERS

The Education Sector Survey (1982) projects the annual output from educational institutions from 1980 to 2000. According to these projections, output from primary teacher training institutions would not charge; i.e. 250 graduates in 1985 through to 1990. This figure shall be used as a rough estimate of the annual available supply of teachers. Comparing the supply to the demand figures in table 5.10, the difference is as follows:

TABLE 5.11 DEMAND AND SUPPLY OF TEACHERS

(1985 - 1990)

	1985	1986	1987	1988	1989	1990
Demand for Teachers (DD) Option 1	461	470	476	482	515	522
Option 2	412	419	426	432	459	467
Supply of Teachers (S)	250	250	250	250	250	250
Exess Demand (S-DD) Option 1	-211	-220	-226	-232	-265	-272
Option 2	-162	-169	-176	-182	-209	-217

Demand and supply imbalances calculated in table 5.11 (rows 4 and 5) indicate that for the two scenarios of the pupil teacher ratio, there will be a shortage of teachers for primary schools over the period 1985 - 1990. Consequently, a pupil teacher ratio of either 42:1 or 47:1 is not a feasible target.

5.3. CONCLUDING REMARKS

This study is primarily concerned with the future evolution of primary school student flows in Lesotho. The growth in enrolment is shown to reflect an increase in the demand for primary education. This demand is eventually transformed into the need for the government to supply the necessary inputs. From the point of view of the findings, the most critical among such inputs is teachers. It is useful at this stage to assess government policy in this regard.

The government of Lesotho has demonstrated, overtime, the need to employ more teachers in response to swelling enrolments in primary schools. But this policy may have failed in one respect as the quality of teachers has shown some defects in terms of the necessary qualifications. Our study confirms the harmful effects of meeting shortages of teachers by the use of unqualified teachers; this is reflected in some amount of deterioration notably in the low promotion rate and the correspo-nding high drop-out and failure rates. The objective of the government to increase the number of qualified teachers must, therefore, be vigorously pursued in order to reverse the trends likely to occur over the planning horizon.

The study reveals a high responsiveness of the promotion rate

to qualified teachers; the relevant elasticity is 20.2[9] If all the 7,286 teachers required by our estimates for option 1[10] are to be qualified, this necessitates a growth of around 11% per annum in the number of qualified teachers from the 1981 level of 3,688.[11] If option 2 scenario were adopted, i.e. maintaining the 1981 pupil-teacher ratio of 47:1, this would require a growth rate of qualified teachers around 8.5% per annum. The budgetary requirements to finance experts to train the teachers, create the necessary infrastructure, and provide fellowships for qualified teachers would be immense under such circumstances. This kind of programme may not be attainable over the short term. It would necessarily require some long term planning, programming and budgeting.

One way of increasing enrolment in teacher training college is for the government to mount a nation-wide campaign to attract potential trainees. Particularly, high school graduates should be given some incentives and encouraged to apply. These graduates, a large percentage of whom do not enter university or other higher educational institutions, often swell up the unemployment problem. Fee-free education, subsidized boarding and lodging, improved curricula at the training colleges are some of the incentives that can attract potential qualified candidates among these graduates.

Even though according to our calculations, enrolment will continue to grow in the future, achievement of universal primary education does not appear to be possible. A larger number of children will remain out of school for such a reason as dropping out. An increasing supply of qualified teachers as our study reveals, will reduce the failure rate and perhaps also reduce the drop-out rate. We noted, however, that withdrawal from schools is not always due to academic reasons, but a consequence of the need for some children to assist female parents in production. It may be concluded from this finding that as long as this demand arises, there will always be children who, for reasons beyond their academic abilities, will remain out of school. Even though the government may not be able to do much about this, the problem should nevertheless not be ignored, but must continue to occupy the attention of the authorities so that some improvement can be found.

9. See chapter 4, equation 3 of table 4.3
10. See chapter 5, table 5.8.
11. See Statistical Annex, table 5.

APPENDIX 1.

STATISTICAL ANNEXES.

(10 Statistical Tables)

TABLE 1 POPULATION, NATIONAL INCOME

YEAR	POPULATION (total,midyear,thousands)	GNP at constant (1970) market prices. (millions maloti)	PER CAPITA GNP at Constant (1970) market prices. (maloti)
1960	869.0	35.3	40.6
1961	885.0	38.0	42.9
1962	902.0	40.9	45.3
1963	919.0	44.0	48.9
1964	936.0	47.3	50.5
1965	953.0	50.9	53.4
1966	974.0	55.0	56.5
1967	995.0	59.4	59.7
1968	1017.0	64.1	63.0
1969	1039.0	69.3	66.7
1970	1061.0	74.8	70.5
1971	1086.0	71.9	66.2
1972	1111.0	84.5	76.1
1973	1137.0	107.4	94.5
1974	1164.0	119.3	102.5
1975	1192.0	134.0	112.4
1976	1220.0	153.0	125.7
1977	1249.0	170.5	136.5
1978	1278.0	182.6	142.9
1979	1309.0	177.4	135.5
1980	1341.0	185.0	138.0
1981	1372.0	200.6	146.2
1982			

SOURCE: WORLD TABLES, WORLD BANK, 1982.

TABLE 2[1]

ENROLMENT, TOTAL AND BYGRADE (Thousands)

ENROLMENT DISTRIBUTION BY GRADE[2]

YEAR	TOTAL	I	II	III	IV	V	VI	VII	VIII
1960	136.1	42.1	26.1	24.7	16.1	13.9	9.7	4.6	2.9
1961	140.2								
1962	144.5								
1963	148.4								
1964	153.3								
1965	158.0	49.0	27.3	26.5	17.9	15.3	12.3	5.7	4.0
1966	162.8								
1967	167.7								
1968	172.8								
1969	178.0								
1970	183.4								
1971	188.6								
1972	194.0	46.6	34.9	33.0	25.2	23.3	17.5	13.6	
1973	199.6	49.9	35.9	31.9	25.9	22.0	18.0	16.0	
1974	205.3	55.4	37.0	33.0	25.0	20.5	16.4	16.4	
1975	211.2	48.6	38.0	35.9	27.6	23.2	19.0	16.9	
1976	217.2	49.9	41.3	36.9	30.4	23.9	19.5	17.4	
1977	223.4	55.9	40.2	35.7	29.0	24.6	17.9	17.9	
1978	230.0	57.5	43.7	36.8	29.9	25.3	20.7	18.4	
1979	236.3	59.1	44.9	37.8	30.7	25.9	21.3	18.9	
1980	243.1	63.2	43.8	38.9	26.7	31.6	21.9	19.4	
1981	251.1	67.8	45.2	37.7	30.1	27.6	22.6	20.1	
1982	259.4								

1. SOURCE: CSR-E-46, UNESCO 1983
2. estimated using information on the percentage distribution of enrolment by grade; UNESCO Statistical Year books (1960 - 1984).

TABLE 3

GROSS ENROLMENT RATIOS[1] 1960-1980

YEAR	GROSS ENROLMENT RATIO(%)
1960	97.0
1961	97.4
1962	97.9
1963	98.3
1964	98.7
1965	99.2
1966	99.6
1967	100.0
1968	100.5
1969	101.0
1970	101.4
1971	101.7
1972	101.9
1973	102.2
1974	102.4
1975	102.7
1976	103.0
1977	103.2
1978	103.5
1979	103.7
1980	104.0

TABLE 4

POPULATION 6-12 YEARS (thousands).

YEAR	POPULATION
1980	140.3
1961	143.9
1962	147.6
1963	151.0
1964	155.3
1965	159.3
1966	163.5
1967	167.7
1968	171.9
1969	176.2
1970	180.9
1971	185.4
1972	190.4
1973	195.3
1974	200.5
1975	205.6
1976	210.9
1977	216.5
1978	222.2
1979	227.9
1980	233.8

SOURCE: C & R -E-46, UNESCO, 1983

1. Defined as total enrolment, regardless of age divided by the population which (according to national regulations) should be enrolled in Primary School. Total enrolment(table 1) / Official school-age population (table 4).

TABLE 5. NUMBER OF SCHOOLS, TEACHERS AND RECURRENT EXPENDITURE

YEAR	NUMBER OF SCHOOLS[1]		NUMBER OF TEACHERS[1]			CURRENT EXPENDITURE ON PRIMARY EDUCATION (Million Maloti) 3
	TOTAL	OFFERING FULL COURSE	TOTAL[2]	UNQUALIFIED	QUALIFIED	
1960	(1029)		(2522)			
1961						
1962						
1963						
1964	(1060)		(2671)			
1965						
1966	(1078)		(2943)			
1967	(1077)		(3065)			
1968						
1969						
1970	(1350)		(3964)			1.216
1971						1.134
1972	1085	328	3936	1317	2619	1.41
1973	1085	378	3951	1128	2823	1.755
1974	1081	378	4139	1215	2924	2.163
1975	1080	378	4228	1220	2948	3.231
1976	1078	416	4235	1260	2975	3.532
1977	1074	414	4304	1330	2974	4.852
1978	1080	410	4421	1500	2921	4.895
1979	1080	476	4782	1695	3087	5.441
1980	1074	561	5097	1855	3242	7.729
1981	1085	603	5350	1662	3688	10.002

SOURCE: 1. EDUCATION STATISTICS - 1981. BOS. MASERU, 1982

2. Figures in Brackets obtained from UNESCO STATISTICAL YEAR BOOKS.

3. EDUCATION SECTOR SURVEY, Maseru, 1982.

TABLE 6 STUDENT OUTFLOW (thousands)

RELATIONSHIP Et = Pt + Ft + Dt

GRADE		1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
I	Et	46.6	49.9	55.4	48.6	49.9	55.9	57.5	59.1	63.2	67.8
	Pt	31.4	40.9	39.8	37.0	34.2	35.9	36.5	34.3	35.7	
	Ft	10.6	3.4	4.1	4.9	9.7	10.9	12.0	16.1	18.3	
	Dt	4.6	5.5	11.5	6.8	6.5	9.1	9.0	8.7	9.2	
II	Et	34.9	35.9	37.0	38.0	41.3	40.2	43.7	44.9	43.8	45.2
	Pt	26.9	33.6	32.4	30.9	31.9	31.0	32.6	31.6	30.9	
	Ft	6.5	1.6	1.7	2.7	5.9	6.4	7.3	10.1	10.8	
	Dt	1.5	0.5	2.9	4.5	3.6	2.8	3.9	3.2	2.1	
III	Et	33.0	31.9	33.0	35.9	36.9	35.7	36.8	37.8	38.9	37.7
	Pt	22.5	27.5	27.6	28.3	26.1	25.5	26.0	25.7	26.7	
	Ft	6.5	1.7	1.5	2.4	4.9	5.5	6.1	8.0	8.9	
	Dt	3.9	2.8	3.9	5.3	5.9	4.7	4.7	4.1	3.3	
IV	Et	25.2	25.9	25.0	27.6	30.4	29.0	29.0	30.7	26.7	30.1
	Pt	18.5	23.6	21.3	22.0	22.0	21.4	22.2	22.5	19.8	
	Ft	5.7	1.1	0.9	1.4	3.5	3.7	4.1	5.2	4.9	
	Dt	2.2	1.2	2.9	4.3	4.9	3.9	3.5	2.5	2.0	
V	Et	23.3	22.0	20.5	23.2	23.9	24.6	25.3	25.9	31.6	27.6
	Pt	15.4	18.5	16.6	18.1	16.9	17.5	18.5	18.3	23.0	
	Ft	4.4	1.1	0.7	1.2	2.8	2.7	3.1	4.3	5.8	
	Dt	3.5	2.3	3.2	3.9	4.2	4.4	3.6	3.2	2.7	
VI	Et	17.5	18.0	16.4	19.0	19.5	17.9	20.7	21.3	21.9	22.6
	Pt	12.1	15.4	13.6	14.6	13.7	13.2	15.6	15.7	16.8	
	Ft	2.7	0.7	0.6	0.9	1.9	1.9	2.4	3.0	3.4	
	Dt	2.6	1.7	2.2	3.7	4.0	2.8	2.8	2.6	1.7	
VII	Et	13.6	16.0	16.4	17.9	17.4	17.9	18.4	18.9	19.4	20.1
	Pt	7.8	10.0	10.1	12.0	9.8	11.0	11.6	12.3	12.6	
	Ft	3.4	2.9	3.3	3.1	4.3	3.9	4.2	4.4	4.7	
	Dt	2.4	3.2	3.0	2.8	3.3	3.0	2.5	2.2	2.1	

SOURCE: Computed

Et = enrolment
Pt = promotions
Ft = failures
Dt = Drop-outs

TABLE 7 - STUDENT INFLOWS (Thousands)

RELATIONSHIP Et = Rt + At

GRADE		1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
I	Et	46.6	49.9	55.4	48.6	49.9	55.9	57.5	59.1	63.2	67.8	
	Rt	8.7	10.6	3.4	4.1	4.9	9.1	10.9	12.0	16.1	18.3	. 27
	At	37.9	39.3	52.0	44.5	45.0	46.6	47.1	47.1	47.1	49.5	. 79
II	Et	34.9	35.9	37.0	38.0	41.3	40.2	43.7	44.9	43.8	45.2	
	Rt	6.1	7.4	1.8	1.7	2.7	5.9	6.4	7.3	10.1	10.8	. 24
	At	28.8	28.5	35.2	36.3	38.6	34.3	37.3	37.6	33.7	34.4	. 76
III	Et	33.0	31.9	33.0	35.9	36.9	35.7	36.8	37.8	38.9	37.7	
	Rt	6.4	5.4	1.7	1.5	2.4	4.9	5.5	4.0	8.0	8.9	. 24
	At	26.6	26.5	31.3	34.4	37.8	30.8	31.3	37.6	30.9	28.8	. 76
IV	Et	25.2	25.9	25.0	27.6	30.4	29.0	29.9	30.7	26.7	30.1	
	Rt	4.4	4.8	1.1	0.9	1.4	3.5	3.7	4.1	5.2	4.9	. 16
	At	20.8	21.1	24.9	26.7	29.0	25.5	26.2	26.6	21.5	25.2	. 84
V	Et	23.3	22.0	20.5	23.2	23.9	24.6	25.3	25.9	31.6	27.6	
	Rt	4.9	4.4	1.1	0.7	1.2	2.8	2.7	3.4	4.4	5.8	. 21
	At	18.4	17.6	19.4	22.5	22.7	21.8	22.6	22.5	27.2	21.2	. 79
VI	Et	17.5	18.0	16.4	19.0	19.5	17.9	20.7	21.3	21.9	22.6	
	Rt	4.3	2.7	0.7	0.6	1.9	1.9	2.4	2.4	3.0	3.4	. 15
	At	13.2	15.3	15.7	18.4	18.6	16.0	18.8	18.9	18.9	19.2	. 85
VII	Et	13.6	16.0	16.4	16.9	17.4	17.9	18.4	18.9	19.4	20.1	
	Rt	2.4	3.4	2.9	3.3	3.0	4.3	3.9	4.3	4.4	4.7	. 23
	At	11.2	12.6	13.5	13.6	14.4	13.6	14.5	14.6	15.0	15.4	. 77

SOURCE: Computed

TABLE 8 - TRANSITION RATES (%)

GRADE		1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
I	nt	.81	.79	.94	.92	.90	.84	.81	.80	.75	.73
	rl	.91	.21	.06	.08	.10	.16	.09	.20	.25	.30
	pt	.673	.82	.718	.761	.686	.642	.635	.58	.565	
	ft	.228	.069	.074	.10	.183	.195	.209	.272	.289	
	dt	.099	.111	.208	.139	.131	.163	.156	.148	.146	
II	at	.83	.79	.95	.96	.94	.85	.85	.84	.77	.76
	rt	.17	.21	.05	.05	.06	.15	.15	.16	.23	.24
	pt	.771	.936	.875	.812	.772	.770	.745	.705	.706	
	ft	.187	.049	.046	.07	.142	.160	.166	.224	.246	
	dt	.042	.015	.079	.118	.086	.070	.089	.071	.048	
III	at	.76	.83	.95	.96	.93	.86	.85	.99	.79	.76
	rt	.24	.17	.05	.04	.07	.14	.15	.01	.21	.24
	pt	.683	.861	.835	.787	.707	.713	.706	.680	.686	
	ft	.198	.052	.046	.066	.132	.155	.167	.211	.228	
	dt	.119	.087	.119	.147	.161	.132	.127	.109	.086	
IV	at	.83	.81	.99	.97	.96	.89	.88	.87	.81	.84
	rt	.17	.19	.01	.03	.04	.11	.12	.13	.19	.16
	pt	.734	.913	.852	.796	.725	.737	.744	.733	.740	
	ft	.163	.041	.034	.050	.115	.127	.138	.171	.185	
	dt	.103	.046	.114	.154	.160	.136	.118	.096	.075	
V	at	.79	.80	.95	.97	.95	.89	.89	.87	.86	.79
	rt	.21	.20	.05	.03	.05	.11	.11	.13	.14	.21
	pt	.66	.842	.81	.779	.706	.71	.733	.707	.729	
	ft	.190	.052	.035	.052	.117	.110	.124	.169	.185	
	dt	.150	.106	.155	.169	.171	.180	.143	.124	.086	
VI	at	.75	.85	.95	.97	.95	.89	.91	.89	.86	.85
	rt	.25	.15	.05	.03	.05	.11	.09	.11	.14	.15
	ft	.697	.858	.83	.766	.701	.74	.752	.736	.765	
	ft	.153	.041	.034	.047	.096	.106	.115	.142	.156	
	dt	.150	.093	.136	.193	.203	.154	.133	.122	.079	
VII	at	.82	.79	.82	.80	.83	.76	.79	.77	.77	.77
	rt	.18	.21	.18	.20	.17	.24	.21	.23	.23	.23
	pt	.574	.619	.616	.671	.561	.613	.631	653	.651	
	ft	.250	.184	.199	.175	.247	.22	.231	.231	.240	
	dt	.176	.197	.185	.154	.192	.167	.138	.116	.109	

$nt = \frac{Nt}{Et}$

$rl = \frac{Rl}{Et}$

$[nt + rl = 1]$

$pt = \frac{Pt}{Et}$

$ft = \frac{Ft}{Et}$

$pt + dt + ft = 1$

$at = \frac{At}{Et}$

$dt = \frac{Dt}{Et}$

$rt = \frac{Rt}{Et}$

$rt + at = 1$

where:
at = admission rat
rt = repetition rat
pt = promotion rate
ft = failure rate
dt = drop-out rate

Source; Computed.

TABLE 9

PROMOTION, DROP-OUT AND FAILURE RATES IN PRIMARY SCHOOLS BY SEX AND GRADE

1972 - 1980

(%)

(i) Promotion Rate (Boys only) / Promotion Rate (Girls only)

Year	GRADE/STANDARD I	II	III	IV	V	VI	VII	I	II	III	IV	V	VI	VII
1972	64.2	72.7	65.2	70.1	66.3	70.7	...	69.7	80.4	70.4	75.3	65.8	69.0	...
1973	79.6	88.6	81.2	85.0	81.5	84.2	...	83.9	97.0	89.4	95.2	85.5	86.7	...
1974	68.8	84.1	77.8	81.6	78.7	83.6	...	74.1	90.1	87.3	87.4	82.2	82.7	...
1975	71.7	76.8	72.7	73.4	74.5	75.6	...	80.0	84.3	83.0	83.3	79.8	76.2	...
1976	65.5	70.7	62.9	64.6	66.0	67.1	...	71.3	82.4	75.9	77.4	73.0	71.6	...
1977	61.1	69.8	63.9	66.2	65.7	72.5	...	66.8	83.0	76.4	78.0	73.7	74.4	...
1978	60.8	68.9	64.5	68.4	68.8	74.0	...	65.8	79.1	74.9	77.9	72.9	74.3	...
1979	55.5	65.7	60.8	65.8	66.5	72.3	...	60.3	74.5	73.3	77.9	72.9	74.3	...
1980	54.3	65.9	61.5	69.7	69.7	76.0	...	58.6	74.5	73.9	76.8	74.4	76.7	...

(ii) Failure Rate (Boys only) / Failure Rate (Girls only)

Year	GRADE/STANDARD I	II	III	IV	V	VI	VII	I	II	III	IV	V	VI	VII
1972	22.8	19.4	19.9	16.9	17.7	15.0	22.7	22.7	18.1	19.7	15.9	19.6	15.4	27.0
1973	6.8	4.9	4.8	3.9	4.7	4.4	14.9	7.0	4.9	5.5	4.2	5.4	5.3	20.3
1974	7.4	4.7	4.8	3.7	3.6	3.4	18.4	7.4	4.5	4.4	3.2	3.4	3.4	20.6
1975	10.0	7.3	6.6	5.7	5.4	4.8	16.2	10.0	6.9	6.6	4.6	5.0	4.6	18.1
1976	18.1	14.9	13.9	12.3	12.7	9.6	21.3	18.5	13.6	12.7	11.0	11.2	9.7	26.5
1977	19.1	16.9	16.2	14.1	12.1	10.9	20.2	19.8	15.3	15.0	12.0	10.4	10.5	22.9
1978	20.8	17.6	18.1	14.8	13.0	12.0	19.4	20.9	15.7	15.7	13.2	12.1	11.3	23.7
1979	28.3	23.7	23.1	18.7	18.3	14.7	21.7	26.3	21.2	19.6	16.0	16.2	14.0	23.8
1980	29.6	27.1	24.8	20.3	20.1	15.6	22.2	28.2	22.6	21.2	17.3	17.7	15.6	24.9

(iii) Drop-Out Rate (Boys only) / Drop-out (Girls only)

Year	GRADE/STANDARD I	II	III	IV	V	VI	VII	I	II	III	IV	V	VI	VII
1972	13.0	7.9	14.9	13.0	15.8	14.3	...	7.6	1.5	9.9	8.8	14.6	15.[illegible]	...
1973	13.6	6.9	14.0	11.1	13.8	11.4	...	9.1	1.9	5.1	0.6	9.1	8.0	...
1974	23.8	11.2	17.4	14.7	17.7	13.0	...	18.5	5.4	8.3	9.4	14.4	13.0	...
1975	18.3	15.9	20.7	20.9	20.1	19.6	...	10.0	8.8	10.4	12.1	15.2	19.2	...
1976	16.4	14.4	23.2	23.1	21.3	23.3	...	10.2	4.0	11.4	11.6	15.8	18.7	...
1977	19.8	13.3	19.9	19.7	22.2	16.6	...	13.4	1.7	8.6	10.0	15.9	14.8	...
1978	18.4	13.5	17.4	16.8	18.2	14.0	...	13.3	5.2	9.4	8.9	12.4	13.1	...
1979	16.2	10.6	16.1	15.5	15.2	13.0	...	13.4	4.3	7.1	6.1	10.9	11.7	...
1980	16.1	7.0	13.7	10.0	10.2	8.4	...	13.3	2.9	4.9	5.9	7.7	7.7	...

SOURCE: EDUCATION STATISTICS - 1981
BOS. MASERU, 1982

TABLE 10

THE DROP-OUT FAILURE, PROMOTION AND REPETITION RATES (%) (BOTH SEXES)

YEAR	Drop-Out Rate	Failure Rate	Promotion Rate	Repetition Rate
1972	8.8	20.5	74.7	9
1973	8.9	6.2	84.9	19
1974	15.2	6.2	78.6	6
1975	15.1	7.8	77.1	6
1976	21.1	14.9	71.1	4
1977	14.7	15.7	69.6	14
1978	12.3	17.0	70.7	15
1979	10.6	21.6	67.8	16
1980	8.6	23.4	68.0	23
1981				

SOURCE: Computed from tables 6 and 7.

BIBLIOGRAPHY

1. ANDERSON, C.A. and BOWMAN, M.J., Education and Economic Development, London, 1965.

2. BRAZER, H.E. and DAVID, M., Social and Economic Determinants of the Demand for Education, in S.J. MUSHKIN (Ed.), Economics of Higher Education, Washington, 1962.

3. CORREA, H., Quantitative Methods of Educational Planning, UNESCO,1961.

4. _____ Quantitative Methods of Educational Planning, UNESCO, 1969.

5. _____ The Economics of Human Resources, The Hague, 1962.

6. _____ The Economics of Human Resources, The Hague, 1967.

7. CHESSWAS, J.D., Methodologies of Educational Planning for Developing Countries, UNESCO, 1969.

8. DURSTINE, R.M. 'In Quest of Useful Models for Educational Systems, in Socio-Economic Planning, Volume 2, 1969.

9. DENISON, E.F., "Measuring the contribution of Education to Economic Growth," in E.A. ROBINSON and J.VAIZEY(eds.) The Economics of Education, Macmillan, 1969.

10. EDDING, F. "Expenditure on Education: Statistics and Comments," in E.A. ROBINSON and J. VAIZEY (eds.), The Economics of Education, Macmillan, 1969.

11. GALPER, H. and DUNN, R.M., "A short-Run Demand Function for Higher Education in the United States," in Journal of Political Economy, Volume 77, 1969.

12. HARBISON, F. and MYERS C.A., Education, Manpower and Economic Growth, New York, 1964.

13. JOLLY, R., Planning Education for African Developmen Nairobi, 1969.

14. MOORTHY, S.K. and THORE, S.O., "Acceleration Theory in Education," in M. BOWMAN et al. (eds.), Readings in Economi of Education, UNESCO, 1968.

15. O.E.C.D., Organisational Problems in Planning Educational Development, Paris, 1966.

16. PANITCHPAKDI, S., Educational Growth in Developing Countries: An Empirical Analysis, Rotterdam, 1973.

17. PAPI, G.U., "General Problems of the Economics of Education," in E.A. ROBINSON (eds.), The Economics of Education, Macmillan, 1969.

and the literature on factors likely to explain changes in student flows. In the same chapter is introduced the student-flow model used in this study: its origins and the extent to which it shall be adapted for Lesotho. (Chapter 4 presents the regression results.)

The estimated relationships are used in chapter 5 to generate enrolment projections and the corresponding teacher requirements. The major findings of the study and conclusions are presented in the last section of the same chapter.
