

SACMEQ Educational Policy Research Series

The SACMEQ II Project in Mauritius:
A Study of the Conditions of Schooling
and the Quality of Education.

Mauritius
Working Report

by

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Foreword

The origins of the Southern and Eastern Africa Consortium for Monitoring Educational Quality (SACMEQ) date back to 1991, the year when several Ministries of Education in Eastern and Southern Africa started working closely with UNESCO's International Institute for Educational Planning (IIEP) on the implementation of integrated educational policy research and training programmes.

In 1995 these Ministries of Education formalized their collaboration by establishing a network that is widely known as SACMEQ. Fifteen Ministries are now members of SACMEQ: Botswana, Kenya, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania (Mainland), Tanzania (Zanzibar), Uganda, Zambia, and Zimbabwe.

SACMEQ is registered in Zimbabwe as an Independent Intergovernmental Non-profit Organization. Its Coordination Centre is located within UNESCO's Harare Cluster Office and is managed by a Director who works under the guidance of a six-member Managing Committee. SACMEQ's Assembly of Ministers meets every two years and provides overall policy guidance concerning SACMEQ's mission and programmes.

The focus of SACMEQ's capacity building programmes has been on building the capacity of Ministries of Education to monitor and evaluate the quality of their basic education systems. SACMEQ employs innovative training approaches that include a combination of face-to-face training, hands-on experience, computer laboratory sessions, and on-line support via the Internet. SACMEQ also encourages a unique form of collaboration among SACMEQ National Research Coordinators in the fifteen member countries as they share and exchange skills and successful experiences.

In September 2004 SACMEQ was awarded the Comenius Medal for its innovative approaches to delivering cross-national educational research and training programmes.

This report provides a description of the results of the SACMEQ II Project - SACMEQ's second major educational policy research project. The results of the SACMEQ I Project were reported in seven national reports for Kenya, Malawi, Mauritius, Namibia, Zambia, Zimbabwe, and Tanzania (Zanzibar).

The SACMEQ Data Archive was launched in June 2004. This valuable information resource contains data, data collection instruments, manuals, technical papers, and related publications from both SACMEQ projects. Copies of the archive may be obtained by completing the registration form on the SACMEQ Website (www.sacmeq.org).

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Chapter 1

Setting the Scene

The Republic of Mauritius is an archipelago in the Indian Ocean, to the east of Madagascar. Mauritius is the main island, ringed to the north by a number of smaller islands, namely Rodrigues, Agalega and St Brandon. The island of Mauritius is located in the southwest part of the Indian Ocean at latitude 20° South and longitude 57.5° east, some 800 km from the southeast coast of Madagascar. With a land area of 1,860 square kilometres and a population estimated at 1.3 million inhabitants, Mauritius has a high population density officially estimated, in 2000, at more than 585 people per square kilometre. The last census (1990) showed 1,031,526 people were living on the island of Mauritius, 34,292 in Rodrigues and 170 on the outer islands. The annual population growth rate during the 1990s remained at about 1.1 percent, with most people living in the strip of towns between the capital Port Louis and the district of Plaine Wilhems.

Mauritius is a multiracial, multilingual and pluricultural country with people whose ancestors came as settlers from Europe, Africa and Asia. The largest ethnic group is that of Hindu Indo-Mauritians, which constitutes 52 percent of the population, Muslim Indo-Mauritians account for 10 percent of the population, Sino-Mauritians five percent and the general population (Europeans and African Creoles) make up around 33 percent of the population.

The history of Mauritius effectively began when Dutch settlers occupied the island from 1598 to 1710. The French took possession of the island in the early eighteenth century and brought labour from Madagascar and Africa. The early years of French occupation were devoted to settlement and development of the island as an agricultural colony. The education system that prevailed at that time was highly academic and was geared mostly towards producing the few administrators the island needed.

In 1810 the British conquered the island and it became a British colony. With the abolition of slavery in 1834 labour was brought from India to work in the fields. During the British period major political, economic and social changes took place. This had a significant bearing on the educational system. The country became independent in 1968, and a republic in 1992. Mauritius has a constitution based on the British model. Power lies with the elected National Assembly, the supreme law-making body of the island.

The official language is English, but French is widely spoken and the common *lingua franca* is Creole. Different ethnic groups speak Hindi, Urdu, Arabic, Tamil, Telegu, Marathi or Mandarin. To keep the cultural diversity of the island, the ancestral languages are taught in primary and secondary schools alongside English and French.

Remarkable progress was achieved in the post-independence period with the diversification of the country's economic base and establishment of a strong welfare state. The economy experienced significant restructuring at each critical stage of its development. Starting from an agricultural economy dominated by sugar cane production, the country had become a major exporter of manufactured goods by 1990. An Export Processing Zone was created at that time, and since then efforts have been made to diversify the industrial base, which comprised mostly textiles and clothing. Rapid growth in tourism and financial services has further transformed the economy, turning it into a four-pillar economy. Mauritius is regarded as an upper-middle income economy. The GDP per capita in 2001 was US\$3,787. The government's policy is to continue to move the economy into higher-value service sectors. In the early years of the twenty-first century Mauritius has been developing its IT sector. The key economic indicators are shown in table 1.0.

The country has a network of about 2,000 kilometres of tarred roads. The transport system is relatively good, allowing teachers to travel easily to and from school daily. School supplies are also easily transported. The health care system is well developed.

Today Mauritius has one of the highest literacy rates among developing countries at more than 95 percent for those under 30 years of age.

Table 1.0: Key economic indicators

	Fiscal years					
	1981-85	1986-90	1991-95	1996-00	2000-01	2001-02
GDP growth (% per year)	5.1	6.9	5.0	5.4	7.2	5.3
Per capita income (USD)	1130	2153	3251	3770	3800	3830
Literacy rate	77	80	82	85	85	85
Life expectancy	68	70	70	71	71	71
Infant mortality	25.6	20.4	20	19	17	17
Total revenue	22.4	23.3	20.1	19.6	18.3	18.3
Total expenditure	29.7	25.1	23.9	24.8	24.8	24.8
Overall fiscal balance	-7.4	-1.8	-3.6	-5.0	-6.6	-6.5
GDP in USD (million)	1118	2227	3527	4326	4500	4537

Development of education

The provision of education in Mauritius is governed by the Education Act of 1957. The Government funds the bulk of primary, secondary and tertiary education. Private operators, who charge fees, are also allowed from pre-primary to vocational and tertiary levels.

In Mauritius there is a high social demand for education and great strides have been made in the provision of universal primary education. In the 1940s the government embarked on a policy of expanding primary education by making it free, a commitment that paid off.. Many schools were set up in the rural areas in line with the government's policy of democratisation of education. Enrolment of students in primary schools increased and almost universal enrolment was attained at primary level. This explains the high literacy rate – one of the factors contributing to Mauritius' economic success.

In 1977 free education was introduced at secondary and tertiary levels. In 1991 education became compulsory from the age of 5 to 12 years. . Higher education began its development with the setting up of a national university in 1965, an Institute of Education in 1973 and the School for Oriental and Cultural Studies based at the Mahatma Gandhi

Institute, in 1976. A Tertiary Education Commission was set up to plan, coordinate and monitor education at the tertiary level.

The educational structure

Mauritius has a 6+5+2 education structure; that is, six years of free and compulsory primary schooling leading to the Certificate of Primary Education, followed by five years of secondary education leading to the Cambridge School Certificate and a further two years of higher secondary ending with the Cambridge Higher School Certificate. This structure is shown in Figure1.0.

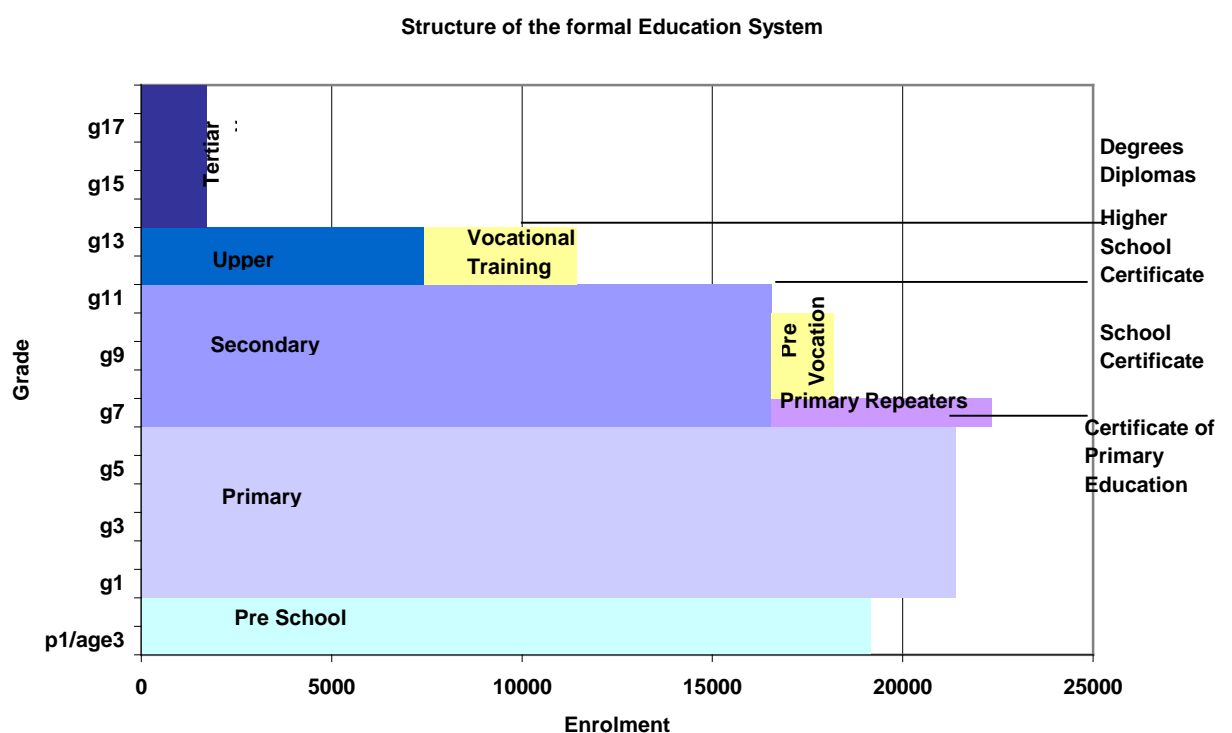


Figure 1.0: Structure of the formal education system in Mauritius in the year-2000.

Examinations at the end of each level regulate the flow of students to the next level. Pupils sit for national and international examinations at the end of each cycle. At the primary level, promotion from one grade to the next is automatic until Grade 6, when pupils sit for the Certificate of Primary Education (CPE). This examination has a dual

purpose: that of certification, and selection for entry to a secondary school. Pupils who are unsuccessful at the CPE examination and under 12 years of age may stay on at primary school for a further year in order to take the examination a second time. Those who are not successful after a second attempt are provided with an alternative type of education under the Pre-vocational Education Scheme. This consists of a three-year course.

Trends in aggregate enrolments

About 292,123 students were enrolled at various levels of education in Mauritius during 2001, of whom 13.1 percent attended pre-primary, 46 percent were in primary and 33 percent attended general secondary. Trends in enrolment are shown in table 1.1. The growth rate of students in the primary schools is expected to continue declining over the next decade, as a result of projected reduction in fertility. However, the secondary school age population is expected to increase in the next decade, but would eventually start declining (World Bank report, 2000).

Table 1.1: Trends in enrolment by level and type of education

Year	Pre-primary	Primary	General secondary	Prevocational
1997	42209	127109	93839	-
1998	42279	130504	94364	4641
1999	41711	133489	95187	4489
2000	39332	135237	95448	4695
2001	38340	134085	97647	4919
2002	36982	132432	99687	5966
2003	38620	129616	103847	7326

The percentage of primary school children in the year 2000 was about 11 percent of the total population and was projected to decline to 9.1 percent of total population by the year 2010. The number of secondary school children was expected to grow at an annual rate of 0.6 percent, reaching 141,000 by the year 2010.

Table 1.2: Population projection for 2000-2010

Age group	Projected population		Rate of growth
	Year 2000	Year 2010	
Age 5-10	129 000	119 000	- 0.8 %
Percentage of total	10.9	9.1	
Age 11-17	133 000	141 000	0.6 %
Percentage of total	11.3	11.3	
Total population	1 176 991	1 247 788	0.6 %

The projected decline in primary school-age population and subsequently in primary cycle enrolments, as seen in Table 1.2, provides options of either maintaining the current level of expenditure to consolidate and implement measures for quality improvement, thereby improving delivery of educational services, or decreasing the current share of primary education and shifting it to secondary education.

Private – public participation

The private sector plays an important role in the provision of education in Mauritius: it accounts for 83 percent of pre-primary enrolment, 22 percent of primary, 73 percent of general secondary, and 47 percent of prevocational education (Table 1.3).

Table 1.3: Share of private in total enrolments

Year	Pre-primary	Primary	General secondary	Prevocational
1997	82%	22%	78%	-
1998	83%	22%	75%	-
1999	85%	22%	75%	-
2000	82%	22%	74%	-
2001	83%	22%	73%	47%
2002	82%	24%	73%	57%
2003	83%	24%	70%	63%

Preschool education

Pre-primary education has a long existence in Mauritius and targets children in the 3-5 years' age range. Attendance is not compulsory at this level. Since 1996 the government has granted a monthly subsidy of Rs 200 to all children aged 4-5 years. The sector is 83 percent private where the fees charged by schools can range from Rs 200 to Rs 2000 or more per child. The government, through the Preschool Trust Fund, manages the

remaining 17 percent, which consists of pre-primary units attached to primary schools. The Preschool Trust Fund also acts as a regulatory body for private pre-primary schools. The Gross Enrolment Ratio in pre-primary schools, which was stagnant at 78 percent in 1993, increased to 96 percent in 2001 (Table 1.4). Some children do not attend pre-primary schools for various reasons, including health problems, extreme poverty or lack of parental interest.

In 2001 the number of 3-5 year olds enrolled in pre-primary schools was 38,340. The Gross Enrolment Ratio was 96 percent. Gender disparity in enrolment at this level is non-existent. The majority of preschool children attended the 904 privately run pre-primary schools. About 67 percent of government and aided primary schools held pre-primary classes on their premises. There were 3,184 staff members of pre-primary schools, of whom 2,441 were teachers and 743 were non-teaching staff. Regular in-service staff development programmes are organized for preschool teachers. Pre-service courses are also provided for prospective preschool heads.

Primary education

Primary education is universal with a gender parity index of 1.0. The Gross Enrolment Ratio decreased from 108 percent in 1993 to 103 percent in 2001 as a result of a decline in repetition rate in Standard VI. The overall Net Enrolment Ratio has been fairly constant at 98 percent for the last several years. In 2001, there were 130,464 pupils enrolled in 293 schools. Of these 293 schools 225 were run by government. Religious authorities receive grants from the government to defray teachers' salaries and operating costs for the running of 53 schools. The remaining 15 schools are private and fee-paying. All primary schools are coeducational. Primary schools are scattered all over the island and although there is a higher concentration in urban areas than in rural areas, there is, on average, one primary school in every village, thus ensuring easy access for all children to a primary school. The principle of 'catchment area' is often used in order to manage the high demand for admission to certain schools.

The primary school day lasts six hours and the school year has 185 days divided into 3 terms. All schools are equipped with basic facilities such as water, toilets, electricity, and telephone facilities. To improve communication with schools, fax facilities have also been made available to all government and aided schools since 2002. The Ministry of Education's policy is to provide all classrooms with blackboards and an adequate number of chairs and tables, to ensure that each pupil has a sitting and writing place. In primary schools a class teacher is responsible for teaching all subjects except the ancestral languages, which are taught by specialist teachers. In 2001, about 5,000 teachers taught in the primary schools and the overall pupil-teacher ratio was 34:1, with class sizes ranging from about 15 to about 50. All teachers follow a compulsory training course before commencing their career. In-service courses are also organized for teachers.

Secondary education

In the year 2001 the Gross Enrolment Ratio at secondary level (mainstream) was 63 percent, with an enrolment of just over 97,000 students. Secondary schools were mostly managed by the private sector and catered for 75 percent of the secondary school population. But in the coming years this picture is likely to change with the massive construction of state secondary schools. In 2001 there were 136 secondary schools, of which 34 were state schools, 98 were aided private and 4 were non-aided private. The pupil-teacher ratio was 18:1.

Table 1.4: Evolution of Gross Enrolment Ratio at pre-primary, primary and secondary levels

	1993	1995	1997	1999	2001	2002	2003
Pre-primary GER	78	78	96	-	96	95	99
Primary GER	108	107	106	105	103	103	102
Secondary GER	50	51	54	58	63	64	66

Internal efficiency**Table 1.5: Cohort analysis for students entering Standard I in 1998**

	Year	No of students	% of original	Pass rate
Pupils in Std I	1988	21 240	100	-
Cohort reaching Std VI (CPE)	1993	20 870	98	61 %
Cohort reaching Form I	1994	15 640	74	
Cohort reaching Form V (SC)	1998	12 750	40	77 %
Cohort reaching Form VI (HSC)	2000	5 740	27	72 %

It can be seen from Table 1.5 that a significant drop in enrolment occurred at the transition from primary to secondary school when nearly one fourth of the cohort in Standard VI did not enter Form I. By the end of the general secondary cycle (Form V) another 14 percent of the cohort had either dropped out or stayed behind to repeat. The highest reduction in the 1988 cohort was seen at the transition into and participation in Form VI colleges.

The efficiency of the primary and secondary sub-sectors was calculated using the data on dropout and repetition rates. The efficiency was 0.85 in the primary cycle and 0.34 in the secondary cycle (table 1.6).

Table 1.6: Student flow efficiency in 2001

Primary cycle	Efficiency due to repetition and drop-out	
	Actual	Theoretical
Public schools	0.85	0.82
Private schools	0.84	0.81
Total schools	0.85	0.85
Secondary cycle		
Public schools	NA	NA
Private schools	NA	NA
Total schools	0.34	0.27

Survival rates and grade enrolment rates

At the primary level (Standard VI), due to automatic promotion, the survival rate was nearly 100 percent; at the secondary level (Form V) it was about 35 percent and at the upper secondary level (Upper Six) it was only about 15 percent (Table 1.7). This gave a school life expectancy of 8.9 years for boys and 9.6 years for girls.

The transition rate from primary to secondary in 2001 was about 73 percent (including about 10 percent joining the prevocational stream); from secondary to upper secondary it was about 40 percent.

Table 1.7: Cohort survival rates

	Survival rates			Grade specific enrolment rates for a cohort		Transition rates	
	Grades	Boys	Girls	Boys	Girls	Boys	Girls
Primary	1	1.00	1.00	1.03	1.04		
	2	1.00	1.00	1.03	1.04		
	3	1.00	1.00	1.03	1.04		
	4	1.00	1.00	1.03	1.04		
	5	1.00	1.00	1.03	1.04		
	6	1.00	1.00	1.02	1.03		
Secondary	7	0.65	0.75	0.67	0.78	65%	75%
	8	0.57	0.66	0.59	0.68		
	9	0.51	0.61	0.52	0.63		
	10	0.43	0.53	0.45	0.56		
	11	0.31	0.39	0.31	0.41		
Form 6	12	0.11	0.16	0.12	0.17	38%	42%
	13	0.10	0.14	0.10	0.15		
School life expectancy (implied)				8.9	9.6		

Wastage

The primary cycle was characterised by a very low drop-out of less than one percent but a significant repetition rate estimated at about 20 percent in Standard VI. In comparison to primary, repetition and drop-outs were much higher in the secondary cycle (Table 1.8)

Table 1.8 : Secondary enrolment and share of repeaters by grade in year 2001

Grade	Enrolment	% Repeaters
Form I	17 300	3 %
Form II	15 955	5 %
Form III	15 700	8 %
Form IV	16 810	19 %
Form V	17 010	29 %
Form VI	7 100	5 %
Form VII	7 765	21 %
All Grades	97 650	13 %

Administrative structure

The provision of education is the responsibility of the government. The Ministry of Education determines the policy and requirements for the different levels of education. The country is divided into 5 education regions or zones. Each region has a Regional Education Office and a Director of Education heads each office. The Ministry of Education, through the Regional Directorates, administers the government schools, having responsibility for the school buildings as well the supply of teachers, equipment and materials to the schools. Each directorate has a corps of inspectors responsible for the coordination of educational activities in schools. Inspectors are selected from practicing head teachers and during their probationary period they follow a part-time in-service training course leading to the award of an Advanced Certificate in Educational Management. Subject to their successful completion of this course they are confirmed as primary school inspectors and become eligible for promotion in the grade. Their work is monitored by the Director of National Inspectorate through weekly meetings and a pre-set reporting mechanism. This provides a mixed mode of on-the-job and face-to-face training for inspectors.

The Private Secondary School Authority is responsible for the administration of government grants to private secondary schools. At the higher education level, different councils and boards, set up by the government and the Tertiary Education Commission coordinate the activities of the different tertiary institutions.

Educational finance

The education sector receives funding mainly from government sources. For the financial year 2000-2001 the recurrent expenditure on education was Rs 3.9 billion. This represented 14.9% of national expenditure and 4% of GDP (table 1.9). Just over 33 percent of this budget was allocated to primary, nearly 39 percent to secondary education and about 13 percent went to higher education. This pattern of budget allocation showed little variation in the period 1997 to 2001 (see Table 1.10).

Free education in Mauritius means that pupils do not pay tuition fees. However there are other indirect costs such as books, stationery, transport, uniforms, and examination fees that must be met by the students and their families. For very poor families these costs can be too high. Funding assistance is provided to some of these needy families by the Ministry of Social Security. Since 1989 the government has provided free textbooks to all primary school children. At the secondary and tertiary levels students purchase their own requisites.

Private tuition

The private costs of education in Mauritius were estimated at more than 10 percent of the government's recurrent budget on education (ADEA & CODESRIA, 2001) Private tuition is the main way by which households participate in the financing of education in Mauritius. Private tuition is defined as the extra coaching that students opt for outside normal school hours and for which they have to pay. Mauritians place a high premium on education. This, coupled with the competitive educational environment, causes about 90 percent of parents to have recourse to private tuition for their children.

Table 1.9: Public expenditure on education

	1997 - 1998	1998 - 1999	1999 - 2000	2000 - 2001	2001 - 2002	2002 - 2003	2003 - 2004
Total expenditure as % of GDP	4.2	4.0	4.1	3.8	3.7	NA	NA
Total expenditure on education as % of total government expenditure	17.9	18.8	17.1	16.2	15.3	14.4	14.7

Table 1.10: Expenditure on education. Percentage of government budget allocated to various levels and aspects of education

Level of education	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004 (Estimates)
Pre-primary (3-5 years)	1.9	1.6	1.5	1.4	1.5	1.5	1.5
Primary	33.9	34.1	35.4	33.2	31.8	32.0	30.3
Secondary	42.4	39.1	38.4	38.7	39.9	40.5	41.9
Technical & vocational	1.8	2.0	1.9	1.9	1.9	1.9	1.7
Post -secondary	11.6	12.4	12.6	13.3	16.2	15.1	13.9
Other	8.4	10.8	10.2	11.5	8.7	9.0	10.7

Policy reforms in education

The different national development plans since independence indicate very similar objectives, laying stress on:

- Equality of opportunity;
- A diversified curriculum;
- Promotion of science, technical and vocational education; and
- Improvement of the quality of education.

A White Paper on education was developed in 1984 with the aim of re-orienting the education system to make it more efficient and adaptable to the changing needs of the country. In the White Paper, concern was also expressed about the large number of failures at CPE. It proposed improving literacy and numeracy through the reform of the primary school curriculum, and a review of examinations and teaching methodology.

A Master Plan was prepared in 1991 following a major policy review. While the aim was to improve the quality and relevance of education at all levels, the Master Plan focused on a number of key concerns with the objectives of:

- (a) Broadening access and equity;
- (b) Improving the quality of education;
- (c) Strengthening management of the education system;

The selection process of the CPE examination was seen as a major dysfunction of the education system. The CPE examination ranked pupils for the purpose of admission to a secondary school. This became necessary because of the limited number of seats in secondary schools. In turn, this placed tremendous pressure on both students and their parents. Several policy reviews addressed this issue and attempts were made to restructure the education system so as to eliminate the ranking. This kind of reform needed time to take effect because mindsets needed to be changed if consensus was to be obtained.

The educational policy review (May 2001) proposed (i) the replacement of CPE ranking by a new assessment mechanism based on a grading system and (ii) the regionalisation of admission to junior secondary level as from January 2003. The new mode of admission was intended to curb the intense competition and yet preserve an element of healthy competition conducive to academic achievement.

The policy review further advocated the introduction of free schooling for eleven years. For this project to be realized the secondary schools have (since 2003) been divided into:

- (i) Form V schools
- (ii) Form VI colleges where admission is restricted by available streams.

This decision was accompanied by a massive increase in secondary schools; the total number of state secondary institutions was expected to increase from 41 to 90 by the year 2006. The strategy requires a massive investment in education.

Prevocational schools

Students who fail the CPE examinations after a second attempt are admitted to a section reserved for prevocational classes in the junior secondary schools where a specially designed curriculum is in place. It has been accompanied by a special pedagogical approach, which involves continuous assessment and remedial teaching in order to ensure that pupils achieve a minimum competency level.

Curriculum reform

After independence the primary school curriculum was diversified. The examinable subjects were English, French, mathematics, environmental studies and an ancestral language. A major reform brought the ‘mauritianisation’ of the primary and lower secondary curriculum to make the content more related to the Mauritian context and responsive to the needs of the learners and the nation.

The reforms presented in the policy review of May 2001 also addressed curriculum matters, and several projects were identified to start in January 2003. A Literacy and Numeracy Strategy was designed to address the illiteracy and innumeracy arising from automatic promotion. The teaching of IT was also introduced in all primary schools, in line with the national goal of developing the country into a cyber island. The curriculum has since been broadened to reinforce the teaching of health, physical education and citizenship. For upper primary pupils (i.e. Standards 4-6) the multidisciplinary subject area of environmental studies has been split into separate areas of science, history and geography.

The Ministry has set up several task forces to further develop reform policies. They comprised groups of experts from several sectors and institutions. The Task Force on Primary Education Curriculum was responsible for identifying and translating national educational needs and aspirations into curriculum specifications. Subject panels comprising lecturers of the Mauritius Institute of Education (MIE) and practicing teachers developed and produced curriculum materials, including learning materials, teacher guidelines, and audio-visual programmes. The National Centre for Curriculum Research and Development (NCCRD) and the MIE, together with the subject panel, had responsibility to test out the new materials, to obtain feedback from teachers and inspectors, to fine-tuning the new materials before publication and to organize training courses for teachers. The primary school sub-inspectorate also played an important role in providing feedback on the relevance of these teaching materials and in monitoring the teaching –learning process in the classroom.

Within the area of curriculum development, there are two projects worthy of further explanation.

(a) School Information and Communications Technology Project (SICTP)

The main objectives of this project are to teach ICT as a subject in its own right and to promote the use of ICT as a supporting and enabling tool for education and for e-learning across the whole spectrum of primary schooling. The ultimate objective is to provide each child, at the end of primary schooling, with a ‘computer driving licence’

ICT was introduced as a school subject in all primary schools of the Republic in January 2003. It is being taught by a cohort of 328 ICT teachers who have completed a full-time pre-service training programme and who have acquired a ‘Proficiency in ICT education for primary schools’ certificate. A continuous in-service training programme in computer proficiency for all primary teachers is underway. This ambitious project involves the construction of a new IT laboratory in each school.

(b) ZEP Schools

To upgrade the level of low-performing schools, the Ministry initiated the Project Schools (1994), later known as Special Support Schools (1997) and, in 2002, strategically redefined as *Zones d’Education Prioritaires* (ZEP literally translated as priority zones for education).

The ZEP project aims at integrating the school with its environment, so as to link the school directly with the overall development of the locality and the community. The philosophy of the *Zones d’Education Prioritaires* is based on the premise that positive reinforcement is required to create favourable learning conditions for children living in the less developed areas.

Schools are classified as ZEP – or not – according to their performance at the end of the primary cycle examination. A ZEP school is one that has had a consistent CPE pass rate

of less than 40 percent over the preceding three years. Also included in this project are previous special support schools whose average CPE pass rate over the last five years lies between 40 and 45 per cent.

The ZEP strategy provides for the active participation of all stakeholders in the process of improving achievement levels in: schools: parents, community, business organizations, non-governmental organizations (NGOs).

This strategy focuses on the following five pillars:

- More equitable reallocation of human resources to schools
- Improvement of infrastructure and school environment;
- Formulation and implementation of a School Development Plan;
- Strengthening community links; and
- Developing an improved management structure for the ZEP project.

Human Resources

The provision of highly motivated staff, both teaching and non-teaching, to every ZEP school is recognized as being critical for the project's success. Therefore the Ministry adopted the following recommendations for ZEP schools:

- The posting of staff to ZEP schools would be voluntary and based on a selection exercise.
- Head teachers would be empowered to select and build up his/her teaching and non-teaching staff.
- Performance related reward schemes would be introduced in ZEP schools.
- Remedial specialist teachers would be appointed to service ZEP schools. These teachers would act as Special Education Needs Coordinators to conduct early screening and detection of children with learning difficulties and provide necessary support, coaching and counselling to those referred by the class teacher.
- School psychologists and Physical Education Instructors would be attached to ZEP schools.

- Social facilitators would form part of the ZEP unit with a view to providing the link between the School Development Plan and the Community Development Program that is under the responsibility of the Trust Fund for Social Integration of Vulnerable groups.

2.2 Infrastructure and Environmental Improvement

A second critical success factor in the implementation of the ZEP project is the creation of a favourable school environment for learning to take place. Accordingly, it was decided a survey would be carried out to identify the areas for intervention. The directive stipulated:

- A one-off upgrading programme in all ZEP schools would be implemented and would include renovation/construction of new toilets.
- Maintenance and upkeep of sanitation and hygiene facilities would be contracted out.
- School premises would be landscaped, tarred and fenced. - Classroom furniture would be upgraded or renewed.
- Schools would be provided with a teachers' staff-room, reading rooms/specialist rooms, sports and playground facilities.
- IT labs would be constructed.

The school development plan

Yet another critical factor in successful implementation of the ZEP project is the school development plan. It was agreed that a collaborative and participatory approach should be adopted by the school head in identifying the strengths and weaknesses of the school with a view to chalking out a plan of action. The school plan was expected to:

- Be in accordance with the objectives of the ZEP project;
- Spell out implementation activities in a time sequenced framework;
- Identify performance objectives;

- Identify key performance indicators;
- Introduce a literacy and numeracy programme; and
- Introduce the use of IT across the curriculum.

Strengthening community links

The ZEP strategy requires the active participation of all stakeholders -- parents, community, business organizations and non-governmental organizations. Parental interest is a major contributing factor to improving learning and thus to raising the performance level of schools. In cases where learners come from home environments with severe social, economic and psychological problems, the ZEP strategy proposed that the services of parent mediators should be sought. It also recommended that other on-going programmes of positive reinforcement under the aegis of the Trust Fund for social integration of vulnerable groups should be linked to the ZEP project.

The structure of the report

This chapter sets the scene by describing briefly the structure of the Mauritius school system, trends in access and participation, how school administration and finance work, and the policy reforms in education.

Chapter 2 introduces the educational policy research project of the Southern Africa Consortium for Monitoring Educational Quality (SACMEQ). It explains the initial planning, development of instrumentation, sampling methods, field work operations, the data entry and data cleaning, scoring of tests, and analysis and writing of reports.

The next five chapters have been generated from five clusters of general policy concerns. Chapter 3 presents data on pupils' characteristics and their learning environment.

Chapter 4 presents data on teachers' characteristics and their views on teaching, classroom resources, professional support and job satisfaction.

School heads' characteristics, their views on educational infrastructure, the organization and operation of schools, and problems with pupils and staff, are outlined in Chapter 5.

Chapter 6 analyses the extent to which educational inputs (in terms of human and material resources) have been allocated in an equitable fashion among schools within regions.

Chapter 7 examines the levels and variation in achievement of Standard 6 pupils in reading and mathematics, both for Mauritius and for all the other SACMEQ countries.

Chapter 8 looks at the differences between those schools judged as effective, and those that are not. Each of the chapters 3 to 7 has a concluding section that offers a series of policy suggestions arising from the data and research results.

Finally, in Chapter 9, an 'agenda for action' is presented. This summarises the policy suggestions, classifying them in terms of low, medium or high cost and indicates whether they involve short- or long-term action.

Chapter 2

The Conduct of the SACMEQ II Project

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Introduction

There has been a worldwide growth of interest in the application of large-scale scientific survey research techniques to the study of issues related to improving the quality of education. Many developed countries are now applying these techniques to undertake systematic studies of the conditions of schooling and of student achievement levels. In developing countries there have been increased efforts to provide training for educational planners in the technical skills that are required to conduct these kinds of policy research studies.

In 1991 the International Institute for Educational Planning (IIEP) and a number of Ministries of Education in Southern and Eastern Africa began to work together in order to address training and research needs in this area. The focus for this work was on establishing long-term strategies for building the capacity of educational planners to monitor and evaluate the quality of their basic education systems.

In 1993 a proposal was prepared by a group of educational planners (Moyo et al., 1993) that aimed to extend the reach and formal status of this work by creating an association known as the Southern Africa Consortium for Monitoring Educational Quality (SACMEQ). The proposal received a positive reaction from Ministries of Education, and in 1995 SACMEQ was officially launched with the generous assistance of the Governments of Italy and the Netherlands. Fifteen Ministries of Education are now members of SACMEQ: Botswana, Kenya, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania (Mainland), Tanzania (Zanzibar), Uganda, Zambia, and Zimbabwe. The IIEP was invited to become a member of the consortium in 1997.

SACMEQ's main mission is to undertake integrated research and training activities that will:

(a) expand opportunities for educational planners to gain the technical skills required to monitor and evaluate the general conditions of schooling and the quality of basic education,

and (b) generate information that can be used by decision-makers to plan improvements in their education systems.

The SACMEQ consortium has enabled educational researchers and planners to develop important technical skills related to the design and implementation of large-scale data collections, and to the application of a wide variety of computer-based techniques for the preparation, management, analysis, and reporting of educational planning data. SACMEQ's research programme has resulted in the preparation of research reports that have contributed towards the conduct of informed debates concerned with: equity in the allocation of human and material resources among regions and schools, and literacy and numeracy levels for important sub-groups of pupils defined by gender, socio-economic background, and geographic location.

The first two educational policy research projects undertaken by SACMEQ (widely known as "SACMEQ I" and "SACMEQ II") were designed to provide detailed information that could be used to guide planning decisions aimed at improving the quality of education in primary school systems. During 1995-1998 seven Ministries of Education participated in the SACMEQ I Project and the results of this research were reported in a series of national policy reports (Kulpoo, 1998; Machingaidze et al, 1998; Milner et al, 2001; Nassor and Ali Mohammed, 1998; Nkamba and Kanyika, 1998; Nzomo et al, 2001; Voigts, 1998). Technical information about the sampling, instrument construction, and field work for the SACMEQ I Project may be found in these reports.

The SACMEQ II Project commenced in 1998 and has involved 15 Ministries of Education. Moving from the SACMEQ I Project (covering around 1100 schools and 20,000 pupils) to the SACMEQ II Project (covering around 2500 schools and 45,000 pupils) resulted in a major increase in the scale and complexity of SACMEQ's research and training programmes.

The main purpose of this chapter was to provide a detailed account of the key technical procedures that were involved in the design and implementation of the SACMEQ II Project.

The chapter has been presented in three parts.

Part A: "The Fourteen Main Phases of the SACMEQ II Project"

This part of the chapter has listed the fourteen main phases of the SACMEQ II Project. These commenced with pre-planning and initial planning, and then moved through instrument construction, trial testing, sampling, main data collection, data preparation, data merging and scoring, data analyses, and concluded with the writing of national policy reports.

Part B: “Sample Design Procedures for the SACMEQ Project”

This part of the chapter has provided a detailed explanation of the procedures involved in the selection of samples of schools and pupils for the SACMEQ II Project. The sampling procedures were evaluated through an examination of response rates and the calculation of design effects, effective sample sizes, and standard errors of sampling.

Part C: “The Construction of Tests for the SACMEQ II Project”

This part of the chapter has presented the main steps that were involved in test construction for the SACMEQ II Project, and then has examined the advanced scaling procedures that were used to score the tests and to describe pupil and teacher literacy levels according to increasing “levels of competence”. Eight levels of competence were developed for the literacy and numeracy measures, and these represented a departure from “traditional approaches” (based on means and mastery percentages) to describing and comparing the educational performance of groups.

Part A: The Fourteen Main Phases of the SACMEQ II Project

Phase 1: “Pre-Planning” for the SACMEQ II Project

One of the distinguishing features of the SACMEQ Projects has been that their research results have been widely used for policy and planning purposes. This successful outcome has occurred because SACMEQ research reports were designed from the very beginning to address the high-priority policy concerns of decision-makers in Ministries of Education. **This was achieved via a three-step “pre-planning” process (described below for the SACMEQ II Project) that was completed before work commenced on the overall design and implementation of the research.**

Step 1: The SACMEQ II Project commenced by engaging senior decision-makers in Ministries of Education (for example, Ministers, Permanent Secretaries, Heads of Divisions, and Regional Directors) in discussions about high-priority policy concerns associated with their education systems. The SACMEQ National Research Coordinators (NRCs) structured these discussions by asking the decision-makers to identify the main areas where the Ministry needed to review, refine, change, monitor, and/or develop policies that had relevance for the general conditions of schooling and the quality of education. The decision-makers’ responses were then analyzed in order to identify groups of **”General Policy Concerns”** that were subsequently used as a foundation for guiding the research design.

For example, decision-makers in most SACMEQ countries were concerned about policy issues linked with: (a) equity in the gender balance and home background profiles of Grade 6 pupils, and (b) the magnitude of the age range of Grade 6 pupils and its implications for teaching and learning. The NRCs summarized these and similar concerns in the form of a single question: “What are the personal characteristics (for example, age and gender) and home background characteristics (for example, books at home and parent education) of Grade 6 pupils that might have implications for monitoring equity, and/or that might impact upon teaching and learning?” This question represented the first General Policy Concern developed by the NRCs for the SACMEQ II Project.

A total of 20 General Policy Concerns were prepared for the SACMEQ II Project. These have been grouped in Figure 2.1 under five “themes” concerned with: pupils’ characteristics and

learning environments, teachers' characteristics and viewpoints, school heads' characteristics and viewpoints, equity in the allocation of human and material resources, and the reading and mathematics achievement levels of pupils and their teachers.

Step 2: The NRCs linked each of the 20 SACMEQ II General Policy Concerns to a set of “**Specific Research Questions**” that provided precise guidance concerning the information that was required in order to respond to the General Policy Concerns. That is, the Specific Research Questions were used to decide exactly what should be included in, or excluded from, the data collection instruments.

General Policy Concern 10: What was the availability of classroom furniture (for example, sitting/writing places, teacher table, teacher chair, and bookshelves) and classroom equipment (for example, chalkboard, dictionary, maps, book corner, and teacher guides) in Grade 6 classrooms?

General Policy Concern 11: What professional support (in terms of education resource centres, inspections, advisory visits, and school head inputs) was given to Grade 6 teachers?

General Policy Concern 12: What factors had most impact upon teacher job satisfaction?

**Theme C: School Heads' Characteristics and their Viewpoints
on Educational Infrastructure, the Organization and Operation of Schools,
and Problems with Pupils and Staff**

General Policy Concern 13: What were the personal characteristics of school heads (for example, age and gender)?

General Policy Concern 14: What were the professional characteristics of school heads (in terms of academic, professional, experience, and specialized training)?

General Policy Concern 15: What were the school heads' viewpoints on general school infrastructure (for example, electrical and other equipment, water, and basic sanitation) and the condition of school buildings?

General Policy Concern 16: What were the school heads' viewpoints on (a) daily activities (for example, teaching, school-community relations, and monitoring pupil progress), (b) organizational policies (for example school magazine, open days, and formal debates), (c) inspections, (d) community input, (e) problems with pupils and staff (for example, pupil lateness, teacher absenteeism, and lost days of school)?

**Theme D: Equity in the Allocation of Human and Material Resources
Among Regions and Among Schools Within Regions**

General Policy Concern 17: Have human resources (for example, qualified and experienced teachers and school heads) been allocated in an equitable fashion among regions and among schools within regions?

Figure 2.1 (Ctd): SACMEQ II: General Policy Concerns of Ministry Decision-Makers

General Policy Concern 18: Have material resources (for example, classroom teaching materials and school facilities) been allocated in an equitable fashion among regions and among schools within regions?

**Theme E: The Reading and Mathematics Achievement Levels
of Pupils and Their Teachers**

General Policy Concern 19: What were the levels (according to descriptive levels of competence) and variations (among schools and regions) in the achievement levels of Grade 6 pupils and their teachers in reading and mathematics – for my country and for all other SACMEQ countries?

General Policy Concern 20: What were the reading and mathematics achievement levels of important sub-groups of Grade 6 pupils and their teachers (for example, pupils and teachers of different genders, socio-economic levels, and locations)?

Figure 2.1 (Ctd): SACMEQ II: General Policy Concerns of Ministry Decision-Makers

For example, three of the Specific Research Questions linked to the first General Policy Concern were: “What is the age distribution of pupils?” “What is the gender distribution of pupils” and “What is the level of parents’ education?” These questions implied that the pupil questionnaire should collect information about pupil age, gender, and the educational level of pupils’ parents.

Step 3: The NRCs used the SACMEQ II Specific Research Questions to design “**Dummy Tables**” – which were blank (or empty) data tabulation templates that employed the variables and information layouts that would be used in the final SACMEQ II national policy reports.

The main advantages of producing Dummy Tables were that this process forced the NRCs to (a) check that the data collection instruments covered all information needs, (b) ensure close linkages between the specific research questions and the questions on the data collection instruments, (c) reach agreement on the selection of variables and the types of data analyses to be applied, and (c) design and justify the data tabulation templates to be used in reporting the data analyses.

In Figure 2.2 an example of moving through the above three steps has been presented – starting with the first General Policy Concern developed for the SACMEQ II Project, then moving to a set of Specific Research Questions, and finally arriving at a suitable Dummy Table. The table shown in Figure 2.2 only covers information related to the six Specific Research Questions that have been presented in bold type. A different table was developed for the other six Specific Research Questions.

General Policy Concern 1

What were the personal characteristics (for example, age and gender) and home background characteristics (for example, parent education, regularity of meals, home language, etc.) of Grade 6 pupils that might have implications for monitoring equity, and/or that might impact upon teaching and learning?

**Specific Research Questions**

What was the age distribution of pupils?

What was the gender distribution of pupils?

How regularly did pupils eat meals?

How far did pupils travel to school?

What percentage of pupils spoke the language of the test at home?

What was the level of the parents' education?

What support did pupils get at home regarding homework and interest in schoolwork?

Did teachers ask parents to sign that homework assignments have been completed?

Where did pupils live during school days, i.e., when school is on?

How many books were there in pupils' homes?

What access to reading materials and electronic media did pupils have in their homes?

What was the socio-economic status of pupils' parents?

**First Dummy Table for General Policy Concern 1**

Dummy Table : Grade 6 Pupil Age, Gender, and Home Background Characteristics

Region	Age (months)		Gender (pupils)		Books at Home (books)		Possessions at Home (index)		Meals (index)		Parent Education (index)	
	Mean	SE	%	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Region 1												
Region 2												
Region 3												
Region 4												
Region 5												
Region 6												
Region 7												
Region 8												
Nation												

Variable Names for SACMEQ I = XPAGEMON, XPSEX, XPBOOKSH, XPTOTP, XPREGME, XPFAMOED.
Variable Names for SACMEQ II = ZPAGEMON, ZPSEX, ZPBOOKSH, ZPTOTP, ZPREGME, ZPFAMOED.

Figure 2.2: An Example of Transforming a General Policy Question into
Twelve Specific Research Questions and One (of Two) Dummy Tables

The upper section of the Dummy Table in Figure 2.2 was used to name the variables (for example Age, Gender, Books at Home, etc.) and also to provide guidance as to whether the variables were to be based on a single question in the data collection instruments (which was the case for the first three variables), or whether the variables were to be derived from two or more questions to form an “index” (which was the case for the second three variables). In this example, the information in the Dummy Table has been broken down by administrative regions - which was a popular approach because most SACMEQ school systems operated on the basis of some form of regional administration.

Each variable in the table was linked with “statistics” and “units”. For example, the Age variable was expressed as a mean and the units were months, the Gender variable was expressed as a percentage and the units were pupils, and Books in the Home was expressed as a mean and the units were books. The statistics for the final three variables were “indices” and therefore the units depended on the procedures used in their construction. Some indices, such as “Possessions at Home”, were based on a simple count generated from a checklist of possessions, and therefore this index referred to the counted number of possessions. However, other indices (in other tables) were constructed using principal components analysis, and this resulted in “standardized” units of measurement.

The computer-stored names of each variable were listed in the base of each Dummy Table. It was important to include these so that the person responsible for data processing knew exactly which variables to use in the analyses. In the Dummy Table presented in Figure 2.2 the computer-stored variable names have been given for both SACMEQ Projects – indicating that this table needed to be completed twice for the countries that participated in both projects.

In Appendix A the SACMEQ II General Policy Concerns have been listed in association with Specific Research Questions. This list has also included the sequence numbers of the Dummy Tables prepared using either SACMEQ I or SACMEQ II data, and the relevant question numbers in the data collection instruments that were used to collect the required information. The 20 General Policy Concerns were associated with 75 Specific Research Questions, and these were linked to around 150 Dummy Tables.

For example, the first Specific Research Question for the first General Policy Concern was: “What was the age distribution of pupils? From the first page of Appendix A it may be seen

that this information was to be entered into Dummy Tables 3.1(a) and 3.1(b) for the SACMEQ I and SACMEQ II Projects, respectively. The source question for this information was the second question on the pupil questionnaires for both the SACMEQ I Project (SI: P2) and the SACMEQ II Project (SII: P2).

Phase 2: Moving From Pre-Planning to Instrument Construction

A meeting of National Research Coordinators (NRCs) was held in Durban, South Africa during April 1998 in order to use the Dummy Tables produced during the “Pre-Planning” phase of the SACMEQ II Project to guide the construction of data collection instruments. Three experienced South African teachers also attended the meeting in order to participate in sessions concerned with an analysis of the structure, sequence, and content of curricula across countries. The first major decision taken at the meeting was that the data collection for the SACMEQ II Project should be expanded beyond the SACMEQ I Project to include an assessment of both reading and mathematics performance levels for both pupils and teachers.

The meeting operated as two parallel working groups that focussed on test and questionnaire construction. The test construction group completed a comprehensive analysis of the official curricula, school syllabi, textbooks, and examinations that were used in SACMEQ countries. This analysis was used to construct test blueprints as frameworks for writing a large pool of test items for pupils and teachers in both reading and mathematics. The questionnaire group concentrated on using the Dummy Tables to guide the construction of questionnaires for pupils, teachers, and school heads.

By the end of the meeting the following data collection instruments had been drafted: Pupil Reading and Mathematics Tests, Pupil Questionnaire, Teacher Reading and Mathematics Tests, Teacher Questionnaire, and School Head Questionnaire. In addition draft manuals had been prepared for the NRCs and data collectors.

During the meeting the NRCs were invited to make a presentation to a UNESCO meeting of African Ministers of Education that was being held in Durban at the same time. They also attended a special meeting for SACMEQ Ministers of Education in order to discuss the policy impact of SACMEQ research, and to launch the first five SACMEQ I national reports. These events enabled Ministers to gain a much clearer picture of how the SACMEQ research

programme could be used for the preparation of policies aimed at improving the quality of education.

After the Durban meeting, work proceeded at the IIEP and within the SACMEQ countries to finalize the overall SACMEQ II Project research design and to complete “try-out” versions of data collection instruments and manuals. These materials were circulated among the NRCs via the Internet and, on the basis of further NRC inputs, edited and then re-circulated for further comment and improvement.

Phase 3: “Small-Scale Trial Testing” of Instruments and Manuals

When the first drafts of the SACMEQ II data collection instruments and manuals had been completed it was agreed to hold a combined planning and training meeting for NRCs and their Deputies in Harare, Zimbabwe during February 1999.

The main purpose of the meeting was to undertake a small-scale “try-out” of the draft data collection materials. To achieve this, a field test was conducted in 10 schools located in a variety of social and geographic situations within a 50 km radius of Harare. The data gathered during this exercise were entered into computers by the NRCs, and then analysed to provide information about the quality of the data collection instruments and the field procedures. On the basis of these analyses further improvements were made to the tests, questionnaires, and manuals.

An important benefit of the “try-out” exercise was that the NRCs were required to act as both data collectors and data entry staff. This gave them first hand experience of the complexities of these two tasks, and also provided them with a sound foundation for training their own research teams for the trial testing and the main data collection.

In the period March to May 1999, the data collection materials tested at the Harare meeting were shared and edited via the Internet. IIEP staff coordinated this "virtual workgroup" approach and arranged inputs from external consultants.

Phase 4: “Large-Scale Trial Testing” of Instruments and Manuals

The “large-scale trial test” versions of the SACMEQ II data collection instruments were distributed in electronic format via the Internet in June 1999. Paper copies were also distributed to several countries because some NRCs had experienced difficulties with downloading documents in a manner that preserved the integrity of graphical figures and special fonts contained within the tests and questionnaires.

Each NRC was provided with specialized software that could be used to transform the trial test data into computer-readable files. In Lesotho, Malawi, and Swaziland difficulties were experienced in loading and using this software on Ministry of Education computers. An IIEP staff member visited these countries during September 1999 in order to reconfigure the software so that it would operate properly on the available computers. During these visits the NRCs and other Ministry staff were provided with training in computer-based data entry and data cleaning techniques.

The trial testing of the data collection instruments and manuals took place during August-September 1999. More than 400 schools and 8000 pupils were involved in the data collection. During September 1999 these data were entered into computers under the supervision of NRCs and then transmitted via the Internet to the IIEP where they were checked and merged into a single database. At the IIEP a number of validity checks were undertaken on the data, and any errors and/or omissions that emerged were corrected and/or clarified by email communication with the NRCs.

Phase 5: Finalization of Instruments and Manuals for the Main Data Collection

A meeting of SACMEQ II NRCs and their Deputies was held at the IIEP in October 1999 in order to analyze the trial test data. This meeting was held at the same time as the biennial meeting of the SACMEQ Assembly of Ministers, and the NRCs took advantage of this coincidence by presenting a "Policy Forum" for the Ministers.

The meeting concentrated on analyzing the trial test data that had been collected on reading and mathematics performance from pupils and their teachers. The aim was to select the best possible sets of test items for the main data collection by reducing the two forms of the trial tests for pupils and teachers to single forms.

At the close of the meeting another "virtual workgroup" was established in order to use the Internet during the period October 1999 to May 2000 to finalize the preparation of tests, questionnaires, and manuals. The IIEP agreed to prepare final forms of the data collection instruments and to distribute these in "camera-ready" electronic and paper formats that would be suitable for immediate printing.

The preparation of the final forms of the data collection instruments and manuals proved to be a massive task because of the different notations used in different countries. For example, changes were made in order to address the use of: (a) a comma or a full stop for decimals, (b) a comma, a full stop, or a space for "separating" digits in numbers greater than or equal to 1000, (c) different currency units, (d) different nomenclature for grade levels, (e) different methods for expressing dates, and (f) 12 hour or 24 hour clocks for time. Since no two countries used exactly the same conventions for items (a) to (f), it was necessary to prepare a unique set of data collection instruments and manuals for each country.

An extra complexity for several countries at this stage was the need to translate the SACMEQ II tests, questionnaires, and manuals into local languages. Mozambique translated the materials into Portuguese, while Tanzania and Zanzibar translated the materials into Kiswahili. In order to ensure high quality translations for the reading and mathematics tests, each item was translated into the local language and then back translated. The back translations were compared with the original (English) versions of the tests in order to check for omissions, additions, unwanted changes in meaning, or other problems.

Phase 6: Sample Design, Sample Selection, and Sample Evaluation

The sample designs used in the SACMEQ II Project were selected so as to meet the standards set down by the International Association for the Evaluation of Educational Achievement. These standards required that sample estimates of important pupil population parameters should have sampling accuracy that was at least equivalent to a simple random sample of 400 pupils (thereby guaranteeing 95 percent confidence limits for sample means of plus or minus one tenth of a pupil standard deviation unit). Detailed descriptions of the sample design, sample selection, and sample evaluation procedures have been presented in Part B of this chapter.

Phase 7: Preparations for Computer-Based Entry of Data

After the completion of the SACMEQ II data collection instruments and manuals, work commenced on the preparation of data entry structure files for the full data collection. These computer files provided a complete specification of the nature of the data that were to be entered into computers. Separate structure files were prepared for each country as follows: four tests (pupil and teacher reading and mathematics tests), three questionnaires (pupil, teacher, and school head), and two “tracking forms” (used to gather supplementary data about sample schools and sample pupils).

The SACMEQ II structure files were tested extensively throughout August-September 2000 so as to make sure that they contained the correct specifications for linking each variable with specific questionnaire and test items. This process included the specification of valid ranges for each variable so that “wild-codes” (that is, variable values that fall outside realistic ranges) could be intercepted as part of the on-going process of data entry.

Separate sets of structure files had to be prepared for each country – even though the same data collection instruments were employed in all countries. This occurred because each country had its own specific valid code ranges, and because some teacher information used for the identification of subject specialities and classes was country-specific.

The validated structure files and copies of the WINDEM data entry and data cleaning software were sent to NRCs during September 2000. These materials were accompanied by instructions on how to load the software and how to access the structure files. Where problems were encountered, the IIEP provided tutorial support via the Internet. By early October 2000 the NRCs had installed and tested all of these materials.

When the WINDEM software and associated structure files were fully operational, each NRC selected and trained a data entry team. This training was provided “on the job” whereby the data enterers were given completed data collection instruments to enter into computers. After the data enterers had completed data entry for the first 100 pupils their work was checked and discussed during a group meeting so as to clarify all instructions and to ensure that everybody was working carefully and accurately. At regular intervals, similar pauses were made in the data entry work in order to monitor progress and to ensure that standards of work were kept at the highest possible level. If a data enterer submitted poor quality work then that person was given extra training or, in occasional cases, was removed from the data entry team.

Phase 8: Preparations for the Main Data Collection

For the main SACMEQ II data collections each NRC was required to organize at least three days of intensive training for the data collectors. This was conducted for most SACMEQ countries in the period July-September 2000 – just prior to the commencement of the main data collection.

Between 15 and 50 data collectors were trained in most countries. On the first day of training the NRC presented a “simulated” data collection exercise in which he/she acted as a data collector and the trainees took the roles of pupils, teachers, and school heads. The second day involved an intensive study of the Manual for Data Collectors. This document set down, in sequential order, all of the actions to be taken by the data collector from the time of receiving packages of data collection instruments from the Ministry of Education to the time when the data collector had completed the data collection and was preparing all materials for return. The third day involved a second “simulated” data collection whereby the trainees supervised a full-fledged data collection in several schools that were not involved in the main data collection. The experiences gathered during these exercises were shared and discussed during a later meeting so that all data collectors understood the procedures to be completed within schools.

A special effort was made to ensure that the data collections were conducted according to explicit and fully-scripted steps so that the same verbal instructions were used (for pupils, teachers, and school heads) by the data collectors in all sample schools in all countries for each aspect of the data collection. This was a very important feature of the study because the validity of cross-national comparisons arising from the data analyses depended, in large part, on achieving carefully structured and standardized data collection environments.

Two other important matters related to preparing for the main data collection were to obtain formal permission to visit sample schools, and to manage the printing and packaging of a complete set of data collection instruments for each sample school. The arrangement of permission to visit sample schools was a straightforward procedure because all Ministers had previously approved the implementation of the SACMEQ II Project.

In some cases the NRCs arranged printing through the Government Printing Office and in other cases through private printers. Some of the NRCs had difficulty in finding the resources

required for these tasks and therefore needed to obtain assistance from the IIEP in order to search for supplementary funding. When all instruments were printed, the NRCs conducted a “hand check” of all materials so as to verify that there were no missing pages or misprints or omissions. All work related to the printing and packaging of the data collection instruments was undertaken under strict security arrangements – so that there was no possibility of a “leakage” of information about the content of the pupil and teacher reading and mathematics tests.

The final task for this phase was to have NRCs establish expert committees with the mission of selecting subsets of “essential” pupil reading and mathematics test items that were central to the core curriculum in their country. These subsets of “essential” test items were designated for use at a later stage when the scoring of pupils would be undertaken on both the total test and the essential items (after they had been scaled appropriately using Rasch procedures). This task was completed before the main data collection because there was a need for decisions concerning the selection of essential items to be taken without being influenced by a knowledge of pupil performance on these items. The selection of “essential” reading and mathematics test items for the SACMEQ II Project has been summarized in Appendix B and Appendix C, respectively.

Phase 9: Implementation of the Main Data Collection

The main SACMEQ II data collection occurred for 12 of the 15 SACMEQ Ministries of Education in the period September to December 2000, the Mauritius data collection was completed in July 2001, and the Malawi data collection in September 2002.

The numbers of schools involved in the data collection for each school system ranged from 24 in the Seychelles (where the whole target population of schools and Grade 6 pupils were involved), to 275 in Namibia (where the known magnitude of the coefficient of intraclass correlation and the requirement to gather data in “new” administrative regions added substantially to the required number of schools). The average number of schools per country for the designed samples was around 165.

In smaller countries it was possible to assemble the whole data collection team at the head office of the Ministry of Education and then travel out to sample schools. However, the management of transportation represented a major undertaking for NRCs in larger countries

such as Kenya, Namibia, and Mozambique - where much greater distances had to be travelled, and sample schools were sometimes located in extremely remote and difficult-to-find locations. For these countries, the NRCs enlisted the assistance of Regional and District Education Offices.

Two days of data collection were required for each sample school. On the first day pupils were given the pupil questionnaire and the pupil reading test, and on the second day they were given the mathematics test. The teachers (who completed a questionnaire and one of, or both of, the reading and mathematics tests) and school heads (who completed a questionnaire) were asked to respond on the first day. These arrangements made it possible for the data collectors to check all completed questionnaires (pupil, teacher, and school head) during the evening of the first day and then, if necessary, obtain any missing or incomplete information on the second day.

The data collection for teachers was in three parts: questionnaire, reading test, and mathematics test. Where sample teachers taught both reading and mathematics, they took both tests. Where they taught only one of these subjects, they were given the relevant test.

The manual used by the data collectors contained detailed instructions concerning the random selection of 20 sample pupils and up to 6 sample teachers within schools. The data collectors were given intensive prior training in the strict application of these procedures. It was necessary to do this because the validity of the whole SACMEQ II data collection could have been seriously damaged if “outside influences” had been applied to selecting respondents. A further measure that was applied in order to avoid the inclusion of unknown biases into the data collection was to absolutely forbid the replacement of absent pupils.

The data collectors were provided with a 40-point checklist in order to ensure that they completed all important tasks that were required before, during, and after their visits to schools. Each task was cross-referenced to specific pages of instructions in the data collectors’ manual.

Phase 10: Data Checking, Data Entry, and Data Cleaning

(a) Data Checking and Data Entry

Data preparation commenced soon after the main data collection was completed. The NRCs had to organize the safe return of all materials to the Ministry of Education where the data collection instruments could be checked, entered into computers, and then “cleaned” to remove errors prior to data analysis. The data-checking involved the “hand editing” of data collection instruments by a team of trained staff. They were required to check that: (i) all questionnaires, tests, and forms had arrived back from the sample schools, (ii) the identification numbers on all instruments were complete and accurate, and (iii) certain logical linkages between questions made sense (for example, the two questions to school heads concerning “Do you have a school library?” and “How many books do you have in your school library?”).

The next step was the entry of data into computers using the WINDEM software. A team of 5-10 staff normally undertook this work. In some cases the data were “double entered” in order to monitor accuracy.

The numbers of keystrokes required to enter one copy of each data collection instrument were as follows: pupil questionnaire: 150; pupil reading test: 85; pupil mathematics test: 65; teacher questionnaire: 587; teacher reading test: 51; teacher mathematics test: 43; school head questionnaire: 319; school form: 58; and pupil name form: 51.

This information can be re-expressed to give the total number of keystrokes for the whole body of data for one country by multiplying the above figures by the number of instruments in the final data collection. In the case of Namibia the total number of keystrokes was as follows: pupil questionnaire: 762,600; pupil reading test: 429,080; pupil mathematics test: 328,250; teacher questionnaire: 358,657; teacher reading test: 15,504; teacher mathematics test: 14,061; school head questionnaire: 86,130; school form: 39,150; and pupil name form: 259,284. That is, a total of 2,292,716 keystrokes were required to enter all of the data for Namibia.

An experienced keyboard operator can work at a rate of 25 keystrokes per minute (working from multi-paged questionnaires and stopping occasionally to clarify individual questionnaire entries with the supervisor). Assuming that this kind of work rate could be sustained for, say,

around a maximum of six hours per day, then the whole data entry operation for Namibia was estimated to amount to around 255 person days of data entry work. This implied an estimated five weeks of work for the 10 person data entry team that operated in Namibia.

The Seychelles data collection was much smaller than Namibia's – with an estimated total of only 68 person days of data entry required. However, this implied an estimated seven weeks of work because the Seychelles only had access to a two-person data entry team.

There was a great deal of variation in the delivery dates for the initial versions of the computer-stored SACMEQ II data files. This occurred because of different testing dates and also because of different amounts of time required to complete entry of data into computers. The dates associated with the initial delivery of SACMEQ II data for cleaning have been presented in the second column of Table 2.1. The first data files were delivered by Botswana and the Seychelles in February 2001, and the last were delivered by Malawi in December 2002.

Table 2.1: Number of Cycles and Amount of Time Required for the Completion of SACMEQ II Data Cleaning.

School System	Date When Data Arrived	Date When Cleaning Finished	Number of Cleaning Cycles	Number of Months
Botswana	8-Feb-01	5-Dec-01	15	10
Kenya	20-Jun-01	23-Oct-02	24	16
Lesotho	20-Mar-01	25-Jan-02	15	10
Malawi	15-Dec-02	5-May-03	13	5
Mauritius	9-Oct-01	15-Apr-03	11	18
Mozambique	8-Feb-01	27-Jan-03	23	24
Namibia	2-May-01	25-Jan-02	9	9
Seychelles	15-Feb-01	13-Jun-01	5	4
South Africa	9-Mar-01	26-Aug-02	22	18
Swaziland	7-Jun-01	27-Sep-02	14	16
Tanzania	26-Mar-01	19-Nov-02	25	20
Uganda	26-Feb-01	22-Jan-03	31	23
Zambia	23-Jan-01	29-Nov-02	25	22
Zanzibar	15-Jun-01	23-Apr-03	27	22

(b) Data Cleaning

The NRCs received written instructions and follow-up support from IIEP staff in the basic steps of data cleaning using the WINDEM software. This permitted the NRCs to (i) identify major errors in the sequence of identification numbers, (ii) cross-check identification numbers across files (for example, to ensure that all pupils were linked with their own reading and mathematics teachers), (iii) ensure that all schools listed on the original sampling frame also had valid data collection instruments and vice-versa, (iv) check for “wild codes” that occurred when some variables had values that fell outside pre-specified reasonable limits, and (v) validate that variables used as linkage devices in later file merges were available and accurate.

A second phase of data preparation directed efforts towards the identification and correction of “wild codes” (which refer to data values that that fall outside credible limits), and “inconsistencies” (which refer to different responses to the same, or related, questions). There were also some errors in the identification codes for teachers that needed to be corrected before data could be merged.

During 2002 a supplementary training programme was prepared and delivered to all countries via the Internet. This training led each SACMEQ Research Team step-by-step through the required data cleaning procedures – with the NRCs supervising “hands-on” data cleaning activities and IIEP staff occasionally using advanced software systems to validate the quality of the work involved in each data-cleaning step.

This resulted in a “cyclical” process whereby data files were cleaned by the NRC and then emailed to the IIEP for checking and then emailed back to the NRC for further cleaning. The figures presented in the final two columns of Table 2.1 show the number of cleaning “cycles” (that is the number of times that SACMEQ II data were sent from a country to the IIEP for detailed checking and then returned to the country for further cleaning) and the total amount of time in months required to complete the data cleaning for each country.

The number of cycles required to complete all of the data cleaning ranged from lows of 5 and 9 cycles in the Seychelles and Namibia, respectively, to highs of 27 and 31 cycles in Zanzibar and Uganda, respectively. The time required to complete the all of the data cleaning took from lows of 4 and 9 months in the Seychelles and Namibia, respectively, to highs of 23 and 24 months in Uganda and Mozambique, respectively.

Phase 11: Merging and Weighting

As each NRC finalized the cleaning of the SACMEQ II data for his/her country, the data from all sources within a country were merged and weighted.

The merging process required the construction of a single data file for each school system in which pupils were the units of analysis. This was achieved by “disaggregating” the teacher and school head data over the pupil data. That is, each record of the final data file for a country consisted of the following four components: (a) the questionnaire and test data for an individual pupil, (b) the questionnaire and test data for his/her mathematics and reading teacher, (c) the questionnaire data for his/her school head, and (d) school and pupil “tracking forms” that were required for data cleaning purposes.

The merged file enabled linkages to be made among pupils, teachers, and school heads at the “between-pupil” level of analysis. To illustrate, with the merged file it was possible to examine questions of the following kind: “What are the average reading and mathematics test

scores (based on information taken from the pupil tests) for groups of pupils who attend urban or rural schools (based on information taken from the school head questionnaire), and who are taught by male or female teachers (based on information taken from the teacher questionnaire)?”

The calculation of sampling weights could only be conducted after all files had been cleaned and merged. Sampling weights were used to adjust for missing data and for variations in probabilities of selection that arose from the application of stratified multi-stage sample designs. There were also certain country-specific aspects of the sampling procedures, and these had to be reflected in the calculation of sampling weights.

Two forms of sampling weights were prepared for the SACMEQ II Project. The first sampling weight (RF2) was the inverse of the probability of selecting a pupil into the sample. These “raising factors” were equal to the number of pupils in the defined target population that were “represented by a single pupil” in the sample. The second sampling weight (pweight2) was obtained by multiplying the raising factors by a constant so that the sum of the sampling weights was equal to the achieved sample size.

Phase 12: “Scoring” Literacy and Numeracy Levels

A particularly innovative aspect of the SACMEQ II Project was its approach to presenting the literacy and numeracy performance of pupils in a manner that provided descriptive accounts of increasing levels of competence. This was made possible through the use of the Rasch scaling procedures - which permitted, for each test, the performance of pupils to be aligned along a single dimension that could be broken into groups or levels – each being named according to the skills required to successfully complete the items within each group. This method of defining reading and mathematics performance moved far beyond the traditional approach of assigning scores based on the number of correct test items.

The traditional approach to describing test performance is of limited use concerning the identification of specific strategies that can be understood by teachers who would like to plan either remediation programmes or performance improvement for their pupils. In contrast, the levels of competence approach provides meaningful descriptive information about the tasks that pupils can currently manage, and the knowledge and skills that pupils require if they are to move to higher levels of competence.

Four main steps were used in the SACMEQ II Project to define levels of competence. First, Rasch Item Response Theory was used to establish the difficulty value for each test item. Second, the NRCs subjected each test item to an intensive “skills audit” (in order to identify the required problem-solving mechanisms for each item “through a Grade 6 pupil’s eyes”). Third, the items were clustered into eight groups or “levels” that had similar difficulties and that required similar skills. Finally, the NRCs wrote descriptive accounts of the competencies associated with each cluster of test items by using terminology that was familiar to ordinary classroom teachers. These four steps have been described in detail in Part C of this chapter.

The work undertaken to define the descriptive levels of competence was commenced at a meeting of NRCs and their Deputies in the Seychelles during June 2001. This work continued via the Internet and was eventually finalized at another follow-up meeting of the same participants that was held in Mauritius during December 2002. The major delay in finalizing this aspect of the work was due to the problem that the scaling of test scores using the Rasch technique required all countries to have completed their data cleaning.

When all data were available, it was possible to transform the Rasch scores to an international mean and standard deviation of 500 and 100, respectively. These two figures were established by using a special sampling weight that treated the samples in each country as if they were the same size.

Phase 13: Analysing the Data

The data analyses for the SACMEQ II Project were very clearly defined because they were focussed specifically on generating results that could be used to “fill in the blank entries” in the Dummy Tables described above. There were two main tasks in this area. First, the SPSS software system was used to construct new variables (often referred to as “indices”) or to recode existing variables. For example, an index of “socioeconomic level” was constructed by combining recoded variables that described the educational level of the pupils’ parents, the materials used in the construction of pupils’ homes, and the number of possessions in pupils’ homes. Second, the IIEP’s specialized data analysis software, IIEPJACK, was used to “fill” the Dummy Tables with appropriate statistics along with their correct measures of sampling error.

Phase 14: Writing the SACMEQ II Policy Reports

The NRCs commenced the process of drafting their national educational policy reports during early 2003. Two workshops (in Mauritius in December 2002 and in Paris during September 2003) were organized to support the NRCs in this work. These workshops permitted the NRCs to work together and exchange ideas concerning the policy implications of the research results.

Some sections of the national reports were written as “group tasks” because they described aspects of the SACMEQ II Project research programme that were common across countries. However, the tasks of reporting and interpreting the research results were undertaken on a country-by-country basis.

The general structure of the national reports was common across all SACMEQ countries. The 5 “themes” listed in Figure 2.1 were used as chapter titles, the 20 “General Policy Concerns” listed in Figure 2.1 were used within the chapters as main headings, and the 75 “Specific Research Questions” listed in Appendix A were used as sub-headings.

Throughout each national report the NRCs introduced “policy suggestions” based on the research results. In the final chapter these policy suggestions were drawn together into an “agenda for action” that grouped the suggestions according to timeframe and estimated costs. These ranged from low cost and easy to implement actions (for example: adapting the established School Census Questionnaire to include some questions on the availability of certain school and classroom resources) up to long-term expensive investments (for example: the implementation of a nationwide programme of in-service training for teachers).

Part B: Sample Design Procedures for the SACMEQ II Project

This part of the chapter has described the sample design procedures that were employed for the SACMEQ II Project. First, a detailed description has been presented of the step-by-step procedures involved in the design of the samples, the selection of the samples, and the construction of sampling weights. Second, information has been presented on the “evaluation” of the SACMEQ II sampling procedures - in terms of the calculation of response rates, design effects, effective sample sizes, and standard errors of sampling.

Some Constraints on Sample Design

Sample designs in the field of education are usually prepared amid a network of competing constraints. These designs need to adhere to established survey sampling theory and, at the same time, give due recognition to the financial, administrative, and socio-political settings in which they are to be applied. The “best” sample design for a particular project is one that provides levels of sampling accuracy that are acceptable in terms of the main aims of the project, while simultaneously limiting cost, logistic, and procedural demands to manageable levels. The major constraints that were established prior to the preparation of the sample designs for the SACMEQ II Project have been listed below.

Target Population: The target population definitions should focus on Grade 6 pupils attending registered mainstream government or non-government schools. In addition, the defined target population should be constructed by excluding no more than 5 percent of pupils from the desired target population.

Bias Control: The sampling should conform to the accepted rules of scientific probability sampling. That is, the members of the defined target population should have a known and non-zero probability of selection into the sample so that any potential for bias in sample estimates due to variations from “epsem sampling” (equal probability of selection method) may be addressed through the use of appropriate sampling weights (Kish, 1965).

Sampling Errors: The sample estimates for the main criterion variables should conform to the sampling accuracy requirements set down by the International Association for the Evaluation of Educational Achievement (Ross, 1991). That is, the standard error of sampling

for the pupil tests should be of a magnitude that is equal to, or smaller than, what would be achieved by employing a simple random sample of 400 pupils (Ross, 1985).

Response Rates: Each SACMEQ country should aim to achieve an overall response rate for pupils of 80 percent. This figure was based on the wish to achieve or exceed a response rate of 90 percent for schools and a response rate of 90 percent for pupils within schools.

Administrative and Financial Costs: The number of schools selected in each country should recognize limitations in the administrative and financial resources available for data collection.

Other Constraints: The number of pupils selected to participate in the data collection in each selected school should be set at a level that will maximize validity of the within-school data collection for the pupil reading and mathematics tests.

The Specification of the Target Population

The target population for both the SACMEQ I and SACMEQ II Projects was focussed on the Grade 6 level for three main reasons.

First, Grade 6 identified a point near the end of primary schooling where school participation rates were reasonably high for most of the seven countries that participated in the SACMEQ I data collection during 1995-1997, and also reasonably high for most of the fourteen countries that participated in the SACMEQ II collection during 2000-2002. For this reason, Grade 6 represented a point that was suitable for making an assessment of the contribution of primary schooling towards the literacy and numeracy levels of a broad cross-section of society.

(Note: The Net and Gross Enrolment Ratios for the period 1995 to 2003 have been presented for the SACMEQ countries in Table 2.2. The NRCs used official statistical reports to prepare these values. In some Ministries these data were collected and collated in a format that permitted the construction of ratios for either Grades 1-6 or Grades 1-7. In other countries it was necessary for the National Research Coordinator to calculate the ratios from available raw data. In Uganda some of the estimated Net Enrolment Ratios were greater than 100 – a result that was theoretically not possible and probably arose from inaccuracies in estimating the numbers of pupils in the relevant age cohort between Population Censuses).

Second, the NRCs considered that testing pupils at grade levels lower than Grade 6 was problematic – because in some SACMEQ countries the lower grades were too close to the transition point between the use of local and national languages by teachers in the classroom. This transition point generally occurred at around Grade 3 level – but in some rural areas of some countries it was thought to be as high as Grade 4 level.

Third, the NRCs were of the opinion that the collection of home background information from pupils at grade levels lower than Grade 6 was likely to lack validity for certain key “explanatory” variables. For example, the NRCs felt that children at lower grade levels did not know how many years of education that their parents had received, and they also had difficulty in accurately describing the socioeconomic environment of their own homes (for example, the number of books at home).

(a) Desired Target Population

The desired target population definition for the SACMEQ II Project was exactly the same (except for the year) as was employed for the SACMEQ I Project. This consistency was maintained in order to be able to make valid cross-national and cross-time estimates of “change” in the conditions of schooling and the quality of education.

The desired target population definition for the SACMEQ II Project was as follows.

“All pupils at Grade 6 level in 2000 (at the first week of the eighth month of the school year) who were attending registered mainstream primary schools.”

Note that the year dates for this definition were varied for two countries (Mauritius in 2001, and Malawi in 2002) in order to coincide with delayed data collections.

Table 2.2: Net Enrolment Ratios and Gross Enrolment Ratios for the SACMEQ Countries

School System	1995		1996		1997		1998		1999		2000		2001		2002		2003		Grades
	NER	GER	NER	GER	NER	GER	NER	GER	NER	GER	NER	GER	NER	GER	NER	GER	NER	GER	
BOT	96.5*	118.7*	97.6*	120.7*	85.8*	120.1*	87.9*	119.9*	88.3*	119.1*	87.6*	117.9*	87.5*	117.3*	n/a	115.4*	n/a	111.9*	1 to 6
KEN	n/a	107.0	n/a	104.6	n/a	102.4	n/a	103.4	93.4	98.1	86.5	96.3	89.0	96.2	86.9	95.3	94.8	112.3	1 to 6
LES	63.9*	94.8*	71 [#]	89.4*	69 [#]	97.7*	64 [#]	83.2*	61 [#]	80.9*	83 [#]	91.8*	84 [#]	92.7*	85 [#]	93.1*	n/a	n/a	*1 to 6/ [#] 1 to 7
MAL	n/a	n/a	n/a	n/a	94.8*	106.5*	87.8*	97.5*	89.4*	102.6*	91.6*	109.9*	95.0*	114.3*	97.7*	128.0*	n/a	n/a	1 to 6
MAU	98	107	99	107	98	106	98	105	97	105	97	104	97	103	96	103	97	102	1 to 6
MOZ	n/a	n/a	n/a	n/a	44.0	76.2	45.5	79.2	50.1	85.3	54.7	92.1	61.1	101.2	64.1	106.5	69.4	112.7	1 to 5
NAM	95.2	136.2	92.9	144.5	94.9	131.8	93.4	127.2	92.9	123.4	91.3	119.4	94*	114.9	n/a	n/a	n/a	n/a	1 to 7
SEY	100	100.4	99.5	100.5	100	101.1	100	101.2	99.9	100.8	100	101	100	99.5	99.9	100	n/a	n/a	1 to 6
SOU	n/a	n/a	n/a	n/a	n/a	n/a	n/a	N/a	96	106	97	99	97	117	n/a	n/a	n/a	n/a	1 to 7
SWA	n/a	n/a	n/a	n/a	80.7*	105.3*	67.9*	103.8*	76.7*	102.9*	76.1*	100.5*	72.7*	95.4*	n/a	n/a	n/a	n/a	1 to 6
TAN-ML	55.4	77.6	56.3	77.8	56.7	77.9	57.0	76.0	57.1	77.1	58.8	77.6	65.2	82.7	79.3	96.1	88.5	105.3	1 to 7
TAN-ZAN	65.1	80.5	65.5	81.2	66.5	81.2	66.5	82.2	68.6	85.4	71	92.2	76	94.6	n/a	98.1	n/a	99.1	1 to 7
UGA	n/a	n/a	n/a	n/a	84.0	n/a	n/a	N/a	84.0	n/a	110.7	128.3	117.5	129.9	99.8	126.3	100.8	127.5	1 to 7
ZAM	n/a	n/a	70.4	85	69	82.6	68.2	80.8	66.2	78.5	65.6	77.9	n/a	n/a	n/a	n/a	n/a	n/a	1 to 7
ZIM	81.9*	105.4*	n/a	n/a	n/a	104.4*	84.7*	105.2*	89.2*	107.4*	92.5*	110.3*	97.2*	108.1*	92.6*	108.8*	n/a	n/a	1 to 7

Note: the figures in the table were extracted by the SACMEQ National Research Coordinators (NRCs) from official Ministry of Education reports. In some cases (marked with an asterisk (*)) the figures were estimated by the NRCs from raw data, in other cases data were “not available” (denoted as n/a).

The desired target population definition for both SACMEQ Projects was based on a grade-based description (and not an age-based description) of pupils. This decision was taken because an age-based description (for example, a definition focussed on “12 year-old pupils”) may have required the collection of data across many grade levels due to the high incidence of “late starters” and grade repetition. The NRCs also decided that the calculation of “average” descriptions of the quality of education and the conditions of schooling across many grade levels would lack meaning when used for comparative purposes.

It is important to note that while the emphasis in the definition of the desired target population was placed on pupils, the two SACMEQ Projects were also concerned with reporting estimates that described schools and teachers. When the data files were prepared for analysis, the information collected about schools and teachers was disaggregated over pupils - so as to provide estimates of teacher and school characteristics “for the average pupil” – rather than estimates for teachers and schools as distinct target populations in themselves.

(b) Excluded and Defined Target Populations

The use of the word “mainstream” in the definition of the desired target population automatically indicated that special schools for the handicapped should be excluded from the SACMEQ II data collection.

In addition, a decision was taken to exclude small schools – based on the definition of having less than either 15 or 20 pupils in the desired target population. Small schools were excluded because it was known that they represented a very small component of the total population of pupils, and were known to be mostly located in very isolated areas that were associated with high data collections costs. That is, it was understood that the allocation of these small schools to the excluded population had the potential to reduce data collection costs – without the risk of leading to major distortions in the study population.

The exclusion rules that were applied in each country have been listed below.

- Botswana: Schools with less than 20 Grade 6 pupils and special schools.
- Kenya: Schools with less than 15 Grade 6 pupils and special schools.
- Lesotho: Schools with less than 10 Grade 6 pupils and special schools.

- Malawi: Schools with less than 15 Grade 6 pupils, private schools, special schools, and “inaccessible” schools.
- Mauritius: Schools with less than 15 Grade 6 pupils and special schools.
- Mozambique: Schools with less than 20 Grade 6 pupils and special schools.
- Namibia: Schools with less than 15 Grade 6 pupils, “inaccessible” schools, and special schools.
- Seychelles: Schools with less than 10 Grade 6 pupils and special schools.
- South Africa: Schools with less than 20 Grade 6 pupils and special schools.
- Swaziland: Schools with less than 15 Grade 6 pupils and special schools.
- Tanzania: Schools with less than 20 Grade 6 pupils and special schools.
- Uganda: Schools with less than 20 Grade 6 pupils, schools in areas affected by serious military conflicts, and special schools.
- Zambia: Schools with less than 15 Grade 6 pupils and special schools.
- Zanzibar: Schools with less than 20 pupils and special schools.

The “defined target population” was constructed by removing the “excluded target population” from the “desired target population”. In Table 2.3 the numbers of schools and pupils in the desired, defined and excluded populations for the SACMEQ II Project have been presented.

The final column of figures in Table 2.3 summarized the percentage of the SACMEQ II pupil desired target population in each country that had been excluded in order to form the defined target population. In all cases the percentages excluded were less than 5 percent - which satisfied the technical requirements that had been set down for the SACMEQ sampling procedures.

The Stratification Procedures

The stratification procedures adopted for the study employed explicit and implicit strata. The explicit stratification variable, “Region”, was applied by separating each sampling frame into separate regional lists of schools prior to undertaking the sampling. The implicit stratification variable was “School Size” – as measured by the number of Grade 6 pupils.

The main reason for choosing Region as the explicit stratification variable was that the SACMEQ Ministries of Education wanted to have education administration regions as “domains” for the study. That is, the Ministries wanted to have reasonably accurate sample estimates of population characteristics for each region.

There were two other reasons for selecting Region as the main stratification variable. First, this was expected to provide an increment in sampling precision due to known between-region differences in the educational achievement of pupils – especially between predominantly urban and predominantly rural regions. Second, this approach provided a broad geographical coverage for the sample – which was necessary in order to spread the fieldwork across each country in a manner that prevented the occurrence of excessive administrative demands in particular regions.

The use of School Size as an implicit stratification variable within regions also offered increased sampling precision because it provided a way of sorting the schools from “mostly rural” (small schools) to “mostly urban” (large schools). It was known that this kind of sorting was linked to the main criterion variables for the study – with urban schools likely to have higher resource levels and better pupil achievement scores than rural schools.

Sample Design Framework

The SACMEQ II sample designs were prepared by using a specialized software system (SAMDEM) that enabled the high-speed generation of a range of sampling options which satisfied the statistical accuracy constraints set down for the project, and at the same time also addressed the logistical and financial realities of each country.

In order to establish the number of schools and pupils that were required to satisfy SACMEQ’s sampling accuracy standards, it was necessary to know the magnitude of (a) the minimum cluster size, and (b) the coefficient of intraclass correlation.

Table 2.3: Desired, Defined, and Excluded Populations for the SACMEQ II Project

School System	Desired		Defined		Excluded		
	Schools	Pupils	Schools	Pupils	Schools	Pupils	Pupils %
Botswana	720	41408	589	39773	131	1635	3.9
Kenya	15439	631544	13313	607900	2126	23644	3.7
Lesotho	1170	40493	947	39212	223	1281	3.2
Malawi	3663	219945	3368	212046	295	7899	3.6
Mauritius	277	26510	274	26481	3	29	0.1
Mozambique	509	112279	500	112173	9	106	0.1
Namibia	849	48567	767	47683	82	884	1.8
Seychelles	25	1577	24	1571	1	6	0.4
South Africa	17073	962350	11997	920020	5076	42330	4.4
Swaziland	498	19940	458	19541	40	399	2.0
Tanzania	10786	529296	9516	511354	1270	17942	3.4
Uganda	9688	517861	8425	499127	1263	18734	3.6
Zambia	3858	180584	3090	176336	768	4248	2.4
Zanzibar	161	22179	151	22041	10	138	0.6
Total	64716	3354533	53419	3235258	11297	119275	3.6

(a) Minimum Cluster Size

The value of the minimum cluster size referred to the smallest number of pupils within a school that would be included in the data collection. It was important that this was set at a level that permitted test administration within schools to be carried out in an environment that ensured that: (i) the test administrator was able to conduct the testing according to the standardized procedures specified for the study, (ii) the sample members were comfortable and unlikely to be distracted, (iii) the sample members responded carefully and independently to the tests and questionnaires, and (iv) the testing did not place an excessive administrative burden on schools.

After a consideration of these four constraints the SACMEQ National Research Coordinators decided to limit the sample in each selected school to a simple random sample of 20 pupils.

(b) Coefficient of Intraclass Correlation

The coefficient of intraclass correlation (ρ) referred to a measure of the tendency of pupil characteristics to be more homogeneous within schools than would be the case if pupils were assigned to schools at random. The estimated size of ρ may be calculated from previous

surveys that have employed similar target populations, similar sample designs, and similar criterion variables.

The values of rho for educational achievement measures are usually higher for education systems where pupils are allocated differentially to schools on the basis of performance – either administratively through some form of “streaming”, or structurally through socio-economic differentiation among school catchment zones. In general terms, a relatively large value of rho means that, for a fixed total number of sample members (pupils in this study), a larger number of primary sampling units (schools in this study) needs to be *selected in order* to obtain the same sampling precision as would be obtained for a relatively lower value of rho. That is, higher values of rho normally require larger numbers of schools to be selected into the sample.

The following formula may be used for estimating the value of rho in situations where two-stage cluster sampling is employed using (approximately) equal sized clusters (Ross, 1985).

$$\text{estimated } \rho = (b \cdot s(a)^2 - s^2) / (b - 1)s^2$$

where $s(a)^2$ is the variance of cluster means, s^2 is the variance of the element values, and b is the cluster size.

Following a consideration of the results of the SACMEQ I Project, it was decided to use rho values in the range of 0.3 to 0.4 as an estimate of the value of the coefficient of intraclass correlation for most of the countries involved in the SACMEQ II Project. An exception to this was made for Namibia – where calculations based on SACMEQ I data indicated that a value of rho = 0.6 should be used.

(c) Sample Design Tables

In Appendix D of this chapter, a set of Sample Design Tables has been presented for various values of the minimum cluster size, and various values of the coefficient of intraclass correlation. The construction of these tables has been described by Ross (1987). It is important to remember that the tables refer specifically to two-stage sample designs that employ simple random sampling of equal-sized clusters.

The Sample Design Tables do not allow for (a) gains in sampling precision that are associated with effective choice of strata, and (b) losses in sampling precision arising from the use of sampling weights. Nevertheless, they provide a good starting point for estimating the number of schools and pupils that are required in order to meet the sample design standards specified for many educational research studies.

To illustrate the use of these tables, the fourth and fifth columns of the tables list a variety of two-stage samples that would result in an effective sample size of 400. That is, these columns describe sample designs that would provide 95 percent confidence limits of $\pm 0.1s$ for means and ± 5 percent for percentages (where s is the value of the pupil standard deviation). In the tables, the symbol “a” has been used to describe the number of schools, “b” has been used to describe the minimum cluster size, and “n” has been used to describe the total sample size.

For example, consider the intersection of the fourth and fifth columns of figures with the sixth row of figures in the tables when $\rho = 0.1$. The pair of values $a=58$ and $n=1160$ indicate that if ρ is equal to 0.1 and the minimum cluster size, b , is equal to 20, then the two-stage cluster sample design with an effective sample size of 400 would be 20 pupils selected from each of 58 schools – which would result in a total sample size of 1160 pupils. The effect of a different value of ρ , for the same minimum cluster size, may be examined by considering the corresponding rows of the table for $\rho=0.2, 0.3$, etc. in the tables.

The rows of the tables that correspond to a minimum cluster size of 1 refer to the “effective sample size”. That is, they describe the size of a simple random sample that has equivalent accuracy. Therefore, the pairs of figures in the fourth and fifth columns in the table all refer to sample designs that have equivalent accuracy to a simple random sample of size 400. The second and third columns refer to an equivalent sample size of 1,600, and the final two pairs of columns refer to equivalent sample sizes of 178 and 100, respectively.

(d) The Numbers of Schools and Pupils Required for this Study

Using values of $\rho=0.3$ (Botswana, Malawi, Mauritius, Swaziland, Uganda) and $\rho=0.4$ (Kenya, Lesotho, Mozambique, South Africa, Tanzania, Zambia) in association with a minimum cluster size of 20 pupils indicated that there was a need to select (at least) 134 and 172 schools for these two groups of countries, respectively, in order to meet the SACMEQ II

Project sampling requirements. In fact, additional schools were selected in most countries with the aim of achieving reasonably stable sample estimates within Regions.

Exceptions to this approach were made for Namibia, the Seychelles, and Zanzibar. In Namibia, some calculations made using SACMEQ I data indicated that a value of $\rho = 0.6$ should be used to plan the sample. As a result, at least 248 schools were required in Namibia. In the Seychelles and Zanzibar it was decided to include all schools in the defined target population.

Construction of Sampling Frames

The defined target population definition was used to guide the construction of sampling frames from which the samples of schools were selected. The sampling frames were based on national lists of schools that included information about: school identification numbers, enrolment for the target population of Grade 6 pupils, and school regional location. The information used to construct the sampling frames was based on data that had been collected by the SACMEQ Ministries of Education for the most recent School Census.

The sampling frame for each country provided a “listing” of the pupils in the defined target population without actually creating a physical list consisting of an entry for each and every pupil. For this study, the sampling frame needed to provide a complete coverage of the defined target population without being contaminated with incorrect entries, duplicate entries, or entries that referred to elements that were not part of the defined target population.

Work commenced on the construction of SACMEQ II sampling frames in January 2000. For countries with high quality Educational Management Information Systems (EMIS) this task was very easy and was completed within a week. Other countries took up to six months to complete their sampling frames because of (a) major errors in EMIS data files, (b) difficulties in communicating information requirements to the Ministry staff responsible for EMIS functions, (c) difficulties in combining regional databases to form a single national sampling frame, (d) problems with inconsistent school numbering systems, and (e) changes in the geographical boundaries of regions during the time period between the implementations of the SACMEQ I and SACMEQ II Projects.

The Selection of Schools

In educational survey research the primary sampling units that are most often employed (schools) are rarely equal in size. This variation in size causes difficulties with respect to the control of the total sample size when schools are selected with equal probability at the first stage of a multi-stage sample design.

For example, consider a two-stage sample design in which a simple random sample of “a” schools is selected from a list of “A” schools, and then a fixed fraction of pupils, say $1/k$, is selected from each selected school. This design would provide an epsem, or “equal probability of selection method” (Kish, 1965, p. 21), sample of pupils because the probability of selecting a pupil is a/Ak , which is constant for all pupils in the population. However, the total size of the sample would depend upon the size of the schools that were selected.

One method of obtaining greater control over the total sample size is to stratify the schools according to size and then select samples of schools within each stratum. A more widely applied alternative is to employ probability proportional to size (PPS) sampling of schools within strata followed by the selection of a simple random sample of a fixed number of pupils within selected schools. This approach provides control over the sample size and results in epsem sampling of pupils within strata.

The lottery method of PPS selection was implemented in the SACMEQ II Project with the assistance of the SAMDEM software (Sylla et al, 2003). The steps taken in selecting schools using this method have been described in the hypothetical example presented below.

Probability proportional to size (PPS) sampling is often applied via the “lottery method”. For example, consider a situation where two schools are to be selected with probability proportional to size from each stratum of the hypothetical population of 600 pupils described in Table 2.4. The application of the lottery method of PPS selection commences with the allocation, to each school, of a number of lottery tickets equal to the number of pupils in the defined target population.

To illustrate, the first school listed in Table 2.4 has 45 pupils and therefore it is allocated tickets numbered 1 to 45, and the second school has 60 pupils and therefore it is allocated

tickets numbered 46 to 105. And so on. Since a PPS sample of two schools is to be selected from the first stratum, there are two “winning tickets” required.

In the first stratum, the ratio of the number of tickets to the number of winning tickets, known as the “sampling interval”, is $200/2 = 100$. That is, each ticket in the first stratum has a 1 in 100 chance of being drawn as a winning ticket. Note that the sampling interval is $400/2 = 200$ for the second stratum.

The winning tickets for the first stratum may be drawn by using a “random start-constant interval” procedure whereby a random number in the interval 1 to 100 is selected as the first winning ticket and the second ticket is selected by adding an increment of 100 to this number.

Table 2.4: Hypothetical Population for the Illustration of Probability Proportional to Size Selection

Stratum	School	Class	No. Pupils		Cumulative	“Tickets”
			School	Class		
1	1	1	45	20	20	1-45
		2		25	45	
	2	3	60	15	60	46-105
		4		20	80	
		5		25	105	
	3	6	95	25	130	106-200
		7		30	160	
		8		25	185	
		9		15	200	
Sub-total	3	9	200			
2	4	10	45	10	10	1-45
		11		15	25	
		12		20	45	
	5	13	110	20	65	46-155
		14		25	90	
		15		30	120	
		16		35	155	
	6	17	120	35	190	156-275
		18		40	230	
		19		45	275	
	7	20	125	50	325	276-400
		21		75	400	
Sub-total	4	12	400			
Total	7	21	600			

With a random start of 65, the winning ticket numbers would be 65 and 165. This would result in the selection of School 2 (which holds tickets 46-105) and School 3 (which holds tickets 106-200). Using this approach the chance of selecting any school would be proportional to the number of tickets held and therefore each of these schools is selected with probability proportional to the number of pupils in the defined target population. The winning

tickets for the second stratum are similarly selected using a random start-constant interval approach in which the random start is a random number between 1 and 200, and the constant interval is 200.

The Selection of Pupils within Schools

A critical component of the sample design for the SACMEQ II Project was concerned with the selection of pupils within selected schools. It was decided that these selections should be placed under the control of trained data collectors – after they were provided with materials that would ensure that a simple random sample of pupils was selected in each selected school. The data collectors were informed that it was not acceptable to permit school principals or classroom teachers to have any influence over the sampling procedures within schools. These groups of people may have had a vested interest in selecting particular kinds of pupils, and this may have resulted in major distortions of sample estimates (Brickell, 1974).

In the two SACMEQ Projects the data collectors initially explained to School Heads in selected schools that a “mechanical procedure” would be used to select the sample of 20 pupils. The data collectors then applied the following set of instructions in order to ensure that a simple random sample of pupils was selected.

Step 1: Obtain Grade 6 register(s) of attendance.

These registers were obtained for all Grade 6 pupils that attended normal (not “special”) classes. In multiple session schools, both morning and afternoon registers were obtained.

Step 2: Assign sequential numbers to all Grade 6 pupils.

A sequential number was then placed beside the name of each Grade 6 pupil. For example: Consider a school with one session and a total of 48 pupils in Grade 6. Commence by placing the number “1” beside the first pupil on the Register; then place the number “2” beside the second pupil on the Register; ...etc. ...; finally, place the number “48” beside the last pupil on the Register.

Another example: Consider a school with 42 pupils in the morning session and 48 pupils in the afternoon session of Grade 5. Commence by placing the number “1” beside the first pupil on the morning register; ... etc. ...; then place a “42” beside the last pupil on the morning

register; then place a “43” beside the first pupil on the afternoon register; ... etc. ...; finally place a “90” beside the last pupil on the afternoon register.

Step 3: Locate the appropriate set of selection numbers.

In Appendix E sets of “selection numbers” have been listed for a variety of school sizes. (Note that only the sets relevant for school sizes in the range 21 to 245 have been presented.) For example, if a school had 48 pupils in Grade 6, then the appropriate set of selection numbers was listed under the “R48” heading. Similarly, if a school had 90 Grade 5 pupils then the appropriate set of selection numbers was listed under the “R90” heading.

Step 4: Use the appropriate set of selection numbers.

After locating the appropriate set of selection numbers, these were used to select the sample of 20 pupils. The first selection number was used to locate the Grade 6 pupil with the same sequential number on the Register(s). The second selection number was used to locate the Grade 6 pupil with the same sequential number on the Register(s). This process was repeated in order to select 20 pupils

For example: From Appendix E we see that in a school with a total of 50 pupils in Grade 5 the first pupil selected has sequential number “2”; the second pupil selected has sequential number “4”; ... etc. ...; the twentieth pupil selected has sequential number “50”.

The Calculation of Sampling Weights

The following discussion is based on the use of two-stage sampling procedures in which the first stage of sampling consists of the PPS selection of schools followed by the selection of a simple random sample of pupils in selected schools.

Consider a population of pupils that may be described according to the notation presented in Table 2.5. From stratum h of the population select a_h schools with PPS, and then select a simple random sample of n_{hi} pupils within each selected school.

For this sample design, the probability of selecting pupil k in class j from school i within stratum h would be the product of the probability of selecting the pupil’s school at the first stage and the probability of selecting pupil k within school i at the second stage.

$$p = (a_h \times N_{hi} / N_h) \times (n_{hi} / N_{hi}) = (a_h \times n_{hi}) / N_h$$

This application of PPS sampling removes the influence of school size, N_{hi} , from the calculation of the probability of selecting pupil k . Note that, if the value of n_{hi} is constant within strata, then the numerator of the above equation is constant and equal to n_h within strata. In this special case, $p = n_h / N_{hi}$ is a constant for all pupils within a particular stratum.

The calculation of sampling weights for both SACMEQ Projects followed the classical procedure of assigning each pupil a weight that was proportional to the reciprocal of the probability of including a pupil in the sample.

The reciprocals of these probabilities are sometimes referred to as “raising factors” because they refer to the number of elements in the population that are “represented” by the various sample elements.

$$\text{raising factor} = (N_h / (a_h \times n_{hi}))$$

These raising factors are often multiplied by a constant so that the “weighted sample size” is equal to the achieved sample size. In this case the constant would be n/N and the sampling weight for pupil k would be as follows.

$$\text{weight} = (N_h \times n) / (a_h \times n_{hi} \times N)$$

Table 2.5: Notation used in Discussion of Sample Designs

<i>Coverage of units</i>	<i>Units</i>					
	<i>Schools</i>		<i>Classes</i>		<i>Pupils</i>	
	<i>Total</i>	<i>Sample</i>	<i>Total</i>	<i>Sample</i>	<i>Total</i>	<i>Sample</i>
<i>Population</i>	<i>A</i>	<i>A</i>	<i>B</i>	<i>B</i>	<i>N</i>	<i>n</i>
<i>Stratum h</i>	<i>A_h</i>	<i>a_h</i>	<i>B_h</i>	<i>b_h</i>	<i>N_h</i>	<i>n_h</i>
<i>School i</i> (<i>Stratum h</i>)	-	-	<i>B_{hi}</i>	<i>b_{hi}</i>	<i>N_{hi}</i>	<i>n_{hi}</i>
<i>Class j</i> (<i>School i</i> in <i>Stratum h</i>)	-	-	-	-	<i>N_{hij}</i>	<i>n_{hij}</i>

Note: 1. The notation conventions for sample designs described in this manual have been listed in the above table. The table entries describe the number of “units” (schools, classes, or pupils) associated with each of four levels of “coverage” (population, stratum h, school i, or class j).

Note: 2. For example, the symbol *A* has been used to refer to the total number of schools (“units”) in the population (“coverage”), whereas the symbol *A_h* has been used to describe the total number of schools (“units”) in stratum h (“coverage”). Similarly, the symbol *n* has been used to refer to the number of pupils in the sample, whereas the symbol *n_{hij}* has been used to refer to the number of pupils in the sample associated with class j (situated in school i within stratum h).

In most “real” school system sampling situations, the number of pupils in the defined target population within each school listed on the sampling frame is different from the actual number of pupils.

This occurs because sampling frames are usually developed from data collected at some earlier time – often a year prior to the selection of the sample of schools. That is, rather than finding *N_{hi}* pupils in school i within stratum h, we often find that there are *N_{hi}* (actual) pupils.

In addition, due to occasional absenteeism on the day of data collection, instead of being able to test *n_{hi}* pupils in a sample school we often only manage to collect data from *n_{hi}* (actual) pupils. Given these two deviations, the actual probability (assuming random loss of data) of selecting a pupil in school i within stratum h may be written as follows.

Table 2.6: Planned and Achieved Samples for SACMEQ I and SACMEQ II Projects

School System	SACMEQ I				SACMEQ II			
	Schools		Pupils		Schools		Pupils	
	Planned	Achieved	Planned	Achieved	Planned	Achieved	Planned	Achieved
Botswana	N/A	N/A	N/A	N/A	170	170	3400	3322
Kenya	185	184	3700	3233	185	185	3700	3299
Lesotho	N/A	N/A	N/A	N/A	180	177	3600	3155
Malawi	155	148	3100	1983	140	140	2800	2333
Mauritius	159	158	3180	2919	159	159	3180	2945
Mozambique	N/A	N/A	N/A	N/A	180	176	3600	3177
Namibia	160	160	4940	4457	275	275	5500	5048
Seychelles	N/A	N/A	N/A	N/A	24	24	1546	1484
SouthAfrica	N/A	N/A	N/A	N/A	185	169	3700	3163
Swaziland	N/A	N/A	N/A	N/A	170	168	3400	3139
Tanzania	N/A	N/A	N/A	N/A	185	181	3700	2854
Uganda	N/A	N/A	N/A	N/A	164	163	3280	2642
Zambia	165	157	3300	2558	175	173	3500	2611
Zanzibar	128	128	2560	2286	151	145	3020	2514
Zimbabwe	150	150	3000	2697	N/A	N/A	N/A	N/A
Total	1102	1086	23780	20133	2343	2305	47926	41686

$$p = (a_h \times N_{hi} / N_h) \times (n_{hi} (\text{actual}) / N_{hi} (\text{actual}))$$

$$= (a_h \times N_{hi} \times n_{hi} (\text{actual})) / (N_h \times N_{hi} (\text{actual}))$$

In this case we have:

$$\text{“revised raising factor”} = (N_h \times N_{hi} (\text{actual})) / (a_h \times N_{hi} \times n_{hi} (\text{actual}))$$

In order to obtain the “revised weights”, the revised raising factor may be multiplied by a constant equal to the achieved total sample size divided by the sum of the values of the revised raising factor across all pupils in the achieved sample.

In the SACMEQ Projects the revised weights were referred to as “pweight2” on the data files. The raising factor linked to this sampling weight, labelled RF2 on the data file, provided a mechanism for estimating population totals for different important independent variables. For example, by using RF2 it was possible to make estimates such as the total numbers of pupils in the defined target population who were attending isolated, rural, and urban schools; or the total number of pupils in the defined target population who had their own reader, were sharing a reader, or were without a reader.

Some Background Comments on the Calculation of Sampling Errors

The sample designs employed in the SACMEQ Projects departed markedly from the usual “textbook model” of simple random sampling. This departure demanded that special steps be taken in order to calculate “sampling errors” (that is, measures of the stability of sample estimates of population characteristics). In the following discussion, a brief overview has been presented of various aspects of the general concept of “sampling error”. This has included a discussion of notions of “design effect”, “the effective sample size”, and the “Jackknife procedure” for estimating sampling errors.

(a) Bias, Sampling Error, and Mean Square Error

Consider a probability sample of n elements that is used to calculate the sample mean, \bar{x} , as an estimate of the population mean, \bar{X} . If an infinite set of samples of size n were drawn independently from this population and the sample mean calculated for each of these samples, then the average of the resulting sampling distribution of sample means, the expected value of \bar{x} , could be denoted by $E(\bar{x})$.

The accuracy of the sample statistic, \bar{x} , as an estimator of the population parameter, \bar{X} , may be summarized in terms of the mean square error (MSE). The MSE is defined as the average of the squares of the deviations of all possible sample estimates from the value being estimated (Hansen, et al, 1953).

$$\begin{aligned} MSE(\bar{x}) &= E(\bar{x} - \bar{X})^2 \\ &= E(\bar{x} - E(\bar{x}))^2 + (E(\bar{x}) - \bar{X})^2 \\ &= \text{variance of } \bar{x} + (\text{bias of } \bar{x})^2 \end{aligned}$$

A sample design is unbiased if $E(\bar{x}) = \bar{X}$. It is important to remember that “bias” is not a property of a single sample, but of the entire sampling distribution, and that it belongs neither to the selection nor the estimation procedure alone, but to both jointly.

For most well designed samples in survey research, the bias is usually very small – tending towards zero with increasing sample size. The accuracy of sample estimates is therefore generally assessed in terms of the variance of \bar{x} , denoted $\text{var}(\bar{x})$, which quantifies the sampling stability of the values of \bar{x} around their expected value $E(\bar{x})$.

(b) The Accuracy of Individual Sample Estimates

In educational settings the researcher is usually dealing with a single sample of data and not with all possible samples from a population. The variance of sample estimates therefore cannot be calculated in the manner described above. However, for many sample designs based on strict probability sampling methods, statistical theory may be used to provide estimates of the variance based on the internal evidence of a single sample of data.

In the case of a simple random sample of n elements drawn without replacement from a population of N elements, the variance of the sample mean may be estimated from a single sample of data by using the following formula:

$$\text{var}(x) = (N - n) / N \cdot s^2/n$$

where s^2 is the usual sample estimate of the variance of the element values in the population, (Kish, 1965 p. 41).

For sufficiently large values of N , the value of the “finite population correction”, $(N - n)/N$, tends toward unity. The variance of the sample mean in this situation may therefore be estimated by s^2/n .

The sampling distribution of the sample mean is approximately normally distributed for many survey research situations. The approximation improves with increased sample size – even though the distribution of elements in the parent population may be far from normal. This characteristic of sampling distributions is known as the Central Limit Theorem and it occurs not only for the sample mean but also for most estimators commonly used to describe survey research results (Kish, 1965).

From a knowledge of the properties of the normal distribution we know that we can be “68 percent confident” that the range $\bar{x} \pm \text{se}(\bar{x})$ includes the population mean, where \bar{x} is the sample mean obtained from a single sample and $\text{se}(\bar{x})$, often called the standard error, is the square root of $\text{var}(\bar{x})$. Similarly the range $\bar{x} \pm 1.96 \text{ se}(\bar{x})$ will include the population mean with 95 percent confidence.

While the above discussion has concentrated on sample means derived from simple random samples, the same approach may be used to establish confidence limits for many other statistics derived from various types of sample designs. For example, confidence limits may be calculated for complex statistics such as correlation coefficients, regression coefficients, and multiple correlation coefficients (Ross, 1978).

(c) Comparison of the Accuracy of Probability Samples

The accuracy of probability samples is usually considered by examining the variance associated with a particular sample estimate for a given sample size. This approach to the evaluation of sampling accuracy has generally been based on the recommendation put forward by Kish (1965) that the simple random sample design should be used as a standard for quantifying the accuracy of sample designs that incorporate such complexities as stratification and clustering. Kish introduced the term “deff” (design effect) to describe the ratio of the variance of the sample mean for a complex sample design (denoted c) to the variance of the sample mean for a simple random sample (denoted srs) of the same size.

$$\text{That is, } deff = \text{var}(\bar{x}_c) / \text{var}(\bar{x}_{srs})$$

For the kinds of complex sample designs that are commonly used in educational research, the values of $deff$ for many statistics are often greater than unity. Consequently, the accuracy of sample estimates may be grossly overestimated if formulae based on simple random sampling assumptions are used to calculate sampling errors. The potential for arriving at false conclusions by using incorrect sampling error calculations has been illustrated in a study carried out by Ross (1976).

An alternative approach to comparing the accuracy of probability samples is to calculate the “effective sample size”. For a given complex sample design (with a sample size of n_c), the effective sample size for a particular statistic (denoted n^* below) is equal the size of a simple random sample that has the same variance. By using a little algebra (Ross and Rust, 1997) the above equation may be transformed into an expression that relates the size of the complex sample, the design effect, and the effective sample size.

$$n^* = n_c / deff$$

(d) Error estimation for complex probability samples

The computational formulae required to estimate the variance of descriptive statistics, such as sample means, are available for some probability sample designs which incorporate complexities such as stratification and cluster sampling. However, for many commonly-employed statistics, the required formulae are not readily available for sample designs which depart markedly from the model of simple random sampling. These formulae are either enormously complicated or, ultimately, they prove resistant to mathematical analysis (Frankel, 1971). In the absence of suitable formulae, a variety of empirical techniques have emerged in recent years which provide “approximate variances that appear satisfactory for practical purposes” (Kish, 1978 p. 20). The most frequently applied empirical techniques may be divided into two broad categories: Subsample Replication and Taylor’s Series Approximation.

In Subsample Replication a total sample of data is used to construct two or more subsamples and then a distribution of parameter estimates is generated by using each subsample. The subsample results are analysed to obtain an estimate of the parameter, as well as a confidence assessment for that estimate (Finifter, 1972 p. 114). The main approaches in using this technique have been Independent Replication (Deming, 1960), Jackknifing (Tukey, 1958), Balanced Repeated Replication (McCarthy, 1966).

In the SACMEQ II Project it was decided calculate sampling errors by using the IIEPJACK software. This software was based on the Jackknife procedure, and its capacity to interface with the SPSS software system made it possible to quickly and easily prepare tabulations and associated sampling errors for all summary statistics employed in the research.

Evaluation of the SACMEQ Sample Designs

(a) Response Rates

In Table 2.6 the size of the planned and achieved samples have been presented for both the SACMEQ I and SACMEQ II Projects. The value of the achieved sample size as a percentage of the planned sample size represents the “response rate”. The response rate percentages for pupils and schools have been presented for the SACMEQ I Project in Table 2.7(a) and for the SACMEQ II Project in Table 2.7(b). The technical requirement for the SACMEQ research programme was that all countries should seek to achieve overall response rates of 90 percent

for schools and 80 percent for pupils.

From the first two columns of Table 2.7(a) it may be seen that for the SACMEQ I Project all countries achieved the required response rate for schools - however Malawi and Zambia experienced major losses of pupil data within responding schools and as a result achieved pupil response rates of only 64 percent and 78 percent, respectively. The SACMEQ II response rates presented in Table 2.7(b) showed that all countries satisfied the required response rate for schools – however both Tanzania and Zambia experienced considerable loss of data within schools. The pupil response rates for these countries were 77 percent and 75 percent, respectively, - which were fairly close to the goal of an 80 percent response rate.

Table 2.7(a): Response Rates, Design Effects, Effective Sample Sizes for SACMEQ I

School System	Response Rate (%)		Design Effect	Effective Sample Size
	Schools	Pupils	Reading	Reading
Kenya	99	87	10.1	322
Malawi	95	64	4.3	456
Mauritius	99	92	6.1	476
Namibia	100	90	13.3	335
Zambia	95	78	4.9	519
Zanzibar	100	89	1.6	1424
Zimbabwe	100	90	5.2	519

Table 2.7(b): Response Rates, Design Effects, Effective Sample Sizes for SACMEQ II

School System	Response Rate (%)		Design Effect		Effective Sample Size	
	Schools	Pupils	Reading	Math	Reading	Math
Botswana	100	98	5.1	4.9	649	682
Kenya	100	89	10.3	9.3	320	355
Lesotho	98	88	8.1	9.1	391	346
Malawi	100	83	5.3	3.7	442	621
Mauritius	96	93	5.9	5.8	496	495
Mozambique	98	88	4.0	4.2	800	740
Namibia	98	92	6.6	6.2	767	810
Seychelles	100	96	0.9	0.9	1603	1602
South Africa	91	85	17.1	13.6	185	230
Swaziland	99	92	9.4	8.1	333	389
Tanzania	98	77	8.9	6.7	321	423
Uganda	99	81	11.9	14.9	222	176
Zambia	99	75	7.3	6.1	359	424
Zanzibar	96	83	1.1	1.0	2234	2470

Table 2.8 : Values of the Coefficient of Intraclass Correlation for the Tests used in the SACMEQ I and SACMEQ II Projects

School System	SACMEQ I	SACMEQ II	
	Reading	Reading	Mathematics
	roh	roh	roh
Botswana	N/A	26	22
Kenya	42	45	38
Lesotho	N/A	39	30
Malawi	24	29	15
Mauritius	25	26	25
Mozambique	N/A	30	21
Namibia	65	60	53
Seychelles	N/A	8	8
South Africa	N/A	70	64
Swaziland	N/A	37	26
Tanzania	N/A	34	26
Uganda	N/A	57	65
Zambia	27	32	22
Zanzibar	17	25	33
Zimbabwe	27	N/A	N/A
SACMEQ II	33	37	32

(b) Intraclass Correlations

The coefficient of intraclass correlation may be used to measure the proportion of variance in pupil test scores that may be attributed to variation among schools. The coefficient is functionally related to the design effect such that a high value of the coefficient results in a high value of the design effect.

This linkage between the coefficient of intraclass correlation and the design effect implies that more sample schools are required in a country where the coefficient takes a high value than are required in a country where the coefficient takes a low value (in order to reach the same level of sampling accuracy). In Table 2.8 the values of the coefficient of intraclass correlation have been presented for the pupil tests used in the SACMEQ I and SACMEQ II Projects.

For both the reading and mathematics tests used in the SACMEQ II Project, the lowest values of the coefficient occurred for the Seychelles (0.08), Botswana and Mauritius (both around 0.25). In contrast, values in the range 0.50 to 0.70 occurred for Namibia, South Africa., and Uganda. The high values for Namibia were known prior to the completion of the SACMEQ II sample designs because they were calculated to be around 0.65 for the SACMEQ I reading test, and therefore a much larger sample of Namibian schools (275) was selected.

Unfortunately, the high values for South Africa and Uganda were not known beforehand, and the sample designs for these countries were based on “guesstimates” that the value of the intraclass correlation for each country was around 0.4. As a result the number of schools in the sample designs for these two countries was too small – which resulted in a shortfall in the effective sample sizes for these countries.

(c) Design Effects and Effective Sample Sizes

The design effect (Kish, 1965) provides an indicator of the increase in sampling variance that occurs for a complex sample in comparison with a simple random sample of the same size. The effective sample size (Ross, 1987) for a complex sample represents the size of a simple random that would have the same sampling accuracy as the complex sample. In the final columns of Table 2.7(b) and Table 2.7(b) the “design effect” and the “effective sample size” have been presented for the SACMEQ I reading test and the SACMEQ II reading and mathematics tests.

In the SACMEQ I Project two countries (Kenya and Namibia) had effective sample sizes that fell below the target value of 400 pupils; whereas in the SACMEQ II Project five countries (Kenya, Namibia, South Africa, Swaziland, and Seychelles) fell below the target value.

In the SACMEQ II Project, two school systems, South Africa and Uganda, fell far below the required target of an effective sample size of 400 pupils. In South Africa the values were 185 and 230 for reading and mathematics, respectively, and in Uganda the values were 222 and 176 for reading and mathematics, respectively.

The values of the “design effect” and the “effective sample size” have also been presented for various variables and a single country (Botswana) in Tables 2.9(a) and 2.9(b). To illustrate,

consider the design effect and effective sample size values in Table 2.9(a) for the pupil average reading score for Botswana overall. The design effect for this variable was 5.12, which indicated that the variance of the sample estimate of the variance of pupil reading scores for Botswana was 5.12 times larger than would be expected for a simple random sample of the same size (3322 pupils). The effective sample size for this variable indicated that the complex sample of 3322 pupils had a sampling variance that was the same as would have been obtained by employing a simple random sample of 649 pupils.

In Table 2.9(a) and Table 2.9(b) values of the design effect and the effective sample size have been presented for a selection of variables at different “levels” (pupil, teacher, and school head). The word “levels” here refers to the structure of the basic data file for the SACMEQ I and SACMEQ II Projects – in which the units of analysis were pupils – with teacher and school head data being disaggregated over pupils. This disaggregation of teacher and school head data in order to construct a “between-pupils” data file resulted in effective sample sizes for teacher variables that approached the total number of teachers, and effective sample sizes for school head variables that approached the total number of schools.

To illustrate, for Botswana overall the effective sample size for the “teacher academic education” variable was 311 (close to the total number of teachers in the survey), and for the “pupil-toilet ratio” variable was 171 (close to the total number of schools in the survey).

Table 2.9(a). Botswana overall: Sampling errors (SE), design effects, and actual/effective sample sizes for selected variables at the pupil, teacher, and school head levels

Variable	Mean	%	SE	Design Effect	Sample Size	
					Actual	Effective
At pupil level						
Pupil speaking English at home		74.0	1.34	3.08	3322	1077
Pupil being given reading homework		40.1	1.47	2.99	3322	1111
Reading pupil scores	521.1		3.47	5.12	3322	649
Mathematics pupil scores	512.9		3.15	4.87	3321	682
Average				3.38	3322	2141
At reading teacher level				12.39	3312 (393)	273
Teacher academic education	2.56		0.05	10.69	3322 (393)	311
Total classroom resources	6.43		0.12	14.59	3322 (393)	228
Available classroom library		81.2	2.50	13.65	3322 (393)	243
Sex of teacher		66.7	2.68	10.61	3282 (391)	309
Average				12.39	3312 (393)	273
At school head level						
Pupil-toilet ratio	44.43		2.15	19.43	3322 (170)	171
Total school resources	9.81		0.24	18.93	3322 (170)	176
Available school staff room		74.8	3.43	20.79	3322 (170)	160
Sex of school head		53.4	3.89	20.25	3322 (170)	164
Average				19.85	3322 (170)	168

Table 2.9 (b) Botswana Central Region: Sampling errors (SE), design effects, and actual/effective sample sizes for selected variables at the pupil, teacher, and school head levels

Variable	Mean	%	SE	Design Effect	Sample Size	
					Actual	Effective
At pupil level						
Pupil speaking English at home		66.7	3.55	2.80	493	176
Pupil being given reading homework		40.4	3.71	2.81	493	175
Reading pupil scores	506.1		6.56	3.51	493	140
Mathematics pupil scores	506.2		5.57	2.65	493	186
Average				2.46	493	268
At reading teacher level						
Teacher academic education	2.6		0.13	7.41	493 (64)	67
Total classroom resources	6.1		0.33	14.06	493 (64)	35
Available classroom library		81.7	6.59	14.28	493 (64)	35
Sex of teacher		71.5	7.45	13.45	493 (64)	37
Average				12.30	493 (64)	44
At school head level						
Pupil-toilet ratio	40.6		4.56	20.62	493 (25)	24
Total school resources	10.4		0.66	19.31	493 (25)	26
Available school staff room		72.1	9.89	23.98	493 (25)	21
Sex of school head		52.1	10.49	21.75	493 (25)	23
Average				21.42	493 (25)	24

(d) Sampling Errors

The calculation of sampling errors for the SACMEQ Projects needed to acknowledge that the samples were not simple random samples - but rather complex two-stage cluster samples that included weighting adjustments to compensate for variations in selection probabilities. The IIEP's specialized sampling software (IIEPJACK) was used to make these calculations.

In the SACMEQ I and SACMEQ II national policy reports the sampling errors were calculated for each summary statistic, and they were labelled "SE" in the completed Dummy Tables. For example, consider the statistics reported for Botswana overall in Table 2.9(a) and the Central Region of Botswana in Table 2.9(b).

In Table 2.9(a) the pupil average reading score for Botswana overall was 521.1 and the standard error of sampling was 3.47. These figures indicated that one could be 95 percent confident that the population average for pupils in Botswana on the reading test was within the following limits: $521.1 \pm 2(3.47)$. That is, between 514.2 and 528.0. Similarly, in Table 2.9(b) the pupil average reading score for the Central Region in Botswana was 506.1 and the standard error of sampling was 6.56. These figures indicated that one could be 95 percent confident that the population value for pupils in Botswana's Central Region was within the following limits: $506.1 \pm 2(6.56)$. That is, between 493.0 and 519.2.

When data are collected using multi-stage sample designs from sources at different levels of aggregation (pupil, teacher, school) a great deal of care needs to be taken in interpreting the stability of sample estimates of population characteristics. For the SACMEQ Projects, the data analyses were undertaken at the between-pupils level. That is, data collected from teachers and school heads were disaggregated across the pupil data files before the data analyses were undertaken.

The interaction of sample design and level of data analysis required that extra caution be used in interpreting estimates obtained by using information from teachers or school heads. The sampling errors of estimates derived from these two "disaggregated sources" were far larger than figures generated by using standard statistical software packages.

Part C: The Construction of Tests for the SACMEQ II Project

The Main Steps in Test Construction

The following discussion provides information about the construction of the SACMEQ II reading and mathematics tests for pupils and teachers, and the scaling procedures that were used to calibrate test items and to permit pupil and teacher performance to be described in terms of hierarchies of competencies. The procedures used to construct the SACMEQ I reading test for pupils have already been presented in the national policy reports prepared for the seven countries that completed this project (Kulpoo, 1998; Machingaidze et al, 1998; Milner et al, 2001; Nassor and Ali Mohammed, 1998; Nkamba and Kanyika, 1998; Nzomo et al, 2001; Voigts, 1998). The testing undertaken for the SACMEQ II Project was far more extensive than for the SACMEQ I Project – with both Grade 6 pupils and their teachers being given both reading and mathematics tests.

The test construction for both projects was undertaken carefully so as to ensure that the structure of the pupil tests was congruent with the content (domains) and behaviours (skills) derived from detailed analyses of the curricula, syllabi, exams, and textbooks used in the SACMEQ countries.

The SACMEQ II tests for pupils and teachers included “overlapping” test items selected from five earlier studies: the Zimbabwe Indicators of the Quality of Education Study (Ross, 1995), the SACMEQ I and SACMEQ II Projects, the IEA’s Third International Mathematics and Science Study (TIMSS) (Mullis et al, 2001), and the IEA’s International Study of Reading Literacy (IRL) (Elley, 1992). These “overlaps”, when combined with Rasch item analysis and test scoring techniques, made it possible to make valid comparisons among the following groups of respondents: pupils with teachers in the SACMEQ II Project, pupils in the SACMEQ I Project with pupils in the SACMEQ II Project, and pupils in both SACMEQ Projects with pupils in the IEA’s TIMSS and IRL studies. In Appendix F and Appendix G the overlaps of test items across all of these studies have been presented in tabular form. For example, the 66th reading test item listed in Appendix F was located in the SACMEQ I pupil test (“ptembo05”), the SACMEQ II pupil test (“pread17”), the SACMEQ II teacher test

(“tread04”), and the pupil test used in the Zimbabwe Indicators of the Quality of Education Study (“tembo05”).

In Figure 2.3 the key steps involved in constructing the SACMEQ II tests have been presented in diagrammatic form. The main aim of this process was to ensure high levels of face validity and construct validity by achieving congruence between the test blueprint (prepared as a framework for test construction) and the descriptions of increasing levels of competence generated from a Rasch analysis of the item difficulty levels in combination with a skills audit of test items.

The selection of teacher test items had to cover the full range of pupil item difficulties – but did not contain too many easy pupil test items. In addition, in order not to antagonize teachers with an extended testing session, the teacher tests had a much smaller number of test items than the pupil tests.

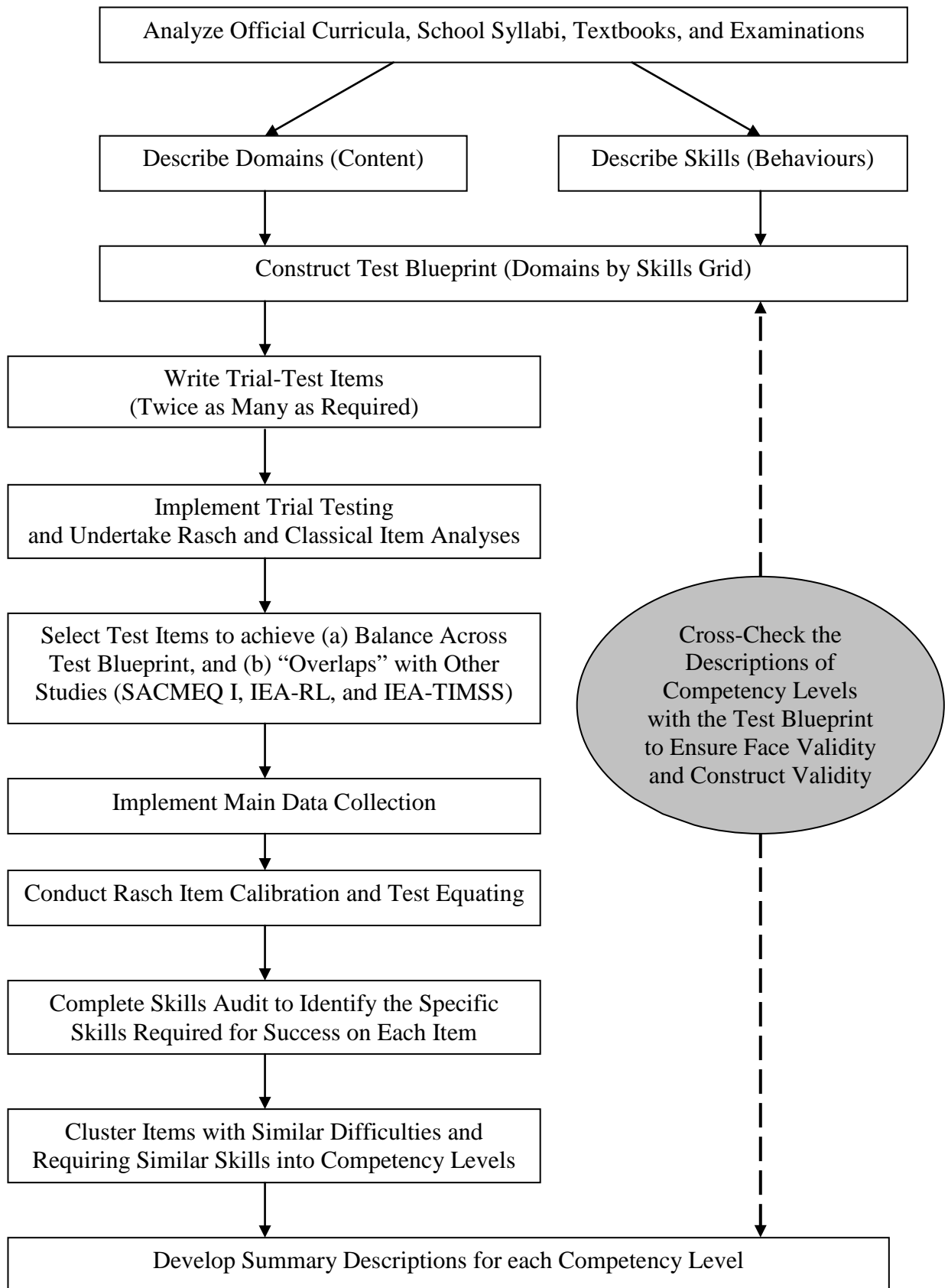


Figure 2.3: Main Steps Involved in Test Construction for the SACMEQ II Project

The Structure of the SACMEQ II Reading Tests

(a) The Definition of “Reading Literacy”

In the SACMEQ II Project “reading literacy” was defined as “ the ability to understand and use those written language forms required by society and/or valued by the individual.”

This was the agreed definition that was used by the 35 countries that participated in the International Reading Literacy Study that was conducted by the International Association for the Evaluation of Educational Achievement (Elley, 1992). It was also the general definition accepted by the SACMEQ National Research Coordinators (NRCs) for the SACMEQ I Project. The NRCs found this definition to be general enough to accommodate the diversity of traditions and languages represented in the SACMEQ countries, and yet still sufficiently specific to provide guidance for test construction.

(b) The Three Reading Domains

In both SACMEQ Projects there was an initial detailed curriculum analysis undertaken across all countries in order to define – after exhaustive discussion of the most important skills contained within the reading curricula at Grade 6 level - the reading skills that were considered by all countries to be the most important. The NRCs invested a great deal of time in this process because they wanted to enhance the validity of the tests by ensuring that they provided a balanced coverage of the main reading domains and the required reading skills. The NRCs decided to accept the three broad content domains for reading literacy (presented in Figure 2.4) that had been adopted for the International Reading Literacy Study, and also previously applied by the NRCs in the SACMEQ I Project.

Narrative prose: Continuous texts in which the writer aims to tell a story – whether this be fact or fiction.

Expository prose: Continuous text in which the writer aims to describe, explain, or otherwise convey factual information or opinion to the reader.

Documents: Structured information organized by the writer in a manner that requires the reader to search, locate, and process selected facts, rather than to read every word of a continuous text.

Figure 2.4: **The Three Domains for the SACMEQ II Reading Test**

(c) A “Proposed” Hierarchy of Reading Skills

It was decided that the construction of the SACMEQ II test should draw upon advanced psychometric procedures that would enable the establishment of a meaningful dimension of increasing competence that could be applied to both the SACMEQ I and II reading tests. This outcome was highly desirable because it permitted valid comparisons to be made of the reading performance of countries across the two projects.

Level 1: Pupils at this level should be able to link words and pictures where the pictures depict common objects of a “concrete” nature.

Level 2: Pupils at this level should be able to link words to more abstract concepts such as propositions of place and direction, and, perhaps, ideas and concepts such as comparatives and superlatives (happiest, biggest, below, etc.)

Level 3: Pupils at this level should be able to link words (such as a phrase or short sentence) from one setting to words in another setting where there is a word match between the two settings.

Level 4: Pupils at this level should be able to deal with longer passages of text that contain a sequence of ideas and content, and that require understanding derived from an accumulation of information gathered by reading forward.

Level 5: Pupils at this level should be able to read forwards or backwards through a text in order to: confirm understanding, or link new information with a piece of information encountered previously, or link ideas from separate parts of a text, or demonstrate the capacity to infer an author’s intention.

Figure 2.5: The “Proposed” Skill Levels for the SACMEQ II Reading Test

The first step in achieving this result was to undertake an intensive examination of curricula in order identify descriptive skill levels that would define a recognizable and meaningful dimension. This dimension, taken in combination with the three domains of reading, formed a framework (or blueprint) for the construction of suitable test items. Five reading skill levels were identified as shown in Figure 2.5. This step may be described as building a “proposed” hierarchy of reading skills.

(d) Constructing the Test Blueprint by Combining Domains with Skill Levels

The NRCs recognized that each of the skill levels specified in Figure 2.5 needed to be carefully interpreted within the context of the kind of text (or reading domain) that was being encountered by pupils. That is, for any single level, the description of the skills

had to be refined in order to more closely reflect whether the reader was dealing with, for example, a fictional story (narrative), a factual account (expository), or a graph, chart, or diagram (document). The NRCs deliberated on this matter for some time and then proceeded to examine the intersections of the three reading domains (Figure 2.4) with the five skill levels (Figure 2.5) in order to form the test blueprint (Figure 2.6).

The skill descriptions in each cell of the blueprint showed how reading behaviour increased in complexity through each of the five skill levels for each of the three domains. The numbers of items in the cells in Figure 2.6 were approximately in proportion to the time spent on parts of the reading curriculum in the SACMEQ countries, and they reflected the advice received from national curriculum experts.

Skill Level	Reading Domain			
	Narrative	Expository	Documents	
Level 1	Word/picture association involving positional or directional prepositions requiring the linkage of a picture to a position or a direction in order to answer the question	Word/picture association involving positional or directional prepositions requiring the linkage of a picture to a position or a direction in order to answer the question	Word/picture association involving positional or directional prepositions requiring the linkage of a picture to a position or a direction in order to answer the question	
Items	2	2	2	6
Level 2	Recognising the meaning of a single word and being able to express it as a synonym in order to answer the question	Recognising the meaning of a single word and being able to express it as a synonym in order to answer the question	Linking simple piece of information to item or instruction	
Items	7	6	9	22
Level 3	Linking information portrayed in sequences of ideas and content, when reading forward	Linking information portrayed in sequences of ideas and content, when reading forward	Systematic search for information when reading forward	
Items	8	10	8	26
Level 4	Seeking and confirming information when reading backwards through text	Seeking and confirming information when reading backwards through text	Linking more than one piece of information in different parts of a document	
Items	9	5	4	18
Level 5	Linking ideas from different parts of text. Making inferences from text or beyond text, to infer author's values and beliefs	Linking ideas from different parts of text. Making inferences from text or beyond text.	Use of embedded lists and even subtle advertisements where the message is not explicitly stated	
Items	6	3	2	11
Total Items	32	26	25	83

Figure 2.6: The Test Blueprint for the SACMEQ II Pupil Reading Test

In the final version of the SACMEQ II reading test there was a total of 83 test items, with (a) 32, 26, and 25 items allocated to the narrative, expository, and documents domains, respectively; and (b) 6, 22, 26, 18, and 11 items set at skill levels 1 to 5, respectively.

The Structure of the SACMEQ II Mathematics Tests

(a) The Definition of “Mathematics Literacy”

In the SACMEQ II Project “mathematics literacy” was defined as “the capacity to understand and apply mathematical procedures and make related judgements as an individual and as a member of the wider society.”

This broad interpretation – with an emphasis on both understanding and decision-making – was prepared to ensure that the mathematics tests were not overly concentrated on mechanical rules and calculations. It was derived by the NRCs following an analysis of the mathematics content domains specified by the International Association for the Evaluation of Educational Achievement (IEA) (Mullis et al., 2001) and the Organization for Economic Cooperation and Development (OECD, 2000). These two frameworks were constructed with widespread participation and reviews by educators around the world – and took into consideration the intended (school system) curriculum, the implemented (school level) curriculum, and the attained curriculum. The IEA identified five mathematics domains: number, algebra (which at the primary school level was called “patterns, equations, and relationships”), measurement, geometry, and data. In contrast the OECD focussed on what their research teams referred to as the “big ideas” in primary school: “change and growth” and “space and shape”.

(b) The Three Mathematics Domains

Unlike the OECD study - which focussed on more generic skills, the SACMEQ II Project was concerned with skills related to the school curriculum. The SACMEQ NRCs therefore used the slightly more detailed IEA domains as a beginning point for an extensive investigation of curricula, textbooks, and examinations for Grade 6 pupils within SACMEQ school systems. On the basis of this work the IEA framework was modified in order to bring it into alignment with what was actually being taught in SACMEQ classrooms in Southern and Eastern Africa. The first IEA domain, “number”, was retained. The second, “algebra”, was not seen as being relevant at the Grade 6 level in African schools, and was therefore removed. The third, “measurement”, was retained. The fourth, “geometry”, was re-expressed by the NRCs

as “space” and then combined with the IEA’s fifth domain of “data” to form a domain of “space-data”.

The final domains selected by the NRCs for the SACMEQ II mathematics tests were focussed on the three areas listed in Figure 2.7.

Number: Operations and number line, square roots, rounding and place value, significant figures, fractions, percentages, and ratios.

Measurement: Measurements related to distance, length, area, capacity, money, and time.

Space-Data: Geometric shapes, charts (bar, pie, and line), and tables of data.

Figure 2.7: The Three Domains for the SACMEQ II Mathematics Test

(c) A “Proposed” Hierarchy of Mathematics Skills

A detailed investigation of the tasks given to pupils (problems, exercises, test questions, exam questions, etc.) across curricula for the 15 SACMEQ school systems enabled the NRCs to specify a set of descriptive skill levels that defined a recognizable and meaningful dimension of mathematics performance. A total of five mathematics skill levels were identified as shown in Figure 2.8. This step may be described as

Level 1: Pupils at this level should be able to identify simple shapes and link simple patterns and shapes to simple digits, to recognize units of measurement, to name basic shapes, and to undertake simple single operations using up to two-digit numbers.

Level 2: Pupils at this level should be able to recognize simple fractions in both numerical and graphical forms, to identify data presented in tables, to make basic calculations using simple measurement units, and to understand numeration with simple computations.

Level 3: Pupils at this level should be able to extend and complete number patterns, to translate shapes and patterns, and to convert measurement units when making simple single-step calculations.

Level 4: Pupils at this level should be able to combine operations in order to link information from tables and charts in performing calculations, to apply two or three-step number operations applied to measurement and conversion problems, and to identify and use appropriate information in the subsequent steps of a calculation.

Level 5: Pupils at this level should be able to make calculations and interpretations linking data from tables and graphs, and to make computations involving several steps and a mixture of operations using fractions, decimals, and whole numbers.

Figure 2.8: The “Proposed” Skill Levels for the SACMEQ II Mathematics Test

building a “proposed” hierarchy of mathematics skills.

(d) Constructing a Mathematics Test Blueprint by Combining Domains with Skill Levels

The NRCs followed the approach used for the construction of the reading tests by combining the mathematics skill levels with mathematics domains to develop a test blueprint. For each skill level this provided a tighter definition of competencies by linking mathematical content to mathematical skills. The level of complexity and skill required also increased within each domain from level to level.

Following extensive discussions and consultations with mathematics education specialists, the NRCs produced Figure 2.9 – which linked domains with skills and gave guidance for the numbers of test items that were required. There were fewer test questions for the mathematics test because each item represented an individual separate task – whereas the reading test was actually based on single passages of text – each of which was attached to sets of items. In the final version of the SACMEQ II pupil mathematics test there was a total of 63 test items, with 27, 18, and 18 items allocated to the number, measurement, and space-data domains, respectively, and 6, 20, 17, 12, and 8 items set at skill levels 1 to 5, respectively.

Skill Level	Mathematics Domain		
	Number	Measurement	Space-Data
Level 1	Recognize numbers. Link patterns to numbers.		
Items	6	0	0
Level 2	Apply single operations to two digit numbers or simple fractions.	Recognize units of measurement. Apply basic calculations using simple measurement units.	Link patterns and graphs to single digits. Recognize and name basic shapes.
Items	8	8	4
Level 3	Extend and complete number patterns.	Convert measurement units when undertaking one-step operations.	Translate shapes and patterns. Identify data in tabular form.
Items	6	4	7
Level 4	Combine arithmetic operations in order to link information from tables and charts when performing calculations.	Apply two and three-step arithmetic operations to numbers. Use and convert measurement units.	Combine arithmetic operations in order to link information from tables and charts.
Items	4	4	4
Level 5	Combine operations in order to make calculations involving several steps and a mixture of operations using combinations of fractions, decimals, and whole numbers.	Combine operations in order to make calculations involving several steps and a mixture of operations using a translation of units.	Link data from tables and graphs in order to make calculations involving several steps and a mixture of operations.
Items	3	2	3
Total Items	27	18	18

Figure 2.9: The Test Blueprint for the SACMEQ II Pupil Mathematics Test

Constructing “Overlapped Tests” to Use in Scaling

When the NRCs had completed the reading and mathematics test blueprints, they worked in teams to either select or write all of the required test items for the SACMEQ II tests. As items were prepared they were classified according to the cells in the test blueprints. For each cell twice as many items as required were prepared so that the rejection of poor items after the trial testing did not result in a shortage of items in some cells. Most test items were in multiple-choice format with four options per item. The item pools were then sent to all countries for review by panels of curriculum specialists. This resulted in editorial changes to the items and recommendations for additional items by the panel members who made sure that the items met the requirements of the respective national curricula.

The data from the trial-testing phase were subjected to Rasch and Classical item analyses in order to detect items that did not “fit” the relevant scales, or that were “behaving differently” across subgroups of respondents defined by gender and country. The poor quality test items were rejected – keeping in mind the need to prepare a “balanced” test across skill levels and domains.

In the case of the measurement of reading performance, there were three groups of respondents: the SACMEQ I pupils, the SACMEQ II pupils, and the SACMEQ II teachers. Each group completed a reading test that was “different but overlapped”. That is, each group completed a reading test that contained some unique test items and some items that also appeared on one or both of the other two tests. In the case of numeracy measurement, the tests were also “different but overlapped”, however there were only two groups of respondents: the SACMEQ II pupils and SACMEQ II teachers. The various overlaps of test items have been presented in diagrammatic form in Figures 2.10 and 2.11.

Although data were gathered at different time points for the SACMEQ I (1995-1997) and SACMEQ II (2000-2002) projects, Figures 2.10 and 2.11 suggest that it is possible to think of the reading and mathematics tests used in the projects as two “artificial” or “composite” tests of 148 different reading items and 91 mathematics items, respectively. This conceptualisation of the tests implies that the three sets of reading test respondents and the two sets of mathematics test respondents can each represent a

single group of respondents for the purposes of undertaking “concurrent” scaling of the tests using the Rasch Model.

For the 148-item “composite” reading test described in Figure 2.10 there were 36 items that came only from the SACMEQ I pupil reading test (part g of the diagram), 52 test items that came only from the SACMEQ II pupil reading test (part a of the diagram), and 26 items that came only from the SACMEQ II teacher reading test (part e of the diagram). An additional 34 items were located in more than one test (parts b, c, d, f of the diagram), with 9 of these items being located in all three tests (part c of the diagram), and 3 sets of items (parts b, d, and f of the diagram) associated with pairs of tests. For the 91-item “composite” mathematics test described in Figure 2.11 there were 50 items that came only from the SACMEQ II pupil mathematics test (part a of the diagram), and 28 items that came only from the SACMEQ II teacher mathematics test (part c of the diagram). An additional 13 items were located in both tests (part b of the diagram).

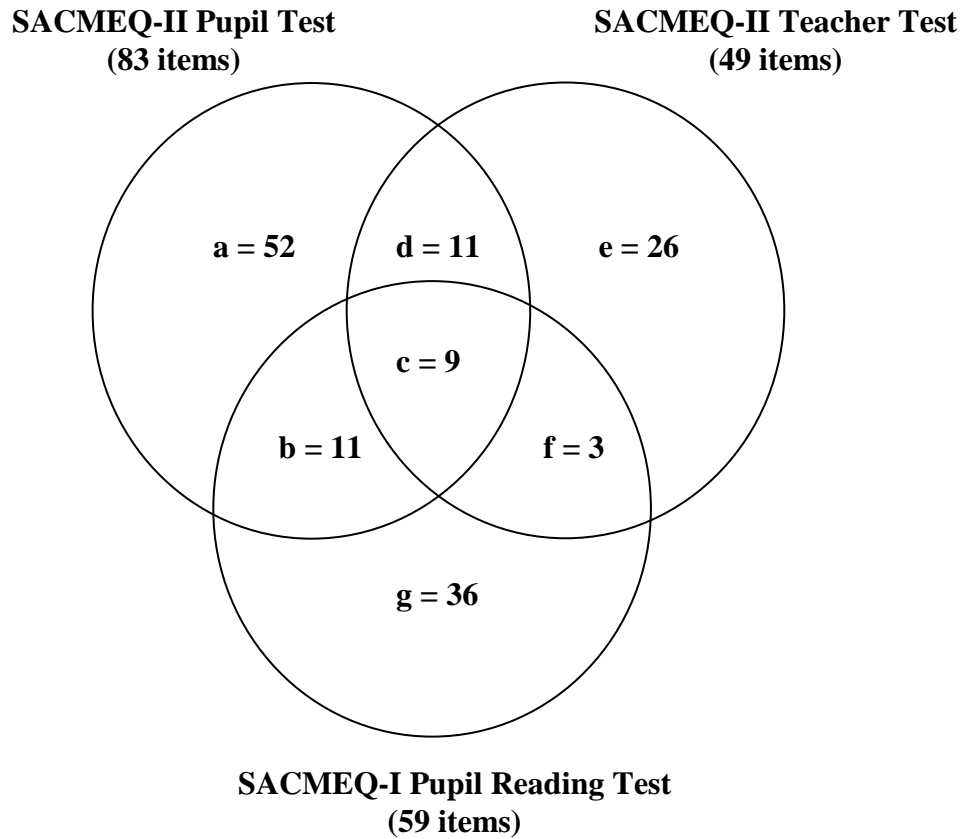


Figure 2.10: The 148 Reading Items for Three Groups of Respondents Taking “Different but Overlapped” SACMEQ Reading Tests

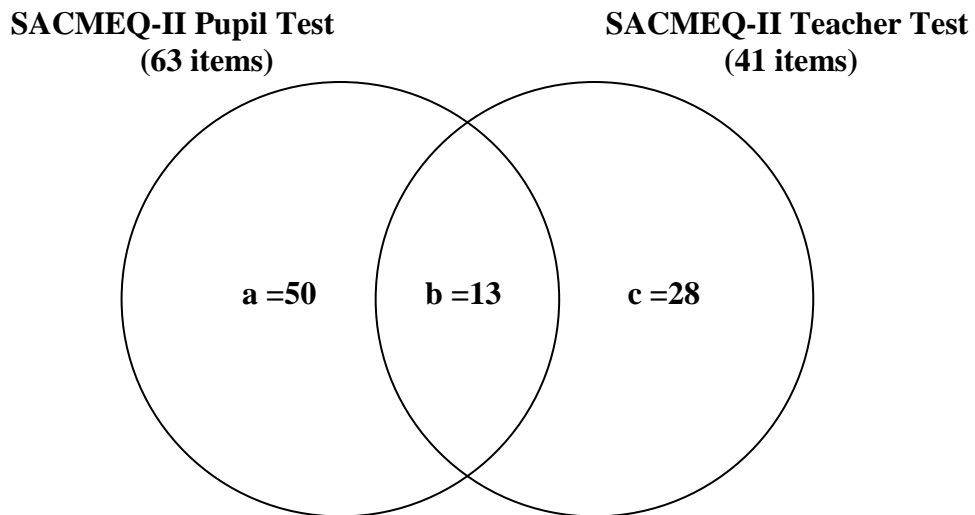


Figure 2.11: The 91 Mathematics Items for Two Groups of Respondents Taking “Different but Overlapped” SACMEQ Maths Tests

SACMEQ-II Pupils	a 52 items	b 11 items	c 9 items	d 11 items	e --	f --	g --
SACMEQ-II Teachers	a --	b --	c 9 items	d 11 items	e 26 items	f 3 items	g --
SACMEQ-I Pupils	a --	b 11 items	c 9 items	d --	e --	f 3 items	g 36 items

Figure 2.12: The Data Matrix Developed for Scaling the 148 Reading Items
Contained within the SACMEQ Reading Tests

SACMEQ-II Pupils	a 50 items	b 13 items	c --
SACMEQ-II Teachers	a --	b 13 items	c 28 items

Figure 2.13: The Data Matrix Developed for Scaling the 91 Items Contained within
the SACMEQ Mathematics Tests

The data matrices used in the Rasch analyses have been presented in diagrammatic form in Figures 2.12 and 2.13. The blank areas of the diagram (denoted by “—”) refer to items not given to respondents. For example, the SACMEQ II pupils received blocks of reading test items that have been labelled in Figure 2.12 as a, b, c, and d. These pupils did not receive the blocks of reading test items in Figure 2.12 that have been denoted by “—” and labelled e, f, and g.

The data matrix used in the Rasch analyses to scale the 148 reading items was constructed by combining data from the three groups of respondents – with valid response codes in the matrix columns referring to each group’s own test, and “missing data” codes in the matrix columns referring to items only found in either or both of the other two tests.

Similarly, the data matrix used to scale the 91 mathematics items was constructed by combining data from two groups of respondents – with valid response codes in the matrix columns referring to each group’s own test, and “missing data” codes in the

matrix columns referring to items only found in the other test. While the computer software treated these columns as “missing data”, in fact these items were not actually given to these respondents.

The two data matrices were analysed using computer software that applied the Rasch Model of measurement (Andrich and Luo, 2000). The first step was to calibrate the test items by calculating the Rasch difficulty values for each item within the 148-item reading test and the 91-item mathematics test. This step was conducted by using an input data file constructed from a simple random sample of pupils and teachers from each school system. The results of the calibration were then used to calculate reading and mathematics scores for all pupils.

Construction of Test Items for the Teacher Tests

The main challenge in the construction of the reading and mathematics tests for teachers was to “fine-tune” the difficulty range of test items so that it would suit the higher levels of competence that were expected of teachers. At the same time it was necessary to ensure that there was sufficient “item overlap” with the pupil tests to permit the performance of teachers and pupils to be measured on the same scale.

In the reading test for teachers, several passages were selected because of the more subtle nature of the messages that they conveyed, and the less-visible underlying assumptions of the writers. For example, one passage on the topic of “smoking” required the teachers to identify the unstated values and beliefs of the writer. Another passage on the topic of “effective thinking” required the teachers to identify assumptions made by the writer about the readers and their knowledge of the topic. These kinds of skills were far beyond the competencies that had been identified from the analyses of Grade 6 curricula.

The “extra” reading and mathematics items for teachers were expected to assess the higher competence levels of teachers – but not to be so difficult that the teachers would be daunted by the challenge. In addition, the selection of easier test items that “overlapped” with the pupil tests had to be made with extreme care because the teachers may have felt insulted if these items were ridiculously easy or if they were concerned with issues that would only interest young children.

In the teacher reading test the extended levels of competence mainly focussed on expository texts – rather than on documents or narratives. It was felt that the use of narratives and documents at this level would have required very complex and long texts that would have generally extended the time required to complete the test.

In the teacher mathematics test the extended levels of competence mainly emphasized problem solving strategies that required the extraction of information from verbal, graphic, or tabular presentations. For these items, the teachers were expected follow three steps: to identify the nature of the problem, to transform the problem into mathematical language, and to solve the problem. In some cases this required the rearrangement of information, and in others it meant translating the problem into one or more equations and then solving the equations.

Using a “Skills Audit” to Identify “Derived” Competence Levels

The SACMEQ tests had been prepared according to systematically-generated test blueprints that described “proposed” levels of competence in reading and mathematics. The results of the Rasch analyses provided a means of assessing whether the levels proposed in the test blueprints in Figures 2.6 and 2.9 were congruent with a detailed examination of the actual test items located at different difficulty levels along the dimensions that had been generated. The descriptions that were obtained after the NRCs had conducted the skills audit were called “derived” levels of competence. The skills audit analyses focussed on the matter of whether the NRCs had actually been able to write test items that were aligned along the five increasing skill levels proposed in the test blueprints.

To address this issue the NRCs examined the 148 items in the “hypothetical” reading test in Figure 2.10 and the set of 91 items in the “hypothetical” mathematics test in Figure 2.11. The two sets of items were first arranged in order of difficulty, and then examined item-by-item in order to describe the specific skills required to provide correct responses. When items had been linked to specific skills they were placed into groups of test items such that the items in each group had similar difficulty values and shared a common “theme” with respect to the underpinning competencies required to provide correct responses.

The three tasks of defining specific skills for each test item, identifying groups of items with similar difficulties, and then naming the “theme” (or competency level) linked to each group were extremely difficult because it required the NRCs to first reach agreement on how the respondents arrived at correct solutions, and to then name the competency required. This required the NRCs to use their practical knowledge of the ways in which pupils solve problems, and then to portray this with a meaningful description of the thought processes that had been applied. The next step was to compare the “proposed” levels of competence to the “derived” levels of competence in order to check the accuracy of the item writers’ skills and the validity of the test.

Reading and Mathematics Competencies Generated from the Skills Audit

The skills audit for the reading and mathematics tests resulted in the identification of eight levels of competence for each test. This was more than had been proposed in the test blueprints.

For both tests there was a strong correspondence between the descriptions of the five blueprint levels and most of the derived levels arising from the skills audit – which suggested that the three “extra” levels were defining more detail on the same reading and mathematics scales. That is, the overall dimensions remained substantially the same, but the skills audit meant that the empirically-generated (or “derived”) dimensions of reading and mathematics were, as expected, somewhat more detailed than the subjectively described (or “proposed”) dimensions used to stimulate test and item development.

Level 1: Pre Reading (Linked with Level 1 in the Test Blueprint)

(a) Skills: Matches words and pictures involving concrete concepts and everyday objects. Follows short simple written instructions.

(b) Example Test Items

- locate familiar words in a short (one line) text
- match words to pictures
- follow short and familiar instructions

Level 2: Emergent Reading (Linked with Level 2 in the Test Blueprint)

(a) Skills: Matches words and pictures involving prepositions and abstract concepts; uses cuing systems (by sounding out, using simple sentence structure, and familiar words) to interpret phrases by reading on.

(b) Example Test Items

- read familiar words and identify some new words
- use simple and familiar prepositions and verbs to interpret new words
- match words and very simple phrases

Level 3: Basic Reading (Linked with Level 3 in the Test Blueprint)

(a) Skills: Interprets meaning (by matching words and phrases, completing a sentence, or matching adjacent words) in a short and simple text by reading on or reading back.

(b) Example Test Items

- use context and simple sentence structure to match words and short phrases
- use phrases within sentences as units of meaning
- locate adjacent words and information in a sentence

Level 4: Reading for Meaning (Linked with Level 4 in the Test Blueprint)

(a) Skills: Reads on or reads back in order to link and interpret information located in various parts of the text.

(b) Example Test Items

- interpret sentence and paragraph level texts
- match phrases across sentences
- read forwards and backwards in order to locate information in longer texts

Figure 2.14: Levels of Reading Competency Generated from Skills Audit

Level 5: Interpretive Reading (Linked with Level 5 in the Test Blueprint)

(a) Skills: Reads on and reads back in order to combine and interpret information from various parts of the text in association with external information (based on recalled factual knowledge) that “completes” and contextualizes meaning.

(b) Example Test Items

- locate, interpret, and read forward to join two pieces of adjacent information
- use multiple pieces of information to interpret general purpose of a document
- paraphrase and interpret a single non-adjacent piece of information

Level 6: Inferential Reading (Linked with Level 5 in the Test Blueprint)

(a) Skills: Reads on and reads back through longer texts (narrative, document or expository) in order to combine information from various parts of the text so as to infer the writer’s purpose.

(b) Example Test Items

- interpret, and make inferences from, different types of texts by reading backwards and forwards to confirm links between widely separated information pieces
- extract information from a non-traditional (left to right) document
- make judgments about an author's intentions or purpose beyond the text content

Level 7: Analytical Reading (Linked with Level 5 in the Test Blueprint)

(a) Skills: Locates information in longer texts (narrative, document or expository) by reading on and reading back in order to combine information from various parts of the text so as to infer the writer’s personal beliefs (value systems, prejudices, and/or biases).

(b) Example Test Items

- combine several pieces of information from a range of locations in complex and lexically dense text or documents
- analyse detailed text or extended documents for an underlying message
- identify meaning from different styles of writing

Level 8: Critical Reading (A New Level Generated from the Skills Audit)

(a) Skills: Locates information in a longer texts (narrative, document or expository) by reading on and reading back in order to combine information from various parts of the text so as to infer and evaluate what the writer has assumed about both the topic and the characteristics of the reader – such as age, knowledge, and personal beliefs (value systems, prejudices, and/or biases).

(b) Example Test Items

- use text structure and organisation to identify an author's assumptions and purposes
- identify an author's motives, biases, beliefs in order to understand the main theme
- link text to establish multiple meanings including analogy and allegory

Figure 2.14 (Ctd.): Levels of Reading Competency Generated from Skills Audit

Level 1: Pre Numeracy (Linked with Level 1 in the Test Blueprint)

(a) Skills: Applies single step addition or subtraction operations. Recognizes simple shapes. Matches numbers and pictures. Counts in whole numbers.

(b) Example Test Items

- count illustrated objects
- recognise basic numbers and shapes
- carry out simple single operations of addition and subtraction

Level 2: Emergent Numeracy (Linked with Level 1 in the Test Blueprint)

(a) Skills: Applies a two-step addition or subtraction operation involving carrying, checking (through very basic estimation), or conversion of pictures to numbers. Estimates the length of familiar objects. Recognizes common two-dimensional shapes.

(b) Example Test Items

- link simple verbal, graphic, and number forms with single arithmetic operations on whole numbers up to four digits
- recognise common shapes or figures in two dimensions
- estimate accurately lengths of simple shapes

Level 3: Basic Numeracy (Linked with Level 2 in the Test Blueprint)

(a) Skills: Translates verbal information presented in a sentence, simple graph or table using one arithmetic operation in several repeated steps. Translates graphical information into fractions. Interprets place value of whole numbers up to thousands. Interprets simple common everyday units of measurement.

(b) Example Test Items

- recognise three-dimensional shapes and number units
- use a single arithmetic operation in two or more steps
- convert in single step units using division

Level 4: Beginning Numeracy (Linked with Level 3 in the Test Blueprint)

(a) Skills: Translates verbal or graphic information into simple arithmetic problems. Uses multiple different arithmetic operations (in the correct order) on whole numbers, fractions, and/or decimals.

(b) Example Test Items

- convert units in two steps and count tabulated data
- analyse a visual prompt and interpret triangular shapes
- translate verbal to arithmetic form using two operations on fractions

Figure 2.15: Levels of Mathematics Competency Generated from Skills Audit

Level 5: Competent Numeracy (Linked with Level 3 in the Test Blueprint)

(a) Skills: Translates verbal, graphic, or tabular information into an arithmetic form in order to solve a given problem. Solves multiple-operation problems (using the correct order of arithmetic operations) involving everyday units of measurement and/or whole and mixed numbers. Converts basic measurement units from one level of measurement to another (for example, metres to centimetres).

(b) Example Test Items

- convert basic measurement units
- understand the order of magnitude of simple fractions
- conduct multiple steps with a range of basic operations in a strict sequence using an analysis of a short verbal or visual prompt

Level 6: Mathematically Skilled (Linked with Level 4 in the Test Blueprint)

(a) Skills: Solves multiple-operation problems (using the correct order of arithmetic operations) involving fractions, ratios, and decimals. Translates verbal and graphic representation information into symbolic, algebraic, and equation form in order to solve a given mathematical problem. Checks and estimates answers using external knowledge (not provided within the problem).

(b) Example Test Items

- perform complex and detailed mathematical tasks (involving considerable abstraction of verbal, visual, and tabular information into symbolic forms and algebraic solutions) using knowledge not supplied with the task
- use of an extended verbal or graphic prompt (involving an analysis of steps) to identify the correct sequence of calculations
- convert, and operate on, units of measurement (time, distance, and weight)

Level 7: Concrete Problem Solving (Linked with Level 5 in the Test Blueprint)

(a) Skills: Extracts and converts (for example, with respect to measurement units) information from tables, charts, visual and symbolic presentations in order to identify, and then solves multi-step problems.

(b) Example Test Items

- use multiple verbal order of steps with conversion of time units
- translate verbal to arithmetic form, apply units conversion with long division
- convert from mixed number fractions to decimals

Level 8: Abstract Problem Solving (A New Level Generated from the Skills Audit)

(a) Skills: Identifies the nature of an unstated mathematical problem embedded within verbal or graphic information, and then translate this into symbolic, algebraic, or equation form in order to solve the problem.

(b) Example Test Items

- identify the nature of a problem, translate the information given into a mathematical approach, and then identify the correct mathematical strategies to obtain a solution

Figure 2.15 (Ctd.): Levels of Mathematics Competency Generated from Skills Audit

The results of the skills audit have been presented in Figures 2.14 and 2.15. The NRCs decided to add a name to each of the levels – in order to summarize the competencies associated with each group. The first three competency levels in reading and mathematics employed the same prefixes (“Pre”, “Emergent”, and “Basic”) in order to reflect the mostly mechanical nature of the most elementary competencies. From the fourth level upwards the prefixes of the summary names were different and tended to reflect deeper levels of understanding of subject specific competencies.

The NRCs considered that the use of a skills audit to generate the eight levels presented in Figures 2.14 and 2.15 was important because the competencies provide a more concrete analysis of what pupils and teachers can actually do, and they also suggest instructional strategies relevant to pupils who are learning at each level of competence. Such descriptions are of great assistance for the construction of textbooks, the design of teacher in-service training programmes, and the development of general classroom teaching strategies - because all of these activities require a sound knowledge of the skills already acquired and the higher order skills that should be aimed at in order to transfer to the next stage of learning.

New levels were identified and derived through the skills audit, but as can be seen in Figures 2.14 and 2.15, the match between the “proposed” and “derived” levels in the dimensions of reading and mathematics competency were strikingly similar. This indicated that the NRCs had been quite successful in designing tests according to specifications as set out in the original test blueprints. It is also provided clear evidence of the content and construct validity of the reading and mathematics tests.

Some examples of test items for each of the eight competency levels in the reading and mathematics tests have been presented in Appendix H and Appendix I, respectively.

The Score Ranges for the Competency Levels

The software used to generate the Rasch reading and mathematics scores automatically adjusted the scores to a scale with an arbitrary zero point and a standard deviation of one. This meant that many pupils were assigned negative scores. Most educationalists are not comfortable with score patterns of this kind. Therefore it was decided to undertake a linear transformation of the reading and mathematics scores that would

result in the mean and standard deviation of pupil scores for the SACMEQ II tests being 500 and 100, respectively (for the pooled data with equal weight given to each country). As a result a score of 500 was equal to the average of all SACMEQ II country mean scores. The transformed scores have been referred to below as “500 Scores”.

The Rasch analysis made it possible for the ability of the pupils to be matched to the difficulty of the test items – which allowed pupils and items to be mapped onto the same scale. This meant that the pupils could also be grouped in the same “ability” or “difficulty” range as the items that had similar difficulty values. In Tables 2.10 and 2.11 the ranges of the “500 Scores” that define the eight reading and mathematics competency levels, respectively, have been presented. The two tables also contain the percentages of pupils and teachers that were located at each competency level.

Table 2.10: Reading Competency Levels Cut-off Points and Frequency Distributions

Reading Competency	Rasch Score Range	500 Score Range	Percentage at Competency Level (SE)		
			Pupils		Teachers
			SACMEQ I	SACMEQ II	SACMEQ II
1 : Pre Reading	Lte -1.765	Lte 373	3.2	6.7	0.1
2 : Emergent Reading	Gt-1.765- -1.332	Gt 73- 414	7.1	14.9	0.2
3: Basic Reading	Gt-1.332- -0.881	Gt414- 457	22.2	18.4	0.1
4: Reading for Meaning	Gt-0.881- -0.334	Gt457- 509	28.7	20.2	1.4
5: Interpretive Reading	Gt-0.334- 0.232	Gt509- 563	19.1	16.8	1.0
6: Inferential Reading	Gt 0.232- 0.807	Gt563- 618	9.3	10.7	4.1
7: Analytical Reading	Gt 0.807- 1.692	Gt618- 703	7.2	8.4	28.1
8: Critical Reading	Gt 1.692	Gt703-	3.3	3.8	65.0

Table 2.11 : Mathematics Competency Levels Cut-off Points and Frequency Distributions

Mathematics Competency	Rasch Score Range	500 Score Range	Percentage at Competency Level (SE)	
			Pupils	Teachers
			SACMEQ II	SACMEQ II
1 : Pre Numeracy	Lte -2.199	Lte364	6.2	0.0
2 : Emergent Numeracy	Gt-2.199- -1.325	Gt364- 462	34.3	0.0
3: Basic Numeracy	Gt-1.325- -0.709	Gt462- 532	29.8	0.9
4: Beginning Numeracy	Gt-0.709- -0.213	Gt532- 587	14.6	2.0
5: Competent Numeracy	Gt-0.213- 0.293	Gt587- 644	7.5	6.0
6: Mathematically Skilled	Gt 0.293- 0.962	Gt644- 720	4.6	16.7
7: Concrete Problem Solving	Gt 0.962- 1.728	Gt720- 806	2.2	36.0
8: Abstract Problem Solving	Gt 1.728	Gt806	0.9	38.5

Conclusion

The aim of this chapter was to describe the research procedures that were applied for the execution of the SACMEQ II Project. The chapter was prepared in three parts that covered the fourteen main phases of the research, the sample design procedures, and the construction of the reading and mathematics tests for pupils and their teachers.

The first part of the chapter described how the SACMEQ II Project commenced with an innovative “pre-planning” phase that underpinned the whole research design. During this phase key decision-makers in Ministries of Education were consulted concerning their “General Policy Concerns” – which were then collated across countries, grouped into five themes, and used as a foundation for the design of the whole data collection and the research reporting procedures.

One of the important messages that emerged from this part of the chapter was that the speed at which a cross-national research project proceeds is strongly influenced by the speed with which the slowest country can complete all aspects of its data collection and data preparation.

The second part of the chapter on sampling included an evaluation of the sampling procedures. The evaluation showed that nine countries satisfied the sampling accuracy requirements that had been set down for the SACMEQ II Project – by achieving equivalent sample sizes for the pupil tests that were in excess of 400 pupils. A further three countries (Kenya, Lesotho, and Swaziland) almost reached this standard by achieving equivalent sample sizes in the range of 350 to 390.

Unfortunately, the accuracy of the sampling in two countries (South Africa and Uganda) fell far below the 400 target – with South Africa and Uganda achieving equivalent sample sizes of only 230 and 176, respectively. These results indicated that care should be exercised in interpreting the reading and mathematics achievement levels that were obtained for these two countries, and also that even more care should be taken when examining within-country regional differences.

The third part of the chapter provided a detailed description of how the SACMEQ II Project moved away from traditional approaches to the calculation of test scores (based on numbers of correct responses to test items) towards the use of Modern Item Response Theory to generate descriptions of “levels of increasing pupil competence”. This approach to describing pupil reading and mathematics achievement offered a mechanism for describing the performance of pupils in a manner that was more meaningful within a teaching and learning context.

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Appendix A

General Policy Concerns, Specific Research Questions, and Dummy Tables for the Design of the SACMEQ II Project

General Policy Concern 1: What were the personal characteristics (for example, age and gender) and home background characteristics (for example, parent education, regularity of meals, home language, etc.) of Grade 6 pupils that might have implications for monitoring equity, and/or that might impact upon teaching and learning?

Specific Research Questions

- What was the age distribution of pupils?
Questionnaire: SI: P2; SII: P2
Dummy Table: 3.1(a), 3.1(b)
- What was the gender distribution of pupils?
Questionnaire: SI: P3 ; SII: P3
Dummy Table: 3.1(a), 3.1(b)
- What was the level of the parents' education?
Questionnaire: SI: P9, P10; SII: P11, P12
Dummy Table: 3.1(a), 3.1(b), 11.17(a), 11.17(b)
- How regularly did pupils eat meals?
Questionnaire: SI: P18; SII: P10
Dummy Table: 3.1(a), 3.1(b)
- What percentage of pupils spoke the language of the test at home?
Questionnaire: SI: P4; SII: P4
Dummy Table: 3.2(a), 3.2(b)
- Where did pupils live during the school week?
Questionnaire: SI: P5; SII: P5
Dummy Table: 3.3(a), 3.3(b)
- How many books were there in pupils' homes?
Questionnaire: SI: P6; SII: P6
Dummy Table: 3.1(a), 3.1(b)
- What other reading materials and electronic media did pupils have at home?
Questionnaire: SI: P8.01, P8.02, P8.03, P8.04, P8.05, P8.06, P8.07 ;
SII: P7.01, P7.02, P7.03, P7.04, P7.05, P07.06, P7.07
Dummy Table: 3.1(a), 3.1(b)
- What was the socio-economic status of pupils' parents in terms of possessions, housing conditions (lighting, floor, wall, roof), and livestock?
Questionnaire: SI: P8 ; SII: P7, P8, P9, P13, P14, P15
Dummy Table: 3.1(a), 3.1(b), 3.4(a), 3.4(b), 3.4(c), 3.4(d), 3.4(e), 3.5

General Policy Concern 2: What were the school context factors experienced by Grade 6 pupils (such as location, absenteeism (regularity and reasons), grade repetition, and homework (frequency, amount, correction, and family involvement)) that might impact upon teaching/learning and the general functioning of schools?

Specific Research Questions

- What was the location of the school?

Appendix A (Ctd.)

Questionnaire: SI: S11, S12; SII: S13, S14

Dummy Table: 7.2

- How many days were pupils absent in the previous month, and what were the reasons for these absences?

Questionnaire: SI: P19; SII: P16, P17

Dummy Table: 3.2(a), 3.2(b), 3.2(c)

- How many pupils had repeated a grade, and were they currently repeating Grade 6?

Questionnaire: SI: P23; SII: P18

Dummy Table: 3.2(a), 3.2(b)

- How frequently did pupils receive homework in reading and mathematics?

Questionnaire: SI: P11; SII: P33, P36

Dummy Table: 8.4(a)

- Did the teachers correct assigned homework?

Questionnaire: SII: P34, P37

Dummy Table: 8.4(b), 8.4(c)

- Did family members monitor, assist with, request demonstrations, ask questions about, and/or look at, pupils' homework?

Questionnaire: : SI: P12, P13, P14, P15, P16; SII: P24, P25, P26, P27, P28, P29, P30

Dummy Table: 9.7(a), 9.7(b), 9.7(c)

General Policy Concern 3: Did Grade 6 pupils have sufficient access to classroom materials (for example, textbooks, readers, and stationery) in order to participate fully in their lessons?

Specific Research Questions

- What percentage of students had reading and mathematics textbooks?

Questionnaire: : SI: P20; SII: P35, P38

Dummy Table: 6.4

- What percentage of pupils had adequate basic classroom supplies for writing, ruling, erasing, etc.?

Questionnaire: : SI: P22; SII: P21

Dummy Table: 6.5(a), 6.5(b)

General Policy Concern 4: Did Grade 6 pupils have access to library books within their schools, and (if they did have access) was the use of these books being maximized by allowing pupils to take them home to read?

Specific Research Questions

- What percentage of pupils had access to (school and classroom) library facilities?

Questionnaire: : SI: T10.9, S31.01; SII: T12.6, S38.01

Dummy Table: 6.1, 7.3

- Were pupils permitted to take library books home? (This question to be crosschecked from pupil and school head questionnaires.)

Appendix A (Ctd.)

Questionnaire: : SI: P21, S34; SII: P20, S39

Dummy Table: 11.1

General Policy Concern 5: Has the practice of Grade 6 pupils receiving extra lessons in school subjects outside school hours become widespread, and have these been paid lessons?

Specific Research Questions

- What percentage of pupils received extra tuition?

Questionnaire: : SI: P17; SII: P31

Dummy Table: 8.3(a)

- Was payment made for receiving extra tuition?

Questionnaire: : SII: P32

Dummy Table: 8.3(b)

General Policy Concern 6: What were the personal characteristics of Grade 6 teachers (for example, age, gender, and socio-economic level), and what was the condition of their housing?

Specific Research Questions

- What was the age distribution of teachers?

Questionnaire: SI: T3; SII: T3

Dummy Table: 4.1(a), 4.1(b)

- What was the gender distribution of teachers?

Questionnaire: SI: T2; SII: T2

Dummy Table: 4.1(a), 4.1(b)

- What was the socio-economic status of teachers in terms of possessions and livestock?

Questionnaire: SI: T28; SII: T27, T28

Dummy Table: 4.1(a), 4.1(b), 11.2(a), 11.2(b)

- What was the general condition (repair status and lighting) of teacher housing?

Questionnaire: SI: T31; SII: T29, T30,

Dummy Table: 4.5, 11.3(a), 11.3(b)

General Policy Concern 7: What were the professional characteristics of Grade 6 teachers (in terms of academic, professional, and in-service training), and did they consider in-service training to be effective in improving their teaching?

Specific Research Questions

- How many years of academic education had teachers completed?

Questionnaire: SI: T4; SII: T4

Dummy Table: 4.3(a), 4.3(b), 4.3(c)

- How many years of teacher training had teachers completed?

Questionnaire: SI: T5; SII: T5

Dummy Table: 4.2(a), 4.2(b)

Appendix A (Ctd.)

- How many years of teaching experience had teachers completed?
Questionnaire: SI: T6; SII: T6
Dummy Table: 4.2(a), 4.2(b)
- How much in-service training had teachers completed?
Questionnaire: SI: T7; SII: T7, T8
Dummy Table: 4.4(a), 4.4(b)
- Did teachers consider that in-service training improved their teaching?
Questionnaire: SII: T9
Dummy Table: 9.8

General Policy Concern 8: How did Grade 6 teachers allocate their time among responsibilities concerned with teaching, preparing lessons, and marking?

Specific Research Questions

- How many periods did teachers teach and how long were these periods?
Questionnaire: SI: T11, T12; SII: T14, T15
Dummy Table: 11.4
- How many hours per week did teachers spend in lesson preparation and marking?
Questionnaire: SI: T13; SII: T16
Dummy Table: 8.5

General Policy Concern 9: What were Grade 6 teachers' viewpoints on (a) pupil activities within the classroom (for example, reading aloud, pronouncing, etc.), (b) teaching goals (for example, making learning enjoyable, word attack skills, etc.) (c) teaching approaches/strategies (for example, questioning, whole class teaching, etc.), (d) assessment procedures, and (e) meeting and communicating with parents?

Specific Research Questions

- What did teachers consider to be the most important pupil activities for teaching reading and mathematics?
Questionnaire: SI: T15; SII: T33, T41
Dummy Table: 8.1(a)(i), 8.1(b)(i)
- What did teachers consider to be the most important teaching goals in reading and mathematics?
Questionnaire: SI: T18; SII: T36, T44
Dummy Table: 8.1(a)(ii), 8.1(b)(ii)
- What teaching approaches/strategies were used most frequently by reading and mathematics teachers?
Questionnaire: SI: T19; SII: T37, T45
Dummy Table: 8.1(a)(iii), 8.1(b)(iii)
- How often did teachers give written tests in reading and mathematics?
Questionnaire: SI: T20; SII: T38, T46
Dummy Table: 8.1(a)(iv), 8.1(b)(iv)

Appendix A (Ctd.)

- Was there a specific section in pupil school reports for reading and mathematics?
Questionnaire: SI: T22; SII: T31, T39
Dummy Table: 11.5
- How often did teachers meet with parents each year?
Questionnaire: SI: T21; SII: T17
Dummy Table: 9.3
- What percentage of parents met with teachers each year?
Questionnaire: SII: T18
Dummy Table: 11.6
- Did teachers ask parents to sign homework assignments?
Questionnaire: SI: T16; SII: T34, T42
Dummy Table: 11.7

General Policy Concern 10: What was the availability of classroom furniture (for example, sitting/writing places, teacher table, teacher chair, and bookshelves) and classroom equipment (for example, chalkboard, dictionary, maps, book corner, and teacher guides) in Grade 6 classrooms?

Specific Research Questions

- What percentages of pupils were in classrooms with adequate sitting and writing places?
Questionnaire: SI: P24, P25; SII: P22, P23
Dummy Table: 6.3
- What percentages of pupils were in classrooms with adequate classroom furniture and equipment (for example, a teacher table, teacher chair, bookshelves, and chalkboard)?
Questionnaire: SI: T10; SII: T12
Dummy Table: 6.1, 6.2
- How many books did teachers have in their classroom library or book corner?
Questionnaire: SI: T8; SII: T10
Dummy Table: 11.8
- Did teachers have teaching aids (for example, a map, dictionary, geometrical instruments, and teachers' guides)?
Questionnaire: SII: T13.1, T13.2, T13.3, T13.4, T13.5
Dummy Table: 11.9(a), 11.9(b)

General Policy Concern 11: What professional support (in terms of education resource centres, inspections, advisory visits, and school head inputs) was given to Grade 6 teachers?

Specific Research Questions

- Did teachers use education resource centres?
Questionnaire: SII: T24

Dummy Table: 8.6

- How did teachers use education resource centres?

Appendix A (Ctd.)

Questionnaire: SII: T24, T24.1, T24.2, T24.3, T24.4, T24.5, T24.6

Dummy Table: 11.10(a), 11.10(b)

- What support did Advisors or Inspectors give to teachers in terms of administrative, professional, and pedagogical matters?

Questionnaire: SII: T20, T21

Dummy Table: 9.9

- Did school heads advise teachers on their teaching?

Questionnaire: SI: T25; SII: T22

Dummy Table: 9.2

General Policy Concern 12: What factors had most impact upon teacher job satisfaction?

Specific Research Questions

- What factors (for example, living conditions, school facilities/equipment, staff relationships, career advancement, salaries, etc.) had most impact upon teachers' job satisfaction?

Questionnaire: SI: T26; SII: T25

Dummy Table: 9.1

- What did teachers rate as the most important factor?

Questionnaire: SI: T27; SII: T26

Dummy Table: 11.11

General Policy Concern 13: What were the personal characteristics of school heads (for example, age and gender)?

Specific Research Questions

- What was the age distribution of school heads?

Questionnaire: SI: S2; SII: S2

Dummy Table: 5.1

- What was the gender distribution of school heads?

Questionnaire: SI: S1; SII: S1

Dummy Table: 5.1

General Policy Concern 14: What were the professional characteristics of school heads (in terms of academic, professional, experience, and specialized training)?

Specific Research Questions

- How many years of academic education had school heads completed?

Questionnaire: SI: S3; SII: S3

Dummy Table: 11.12(a), 11.12(b)

- How many years of teacher training had school heads completed?

Questionnaire: SI: S4; SII: S4

Dummy Table: 5.2

- How many years of teaching experience had school heads completed?

Appendix A (Ctd.)

Questionnaire: SI: S5; SII: S6

Dummy Table: 5.2

- How many years of experience had school heads had either as a school head or an acting school head – in the current school and all together?

Questionnaire: SI: S8, S9; SII: S9, S10

Dummy Table: 11.13

- Have school heads received specialized training in school management?

Questionnaire: SII: S5

Dummy Table: 5.2

General Policy Concern 15: What were the school heads' viewpoints on general school infrastructure (for example, electrical and other equipment, water, and basic sanitation) and the condition of school buildings?

Specific Research Questions

- What items of equipment (telephone, fax, photocopier) and general facilities (library, staff room, store room) did schools have?

Questionnaire: SI: S31; SII: S38

Dummy Table: 7.3

- What kind of water supply did schools have?

Questionnaire: SI: S31.10; SII: S38.08

Dummy Table: 7.3

- What was the nature and provision of toilet facilities in schools?

Questionnaire: SI: S30; SII: S37

Dummy Table: 7.1

- What was the general condition of school buildings?

Questionnaire: SI: S29; SII: S36

Dummy Table: 7.1

General Policy Concern 16: What were the school heads' viewpoints on (a) daily activities (for example, teaching, school-community relations, and monitoring pupil progress), (b) organizational policies (for example school magazine, open days, and formal debates), (c) inspections, (d) community input, (e) problems with pupils and staff (for example, pupil lateness, teacher absenteeism, and lost days of school)?

Specific Research Questions

- What amount of teaching did school heads undertake?

Questionnaire: SI: S7; SII: S7, S8

Dummy Table: 5.3

- What level of importance did school heads attach to activities such as community contacts, monitoring pupil progress, administrative tasks, etc.?

Questionnaire: SI: S22; SII: S28

Dummy Table: 9.4

- What was the incidence of school activities such as a school magazine, public speaking day, “open days, etc.?”

Appendix A (Ctd.)

Questionnaire: SI: S24; SII: S30

Dummy Table: 8.2

- How many school days were lost in the last school year due to non-school events?

Questionnaire: SI: S26; SII: S33

Dummy Table: 7.4

- What were the purposes and frequency of school inspections?

Questionnaire: SII: S24, S25

Dummy Table: 8.7, 11.14

- What was the contribution of the school community (in terms of time and resources for maintaining the school and for providing supplementary funding)?

Questionnaire: SII: S40

Dummy Table: 9.10

- What were the main behavioural problems of pupils?

Questionnaire: SI: S25; SII: S31

Dummy Table: 9.5(a), 9.5(b)

- What were the main behavioural problems of teachers?

Questionnaire: SI: S25; SII: S32

Dummy Table: 9.6(a), 9.6(b)

General Policy Concern 17: Have human resources (for example, qualified and experienced teachers and school heads) been allocated in an equitable fashion among regions and among schools within regions?

Specific Research Questions

- Were qualified and experienced Grade 6 teachers and school heads distributed equitably among regions and among schools within regions?

Questionnaire: SI: T4, T5, T6, T23, S3, S4, S5, S13, S18; SII: T4, T5, T6, T19, S3, S4, S6, S15, S18

Dummy Table: 11.15(a), 11.15(b)

General Policy Concern 18: Have material resources (for example, classroom teaching materials and school facilities) been allocated in an equitable fashion among regions and among schools within regions?

Specific Research Questions

- Were (a) general school infrastructure, (b) classroom equipment, and (c) classroom teaching materials distributed equitably among regions and among schools within regions?

Questionnaire: SI: T10, T31, S20, S28, S30, S31; SII: T12, T30, S22, S35, S37, S38

Dummy Table: 11.16(a), 11.16(b)

Appendix A (Ctd.)

General Policy Concern 19: What were the levels (according to Rasch scores and descriptive levels of competence) and variations (among schools and regions) in the achievement levels of Grade 6 pupils and their teachers in reading and mathematics – for my country and for all other SACMEQ countries?

Specific Research Questions

- What were the overall mean Rasch scores of pupils and their teachers in reading and mathematics across the SACMEQ countries?
Questionnaire: SI: PRT; SII: PRT, PMT, TRT, TMT
Dummy Table: 11.18(a), 11.18(b)
- What were the percentages of between and within school variance associated with pupil Rasch scores in reading and mathematics across the SACMEQ countries?
Questionnaire: SI: PRT; SII: PRT, PMT, TRT, TMT
Dummy Table: 11.19(a), 11.19(b)
- What were the overall percentages of pupils and their teachers across the various levels of competence in reading and mathematics across the SACMEQ countries?
Questionnaire: SI: PRT; SII: PRT, PMT, TRT, TMT
Dummy Table: 11.20(a), 11.20(b)

General Policy Concern 20: What were the reading and mathematics achievement levels of important sub-groups of Grade 6 pupils and their teachers (for example, pupils and teachers of different genders, socio-economic levels, and locations)?

Specific Research Questions

- What were the gender differences in reading and mathematics achievement for pupils and teachers?
Questionnaire: SI: PRT, P3; SII: PRT, PMT, TRT, TMT, P3, T2
Dummy Table: 11.21
- What were the school location differences in reading and mathematics achievement for pupils and teachers?
Questionnaire: SI: PRT, S12; SII: PRT, PMT, TRT, TMT, S14
Dummy Table: 11.22
- What were the socioeconomic differences in reading and mathematics achievement for pupils and teachers?
Questionnaire: SI: PRT, P8; SII: PRT, PMT, TRT, TMT, P7, T27
Dummy Table: 11.23

Appendix B**Reading Test Items Considered to be Central to the
Core Curriculum in Each Country)**

item #	Type	BOT	KEN	LES	MAL	MAU	MOZ	NAM	SEY	SOU	SWA	TAN	UGA	ZAM	ZAN
1	Word recognition	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
2		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
3		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
4		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes
5		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
6		Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes		Yes	Yes	Yes	Yes
7	Sentence completion with a word	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
8		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
9			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
10		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes
11			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	
12	Sentence completion with a phrase	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
13		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
14			Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
15	Narrative	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
16		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
17		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
18	Document	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
19		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
20		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
21		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
22	Narrative	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
23		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
24		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
25		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
26	Document	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes
27		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes
28		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes
29	Expository	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
30		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
31				Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
32		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
33	Document	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
34		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
35	Document	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
36		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
37		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
38		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
39		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
40		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Appendix B (Ctd.)

Item #	Type	BOT	KEN	LES	MAL	MAU	MOZ	NAM	SEY	SOU	SWA	TAN	UGA	ZAM	ZAN
41	Expository	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
42		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
43		Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes		Yes
44		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
45	Narrative	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
46		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
47		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
48		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
49		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes
50	Expository	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
51		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
52		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
53		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
54	Documents	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes		Yes	Yes	Yes	Yes
55		Yes	Yes	Yes	Yes	Yes		Yes		Yes	Yes	Yes	Yes	Yes	Yes
56		Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
57		Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
58	Expository	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes
59		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes
60		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes
61	Narrative	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
62		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
63		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
64		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
65	Expository	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
66		Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
67		Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
68				Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
69		Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes
70	Expository	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
71		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
72		Yes	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
73	Document	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes
74		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes
75		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes
76		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes
77	Expository	Yes	Yes	Yes	Yes		Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes
78							Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes
79		Yes	Yes	Yes	Yes		Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes
80	Expository						Yes			Yes	Yes	Yes	Yes		Yes
81							Yes			Yes	Yes	Yes	Yes		Yes
82		Yes					Yes			Yes	Yes	Yes	Yes		Yes
83							Yes			Yes	Yes	Yes	Yes		Yes

Note: The shaded items were excluded from the final analyses because they failed a Rasch “differential item functioning” test across three groups: SACMEQ I pupils, SACMEQ II pupils, and SACMEQ II teachers.

Appendix C**Mathematics Test Items Considered to be Central to the
Core Curriculum in Each Country)**

Item #	Type	BOT	KEN	LES	MAL	MAU	MOZ	NAM	SEY	SOU	SWA	TAN	UGA	ZAM	ZAN
1	Number	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
2	Number	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes
3	Number	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
4	Number	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5	Space/Data	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
6	Space/Data	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
7	Space/Data	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
8	Number	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
9	Measurement	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
10	Number	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
11	Number	Yes	Yes	Yes			Yes	Yes		Yes	Yes	Yes	Yes	Yes	
12	Number	Yes	Yes	Yes	Yes			Yes		Yes	Yes	Yes	Yes	Yes	Yes
13	Number	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
14	Number	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
15	Measurement	Yes	Yes	Yes	Yes	Yes		Yes		Yes	Yes	Yes	Yes	Yes	Yes
16	Measurement	Yes	Yes	Yes	Yes	Yes		Yes		Yes	Yes	Yes	Yes	Yes	Yes
17	Measurement	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
18	Measurement	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
19	Measurement	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
20	Measurement	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
21	Space/Data	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
22	Number	Yes	Yes	Yes	Yes			Yes		Yes	Yes	Yes	Yes	Yes	Yes
23	Measurement	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
24	Measurement	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
25	Space/Data	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
26	Space/Data	Yes		Yes		Yes		Yes		Yes	Yes	Yes	Yes		
27	Number	Yes	Yes				Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
28	Number	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
29	Number	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
30	Space/Data	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
31	Measurement	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
32	Space/Data	Yes	Yes		Yes	Yes	Yes			Yes		Yes	Yes		
33	Space/Data	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
34	Number	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
35	Number	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes
36	Number	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
37	Measurement	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
38	Number	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
39	Space/Data	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
40	Space/Data	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes		

Appendix C (Ctd.)

item #	Type	BOT	KEN	LES	MAL	MAU	MOZ	NAM	SEY	SOU	SWA	TAN	UGA	ZAM	ZAN
41	Number	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
42	Measurement	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
43	Number	Yes			Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
44	Measurement	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	
45	Measurement	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
46	Number	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
47	Measurement	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
48	Measurement	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
49	Measurement	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
50	Measurement	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
51	Measurement	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
52	Space/Data	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
53	Space/Data	Yes	Yes		Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes	
54	Measurement	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
55	Measurement	Yes				Yes	Yes			Yes	Yes	Yes	Yes		
56	Number	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
57	Number	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
58	Space/Data	Yes		Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	
59	Number	Yes	Yes		Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
60	Number	Yes	Yes		Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
61	Number	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
62	Number	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
63	Measurement	Yes				Yes	Yes			Yes	Yes	Yes	Yes	Yes	

Note: The shaded items were excluded from the final analyses because they failed a Rasch “differential item functioning” test across three groups: SACMEQ I pupils, SACMEQ II pupils, and SACMEQ II teachers.

Appendix D**Sample Design Tables for $\rho = 0.1, 0.2, 0.3$**

Cluster Size b	95% Confidence Limits for Means/Percentages							
	$\pm 0.05s/\pm 2.5\%$		$\pm 0.1s/\pm 5.0\%$		$\pm 0.15s/\pm 7.5\%$		$\pm 0.2s/\pm 10.0\%$	
	a	n	a	n	a	n	a	n
<u>$\rho = 0.1$</u>								
1 (SRS)	1600	1600	400	400	178	178	100	100
2	880	1760	220	440	98	196	55	110
5	448	2240	112	560	50	250	28	140
10	304	3040	76	760	34	340	19	190
15	256	3840	64	960	29	435	16	240
20	232	4640	58	1160	26	520	15	300
30	208	6240	52	1560	24	720	13	390
40	196	7840	49	1960	22	880	13	520
50	189	9450	48	2400	21	1050	12	600
<u>$\rho = 0.2$</u>								
1 (SRS)	1600	1600	400	400	178	178	100	100
2	960	1920	240	480	107	214	60	120
5	576	2880	144	720	65	325	36	180
10	448	4480	112	1120	50	500	28	280
15	406	6090	102	1530	46	690	26	390
20	384	7680	96	1920	43	860	24	480
30	363	10890	91	2730	41	1230	23	690
40	352	14080	88	3520	40	1600	22	880
50	346	17300	87	4350	39	1950	22	1100
<u>$\rho = 0.3$</u>								
1 (SRS)	1600	1600	400	400	178	178	100	100
2	1040	2080	260	520	116	232	65	130
5	704	3520	176	880	79	395	44	220
10	592	5920	148	1480	66	660	37	370
15	555	8325	139	2085	62	930	35	525
20	536	10720	134	2680	60	1200	34	680
30	518	15540	130	3900	58	1740	33	990
40	508	20320	127	5080	57	2280	32	1280
50	503	25150	126	6300	56	2800	32	1600

Appendix D (Ctd.)**Sample Design Tables for $\rho = 0.4, 0.5, 0.6$**

Cluster Size b	95% Confidence Limits for Means/Percentages							
	$\pm 0.05s/\pm 2.5\%$		$\pm 0.1s/\pm 5.0\%$		$\pm 0.15s/\pm 7.5\%$		$\pm 0.2s/\pm 10.0\%$	
	a	n	a	n	a	n	a	n
<u>$\rho = 0.4$</u>								
1 (SRS)	1600	1600	400	400	178	178	100	100
2	1120	2240	280	560	125	250	70	140
5	832	4160	208	1040	93	465	52	260
10	736	7360	184	1840	82	820	46	460
15	704	10560	176	2640	79	1185	44	660
20	688	13760	172	3440	77	1540	43	860
30	672	20160	168	5040	75	2250	42	1260
40	664	26560	166	6640	74	2960	42	1680
50	660	33000	165	8250	74	3700	42	2100
<u>$\rho = 0.5$</u>								
1 (SRS)	1600	1600	400	400	178	178	100	100
2	1200	2400	300	600	134	268	75	150
5	960	4800	240	1200	107	535	60	300
10	880	8800	220	2200	98	980	55	550
15	854	12810	214	3210	95	1425	54	810
20	840	16800	210	4200	94	1880	53	1060
30	827	24810	207	6210	92	2760	52	1560
40	820	32800	205	8200	92	3680	52	2080
50	816	40800	204	10200	91	4550	51	2550
<u>$\rho = 0.6$</u>								
1 (SRS)	1600	1600	400	400	178	178	100	100
2	1280	2560	320	640	143	286	80	160
5	1088	5440	272	1360	122	610	68	340
10	1024	10240	256	2560	114	1140	64	640
15	1003	15045	251	3765	112	1680	63	945
20	992	19840	248	4960	111	2220	62	1240
30	982	29460	246	7380	110	3300	62	1860
40	976	39040	244	9760	109	4360	61	2440
50	973	48650	244	12200	109	5450	61	3050

Appendix D (Ctd.)**Sample Design Tables for $\rho = 0.7, 0.8, 0.9$**

Cluster Size b	95% Confidence Limits for Means/Percentages							
	$\pm 0.05s/\pm 2.5\%$		$\pm 0.1s/\pm 5.0\%$		$\pm 0.15s/\pm 7.5\%$		$\pm 0.2s/\pm 10.0\%$	
	a	n	a	n	a	n	a	n
<u>$\rho = 0.7$</u>								
1 (SRS)	1600	1600	400	400	178	178	100	100
2	1360	2720	340	680	152	304	85	170
5	1216	6080	304	1520	136	680	76	380
10	1168	11680	292	2920	130	1300	73	730
15	1152	17280	288	4320	129	1935	72	1080
20	1144	22880	286	5720	128	2560	72	1440
30	1136	34080	284	8520	127	3810	71	2130
40	1132	45280	283	11320	126	5040	71	2840
50	1130	56500	283	14150	126	6300	71	3550
<u>$\rho = 0.8$</u>								
1 (SRS)	1600	1600	400	400	178	178	100	100
2	1440	2880	360	720	161	322	90	180
5	1344	6720	336	1680	150	750	84	420
10	1312	13120	328	3280	146	1460	82	820
15	1302	19530	326	4890	145	2175	82	1230
20	1296	25920	324	6480	145	2900	81	1620
30	1291	38730	323	9690	144	4320	81	2430
40	1288	51520	322	12880	144	5760	81	3240
50	1287	64350	322	16100	144	7200	81	4050
<u>$\rho = 0.9$</u>								
1 (SRS)	1600	1600	400	400	178	178	100	100
2	1520	3040	380	760	170	340	95	190
5	1472	7360	368	1840	164	820	92	460
10	1456	14560	364	3640	162	1620	91	910
15	1451	21765	363	5445	162	2430	91	1365
20	1448	28960	362	7240	162	3240	91	1820
30	1446	43380	362	10860	161	4830	91	2730
40	1444	57760	361	14440	161	6440	91	3640
50	1444	72200	361	18050	161	8050	91	4550

Appendix E

Random Number Tables for the Selection of 20 Grade 6 Students within each Selected School

Case#	R21	R22	R23	R24	R25	R26	R27	R28	R29	R30	R31	R32	R33	R34	R35	Case#	R36	R37	R38	R39	R40	R41	R42	R43	R44	R45	R46	R47	R48	R49	R50	
1	1	1	1	1	1	1	1	1	1	2	2	1	1	2	1	1	1	3	1	1	1	1	3	4	2	1	1	2	1	2		
2	2	2	2	2	2	2	2	2	3	3	3	2	3	3	3	2	5	2	5	6	2	2	5	4	5	5	2	2	3	2	4	
3	3	3	3	3	3	3	3	3	4	4	6	3	4	4	4	3	6	3	6	7	4	6	6	6	6	6	3	6	5	6	5	
4	4	4	4	4	4	4	5	4	6	5	7	7	5	5	6	6	4	8	4	7	8	7	7	8	10	13	8	4	11	7	9	6
5	5	5	5	5	5	6	5	7	6	8	8	7	7	9	7	5	10	7	10	11	10	8	11	12	15	9	10	12	8	10	8	
6	6	6	6	6	6	7	6	8	7	9	9	8	9	12	12	6	11	8	11	13	11	10	13	13	16	10	11	13	10	13	9	
7	7	7	7	7	7	8	7	11	8	10	11	9	11	14	13	7	13	9	12	15	14	11	14	15	19	12	15	17	13	15	14	
8	8	8	8	8	8	10	8	12	9	11	12	10	12	15	15	8	14	12	16	17	16	12	17	16	22	13	19	18	17	16	21	
9	9	9	9	9	9	12	11	9	13	10	13	13	11	14	17	16	9	17	14	17	18	17	13	18	20	23	15	20	20	18	17	22
10	10	10	11	11	13	13	10	14	12	14	14	13	15	18	17	10	18	15	24	19	18	15	20	26	26	17	21	21	19	23	23	
11	11	11	12	12	14	14	11	15	13	15	17	14	16	19	20	11	19	16	25	21	21	17	22	28	28	22	26	27	20	32	24	
12	13	13	13	15	15	15	12	16	16	17	18	16	17	21	21	12	23	17	26	23	22	19	23	32	33	23	30	28	21	33	25	
13	14	14	15	17	16	16	16	17	19	18	20	17	19	23	22	13	24	19	27	26	23	22	24	33	34	25	31	29	25	34	27	
14	15	15	16	18	17	17	18	19	20	19	22	20	21	27	23	14	25	20	29	28	24	23	25	34	35	27	33	30	28	35	29	
15	16	16	17	19	18	20	19	20	22	20	24	23	22	28	24	15	26	24	30	31	30	26	29	35	36	29	35	35	30	36	31	
16	17	18	18	20	19	21	20	21	24	22	26	25	24	29	25	16	30	28	31	33	32	28	30	36	37	30	37	43	32	38	33	
17	18	19	20	21	20	22	22	22	25	23	27	27	27	30	28	17	31	30	32	34	34	29	31	38	38	34	38	44	34	41	34	
18	19	20	21	22	21	23	23	23	26	24	28	29	30	31	32	18	33	31	33	35	35	31	33	39	39	36	40	45	39	45	40	
19	20	21	22	23	23	24	25	24	27	25	29	30	32	32	33	19	35	32	35	36	37	38	34	42	40	41	44	46	44	48	43	
20	21	22	23	24	24	25	26	25	29	27	31	31	33	34	34	20	36	35	38	39	39	41	35	43	41	44	45	47	48	49	50	

Case#	R51	R52	R53	R54	R55	R56	R57	R58	R59	R60	R61	R62	R63	R64	R65	Case#	R66	R67	R68	R69	R70	R71	R72	R73	R74	R75	R76	R77	R78	R79	R80
1	1	2	3	3	1	6	2	1	1	1	2	4	8	2	3	1	4	1	4	1	4	3	6	1	2	1	1	4	3	7	6
2	3	3	4	5	8	7	5	3	3	2	5	6	15	6	6	2	10	6	6	7	9	5	8	3	7	3	5	7	4	8	12
3	4	5	5	6	9	8	9	6	5	15	10	8	18	7	8	3	11	9	7	10	10	9	10	4	8	21	7	12	13	11	13
4	10	6	8	15	10	12	13	9	7	16	11	11	20	8	14	4	12	15	9	20	14	12	13	9	10	23	17	15	14	13	14
5	15	12	12	16	11	14	15	10	8	17	21	12	21	9	15	5	16	19	10	21	15	14	14	13	14	28	18	18	16	28	27
6	18	16	17	17	13	16	20	12	12	18	22	19	23	13	17	6	19	22	11	25	18	17	16	14	19	30	19	19	20	29	28
7	19	18	21	18	21	19	22	23	16	19	23	25	26	14	21	7	26	23	13	29	20	22	22	17	23	34	23	20	32	39	30
8	23	21	27	20	24	20	25	25	21	20	24	29	33	18	22	8	27	26	15	30	21	25	23	18	26	37	26	21	34	40	31
9	24	24	29	21	25	21	31	27	24	24	27	33	35	23	25	9	28	30	17	32	27	28	24	19	36	41	28	25	41	41	33
10	28	26	30	23	26	24	33	32	28	25	28	34	36	26	29	10	31	36	25	33	38	29	27	22	38	42	29	26	42	42	35
11	29	27	31	25	27	25	36	33	29	26	31	35	37	28	33	11	34	41	32	35	39	38	30	24	41	44	33	32	48	51	36
12	33	29	32	27	31	26	38	38	31	31	32	36	40	29	35	12	44	48	33	38	43	41	31	29	45	45	41	34	53	53	40
13	35	32	33	34	32	30	39	40	36	35	35	41	43	31	36	13	45	50	35	41	46	46	35	33	47	46	45	41	55	55	45
14	37	33	37	36	34	39	42	43	42	38	40	42	45	33	40	14	46	54	38	47	47	49	38	38	56	50	51	47	56	60	48
15	39	35	38	39	36	41	43	45	45	39	45	46	46	36	41	15	48	60	39	51	51	54	39	39	58	52	52	57	63	62	55
16	42	37	40	41	38	43	44	46	49	41	49	48	49	45	53	16	53	61	47	54	57	55	40	45	62	53	57	60	67	68	58
17	43	39	41	46	39	47	45	48	52	49	55	56	50	54	55	17	55	62	53	55	59	57	43	58	63	56	64	64	70	71	66
18	45	44	43	49	40	49	51	51	53	55	57	57	55	58	61	18	57	63	60	60	60	61	47	64	68	71	65	70	72	73	67
19	47	46	45	51	42	53	54	53	54	56	59	58	60	61	62	19	58	66	65	63	61	70	61	69	70	72	68	74	73	74	73
20	51	48	48	53	51	56	56	55	56	60	61	61	63	64	63	20	59	67	67	68	66	71	71	70	71	73	71	75	75	76	75

Appendix E (Ctd.)**Random Number Tables for the Selection of 20 Grade 6 Students within each Selected School**

Case#	R81	R82	R83	R84	R85	R86	R87	R88	R89	R90	R91	R92	R93	R94	R95	Case#	R96	R97	R98	R99	R100
1	2	1	4	8	7	13	2	3	2	2	3	4	3	4	6	1	6	7	4	1	2
2	3	3	10	10	11	16	3	5	7	4	4	6	6	11	11	2	7	11	9	2	5
3	6	4	11	11	13	17	10	11	14	5	6	7	8	14	20	3	9	13	15	3	6
4	8	5	14	12	15	19	18	12	16	12	9	10	12	19	22	4	13	15	32	6	7
5	12	10	15	13	20	20	21	18	19	15	10	15	31	20	23	5	17	16	38	9	30
6	13	13	25	18	21	21	22	19	31	16	14	19	36	21	27	6	26	25	39	11	33
7	16	17	28	24	24	30	29	22	32	19	16	20	45	32	32	7	35	29	42	15	42
8	22	24	29	30	30	43	30	28	33	23	22	27	48	35	34	8	41	33	51	16	47
9	24	26	30	35	32	50	32	31	40	28	29	34	51	36	36	9	45	37	53	36	51
10	33	32	33	42	34	53	33	39	45	31	31	35	53	43	37	10	56	41	54	39	53
11	41	42	34	43	36	54	34	41	49	36	37	41	54	44	49	11	65	43	57	47	57
12	43	47	39	55	47	65	35	48	50	37	49	50	57	46	52	12	66	50	61	53	64
13	44	52	48	56	52	67	46	50	58	48	50	58	67	47	57	13	68	60	78	73	65
14	54	54	53	58	56	72	48	52	61	52	53	62	70	48	66	14	73	62	82	78	67
15	59	60	60	62	58	76	56	53	62	58	56	66	73	55	69	15	76	65	86	81	78
16	60	64	64	64	60	79	57	55	64	59	68	75	74	61	73	16	82	72	91	82	79
17	65	65	67	69	63	80	61	72	73	64	73	81	78	74	74	17	83	76	92	85	81
18	66	68	68	70	74	81	65	77	77	70	76	84	82	80	77	18	84	77	93	89	87
19	79	69	70	75	77	83	68	78	79	78	84	90	86	86	86	19	89	80	96	91	93
20	80	82	75	77	84	85	75	79	82	81	88	92	88	94	93	20	95	96	98	93	96

Case#	R101	R102	R103	R104	R105	R106	R107	R108	R109	R110	R111	R112	R113	R114	R115	Case#	R116	R117	R118	R119	R120	R121	R122	R123	R124	R125	R126	R127	R128	R129	R130
1	10	5	4	6	2	4	12	1	1	3	2	6	10	3	2	1	3	4	3	3	20	7	7	12	8	9	2	1	27	1	6
2	11	16	7	8	10	5	21	9	7	4	8	23	13	13	6	2	5	7	12	6	23	13	17	32	10	12	14	8	28	6	15
3	18	22	11	13	16	6	26	10	11	6	10	32	14	15	17	3	6	12	15	8	26	21	18	35	11	18	17	10	30	17	24
4	19	31	25	20	25	8	28	12	13	13	12	54	18	17	25	4	10	19	23	16	38	22	19	38	16	20	20	12	43	20	25
5	25	37	26	28	27	13	37	17	14	20	13	55	22	20	28	5	15	20	27	17	39	27	24	42	26	23	25	24	47	26	28
6	26	42	28	33	39	14	41	25	19	26	18	59	25	25	29	6	19	22	28	22	41	30	29	49	38	25	37	31	48	41	33
7	29	43	38	37	46	15	43	40	21	35	30	66	26	29	39	7	23	28	42	25	43	36	33	68	46	27	41	35	55	50	35
8	45	46	40	42	51	17	44	43	29	44	38	69	30	55	42	8	27	30	53	28	45	41	35	76	47	28	47	43	63	51	36
9	47	51	45	44	52	33	53	44	32	48	48	74	41	56	52	9	33	33	54	44	49	69	37	86	57	36	67	53	65	53	37
10	62	54	49	57	61	40	60	48	34	49	50	78	44	57	62	10	35	39	55	45	61	89	46	90	60	45	71	62	67	68	38
11	65	58	57	62	65	50	61	56	41	50	52	89	47	62	64	11	41	46	60	47	64	92	56	92	65	57	75	65	71	70	41
12	72	61	60	68	68	61	68	59	42	51	56	90	49	74	66	12	52	48	62	52	67	99	65	95	69	59	79	68	79	84	42
13	79	64	67	80	69	63	73	62	47	54	64	98	50	78	79	13	53	54	63	74	71	104	71	96	70	80	88	73	80	88	57
14	88	70	68	85	70	73	74	64	64	66	66	99	64	90	81	14	56	57	73	77	75	105	75	101	81	86	89	79	96	92	67
15	93	73	69	86	77	80	75	68	65	70	81	100	66	92	86	15	57	97	84	78	80	109	78	102	87	92	100	92	103	96	71
16	95	82	72	87	78	85	81	78	71	75	84	104	69	93	87	16	61	99	90	98	83	111	97	106	88	95	101	98	107	115	83
17	96	93	78	88	82	93	88	81	79	78	86	105	73	97	94	17	64	102	105	106	89	114	102	108	94	100	109	99	108	119	85
18	99	94	97	97	90	95	93	87	86	79	91	109	82	99	96	18	83	110	108	107	110	116	115	114	95	106	117	100	112	125	102
19	100	98	101	98	96	96	104	91	97	89	105	110	103	102	103	19	95	113	109	114	115	117	117	121	116	113	119	117	113	126	106
20	101	102	102	102	104	97	105	102	98	108	109	111	107	104	115	20	113	115	111	119	119	119	121	123	119	115	124	119	125	129	122

Appendix E (Ctd.)**Random Number Tables for the Selection of 20 Grade 6 Students within each Selected School**

Case#	R131	R132	R133	R134	R135	R136	R137	R138	R139	R140	R141	R142	R143	R144	R145	Case#	R146	R147	R148	R149	R150	R151	R152	R153	R154	R155	R156	R157	R158	R159	R160
1	4	5	2	3	3	5	20	35	15	1	1	10	9	3	1	1	5	3	6	3	12	4	6	6	6	10	1	1	9	9	8
2	8	8	6	10	17	7	22	36	18	2	7	12	12	12	5	2	6	12	10	7	18	13	9	10	16	13	15	2	18	19	31
3	39	11	13	13	30	12	34	37	24	8	11	34	17	15	27	3	10	21	13	17	25	15	15	18	25	30	17	11	19	30	33
4	43	26	36	33	31	13	37	53	26	14	27	37	20	16	31	4	14	34	14	29	30	19	19	21	26	40	21	38	25	51	35
5	46	33	38	38	55	15	41	73	28	15	28	38	34	21	39	5	15	35	17	41	33	29	20	22	32	56	22	44	26	64	38
6	54	49	42	55	56	23	51	75	29	18	42	39	37	43	46	6	16	43	20	46	41	30	21	26	39	73	25	49	30	67	57
7	71	62	44	57	70	32	52	78	30	34	45	60	52	48	49	7	17	51	40	50	45	36	22	34	49	74	29	50	36	69	60
8	85	64	51	58	92	42	64	83	38	46	49	61	69	68	52	8	29	62	42	52	51	39	34	40	51	75	47	83	39	81	62
9	86	73	58	59	96	51	70	89	53	49	58	67	72	80	62	9	44	68	45	64	53	46	39	44	52	82	55	89	46	89	72
10	100	78	65	61	102	53	74	90	64	58	59	82	85	93	74	10	54	73	53	69	54	51	43	46	54	83	63	104	51	94	74
11	101	79	67	62	103	59	75	93	65	71	67	85	86	96	76	11	55	75	59	71	58	58	65	51	57	90	72	105	52	100	97
12	104	86	77	66	105	62	76	96	77	81	71	86	90	97	82	12	69	83	60	80	60	62	76	55	63	103	80	107	66	101	123
13	106	88	90	73	107	66	78	105	85	96	77	95	93	106	86	13	76	101	71	87	64	77	82	56	73	108	81	108	70	106	124
14	107	90	99	79	108	92	83	115	86	106	79	97	100	115	111	14	84	103	83	93	102	82	91	60	90	110	86	122	75	109	127
15	108	97	100	86	109	94	85	116	96	114	84	107	105	120	114	15	104	107	92	98	103	98	100	67	102	121	93	125	87	124	128
16	113	115	117	98	110	105	93	117	102	116	101	112	106	127	115	16	108	125	102	107	110	103	105	85	104	125	97	142	94	133	149
17	117	119	118	99	113	107	96	121	107	120	126	118	115	133	118	17	111	128	108	110	117	109	113	90	125	129	103	145	119	142	154
18	127	120	119	112	120	115	99	124	114	122	129	124	122	134	132	18	130	130	135	131	127	111	114	94	133	130	128	148	138	149	155
19	129	129	121	113	129	120	105	130	127	123	136	129	131	142	141	19	133	143	136	134	140	112	132	109	134	140	154	149	145	151	156
20	130	131	133	121	131	125	122	137	137	125	138	135	142	143	142	20	140	145	146	139	150	139	147	149	142	153	155	157	152	154	158

Case#	R161	R162	R163	R164	R165	R166	R167	R168	R169	R170	R171	R172	R173	R174	R175	Case#	R176	R177	R178	R179	R180	R181	R182	R183	R184	R185	R186	R187	R188	R189	R190
1	1	10	16	14	3	13	10	7	2	5	1	7	2	19	8	1	5	2	2	1	1	15	1	2	8	12	6	15	1	5	4
2	2	31	21	27	5	15	29	21	6	18	8	9	6	31	11	2	19	15	5	2	15	17	8	4	9	17	10	17	6	10	10
3	4	52	28	36	16	19	35	23	28	40	14	19	24	38	21	3	20	25	9	21	17	35	15	38	16	38	15	18	13	14	27
4	10	54	29	46	33	42	39	36	41	58	23	27	28	44	44	4	22	31	11	29	27	41	19	44	17	39	28	33	15	16	33
5	39	64	41	51	35	46	53	69	48	64	38	59	37	48	48	5	29	37	13	42	37	45	28	52	26	45	39	40	30	20	37
6	56	66	42	54	42	49	54	90	70	86	39	75	53	51	49	6	45	47	22	44	40	55	52	59	54	51	53	52	44	21	45
7	58	69	46	57	49	64	66	91	74	87	43	77	62	62	59	7	67	62	52	46	58	64	65	74	66	57	88	62	61	38	49
8	63	71	49	62	55	67	81	95	84	105	49	89	71	71	64	8	68	67	69	53	73	70	72	88	73	59	91	68	63	44	56
9	64	75	62	72	61	73	103	107	88	109	59	90	91	77	67	9	73	86	76	64	78	80	73	93	75	60	92	78	82	52	71
10	77	77	70	79	63	104	106	115	101	112	72	93	103	79	70	10	80	87	80	70	104	111	74	97	82	61	97	80	85	69	82
11	84	84	75	89	65	107	117	124	106	125	82	94	119	108	72	11	91	96	81	75	116	114	78	115	85	72	112	107	91	81	119
12	85	87	78	98	78	113	122	128	115	126	87	96	127	111	79	12	99	103	88	76	117	115	80	116	90	73	116	109	104	86	122
13	87	91	79	99	105	115	130	133	117	131	95	113	128	113	94	13	110	109	94	82	118	117	98	123	120	76	126	116	119	105	128
14	97	92	111	119	107	116	134	134	121	134	106	123	129	117	122	14	126	117	101	90	119	119	99	124	133	87	130	124	120	109	134
15	107	93	117	128	119	127	136	138	126	139	127	125	133	131	123	15	129	119	106	129	142	127	120	130	148	96	151	132	123	113	139
16	111	96	146	134	131	146	139	142	137	141	137	134	140	142	131	16	133	124	114	141	144	134	122	149	151	126	153	133	138	114	146
17	115	126	147	142	134	148	147	152	158	152	142	141	146	149	132	17	137	146	133	151	163	140	143	155	167	129	159	155	143	131	148
18	125	128	156	147	143	159	152	153	160	159	143	143	151	153	146	18	140	162	136	159	164	159	163	161	168	146	167	157	148	143	164
19	128	153	157	156	161	164	157	161	163	162	146	159	154	156	159	19	154	164	142	167	167	176	164	164	175	151	168	159	153	171	167
20	155	155	161	162	162	165	162	164	168	163	147	172	163	157	163	20	155	173	154	168	176	178	171	170	180	157	182	167	160	184	187

Appendix E (Ctd.)**Random Number Tables for the Selection of 20 Grade 6 Students within each Selected School**

Case#	R191	R192	R193	R194	R195	R196	R197	R198	R199	R200	Case#	R201	R202	R203	R204	R205	R206	R207	R208	R209	R210	R211	R212	R213	R214	R215
1	12	5	9	11	21	2	4	4	7	4	1	7	1	7	16	4	11	5	9	8	2	17	1	6	1	5
2	22	10	12	14	22	6	14	8	9	16	2	17	16	8	30	40	15	23	10	15	16	19	26	11	8	9
3	24	13	30	17	35	12	40	27	13	38	3	21	28	21	63	47	37	38	12	19	20	25	40	14	31	25
4	45	15	42	25	39	13	53	28	32	41	4	56	29	22	72	55	41	43	21	29	39	34	42	25	39	31
5	49	23	46	32	45	18	54	41	64	43	5	62	38	31	75	96	46	58	34	69	50	41	65	36	45	32
6	55	26	56	35	54	25	78	49	66	54	6	66	44	32	76	105	49	67	41	72	67	44	69	37	52	38
7	59	35	70	37	75	42	84	77	88	56	7	78	58	44	88	120	50	70	45	84	92	62	73	42	54	39
8	60	52	73	67	79	44	85	80	117	61	8	80	70	57	89	123	52	79	84	90	104	67	75	47	60	55
9	76	57	78	70	100	58	106	89	119	68	9	106	96	59	94	124	70	81	110	95	106	73	110	70	65	58
10	109	84	88	71	109	61	111	94	130	94	10	122	98	71	126	138	73	118	120	114	114	87	113	91	73	60
11	116	86	90	72	111	65	113	95	133	96	11	124	102	78	135	142	94	121	125	117	118	113	114	94	75	71
12	120	105	92	74	113	98	122	104	139	100	12	125	121	86	139	143	121	126	129	118	135	132	158	99	90	79
13	123	123	102	83	115	111	142	105	144	105	13	126	123	87	147	149	139	131	133	124	137	143	159	133	96	92
14	148	126	104	105	132	116	172	111	146	124	14	132	124	90	153	152	142	151	138	148	142	148	163	139	107	93
15	149	132	113	117	144	133	181	151	151	130	15	150	155	146	160	153	151	165	139	149	148	153	164	141	129	107
16	150	140	118	123	154	134	182	154	170	150	16	163	163	147	173	163	155	166	150	152	156	159	177	182	173	115
17	162	152	130	128	156	160	185	166	172	151	17	166	172	164	179	164	166	178	160	155	159	165	187	199	174	118
18	169	154	152	130	162	168	194	175	174	169	18	170	182	172	184	165	179	179	191	176	185	168	191	201	186	160
19	170	160	153	135	167	173	195	196	177	172	19	192	185	178	190	171	201	185	201	198	190	200	208	202	189	210
20	184	166	173	156	173	174	196	198	182	198	20	194	190	180	193	198	204	189	202	199	203	206	211	206	198	213

Case#	R216	R217	R218	R219	R220	R221	R222	R223	R224	R225	R226	R227	R228	R229	R230	Case#	R231	R232	R233	R234	R235	R236	R237	R238	R239	R240	R241	R242	R243	R244	R245
1	10	21	14	1	2	1	10	1	5	1	10	35	2	6	3	1	22	3	14	19	4	43	21	2	1	15	24	4	4	24	12
2	12	31	31	7	5	12	18	3	13	12	14	40	5	12	7	2	24	7	35	31	22	46	24	8	5	36	27	8	67	28	30
3	16	37	32	8	11	13	20	4	35	19	47	70	36	49	24	3	36	23	39	44	28	48	55	31	11	49	30	16	77	38	61
4	20	48	34	12	15	25	24	18	41	29	66	77	44	60	28	4	38	65	55	58	38	55	56	35	42	76	42	30	85	49	62
5	23	71	37	22	68	51	25	37	46	32	71	78	55	78	33	5	54	103	66	62	39	62	66	40	45	79	61	41	109	52	74
6	43	79	46	86	75	54	29	54	54	50	78	79	56	85	75	6	72	106	98	65	46	65	79	45	49	84	79	44	110	56	77
7	51	102	54	87	83	60	31	57	55	70	102	137	57	100	88	7	77	107	112	79	58	66	88	56	68	88	93	45	116	57	89
8	53	109	65	91	94	86	72	77	64	101	108	138	65	110	121	8	94	143	115	80	61	75	89	59	70	120	96	46	122	67	91
9	72	125	69	108	98	98	75	81	81	126	111	139	79	114	126	9	95	144	121	82	77	86	93	63	79	126	101	49	129	70	96
10	87	127	79	122	108	103	82	101	120	135	120	152	82	121	131	10	137	153	126	87	79	87	112	64	116	141	112	96	133	107	101
11	120	147	92	124	124	139	104	115	126	152	125	166	83	123	136	11	149	154	133	89	99	101	117	87	118	143	124	156	138	163	102
12	124	158	104	152	132	158	116	122	141	164	132	172	92	126	137	12	170	155	137	92	103	107	134	99	143	159	171	162	139	177	104
13	140	163	116	157	147	175	118	128	155	167	135	173	109	144	139	13	177	175	141	151	127	145	135	105	145	165	173	163	160	185	114
14	142	164	119	164	150	184	122	144	156	173	142	176	126	151	143	14	180	179	151	159	133	170	145	122	186	172	174	174	163	188	128
15	146	170	135	169	159	185	131	152	159	179	147	179	152	162	148	15	185	180	160	181	168	190	155	143	200	201	184	178	170	191	150
16	169	185	137	178	160	186	143	182	171	187	171	184	166	163	182	16	186	184	174	184	182	196	183	178	207	206	197	191	197	207	190
17	171	188	139	180	168	188	148	196	183	210	189	196	173	177	201	17	201	195	180	189	191	199	202	187	208	208	201	209	199	209	196
18	176	199	145	205	171	193	167	199	193	213	203	200	179	178	209	18	209	208	210	213	203	222	210	204	213	218	223	220	200	221	198
19	186	203	159	206	197	217	174	207	205	214	218	214	203	217	218	19	217	216	217	218	217	227	211	225	221	222	229	229	219	232	235
20	199	214	165	219	209	219	210	216	216	225	219	219	205	224	221	20	228	223	228	233	230	230	236	229	228	240	241	241	228	243	240

Appendix F

**The 148 Test Items (and their Sources) that were Used in
the “Hypothetical Test” for Calibrating the Reading Test Items**

Section	RUMM VarName	SPSS VarName	KEY	S2P	S2T	S1P	Zim91	IEA Pop1	IEA Pop2
Section A	I0001	RA01XXXX	2	pread01					
	I0002	RA02XXXX	2	pread02					
	I0003	RA03XXXX	3	pread03					
	I0004	RA04XXXX	1	pread04					
	I0005	RA05XXXX	2	pread05					
	I0006	RA06XXXX	1	pread06					
	I0007	RA07XXXX	2	pread07					
	I0008	RA08XXXX	2	pread08					
	I0009	RA09XXXX	2	pread09					
	I0010	RA10XXXX	3	pread10					
	I0011	RA11XXXX	2	pread11					
	I0012	RA12XXXX	2	pread12					
	I0013	RA13XXXX	4	pread13					
	I0014	RA14XXXX	4	pread14					
	I0015	RA22XXXX	3	pread22					
	I0016	RA23XXXX	3	pread23					
	I0017	RA24XXXX	1	pread24					
	I0018	RA25XXXX	1	pread25					
	I0019	RA26XXXX	4	pread26					
	I0020	RA27XXXX	2	pread27					
	I0021	RA28XXXX	2	pread28					
	I0022	RA33XXXX	2	pread33					
	I0023	RA34XXXX	1	pread34					
	I0024	RA35XXXX	1	pread35					
	I0025	RA36XXXX	2	pread36					
	I0026	RA37XXXX	2	pread37					
	I0027	RA38XXXX	2	pread38					
	I0028	RA39XXXX	2	pread39					
	I0029	RA40XXXX	1	pread40					
	I0030	RA41XXXX	1	pread41					
	I0031	RA42XXXX	4	pread42					
	I0032	RA43XXXX	1	pread43					
	I0033	RA44XXXX	1	pread44					
	I0034	RA45XXXX	3	pread45					
	I0035	RA46XXXX	1	pread46					
	I0036	RA58XXXX	1	pread58					
	I0037	RA59XXXX	2	pread59					
	I0038	RA61XXXX	2	pread61					
	I0039	RA62XXXX	2	pread62					
	I0040	RA63XXXX	4	pread63					
	I0041	RA64XXXX	1	pread64					
	I0042	RA70XXXX	1	pread70					
	I0043	RA71XXXX	4	pread71					

Section	RUMM VarName	SPSS VarName	KEY	S2P	S2T	S1P	Zim91	IEA Pop1	IEA Pop2
	I0044	RA72XXXX	2	pread72					
	I0045	RA73XXXX	4	pread73					
	I0046	RA74XXXX	3	pread74					
	I0047	RA75XXXX	3	pread75					
	I0048	RA76XXXX	2	pread76					
	I0049	RA80XXXX	4	pread80					yes
	I0050	RA81XXXX	2	pread81					yes
	I0051	RA82XXXX	4	pread82					yes
Section B	I0052	RA83XXXX	4	pread83					yes
	I0053	RA29XX20	4	pread29		porange1			
	I0054	RA30XX21	1	pread30		porange2			
	I0055	RA31XX22	3	pread31		porange3			
	I0056	RA32XX23	4	pread32		porange4			
	I0057	RA47XX08	4	pread47		pbird3	bird3	yes	
	I0058	RA48XX10	2	pread48		pbird5	bird5	yes	
	I0059	RA49XX06	3	pread49		pbird1	bird1	yes	
	I0060	RA54XX12	3	pread54		pisland2	island2	yes	
	I0061	RA55XX11	1	pread55		pisland1	island1	yes	
	I0062	RA56XX14	4	pread56		pisland4	island4	yes	
Section C	I0063	RA57XX13	2	pread57		pisland3	island3	yes	
	I0064	RA160304	2	pread16	tread03	ptembo4	tembo4		
	I0065	RA170405	2	pread17	tread04	ptembo5	tembo5		
	I0066	RA180524	1	pread18	tread05	pmaria1	maria1	yes	
	I0067	RA190625	2	pread19	tread06	pmaria2	maria2	yes	
	I0068	RA200726	4	pread20	tread07	pmaria3	maria3	yes	
	I0069	RA651456	1	pread65	tread14	ptree1	tree1	yes	
	I0070	RA661557	1	pread66	tread15	ptree2	tree2	yes	
	I0071	RA671658	1	pread67	tread16	ptree3	tree3	yes	
	I0072	RA691860	2	pread69	tread18	ptree5	tree5	yes	
Section D	I0073	RA1501XX	2	pread15	tread01				
	I0074	RA2108XX	3	pread21	tread08				
	I0075	RA5031XX	1	pread50	tread31				
	I0076	RA5132XX	3	pread51	tread32				
	I0077	RA5233XX	3	pread52	tread33				
	I0078	RA5334XX	1	pread53	tread34				
	I0079	RA6035XX	2	pread60	tread35			yes	
	I0080	RA6817XX	3	pread68	tread17				
	I0081	RA7741XX	4	pread77	tread41				
	I0082	RA7843XX	1	pread78	tread43				
	I0083	RA7944XX	2	pread79	tread44				
Section E	I0084	RAXX02XX	3		tread02				
	I0085	RAXX09XX	4		tread09				
	I0086	RAXX13XX	1		tread13				
	I0087	RAXX19XX	2		tread19				yes
	I0088	RAXX20XX	3		tread20				yes
	I0089	RAXX21XX	2		tread21				yes
	I0090	RAXX22XX	2		tread22				yes
	I0091	RAXX23XX	2		tread23				
	I0092	RAXX24XX	3		tread24				yes

Section	RUMM VarName	SPSS VarName	KEY	S2P	S2T	S1P	Zim91	IEA Pop1	IEA Pop2
	I0093	RAXX25XX	1		tread25				
	I0094	RAXX26XX	4		tread26				
	I0095	RAXX27XX	2		tread27				
	I0096	RAXX28XX	2		tread28				
	I0097	RAXX29XX	2		tread29				
	I0098	RAXX30XX	1		tread30				
	I0099	RAXX36XX	3		tread36			yes	
	I0100	RAXX37XX	2		tread37			yes	
	I0101	RAXX38XX	4		tread38				
	I0102	RAXX39XX	3		tread39				
	I0103	RAXX40XX	3		tread40				
	I0104	RAXX42XX	2		tread42				
	I0105	RAXX45XX	3		tread45				
	I0106	RAXX46XX	1		tread46				
	I0107	RAXX47XX	1		tread47				
	I0108	RAXX48XX	1		tread48				
	I0109	RAXX49XX	3		tread49				
Section F	I0110	RAXX1027	1		tread10	pquick1	quick1	yes	
	I0111	RAXX1128	4		tread11	pquick2	quick2	yes	
	I0112	RAXX1229	3		tread12	pquick3	quick3	yes	
Section G	I0113	RAXXXX01	4			ptembo1			
	I0114	RAXXXX02	3			ptembo2			
	I0115	RAXXXX03	4			ptembo3			
	I0116	RAXXXX07	3			pbird2		yes	
	I0117	RAXXXX09	3			pbird4		yes	
	I0118	RAXXXX15	4			pjoseph1	joseph1		
	I0119	RAXXXX16	4			pjoseph2	joseph2		
	I0120	RAXXXX17	1			pjoseph3	joseph3		
	I0121	RAXXXX18	2			pjoseph4	joseph4		
	I0122	RAXXXX19	4			pjoseph5			
	I0123	RAXXXX30	4			pempty1	bottles1	yes	
	I0124	RAXXXX31	3			pempty2	bottles2	yes	
	I0125	RAXXXX32	4			pempty3	bottles3	yes	
	I0126	RAXXXX33	1			pempty4	bottles4	yes	
	I0127	RAXXXX34	3			pcarrot1	carrots1		
	I0128	RAXXXX35	4			pcarrot2	carrots2		
	I0129	RAXXXX36	1			pcarrot3	carrots3		
	I0130	RAXXXX37	1			pcarrot4	carrots4		
	I0131	RAXXXX38	4			pcarrot5	carrots5		
	I0132	RAXXXX39	2			ptempra1	temper1		
	I0133	RAXXXX41	2			ptempra3	temper3		
	I0134	RAXXXX42	4			ptempra4	temper4		
	I0135	RAXXXX43	2			ptempra5	temper5		
	I0136	RAXXXX44	3			pmaize1			
	I0137	RAXXXX45	3			pmaize2			
	I0138	RAXXXX46	3			pmaize3			
	I0139	RAXXXX47	2			pmaize4			
	I0140	RAXXXX48	3			pmaize5			
	I0141	RAXXXX49	1			pmaize6			

Section	RUMM VarName	SPSS VarName	KEY	S2P	S2T	S1P	Zim91	IEA Pop1	IEA Pop2
	I0142	RAXXXX50	3			pgrandp1			
	I0143	RAXXXX51	4			pgrandp2			
	I0144	RAXXXX52	2			pgrandp3			
	I0145	RAXXXX53	3			pgrandp4			
	I0146	RAXXXX54	4			pgrandp5			
	I0147	RAXXXX55	3			pgrandp6			
	I0148	RAXXXX59	1			ptree4			

Appendix G**The 91 Test Items (and their Sources) that were Used in the “Hypothetical Test” for Calibrating the Mathematics Test Items**

Section	RUMM VarName	SPSS VarName	KEY	S2P	S2T	TIMSS Pop1	TIMSS Pop2
Section A	I0001	MA01XX	2	pmath01			
	I0002	MA02XX	2	pmath02			
	I0003	MA03XX	3	pmath03			
	I0004	MA04XX	2	pmath04			
	I0005	MA05XX	2	pmath05			
	I0006	MA06XX	3	pmath06			
	I0007	MA07XX	4	pmath07			
	I0008	MA08XX	2	pmath08			
	I0009	MA09XX	2	pmath09			
	I0010	MA10XX	4	pmath10			
	I0011	MA11XX	1	pmath11			
	I0012	MA12XX	3	pmath12			
	I0013	MA13XX	2	pmath13			
	I0014	MA14XX	4	pmath14			
	I0015	MA15XX	3	pmath15			
	I0016	MA16XX	2	pmath16			
	I0017	MA17XX	2	pmath17			
	I0018	MA18XX	2	pmath18			
	I0019	MA19XX	1	pmath19			
	I0020	MA20XX	1	pmath20			
	I0021	MA21XX	2	pmath21			
	I0022	MA22XX	1	pmath22			
	I0023	MA23XX	3	pmath23			
	I0024	MA24XX	2	pmath24			
	I0025	MA25XX	2	pmath25			
	I0026	MA31XX	2	pmath31			
	I0027	MA34XX	3	pmath34			
	I0028	MA35XX	2	pmath35			
	I0029	MA36XX	2	pmath36			
	I0030	MA37XX	2	pmath37			
	I0031	MA38XX	1	pmath38			
	I0032	MA39XX	3	pmath39			
	I0033	MA40XX	2	pmath40			
	I0034	MA41XX	4	pmath41			
	I0035	MA42XX	1	pmath42			
	I0036	MA43XX	4	pmath43			
	I0037	MA45XX	3	pmath45			
	I0038	MA46XX	3	pmath46			
	I0039	MA47XX	2	pmath47			L-10
	I0040	MA48XX	2	pmath48			
	I0041	MA49XX	1	pmath49			
	I0042	MA50XX	2	pmath50			P-17
	I0043	MA51XX	3	pmath51			

Section	RUMM VarName	SPSS VarName	KEY	S2P	S2T	TIMSS Pop1	TIMSS Pop2
	I0044	MA52XX	3	pmath52			
	I0045	MA53XX	2	pmath53			
	I0046	MA54XX	3	pmath54			
	I0047	MA59XX	1	pmath59			
	I0048	MA60XX	2	pmath60			
	I0049	MA61XX	3	pmath61			
	I0050	MA62XX	1	pmath62			
Section B	I0051	MA2616	2	pmath26	tmath16		
	I0052	MA2701	4	pmath27	tmath01	I-3	
	I0053	MA2803	1	pmath28	tmath03	I-8	
	I0054	MA2905	3	pmath29	tmath05	K-6	
	I0055	MA3007	3	pmath30	tmath07	L-5	
	I0056	MA3212	3	pmath32	tmath12		
	I0057	MA3315	2	pmath33	tmath15		
	I0058	MA4411	2	pmath44	tmath11		
	I0059	MA5514	2	pmath55	tmath14		
	I0060	MA5602	4	pmath56	tmath02	I-7	
	I0061	MA5706	3	pmath57	tmath06	K-9	
	I0062	MA5833	1	pmath58	tmath33		
	I0063	MA6328	1	pmath63	tmath28		N-17
	I0064	MAXX04	2		tmath04	I-9	R-12
Section C	I0065	MAXX08	3		tmath08		
	I0066	MAXX09	4		tmath09		P-8
	I0067	MAXX10	4		tmath10		
	I0068	MAXX13	3		tmath13		
	I0069	MAXX17	3		tmath17		I-8
	I0070	MAXX18	4		tmath18		J-14
	I0071	MAXX19	2		tmath19		J-18
	I0072	MAXX20	2		tmath20		K-4
	I0073	MAXX21	2		tmath21		
	I0074	MAXX22	2		tmath22		K-6
	I0075	MAXX23	3		tmath23		L-11
	I0076	MAXX24	2		tmath24		K-8
	I0077	MAXX25	1		tmath25		L-14
	I0078	MAXX26	2		tmath26		L-17
	I0079	MAXX27	3		tmath27		M-6
	I0080	MAXX29	2		tmath29		Q-1
	I0081	MAXX30	2		tmath30		R-7
	I0082	MAXX31	4		tmath31		R-9
	I0083	MAXX32	3		tmath32		S-2
	I0084	MAXX34	3		tmath34		V-3
	I0085	MAXX35	3		tmath35		
	I0086	MAXX36	3		tmath36		
	I0087	MAXX37	3		tmath37		
	I0088	MAXX38	3		tmath38		
	I0089	MAXX39	2		tmath39		
	I0090	MAXX40	3		tmath40		
	I0091	MAXX41	3		tmath41		

Appendix H

Example Test Items for Each Level of Competence in Reading

Level 1: Pre Reading (Linked with Level 1 in the Test Blueprint)

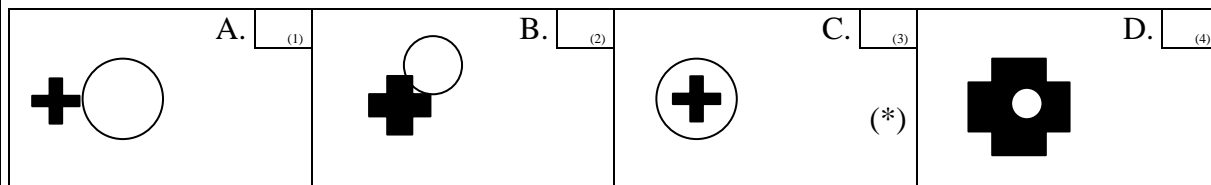
(a) Skills: Matches words and pictures involving concrete concepts and everyday objects.
Follows short simple written instructions.

(b) Example Test Items

- locate familiar words in a short (one line) text
- match words to pictures
- follow short and familiar instructions

In the questions on this page, choose the diagram that matches the word or sentences.

2. This cross is inside the circle.



Source: SACMEQ II Pupil Test.

Rasch Difficulty: -1.895

Comment: In this item the pupil needs to match the words “cross” and “circle” with the two items in each diagram – and then match the word “inside” with the diagram that illustrates the meaning of the word.

Appendix H (Ctd.)

Level 2: Emergent Reading (Linked with Level 2 in the Test Blueprint)

(a) Skills: Matches words and pictures involving prepositions and abstract concepts; uses cuing systems (by sounding out, using simple sentence structure, and familiar words) to interpret phrases by reading on.

(b) Example Test Items

- read familiar words and identify some new words
- use simple and familiar prepositions and verbs to interpret new words
- match words and very simple phrases

The Indian Tailor Bird

One of the most interesting birds I have seen is the Indian Tailor Bird. It is a small olive green bird that doesn't look at all unusual, yet it has a most unusual way of making its nest. The birds work together in pairs. First they find a leaf, the right size, and make holes along the edges with their beaks. Through these holes they thread grass. One bird pushes the thread from the outside, while the other bird sits in the nest and pushes it back until the edges of the leaf are sewn together to make a kind of bag, still hanging on the tree, in which the Tailor Bird lays its eggs.

50. What does the Tailor Bird use in place of thread?

- A. ☐ (1) Grass (*)
- B. ☐ (2) String
- C. ☐ (3) Spider web
- D. ☐ (4) Thorns

Source: SACMEQ II Pupil Test and SACMEQ II Teacher Test.

Rasch Difficulty: -1.634

Comment: In this item the words "thread" and "grass" are adjacent in both the question and in the text. The pupil needs to match a word in the question to a word in the text and then use the text immediately adjacent to it by reading on - but only within a very restricted range of text. The skill involved is essentially a word matching skill.

Appendix H (Ctd.)

Level 3: Basic Reading (Linked with Level 3 in the Test Blueprint)

(a) Skills: Interprets meaning (by matching words and phrases, completing a sentence, or matching adjacent words) in a short and simple text by reading on or reading back.

(b) Example Test Items

- use context and simple sentence structure to match words and short phrases
- use phrases within sentences as units of meaning
- locate adjacent words and information in a sentence

The Bird And The Elephant

A large tree grew in the middle of the jungle. At the top, a small bird had made a nest for her family of three baby birds. One day, an elephant came by. He leaned against the trunk, and scratched his back. The tree started to crack and sway. The baby birds, full of fear, huddled against their mother. She stuck the tip of her beak out of the nest, and said: "Hey, big animal, there are many trees around here! Why shake this one? My children are afraid, and could fall out of their nest."

The elephant said nothing, but he looked at the bird with his small eye, flapped his large ears in the wind, and left.

The next day, the elephant returned and scratched against the trunk once more. The tree began to sway. The frightened baby birds once again huddled against their mother's wings. Now Mother Bird was angry. "I order you to stop shaking our tree," she cried, "or I will teach you a lesson!"

"What could you do to a giant like me?" laughed the elephant. "If I wanted to, I could give such a push to this tree that your nest and your children would be flung far and wide."

The mother bird said nothing.

The next day, the elephant returned and scratched again. Quick as a flash, the mother bird flew into one of the elephant's enormous ears, and there, tickled the elephant by scratching him with her feet. The elephant shook his head ... nothing happened. So he begged the bird to leave and promised to stop scratching against the trunk.

The bird then left the elephant's ear and returned to her nest, beside her children.

Never again did the elephant return to scratch his back.

45. Where exactly did the large tree grow?

- A. ☐ ₍₁₎ In the thick jungle
- B. ☐ ₍₂₎ In the forest
- C. ☐ ₍₃₎ In the middle of the jungle (*)
- D. ☐ In the garden

Source: SACMEQ II Pupil Test.

Rasch Difficulty: -1.049

Comment: This item is similar to those in the previous level - but in this instance the pupil needs to first match phrases, and then locate the adjacent phrase by reading on in the text.

Appendix H (Ctd.)**Level 4: Reading for Meaning (Linked with Level 4 in the Test Blueprint)**

(a) Skills: Reads on or reads back in order to link and interpret information located in various parts of the text.

(b) Example Test Items

- interpret sentence and paragraph level texts
- match phrases across sentences
- read forwards and backwards in order to locate information in longer texts

Grandpa

Once upon a time, there was a very old man. His eyes had become weak. His ears were deaf, and his knees would shake. When he sat at the table, he was hardly able to hold the spoon. He spilled soup on the tablecloth, and he often slobbered.

He lived with his son and daughter-in-law. They also had a small boy who was four years old, so the old man was a grandfather.

His son and his son's wife found it disgusting to see him spilling food at the table. And so they finally ordered him to sit in a corner behind the stove. Here, they served him his food on a small earthenware plate. Now, Grandpa didn't even get enough to satisfy his hunger. He sat there feeling sad. He looked at the table, where the others were eating, and his eyes filled with tears.

Then, one day his shaking hands could not even hold the plate. It fell to the floor, and was broken into many pieces. The young wife scolded him. But the old grandfather said nothing. He just sighed. Then the young wife bought him a very cheap wooden bowl. Now he had to eat from that.

One day, while they were having dinner, the grandchild sat on the floor, and was very busy with some small pieces of wood.

"What are you doing?" asked his father.

"I am making a bowl," the boy answered.

"What is it for?"

"It is for my father and mother to eat from when I grow up."

The man and wife looked at each other for a long time. Then, they started crying. At once, they asked the old grandpa back to the table, and from then on he always ate with them. After that, even if he sometimes spilt his food, they never said a word about it.

54. How did grandfather feel when he sat by the stove?

- A. ☐ (1) Bored.
- B. ☐ (2) Tired.
- C. ☐ (3) Pleased.
- D. ☐ Unhappy (*)

Source: SACMEQ I Pupil Test

Rasch Difficulty: -0.544

Comment: In this item the pupil needs to be able to read on and read back once the key idea is located in the text. The pupil needs to read for meaning and then to link and interpret information from various parts of the text - not simply adjacent to the central idea of the task.

Appendix H (Ctd.)

Level 5: Interpretive Reading (Linked with Level 5 in the Test Blueprint)

(a) Skills: Reads on and reads back in order to combine and interpret information from various parts of the text in association with external information (based on recalled factual knowledge) that “completes” and contextualizes meaning.

(b) Example Test Items

- locate, interpret, and read forward to join two pieces of adjacent information
- use multiple pieces of information to interpret general purpose of a document
- paraphrase and interpret a single non-adjacent piece of information

Read the following passage and then answer the questions below.

What Is Quicksand?

Quicksand is a special kind of sand. Quicksand can swallow a pig, or a human, or an elephant.

Quicksand often looks like plain wet sand. But it is really soupy sand with so much water between the grains that you can’t stand on it.

If you step onto quicksand, you will slowly sink up to your knees. If you thrash and squirm, you will sink deeper and deeper. But, if you lie flat on your back with your arms stretched out, you can float on the sand, as you can float in water.

Watch out for quicksand on sand bars, on the bottom of streams, or along sandy seacoasts.

You can test for quicksand by poking it with a long stick or pole. If the sand shakes and quakes, don’t try to walk on it! It may be quicksand.

10. What is the main purpose of the passage?

- A. ☐ (1) *To tell people how to avoid the dangers of quicksand. (*)*
- B. ☐ (2) *To encourage people to protect the beauty of nature.*
- C. ☐ (3) *To describe how people and animals have been swallowed by quicksand.*
- D. ☐ (4) *To explain how quicksand got its name.*

Source: SACMEQ I Pupil Test and SACMEQ II Teacher Test.

Rasch Difficulty: 0.073

Comment: The pupils need to read on and read back in order to combine and interpret information from different parts of the text – and then use this to interpret the general purpose of the document.

Appendix H (Ctd.)

Level 6: Inferential Reading (Linked with Level 5 in the Test Blueprint)

(a) Skills: Reads on and reads back through longer texts (narrative, document or expository) in order to combine information from various parts of the text so as to infer the writer's purpose.

(b) Example Test Items

- interpret, and make inferences from, different types of texts by reading backwards and forwards to confirm links between widely separated information pieces
- extract information from a non-traditional (left to right) document
- make judgments about an author's intentions or purpose beyond the text content

Photography

Read the comic strip and then answer the questions below.

72. Why should you take the lens cap off?

A. ☐ (1) To let a lot of light into the camera.

B. ☐ (2) So that it doesn't get in the way of the aperture. (*)

C. ☐ (3) To move the camera closer to you.

D. ☐ So the camera will be quiet.

Source: SACMEQ II Pupil Test.

Rasch Difficulty: 0.453

Comment: The pupil needs to examine and interpret information related to different pictures and words in a non-traditional (comic strip) instructional document, and then make a judgement about the purpose of a particular instruction made by the author.

Appendix H (Ctd.)

Level 7: Analytical Reading (Linked with Level 5 in the Test Blueprint)

(a) Skills: locates information in longer texts (narrative, document or expository) by reading on and reading back in order to combine information from various parts of the text so as to infer the writer's personal beliefs (value systems, prejudices, and/or biases).

(b) Example Test Items

- combine several pieces of information from a range of locations in complex and lexically dense text or documents
- analyse detailed text or extended documents for an underlying message
- identify meaning from different styles of writing

Vacancy

Read the following advertisement and then answer the questions below.

**Vacancy - Job opportunity
Post - Clerical Assistant**

**A vacancy exists for the post of a clerical assistant
in a large farm located in Mbewe.**

Qualifications:

The applicant,

- Should be a female of between 20 and 25 years of age;
- Must have successfully completed Primary 6;
- Should be fluent in either of the following languages: Kiswahili, English, or Portuguese;
- She must have a minimum work experience of three years in clerical duties.

Application should be sent to:

The General Manager
Mbewe Farm
P.O. Box 70
Mbewe

The deadline for application is 15 October 1999.

50. The job opportunity is for ...
- A. ☐ (1) a female clerk.
- B. ☐ (2) the general manager.
- C. ☐ (3) a large pineapple farm.
- D. ☐ (4) a clerical assistant. (*)

Source: SACMEQ II Teacher Test.

Rasch Difficulty: 1.348

Comment: In this item the pupil needs to read on and read back in order to combine information from various parts of a document, and then to decide upon the kind of person that the writer has in mind for the position.

Appendix H (Ctd.)**Level 8: Critical Reading (A New Level Generated from the Skills Audit)**

(a) Skills: Locates information in a longer texts (narrative, document or expository) by reading on and reading back in order to combine information from various parts of the text so as to infer and evaluate what the writer has assumed about both the topic and the characteristics of the reader – such as age, knowledge, and personal beliefs (value systems, prejudices, and/or biases).

(b) Example Test Items

- use text structure and organisation to identify an author's assumptions and purposes
- identify an author's motives, biases, beliefs in order to understand the main theme
- link text to establish multiple meanings including analogy and allegory

Effective Thinking

Effective thinking, while starting with logic, goes further so as to include broad mental skills. It includes the understanding of complex and fluid situations, in dealing with which logical methods are inadequate as mental tools. Of course, thinking must never violate the rules of logic, but it may use techniques beyond those of exact mathematical reasoning. In the fields of social study and history, and in the problems of daily life, there are large areas where evidence is incomplete and may never be completed. Sometimes the evidence may also be untrustworthy; but if the situation is practical, a decision must be made. The scientist has been habituated to deal with properties which can be abstracted from their total background and with variables which are few and well defined. Consequently, where the facts are unique and unpredictable, where the variables are numerous and their interactions too complicated for precise calculation, the scientist is apt to throw up his hands in despair and perhaps turn the situation over to the sentimentalists or the mystics. But surely he would be wrong to ignore both this type of problem and this type of thinking; for the methods of logical thinking do not exhaust the resources of reason. In coping with complex and fluid situations we need thinking which is relational and which searches for cross bearings between areas; this is thinking in a context. By its use it is possible to reach an understanding of historical and social materials and of human relations, although not with the same degree of precision as in the case of simpler materials and recurring events. As Aristotle says, "It is the mark of an educated man to expect no more exactness than the subject permits."

46. The author believes scientists should widen their field of work by undertaking problems that are ...
- A. ☐ (1) less specific and less precise. (*)
- B. ☐ (2) more exact.
- C. ☐ (3) more abstract.
- D. ☐ (4) less complex and fluid.

Source: SACMEQ II Teacher Test

Rasch Difficulty: 3.372

Comment: In this task the pupil needs to read through the entire passage, to locate information relevant to scientists' thinking processes, and to distinguish this from alternative thinking styles. Then the pupil needs to identify the beliefs of the author by inference.

Appendix I

Example Test Items for Each Level of Competence in Mathematics

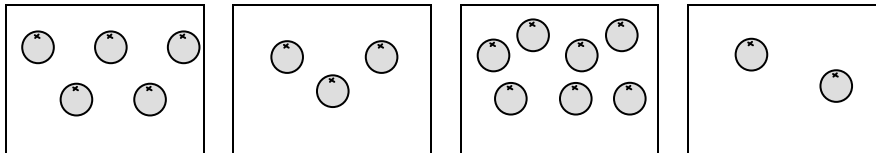
Level 1: Pre Numeracy (Linked with Level 1 in the Test Blueprint)

(a) Skills: Applies single step addition or subtraction operations. Recognizes simple shapes. Matches numbers and pictures. Counts in whole numbers.

(b) Example Test Items

- count illustrated objects
- recognise basic numbers and shapes
- carry out simple single operations of addition and subtraction

1. Which box has 7 oranges? Tick the correct box.



- A. ☐ (1) B. ☐ (2) C. ☐ (3) (*) D. ☐ (4)

3. $73 + 27 =$

- A. ☐ (1) 46
 B. ☐ (2) 90
 C. ☐ (3) 100 (*)
 D. ☐ (4) 110

Source: Both from SACMEQ II Pupil Test.

Rasch Difficulty: -4.584 and -2.717

Comment: In the first item the pupil needs to match the numeral with the picture representing the same number. This skill represents the ability to count and recognise numerical representations. In the second item the pupil needs to demonstrate the ability to perform a simple single arithmetic operation.

Appendix I (Ctd.)

Level 2: Emergent Numeracy (Linked with Level 1 in the Test Blueprint)

(a) Skills: Applies a two-step addition or subtraction operation involving carrying, checking (through very basic estimation), or conversion of pictures to numbers. Estimates the length of familiar objects. Recognizes common two-dimensional shapes.

(b) Example Test Items

- link simple verbal, graphic, and number forms with single arithmetic operations on whole numbers up to four digits
- recognise common shapes or figures in two dimensions
- estimate accurately lengths of simple shapes

4. Subtract ...

$$\begin{array}{r} 6,000 \\ - 2,369 \\ \hline \\ \hline \end{array}$$

- A. ☐ ₍₁₎ 3,531
- B. ☐ ₍₂₎ 3,631 (*)
- C. ☐ ₍₃₎ 3,742
- D. ☐ ₍₄₎ 4,369

Source: SACMEQ II Pupil Test and SACMEQ II Teacher Test.

Rasch Difficulty: -2.043

Comment: The pupil needs to perform the task of subtraction - with carrying.

Appendix I (Ctd.)

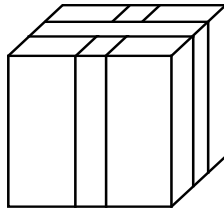
Level 3: Basic Numeracy (Linked with Level 2 in the Test Blueprint)

(a) Skills: Translates verbal information presented in a sentence, simple graph or table using one arithmetic operation in several repeated steps. Translates graphical information into fractions. Interprets place value of whole numbers up to thousands. Interprets simple common everyday units of measurement.

(b) Example Test Items

- recognise three-dimensional shapes and number units
- use a single arithmetic operation in two or more steps
- convert in single step units using division

40. *What shape is this present?*



- A. ☐ (1) sphere
- B. ☐ (2) cube (*)
- C. ☐ (3) cylinder
- D. ☐ pyramid

Source: SACMEQ II Pupil Test.

Rasch Difficulty: -1.26

Comment: The pupil needs to know the names of 3 dimensional regular shaped objects, and then to be able to link them to everyday objects (for example, gifts).

Appendix I (Ctd.)

Level 4: Beginning Numeracy (Linked with Level 3 in the Test Blueprint)

(a) Skills: Translates verbal or graphic information into simple arithmetic problems. Uses multiple different arithmetic operations (in the correct order) on whole numbers, fractions, and/or decimals.

(b) Example Test Items

- convert units in two steps and count tabulated data
- analyse a visual prompt and interpret triangular shapes
- translate verbal to arithmetic form using two operations on fractions

11. A cake was shared among four pupils as follows: John gets $\frac{1}{2}$, Peter gets $\frac{1}{8}$, Sarah gets $\frac{1}{4}$ and Janet gets $\frac{1}{16}$. Who gets the largest share?

A. ☐ (1) *John (*)*

B. ☐ (2) *Janet*

C. ☐ (3) *Sarah*

D. ☐ (4) *Peter*

Source: SACMEQ II Pupil Test

Rasch Difficulty: -0.356

Comment: The pupil needs to translate the verbal description of a problem into an arithmetic problem – and then use several operations with fractions to obtain an answer.

Appendix I (Ctd.)**Level 5: Competent Numeracy (Linked with Level 3 in the Test Blueprint)**

(a) Skills: Translates verbal, graphic, or tabular information into an arithmetic form in order to solve a given problem. Solves multiple-operation problems (using the correct order of arithmetic operations) involving everyday units of measurement and/or whole and mixed numbers. Converts basic measurement units from one level of measurement to another (for example, metres to centimetres).

(b) Example Test Items

- convert basic measurement units
- understand the order of magnitude of simple fractions
- conduct multiple steps with a range of basic operations in a strict sequence using an analysis of a short verbal or visual prompt

37. On a trip a bus driver keeps a record of how far he travels each day and the time taken. Here is the first part of his record. How far did the driver most likely travel on Day 3?

Day	Distance travelled (km)	Time taken (hours)
1	42	6
2	63	9
3		8
4	49	7

- A. ☐ (1) 23 km
- B. ☐ (2) 56 km (*)
- C. ☐ (3) 64 km
- D. ☐ (4) 84 km

Source: SACMEQ II Pupil Test and SACMEQ II Teacher Test.

Rasch Difficulty: -0.024

Comment: The pupil needs to translate tabular information into an arithmetic form and then solve the problem using multiple steps and multiple arithmetic operations in the correct sequence.

Appendix I (Ctd.)**Level 6: Mathematically Skilled (Linked with Level 4 in the Test Blueprint)**

(a) Skills: Solves multiple-operation problems (using the correct order of arithmetic operations) involving fractions, ratios, and decimals. Translates verbal and graphic representation information into symbolic, algebraic, and equation form in order to solve a given mathematical problem. Checks and estimates answers using external knowledge (not provided within the problem).

(b) Example Test Items

- perform complex and detailed mathematical tasks (involving considerable abstraction of verbal, visual, and tabular information into symbolic forms and algebraic solutions) using knowledge not supplied with the task
- use of an extended verbal or graphic prompt (involving an analysis of steps) to identify the correct sequence of calculations
- convert, and operate on, units of measurement (time, distance, and weight)

The chart below shows some temperature readings made at different times on four days. Use the chart to answer questions 47 to 50.

	6 a.m.	9 a.m.	12 noon	3 p.m.	8 p.m.
Monday	15°C	17°C	20°C	21°C	19°C
Tuesday	15°C	15°C	15°C	10°C	9°C
Wednesday	8°C	10°C	14°C	13°C	15°C
Thursday	8°C	11°C	14°C	17°C	20°C

49. *What was the average temperature on Wednesday?*

- A. ₍₁₎ 12° C (*)
- B. ₍₂₎ 13° C
- C. ₍₃₎ 14° C
- D. ₍₄₎ 15° C

Source: SACMEQ II Pupil Test.

Rasch Difficulty: 0.710

Comment: The pupil needs to identify appropriate information expressed as temperatures in tabular form, and then to convert this into numbers, and then translate these into an arithmetic form in order to solve a problem.

Appendix I (Ctd.)**Level 7: Concrete Problem Solving (Linked with Level 5 in the Test Blueprint)**

(a) Skills: Extracts and converts (for example, with respect to measurement units) information from tables, charts, visual and symbolic presentations in order to identify, and then solves multi-step problems.

(b) Example Test Items

- use multiple verbal order of steps with conversion of time units
- translate verbal to arithmetic form, apply units conversion with long division
- convert from mixed number fractions to decimals

24. The table shows the values of x and y , where x is proportional to y . What are the values of P and Q ?

x	3	6	P
y	7	Q	35

- A. ☐ ₍₁₎ $P=15$ and $Q=14$ (*)
- B. ☐ ₍₂₎ $P=14$ and $Q=31$
- C. ☐ ₍₃₎ $P=10$ and $Q=14$
- D. ☐ ₍₄₎ $P=14$ and $Q=15$

Source: SACMEQ II Teacher Test.

Rasch Difficulty: 1.573

Comment: The pupil needs to extract information from several places in a table of figures and then apply proportionate calculations in order to solve a multi-step problem involving fractions and conversions into whole numbers.

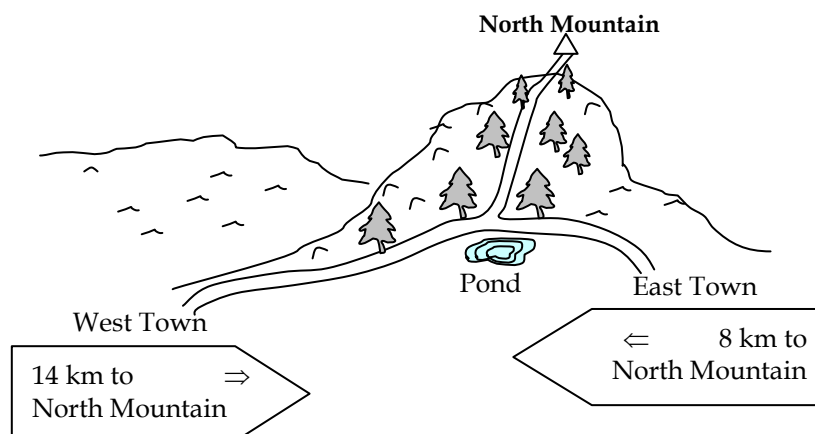
Appendix I (Ctd.)**Level 8: Abstract Problem Solving (A New Level Generated from the Skills Audit)**

(a) Skills: Identifies the nature of an unstated mathematical problem embedded within verbal or graphic information, and then translate this into symbolic, algebraic, or equation form in order to solve the problem.

(b) Example Test Items

- identify the nature of a problem, translate the information given into a mathematical approach, and then identify the correct mathematical strategies to obtain a solution

35. There are two ways to go to North Mountain. One is from East Town and the other is from West Town. The distance from East Town to the pond in the map below is $\frac{1}{3}$ of the distance from West Town to the pond. What is the distance from West Town to the pond?



- A. ☐ (1) 7 km
 B. ☐ (2) 8 km
 C. ☐ (3) 9 km (*)
 D. ☐ (4) 10 km

Source: SACMEQ II Teachers Test.

Rasch Difficulty: 1.934

Comment: The pupil needs to translate the information given into a form of mathematical thinking and then search for a solution strategy. The pupil needs to link the unknown distances to variables and then solve simultaneous equations. The key skills are the identification of the problem, its translation into a symbolic form, and the solution of the equations.

Chapter 3

What Were the Characteristics of the Standard 6 Pupils and their Homes?

Introduction

This chapter presents information on some of the characteristics of pupils and their homes and learning environments. These data are given for three reasons. First, because they provide a context for the analyses that come later in this report. Second, the data can be used to compare the types of pupils in Standard 6 at different time periods. The third reason is that home background is an important variable in all analyses of educational data. From the home context variables a socio-economic scale will be constructed and it is important for the reader to know exactly which variables have been included. It is common sense that schools with an intake of pupils from 'better' home backgrounds should achieve better than schools with an intake of pupils from poorer backgrounds. Indeed, the research literature abounds with examples. It is schools that have high scores but an intake of children from families of low socio-economic-status that are remarkable. Many of the school and teacher variables appearing in later chapters will be examined for their impact on pupil achievement. It will be important to examine their bivariate relationships with achievement and also their effect on achievement after taking account of the socio-economic status (SES) of the pupils.

Policy suggestion 3.1: The Ministry should plan to continue the survey of the same target population employed during SACMEQ I (1995) and SACMEQ II (2001) to examine changes in important educational indicators over time.

A note on the interpretation of the data

It is very important to interpret each statistic in association with its sampling error. It will be recalled from Chapter 2 that the sample was drawn in order to yield standard errors of sampling for pupils in Standard 6 in Mauritius, such that a sample estimate of a population percentage would have a standard error of ± 2.5 percent. For this level of sampling accuracy we can be sure 19 times out of 20 that the population value of a percentage lies within ± 5 percent of the estimate derived from the sample. The

sampling errors for means are also given in the tables and the same principle applies for limits of two standard errors of sampling.

Where a percentage or a mean is presented for a sub-group of pupils (such as for zones) then the standard error will be greater than for the sample as a whole. This occurs, in part, because the sample sizes for sub-groups are smaller than the total sample sizes. Had smaller standard errors for sub-groups been required, this would have increased the size of the total sample and also of the budget required to undertake much larger field data collections and data analyses.

To illustrate, consider the first column of entries in Table 3.1. The average age of pupils in months at the time of data collection is presented separately for each zone and for Mauritius overall. The standard error (SE) of each average is also presented. For the first zone, Port Louis and the North, the average pupil age was 135.9 months at the time of the data collection, and the standard error for this estimate was 0.26 months. That is, there were 19 chances in 20 that the average age of the population of Standard 6 pupils in the Port Louis and North zone was $135.9 \pm 2(0.26)$. In other words, we can be 95 percent confident that the population value for Port Louis and North was between 135.38 months and 136.42 months.

It is important to note that the value of the standard error for each estimate changed from zone to zone. The variation was caused by two factors: differences in the distribution of pupils among schools within zones and the structure of the sample design within each zone. The smallest standard error of 0.12 months occurred for the sample estimate of average age for the whole population of Standard 6 pupils in Mauritius. This result was to be expected because the overall sample estimate was based on a much larger sample of schools and pupils than the corresponding estimate for any single zone.

In interpreting the values in Table 3.1 and other tables throughout this report, we need to remember that the percentages and means have been presented in terms of pupils.

That is, pupils were the units of analysis - even though some variables in this report refer to teachers or schools. Where a percentage for a variable that describes teachers has been presented, this percentage should be interpreted as 'the stated percentage of pupils was in schools with teachers having the particular characteristic'. Similarly, a percentage for a variable that describes schools should be interpreted as 'the stated percentage of pupils was in schools with the particular characteristic'.

Specific policy questions related to educational inputs

As a starting point, in order to guide the data analyses, the very broad educational policy question posed in the title to this chapter was divided into five specific questions. These five questions – listed below -- were used to develop a more structured response to the educational policy issues surrounding the main question. listed below

- a) What were the personal characteristics and home background characteristics of Standard 6 pupils that might have an implication for monitoring equity and/or that might impact upon teaching and learning?
- b) What were the school context factors experienced by Standard 6 pupils, grade repetition and homework that might impact upon teaching/learning and the general functioning of schools?
- c) Did Standard 6 pupils have sufficient access to classroom materials in order to participate fully in their lessons?
- d) Did Standard 6 pupils have access to library books within their schools and (if they did have access) was the use of these books being maximized by allowing pupils to take them home to read?
- e) Has the practice of Standard 6 pupils receiving extra tuition in school subjects outside school hours become widespread and have there been paid lessons?

What were the personal characteristics of Standard 6 pupils?

Table 3.1 gives the ages in months of the pupils as well as the percentages of girls in Standard 6 are.

Table 3.1. The means and sampling errors of pupil age and the percentage of female pupils

Zone	Age		Sex		Books at home		Possessions at home Max=13		Meals		Parent education	
	(months)		(female)		(number)		(index)		(index)		(index)	
	Mean	SE	%	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Zone 1 P/Louis & North	135.9	0.26	47.2	1.14	31.2	2.88	9.9	0.14	11.6	0.09	7.7	0.15
Zone 2 East & B/Bassin	135.8	0.26	48.8	1.17	42.5	4.71	9.8	0.16	11.7	0.07	7.7	0.18
Zone 3 South & Curepipe	135.9	0.23	47.2	1.25	43.1	5.46	9.6	0.20	11.6	0.10	7.4	0.16
Zone 4 West & Vacoas	135.6	0.20	49.9	1.18	41.3	5.60	9.8	0.24	11.6	0.08	8.0	0.18
Zone 5 Rodrigues	136.8	0.38	47.5	1.70	16.8	3.61	7.5	0.30	11.4	0.20	6.2	0.18
Mauritius	135.8	0.12	48.1	0.58	37.6	2.11	9.7	0.09	11.6	0.04	7.7	0.08

The mean age for all of the Standard 6 pupils was 135.8 months. If all pupils had entered school at the official age of entry and there had been no grade-repeating, then the expected age during the first week of August (the date of testing) would have been 133 months. Pupils enter school in January if they have turned 5 years by 31 December of the previous year. The figure of 133 months was derived by adding 5 years 7 months of study to 5 years and 6 months (the average age of entry). Thus, the pupils in the sample were very slightly older than might have been expected. This may well be due to those who had repeated a grade. The distribution of boys and girls was more or less the same as in the census figures. There were no differences between the SACMEQ 1 (data collected in 1995) and SACMEQ 2 (data collected in 2001) mean ages and percentage of female pupils.

Policy suggestion 3.2: The Planning Unit should investigate the possibility of allowing some more flexibility in the age of entry to primary school with a view to decreasing the average age of entry to the primary level.

Policy suggestion 3.3: In the light of the reforms being implemented the Planning Unit should investigate the practice of repeating a grade at Standard 6 level in order to determine whether this extra year can be justified on educational grounds.

About ninety-four percent of pupils lived with their parents or guardians, about five percent lived with relatives while attending school and only about one percent were in a hostel or lived by themselves. Thus, when describing homes, nearly all children were referring to their own homes.

Nearly all homes had floors that were tiled or cement, walls made of bricks or stones, and roofs made of cement/concrete or metal/asbestos. An index was created of the building quality of homes. The best possible score was 16. The average for Mauritius was 14.5. The range among zones was from 14.3 to 14.6.

The home environment is made up of various components. One component concerns the wealth of the home in monetary terms. It is impossible to ask what parents earn of their children. Thus proxy, or indirect, methods of assessing the wealth of a home had to be used, such as the goods they possess at home (home possessions). Another component is the intellectual milieu as characterized by the education of the parents and the books they have at home. Both of these can be of use to the child's learning.

The number of books at home was small, but it should be recalled that in Mauritius there are many libraries and both parents and pupils make use of them. But, at the same time, it can be seen that the pupils in Rodrigues were disadvantaged in terms of reading materials at home. Given that it is important for pupils to be able to read at home if they are to perform well in reading tests (Elley, 1994), it was disappointing to learn that there were so few books in homes in Rodrigues. If there are few books in the home, then the Ministry may wish to overcome this deficit by ensuring that children can take books home from school to read and the Ministry can also provide mobile libraries that visit villages at least once every two weeks.

Policy suggestion 3.4: The Ministry should ensure that learners are able to borrow books to take home to read. To compensate for the limited educational resources available in the homes of learners of Zone 5 (Rodrigues), the responsible authority should provide mobile libraries.

The next information presented in Table 3.1 is the number of possessions that pupils stated were in their homes. The Pupil questionnaire asked about thirteen possessions they might have in their home. These were: daily newspaper, weekly or monthly magazine, radio, TV set, video cassette recorder (VCR), cassette player, telephone, car, motorcycle, bicycle, piped water, electricity (mains, generator, solar), and a table to write on. The number of possessions owned in the home was summed for each pupil. The lowest score possible was zero and the highest 13.0. The average number of possessions was 9.7 items. The parents of the pupils in Rodrigues also tended to be slightly less well off in terms of possessions in the home (7.5).

In general it can be said that the material conditions of the homes of Standard 6 pupils had improved in the period 1995-2001.

A further question concerned the pupils' nutrition in terms of having three meals a day, even if the nutritional value of each meal was not known. The question asked about a morning meal, a midday meal and an evening meal and how many times a week they ate each of the meals. A score of 3 meant that they did not eat at all, while a score of 12 indicated that they ate every meal each day. All pupils in Mauritius had sufficient meals per week (average = 11.6).

The final information presented in Table 3.1 concerns the parental education of the Standard 6 pupils. Separate questions were asked of the mother's and father's educational levels. The results were summed. A score of '1' indicated that neither parent had received any school education and a score of 12 indicated that both parents had completed senior secondary and had had some tertiary education. The average was 7.7. The problem of this average is that it can mask large differences between mothers and fathers. A cross-tabulation between the levels of fathers' and mothers' education is presented in Table 3.2. The table depicts the percentages of mothers with certain levels of education and the percentage of fathers with different levels. Taking the first row in the table, it can be seen that there were 22.5 percent of fathers with no schooling who

were married to wives with no schooling, 23.9 percent were married to wives with some primary, 32.4 percent were married to wives who had completed primary school, and so on.

In general, there were no differences between 1995 and 2001 in the types of homes from which pupils came.

Table 3.2. Cross-tabulation of father's and mother's education

		Mother's education						
		No school	Some primary	All primary	Some secondary	All secondary	Some post-secondary and plus	All mothers
Father's education	No school	22,5	23,9	32,4	11,3	5,6	4,2	100,0
	Some primary	5,8	30,4	30,0	23,3	9,3	1,3	100,0
	All primary	3,3	7,9	46,8	27,2	12,6	2,2	100,0
	Some secondary	2,1	8,9	28,8	46,8	11,3	2,1	100,0
	All secondary	1,3	6,6	20,1	29,8	39,1	3,0	100,0
	Some post-secondary and plus	1,4	3,4	15,9	21,2	37,4	20,7	100,0
	All fathers	3,0	10,1	29,8	31,9	20,1	5,0	100,0

What were the school context factors experienced by Standard 6 pupils?

Normally, pupils living in urban areas achieve better than pupils living in rural areas. Mauritius is an island where it takes only two hours to drive from one end to the other. In this sense it does not take long for a pupil to move from what might be termed a rural to an urban area. A question was asked of the school head about whether his or her school was located in an isolated area, a village, a small town or a city. The first two categories were put together and called 'rural' and the last two categories were collapsed into one category and called 'urban'. The percentage of pupils in schools located in 'urban' areas was calculated and the results are reported in Table 3.3. At the same time, there was a further question asking the head how many kilometres it was from the school to a health clinic, a tarmac road, a public library, a bookshop and a secondary school. These distances were averaged for each school. The average distances to the sum of the facilities are given in Table 3.3.

It can be seen that about half of the Standard 6 pupils were in urban schools in 2001 and that this had not changed much since 1995. Nearly 87 percent of pupils in Zone 4 were

in urban schools and the most rural pupils were still in Rodrigues. However, Rodrigues had fewer pupils in rural schools in 2001 than in 1995. The average distance from schools to public facilities was just over two kilometres. The schools were well served by the local infrastructure.

Table 3.3. School location (SACMEQ I and SACMEQ II)

Zone	SACMEQ I				SACMEQ II			
	Urban		Distance (km)		Urban		Distance (km)	
	%	SE	Mean	SE	%	SE	Mean	SE
Zone 1 P/Louis & North	46.8	3.62	2.0	0.18	55.9	4.02	2.1	0.20
Zone 2 East & B/Bassin	47.7	5.69	2.6	0.27	34.8	5.43	2.5	0.33
Zone 3 South & Curepipe	36.2	7.49	2.6	0.30	35.0	8.07	2.8	0.47
Zone 4 West & Vacoas	79.9	3.14	2.4	0.36	86.7	4.22	2.4	0.24
Zone 5 Rodrigues	16.7	11.24	3.5	0.66	30.0	13.14	2.4	0.41
Mauritius	49.2	1.88	2.4	0.12	51.7	2.37	2.4	0.14

Table 3.4. Percentages, mean, and sampling errors for the pupil language, days absent, and repetition (SACMEQ II)

Zone	Speak English		Days absent		Repetition	
	%	SE	Mean	SE	%	SE
Zone 1 P/Louis & North	57.5	4.38	2.0	0.16	18.5	1.67
Zone 2 East & B/Bassin	72.7	3.95	1.6	0.15	18.6	1.87
Zone 3 South & Curepipe	65.0	5.44	1.9	0.25	19.8	1.53
Zone 4 West & Vacoas	68.5	5.13	1.6	0.19	16.4	1.39
Zone 5 Rodrigues	54.3	8.11	1.6	0.35	26.5	2.30
Mauritius	64.4	2.29	1.8	0.09	18.7	0.82

The tests were in English. One interesting aspect of the home is the extent to which the pupils spoke English at home rather than Creole. The percentages of pupils who spoke English sometimes, often or all of the time is presented in Table 3.4. It can be seen that 64.4 percent of pupils spoke English at home at least sometimes. In other words there

were 35 percent of pupils who never spoke English at home. However, nearly 73 percent of pupils in Zone 2 spoke English sometimes.

Absenteeism can sometimes be a problem. In Mauritius, pupils were absent 1.8 days in the month before the testing took place. Over a year this can be quite a few days. Although absenteeism was low, a question was asked about the reasons for absenteeism. Most absenteeism was associated with illness and occasionally with family reasons. It was never associated with pupils having to work or with having to pay fees. Nearly 20 percent of pupils had repeated a grade once or more. Grade repetition was highest in Zone 5 (Rodrigues).

Policy Suggestion 3.5: The Ministry should identify those schools where absenteeism seems to be a problem and organize special teacher-parent workshops to sensitise parents on this issue. It is suggested that such workshops should be a regular feature in all primary schools for all parents of new entrants.

There were some interesting changes between SACMEQ I and SACMEQ II for each of these variables. These are shown in Figure 3.1. Some 14 percent more pupils spoke English at home than in 1995, perhaps reflecting the fact that much more English was being spoken on TV in 2001 than in 1995. Days absent per month rose from 1.2 to 1.8 days. But 1.8 is still a small number compared with some countries. Grade repetition decreased from 25 to 19 percent. All of the above are in accordance with government policy. More English is spoken, absenteeism is low and grade repetition has decreased.

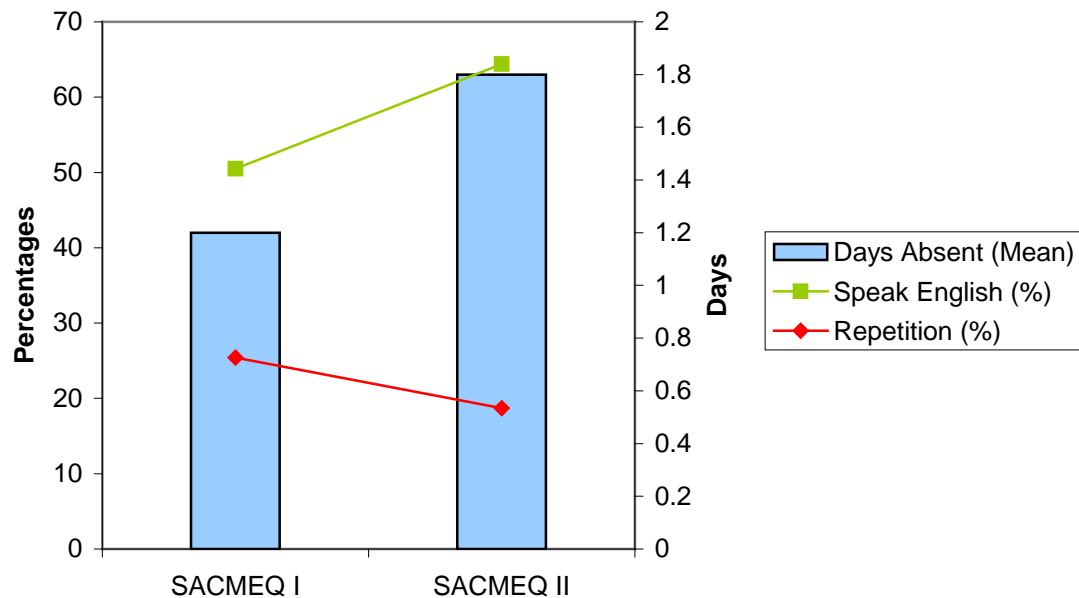


Figure 3.1. Percentage for pupil language, repetition and mean days absent (SACMEQ I and SACMEQ II)

Policy suggestion 3.6: The Ministry should establish a taskforce to examine whether grade repetition can be justified on either educational or cost effective grounds.

How often was homework given and corrected?

Information was given about the extent that parents or others in the home ensured that homework was done. Homework is important if pupils are to have practice in learning. Walberg and Paik(2000) have shown that those pupils receiving homework achieve more than those pupils who do not receive homework. Furthermore, when the homework was marked by the teachers and worked through with the pupils either collectively or individually, then those pupils achieved more than those who did homework but did not have it marked by the teachers and worked through with them.

The first column in Table 3.5 indicates the extent to which homework was given most days. It shows that 83 percent of pupils had homework most days. More had homework in mathematics (81 percent) than in reading (54 percent). This section concerns the percentage of pupils being given homework in reading at least once or twice a week.

Information on how frequently the pupil perceived that teachers corrected the homework is presented in Table 3.6. We see that some 65 percent of pupils said their homework was always or mostly corrected, and 26 percent said ‘sometimes corrected’. On the whole, 4.4 percent of the Standard 6 learners reported no homework given and a further 4.8 percent reported that their homework was never corrected. About 9 percent of Standard 6 pupils reported not being given homework or not having their homework corrected. Is there any relation between these 9 percent of learners and those that did not take extra tuition?

Table 3.5. Percentages and sampling errors for the frequency of homework given most days (SACMEQ I and SACMEQ II)

Zone	SACMEQ I		SACMEQ II			
	Homework on any subject		Reading homework		Mathematics homework	
	%	SE	%	SE	%	SE
Zone 1 P/Louis & North	81.8	3.22	58.2	5.86	77.6	4.97
Zone 2 East & B/Bassin	81.1	3.67	54.4	6.30	88.0	2.59
Zone 3 South & Curepipe	86.9	2.64	53.1	6.13	82.5	4.76
Zone 4 West & Vacoas	86.7	3.90	53.4	5.46	81.3	3.80
Zone 5 Rodrigues	60.8	8.86	27.9	7.97	64.7	8.53
Mauritius	82.6	1.67	54.2	2.92	81.1	2.17

Table 3.6. Percentages and sampling errors for the frequency of reading homework being corrected by teacher (SACMEQ II)

Zone	No homework given		Never corrected		Sometimes corrected		Mostly/always corrected	
	%	SE	%	SE	%	SE	%	SE
Zone 1 P/Louis & North	3.6	1.52	4.8	2.40	23.1	5.09	68.5	5.51

Zone 2 East & B/Bassin	3.5	1.36	1.8	0.64	26.6	5.37	68.1	5.69
Zone 3 South & Curepipe	1.4	0.75	1.5	0.85	33.1	5.54	64.1	5.81
Zone 4 West & Vacoas	10.5	3.10	11.9	4.32	22.7	5.23	54.9	6.71
Zone 5 Rodrigues	3.6	1.50	3.9	1.99	27.8	8.14	64.6	8.92
Mauritius	4.4	0.87	4.8	1.20	26.1	2.60	64.7	2.85

Similar data for mathematics are given in Table 3.7. Homework in mathematics was given more frequently and also marked more frequently than homework in reading.

Table 3.7. Percentages and sampling errors for the frequency of mathematics homework being corrected by teacher (SACMEQ II)

Zone	No homework given		Never corrected		Sometimes corrected		Mostly/always corrected	
	%	SE	%	SE	%	SE	%	SE
Zone 1 P/Louis & North	3.6	1.35	0.4	0.27	5.2	2.39	90.8	2.76
Zone 2 East & B/Bassin	2.3	1.20	1.5	0.76	9.8	2.81	86.4	3.10
Zone 3 South & Curepipe	0.7	0.44	0.3	0.22	12.1	4.08	86.9	4.25
Zone 4 West & Vacoas	2.5	0.90	1.1	0.54	15.0	4.38	81.4	4.66
Zone 5 Rodrigues	0.8	0.54	0.8	0.82	11.5	4.20	86.9	4.10
Mauritius	2.4	0.56	0.8	0.22	9.8	1.58	87.0	1.73

Given the importance of homework, it would seem useful to examine why more homework was not given in reading. First, however, we will look at the reading scores and whether these are acceptable (see Chapter 7).

Policy suggestion 3.7: The Inspectorate should establish a taskforce to look into the formulation of a policy on homework and homework correction.

How much did parents help children with their schoolwork?

One important aspect of the home environment is how much the parents or some other adult show interest in a child's schoolwork or interact to help the child with schoolwork. This is part of the intellectual milieu of the home. Education is, or should be, a joint effort of the home and the school. Pupils' replies to questions about their interaction with parents or someone else in the home are presented in Tables 3.8 to 3.10.

Table 3.8 refers to parental behaviour such as ensuring that the homework was done, actually helping with homework in general, and also looking at the work once it was completed. About half of the pupils had parents who ensured that the homework was done. But this means that half did not. Relatively few parents helped with the homework, but 35 percent actually looked at the work once it had been completed. All of this is encouraging although it still leaves room for improvement. Teacher-parent meetings can be helpful in changing parental behaviour for the better.

Table 3.8. Home assistance with school related work (SACMEQ I and SACMEQ II)

Zone	Home assistance 'most of the time' with school work											
	SACMEQ I						SACMEQ II					
	Ensure homework done		Help with the homework		Look at school work done		Ensure homework done		Help with the homework		Look at school work done	
	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE
Zone 1 P/Louis & North	49.2	4.72	12.6	2.15	23.4	3.48	51.6	5.21	20.2	4.84	34.4	4.44
Zone 2 East & B/Bassin	43.0	4.31	12.9	2.31	24.4	3.50	50.6	4.57	17.0	4.00	39.7	4.52
Zone 3 South & Curepipe	50.8	5.42	14.5	3.85	23.0	3.57	56.8	5.75	22.3	4.29	31.9	4.63
Zone 4 West & Vacoas	60.1	5.07	14.8	2.12	37.5	4.74	44.0	5.72	13.9	3.28	36.0	5.10
Zone 5 Rodrigues	35.4	8.07	15.9	3.64	17.8	3.74	29.7	5.92	12.0	4.29	23.2	6.81
Mauritius	49.3	2.39	13.6	1.27	25.8	1.82	50.2	2.61	18.4	2.16	34.9	2.26

Table 3.9. Home assistance with reading work (SACMEQ I and SACMEQ II)

Home assistance 'most of the time' with school reading work								
Zone	SACMEQ I				SACMEQ II			
	Ask to read		Questions on school reading work		Ask to read		Questions on school reading work	
	%	SE	%	SE	%	SE	%	SE
Zone 1 P/Louis & North	12.3	2.57	15.9	3.15	33.9	5.53	32.0	5.33
Zone 2 East & B/Bassin	19.6	3.15	19.0	3.38	28.1	4.08	28.8	4.03
Zone 3 South & Curepipe	12.1	2.78	13.0	2.17	32.2	5.64	25.6	4.98
Zone 4 West & Vacoas	17.7	2.91	18.0	2.69	18.6	2.93	21.0	3.47
Zone 5 Rodrigues	15.8	5.17	7.2	1.95	12.4	3.79	7.0	2.20
Mauritius	15.2	1.37	16.0	1.46	28.5	2.49	26.8	2.36

Table 3.9 answers to what extent someone at home asked the child to read aloud, and also about questions asked by adults about the reading work at school. Nearly 30 percent asked the children to read to them in 2001, quite an improvement since 1995. The case was similar for parents asking questions about school reading. But again the situation could be improved, perhaps starting with Rodrigues.

Table 3.10. Home assistance with mathematics work (SACMEQ II)

Home assistance 'most of the time' with math school work				
Zone	Do mathematical calculations		Questions on school mathematics work	
	%	SE	%	SE
Zone 1 P/Louis & North	25.9	5.39	31.3	5.23
Zone 2 East & B/Bassin	19.1	3.47	23.8	4.21
Zone 3 South & Curepipe	25.9	4.86	25.1	4.40
Zone 4 West & Vacoas	27.9	4.50	23.3	3.61
Zone 5 Rodrigues	17.4	4.50	10.9	2.88
Mauritius	24.4	2.36	26.0	2.30

Table 3.10 indicates the percentage of parents who help their children most of the time with mathematical calculations and who ask questions about the mathematics school work being done. Again, only about 25 percent of Standard 6 pupils were receiving help. The same comments apply as for reading.

Policy suggestion 3.8: The Ministry should establish a task force to identify strategies for strengthening links with the homes in order to sensitise and motivate parents to show more interest in both the classwork and homework of learners.

Did Standard 6 pupils have sufficient access to classroom materials?

Although in some countries it is possible for pupils to learn even if they have to share a textbook, it is better for all children to have their own textbook. The data is presented in Table 3.11 and Figure 3.2.

In Figure 3.2 the orange bar represents SACMEQ I findings and the purple bar SACMEQ II findings. The vertical line found at the top of each bar represents the standard error in the measurement. It can be seen that there was a five percent decrease in the percentage of pupils having their own reading textbook between SACMEQ I and SACMEQ II. The large decreases were in the first three zones, but there was an increase in Rodrigues. The supply of mathematics textbooks was better than for reading books. It will be interesting to see if there has been any decrease in reading achievement between 1995 and 2001, and if this is in any way related to the decrease in pupils having their own textbooks.

Table 3.11. Percentages and sampling errors for pupils having own reading and mathematics textbooks (SACMEQ I and SACMEQ II)

Zone	SACMEQ I		SACMEQ II			
	Own reading textbook		Own reading textbook		Own mathematics textbook	
	%	SE	%	SE	%	SE
Zone 1 P/Louis & North	95.8	3.24	90.7	3.15	95.0	2.33
Zone 2 East & B/Bassin	97.1	0.71	91.0	2.84	94.2	1.96
Zone 3 South & Curpipe	97.7	1.40	89.1	4.45	99.1	0.40
Zone 4 West & Vacoas	96.9	2.05	94.7	1.81	95.2	2.18
Zone 5 Rodrigues	86.1	6.09	97.5	1.73	100.0	0.00
Mauritius	96.3	1.18	91.5	1.59	95.9	0.99

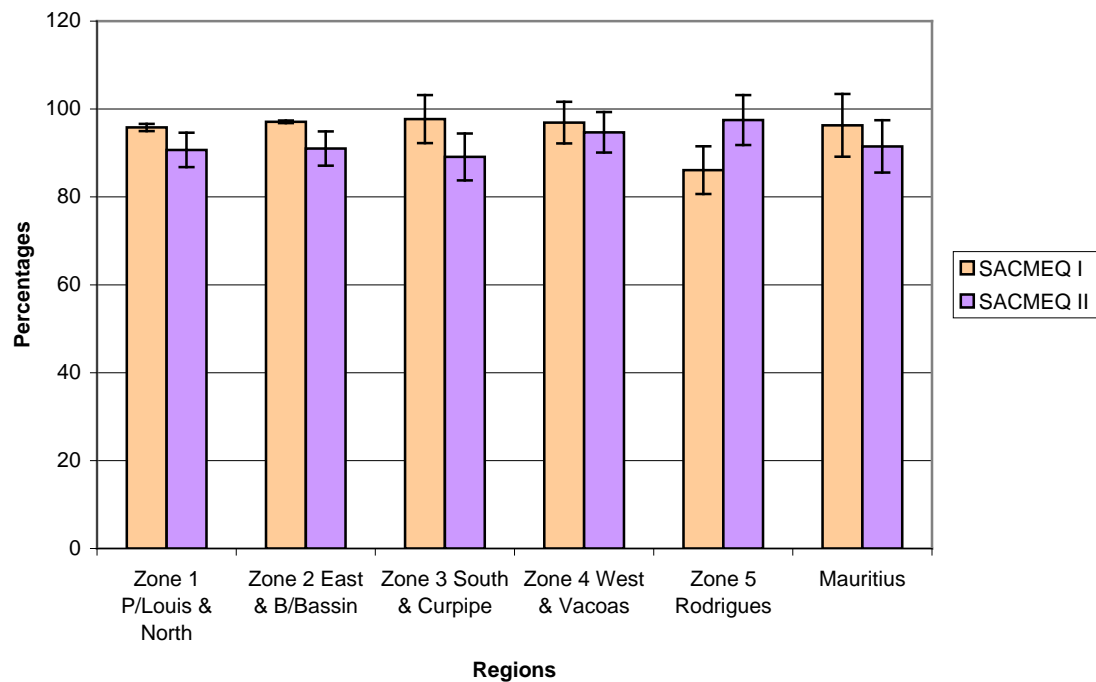


Figure 3.2: Percentages and sampling errors for pupils having own reading textbook (SACMEQ I and SACMEQ II)

Policy suggestion 3.9: The Ministry should take care to ensure that every pupil has his or her own textbook for each subject area.

Questions were asked about basic classroom materials such as exercise books, notebooks, and pencils as well as about erasers, pens, and rulers. The data for these materials in both 1995 and 2001 are presented in Tables 3.12 (and Figure 3.3) and 3.13 and Figure 3.4.

Table 3.12. Percentages and sampling errors for shortages of basic classroom materials: Exercise books, notebook, and pencil. (SACMEQ I and SACMEQ II)

Zone	SACMEQ I						SACMEQ II					
	Exercise books		Notebook		Pencil		Exercise books		Notebook		Pencil	
	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE
Zone 1 P/Louis & North	0.3	0.19	10.5	2.07	0.6	0.40	3.1	2.34	25.6	4.50	3.8	2.48
Zone 2 East & B/Bassin	0.7	0.34	7.0	2.91	0.5	0.29	1.5	0.65	21.0	4.69	1.2	0.52
Zone 3 South & Curpipe	0.4	0.32	11.4	2.18	0.3	0.26	0.7	0.36	24.8	4.63	1.2	0.55
Zone 4 West & Vacoas	3.0	2.90	9.8	4.01	2.3	2.02	4.1	1.96	16.6	3.78	6.8	3.62
Zone 5 Rodrigues	1.3	0.92	40.1	6.38	1.3	0.92	0.4	0.41	57.1	9.47	0.0	0.00
Mauritius	0.9	0.51	11.0	1.31	0.8	0.38	2.3	0.88	23.9	2.23	3.1	1.09

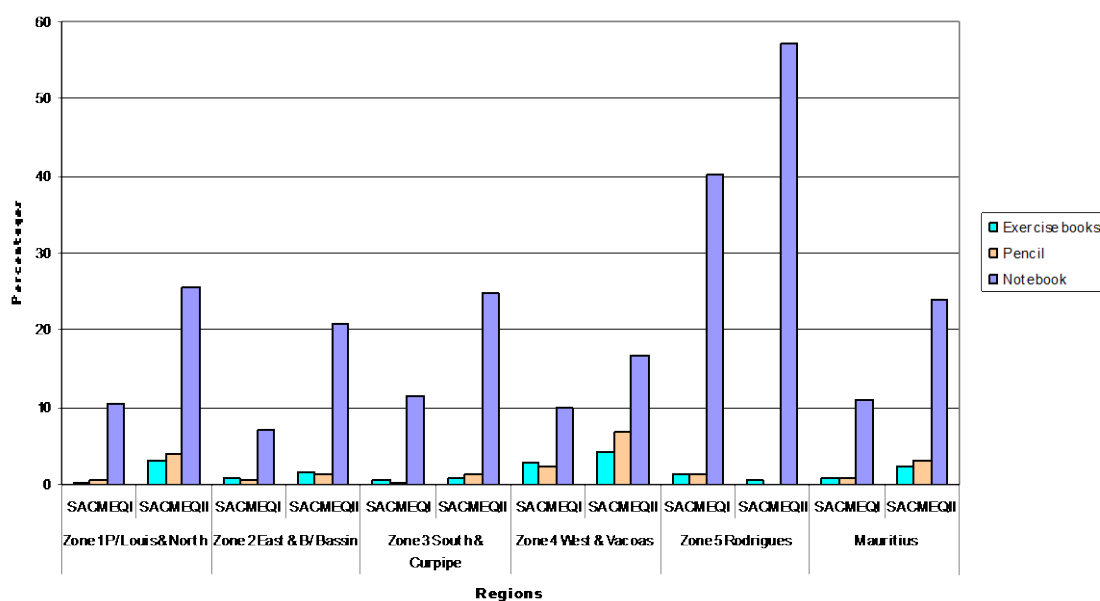


Figure 3.3: Percentages and sampling errors of pupils without basic classroom materials: Exercise books, notebook, and pencil. (SACMEQ I and SACMEQ II)

Table 3.13. Percentages and sampling errors for shortages of basic classroom materials: Eraser, pen, and ruler. (SACMEQ I and SACMEQ II)

Zone	SACMEQ I						SACMEQ II					
	Eraser		Pen		Ruler		Eraser		Pen		Ruler	
	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE
Zone 1 P/Louis & North	3.8	1.30	8.1	2.08	5.1	1.15	5.5	2.56	12.5	2.78	7.2	2.46
Zone 2 East & B/Bassin	2.7	0.70	9.2	3.00	1.5	0.54	5.2	1.80	9.7	1.92	5.7	1.16
Zone 3 South & Curpipe	2.0	0.67	6.5	1.47	2.6	0.76	2.2	0.60	9.3	2.12	6.0	1.22
Zone 4 West & Vacoas	5.2	2.56	5.9	2.29	4.6	2.10	6.8	3.52	12.9	3.70	7.8	3.66
Zone 5 Rodrigues	8.9	2.96	43.0	6.46	15.1	5.21	4.4	1.77	45.4	6.77	14.9	3.23
Mauritius	3.6	0.66	9.2	1.18	4.1	0.61	5.0	1.16	12.6	1.35	7.0	1.14

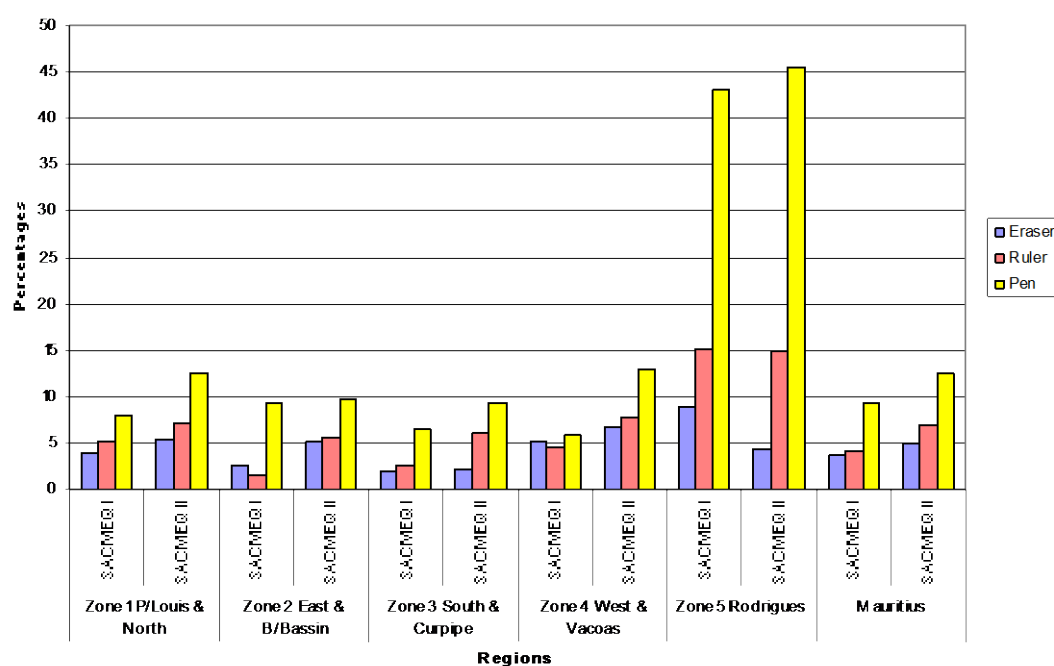


Figure 3.4: Percentages of pupils without basic classroom materials: eraser, pen, and ruler. (SACMEQ I and SACMEQ II)

It is important to note that the percentages in Tables 3.12 and 3.13 are the percentages of pupils NOT having the items mentioned. In table 3.12 the overall percentage for Mauritius (in 1995, SACMEQ I) for Standard 6 pupils not having a notebook was 11.0 percent, ranging from a low 7.0 in Zone 2, East & Beau Bassin to a high 40 percent in Zone 5, Rodrigues. This implies that 7.0 percent of Standard 6 pupils in Zone 2, East &

Beau Bassin did not have a notebook and 40 percent of Standard 6 pupils in Rodrigues did not have a notebook. And in 2001, SACMEQ II, the overall percentage for Mauritius for Standard 6 pupils not having a notebook was 23.9 percent, ranging from 16.6 percent in Zone 4, West and Vacoas to a high 57.1 percent in Zone 5, Rodrigues. This implies that 16.6 percent of Standard 6 pupils in Zone 4 and 57.1 percent of Standard 6 pupils in Zone 5 did not have a notebook. (*A notebook was defined as one which was not taken by the teacher for correction and which contained personal notes and/or kept a record of class work and homework to be done.*)

From Tables 3.12 and 3.13 it can be seen that there has been an increase in the percentage of pupils NOT having learning tools, except for Rodrigues. This is somewhat disquieting and it is not clear why this has occurred. It is important to alert the Ministry to this decrease in the material conditions of classrooms.

Policy suggestion 3.10: The Ministry should ensure that every learner has the basic learning tools such as an exercise book, a notebook, a pencil and an eraser to guarantee the active participation of every learner in classwork.

Did Standard 6 pupils have access to library books and were pupils allowed to take them home to read?

High levels of literacy are more likely wherever students have access to libraries and can borrow books (Elley, 1992). The availability of classroom libraries and book corners -- as distinct from school libraries -- may be even more important in many countries. In table 3.14, data is presented for the level of access to books by Standard 6 pupils in 1995 (SACMEQ I) and for 2001 (SACMEQ II). School heads reported that 96 percent of pupils were in schools having a school library in 1995 compared to only 91 percent of pupils in 2001. Teachers reported in 1995 that 56.3 percent of pupils were in classrooms having a classroom library or a book corner. This situation has improved: in 2001 some 66 percent of Standard 6 pupils were in classrooms having a classroom library or a book corner.

Table 3.14. Percentages and sampling errors for availability of school and classroom library

	SACMEQ I		SACMEQ II	
	%	SE	%	SE
School library	96.5	1.64	90.8	2.33
Classroom library/ book corner	56.3	3.57	65.9	2.97

Pupils were asked whether they were allowed to have books from the school library on overnight loan. The data is presented in the second column of table 3.15. for SACMEQ I (1995) and in the fourth column for SACMEQ II (2001).

School heads were asked to report on whether pupils do borrow books from the school library to take home. This data is presented in Table 3.15. It can be seen that overall about 93 percent of Standard 6 pupils did borrow books to take home in 1995; and in 2001, about 90 percent could avail themselves of this facility.

Table 3.15. Percentages and sampling errors for pupil and school head responses to whether pupils are permitted to borrow books from a classroom or a school library (SACMEQ I and SACMEQ II)

Zone	SACMEQ I				SACMEQ II			
	Pupil*		School head		Pupil*		School head	
	%	SE	%	SE	%	SE	%	SE
Zone 1 P/Louis & North	78.7	5.25	95.1	3.68	75.5	5.43	87.8	5.19
Zone 2 East & B/Bassin	83.1	5.07	88.0	6.68	72.0	6.50	89.8	5.68
Zone 3 South & Curpipe	84.7	4.89	94.5	3.48	64.9	6.60	92.0	5.43
Zone 4 West & Vacoas	88.9	5.52	97.4	1.93	68.8	7.17	93.7	3.86
Zone 5 Rodrigues	76.0	9.45	83.3	11.24	70.9	10.09	84.5	10.48
Mauritius	82.7	2.55	93.2	2.19	71.0	3.04	90.1	2.59

Notes: (1) The asterisk means that it is not possible to make direct comparisons between SACMEQ I and SACMEQ II variable,

(2) There is no accordance between what pupils report and what school heads report because the questions were not the same

The data show that there was a need to review Ministry policy related to the borrowing of books in primary schools in Mauritius. Further there was a difference for 'library availability' and 'borrowing'. A third point that needs to be taken into account is the need to have the 'right' books in terms of meeting the reading needs of the pupils.

Policy suggestion 3.11: The curriculum unit should conduct a national book audit to assess (a) book availability and (b) book quality.

Policy suggestion 3.12: The Inspectorate should be asked to ensure that if schools have either classroom or school libraries, then standard 6 pupils should be permitted to borrow books and take them home to read.

Has the practice of Standard 6 pupils receiving extra tuition in school subjects outside school hours become widespread and have there been paid lessons?

There is a tradition in Mauritian schools of extra tuition, commonly referred to as private tuition. The class teachers, in the afternoon, will continue teaching the same children that they had in class in the morning on condition that the extra tuition is paid for. A question was asked about pupils taking extra tuition in any subject. As can be seen from Table 3.16, there was a nine percent increase of pupils taking extra tuition from 1995 (77.5 percent) to 2001 (86.5percent). This is a significant increase. From Table 3.17 we see that 91 percent of pupils stated that they knew the extra tuition was paid for. Only eight percent said that it was not paid for. There was not much difference among the zones except again in Rodrigues, where there were fewer pupils taking extra tuition and fewer extra lessons that were paid for.

In the early 1990s the Ministry of Education initiated a national debate on the issue of abuse of extra (private) tuition. Private tuition became a necessary evil because of the mismatch between demand and supply of seats available in what was perceived to be 'good' secondary schools. The government's damage control strategy was to allow teachers the free use of school premises to give private tuition. However, it was

declared unlawful to canvas for, or to give extra tuition to, pupils in Standards I to III. The size of the fee charged by the teachers remained a private matter between the acquiescent parents and the teachers. Thus, the responses to the questions on private tuition came as no surprise.

Table 3.16. Percentages and sampling errors for the extra tuition taken by pupils outside school hours (SACMEQ I and SACMEQ II)

Zone	Extra tuition on any subject			
	SACMEQ I		SACMEQ II	
	%	SE	%	SE
Zone 1 P/Louis & North	79.1	2.28	86.4	2.17
Zone 2 East & B/Bassin	75.1	3.84	89.6	1.68
Zone 3 South & Curepipe	73.7	2.99	84.3	2.50
Zone 4 West & Vacoas	83.9	2.50	88.2	2.32
Zone 5 Rodrigues	72.5	3.61	74.5	6.55
Mauritius	77.5	1.45	86.5	1.10

Table 3.17. Percentages and sampling errors for the payment of extra tuition taken by pupils outside school hours (SACMEQ II)

Zone	There is payment		There is no payment		Don't know	
	%	SE	%	SE	%	SE
Zone 1 P/Louis & North	92.0	1.86	7.6	1.81	0.4	0.23
Zone 2 East & B/Bassin	91.3	1.80	6.2	1.31	2.5	1.08
Zone 3 South & Curepipe	91.7	2.09	7.7	2.02	0.6	0.55
Zone 4 West & Vacoas	90.1	2.57	7.7	1.99	2.2	1.03
Zone 5 Rodrigues	69.9	4.23	28.0	4.23	2.1	1.24
Mauritius	90.7	1.01	8.0	0.89	1.3	0.35

The percentage of pupils taking extra tuition was very high. In the light of expanded access to post-primary education it would be desirable to have a small study conducted on the nature of extra tuition. How are pupils selected for extra tuition or is it those pupils whose parents cannot pay who are excluded? Does the teacher simply repeat what was taught from the curriculum that morning or at least give extra exercises based on the morning's work, or does the teacher cover more of the curriculum? Is the extra tuition really necessary or is it simply that the teachers are supplementing their salaries?

Policy suggestion 3.13: It is suggested that the Ministry of Education commission a small study to examine the issues related to extra tuition..

Conclusion

In this chapter information on selected characteristics of Standard 6 pupils as well as on their homes and learning environments has been summarised. Comparisons were made with the data collected by SACMEQ 1 in 1995. The examples covered the age of Standard 6 pupils, the material and educational resources in their homes and the level of parental interest in schoolwork. The average age of pupils during the seventh month of Standard 6 was found to be slightly higher than the expected 133 months; it is suggested that the age of entry to school should be made a little more flexible for greater cost effectiveness of the system. Pupils turning 5 years on 1 January or after should not be admitted to primary school in that current year and must wait a full year before seeking admission the following year. However these children may be admitted to a pre-primary class for a year of free pre-primary education. No doubt a cut-off point is necessary to define the age of entry to the primary cycle. The report suggests reviewing this cut-off point ,especially in the light of a decrease in grade repetition from 25 to 19 percent in the period 1995-2001 (Figure 3.1).

A second policy suggestion that emerged concerns the high rate of repetition. Analysis of data from SACMEQ I showed that some of the best readers from Standard 6 had repeated a grade. This result implied that grade repetition was resorted to as a way to improve performance at the CPE examinations. Competition for a seat at secondary

level was linked to what parents perceived to be 'good' secondary schools and the limited number of seats available in those schools. Following a substantial expansion in the availability of seats at the junior secondary level, it would be useful for the Ministry review the criteria for allowing grade repetition, especially at Standard 6 level. As far as grade repetition at levels lower than Standard 6 is concerned, there is certainly need for more information about the causes, so that appropriate strategies may be developed to address the issue.

Another policy suggestion concerns the problem of absenteeism at school.. Since it is likely that learners who are often absent will learn less than those who are present, t effective measures should Identified.

It is disquieting to note that in the period of 1995 to 2001 there was an increase in the percentage of Standard 6 pupils not having sufficient access to classroom materials. How can one expect active participation in class work in such a situation? This is the subject of another policy suggestion. The indicators used covered basic classroom materials such as a notebook, an exercise book, a pen, pencil, ruler, eraser and textbooks in reading and mathematics. Some pupils reported not having these basic classroom materials and analysis showed there were differences among schools within the zones.. A policy suggestion was made to identify appropriate Ministry intervention to provide these pupils with the basic materials.

Though the Ministry's policy is to provide textbooks to every learner in the primary cycle, it was reported that about 8.5 percent of Standard 6 learners did not have their own reading textbook and about 4.1 percent did not have their own mathematics textbook. It can be assumed that those without textbooks would not be participating as actively in their class work and homework as those with textbooks. The point was made in a policy suggestion that every pupil should have their own textbooks, and that in cases where the textbooks were lost or became unusable, they should be replaced.

Another policy suggestion emerged from the need to assess the number of books available for borrowing and their 'quality' in terms of meeting the reading needs of the pupils.

Private tuition has evolved as a parallel institution in Mauritius. The percentage of Standard 6 pupils taking private tuition increased from about 80 percent to about 90 percent from 1995 to 2001. More needs to be known about who receives and who does not receive private tuition; what it consists of and how effective it is. Is there not a conflict of interest in the current practice of allowing the teachers of nearly 90 percent of Standard 6 pupils to receive financial rewards for teaching their pupils as private clients outside school hours?

Other policy suggestions focused on encouraging parental interest in the class work and homework of the learners, an important component of education.

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Chapter 4

Teachers' Characteristics and their Views on Teaching, Classroom Resources, Professional Support, and Job Satisfaction

Introduction

This chapter is concerned with some of the characteristics of Standard 6 teachers. These data are presented for the same reasons as in the previous chapter on Standard 6 pupils, namely to present the context variables for interpreting the achievement data given later and also to have such information available to see how such inputs change over time.

In Mauritius all teachers of Standard 6 are class teachers and teach all subjects. In this study the two aspects of pupil achievement that were measured were reading comprehension and mathematics. Unlike some other countries where there are separate reading and mathematics teachers, in Mauritius it is the same teachers who are responsible for both subjects.

The major questions posed for this chapter are:

1. What were the personal characteristics of Grade 6 teachers (for example, age, gender, and socio-economic level), and what was the condition of their housing?
2. What were the professional characteristics of Grade 6 teachers (in terms of academic, professional, and in-service training), and did they consider in-service training to be effective in improving their teaching?
3. How did Grade 6 teachers allocate their time among responsibilities concerned with teaching, preparing lessons, and marking?
4. What were Grade 6 teachers' views on (a) pupil activities within the classroom (for example, reading aloud, pronouncing, etc.), (b) teaching goals (for example, making learning enjoyable, word attack skills, etc.) (c) teaching approaches/strategies (for example, questioning, whole class teaching, etc.), (d) assessment procedures, and (e) meeting and communicating with parents?
5. What was the availability of classroom furniture (for example, sitting/writing places, teacher table, teacher chair, and bookshelves) and classroom equipment (for example, chalkboard, dictionary, maps, book corner, and teacher guides) in Grade 6 classrooms?

6. What professional support (in terms of education resource centres, inspections, advisory visits, and school head inputs) was given to Grade 6 teachers?
7. What factors had most impact upon teacher job satisfaction?

What were the personal characteristics of Grade 6 teachers and what was the condition of their housing?

Several important characteristics of teachers were measured. These concerned the age of teachers, their sex, whether they were specialist or general class teachers, their academic and professional qualifications, years of teaching experience, and the number of in-service courses attended. A sub-sample of three Standard 6 teachers was taken in each school. In nearly all schools there were only three classes in Standard 6, thus ensuring that nearly all of the teachers actually teaching Standard 6 answered the teacher questionnaire.

(a) Age of teacher

The average ages of Standard 6 teachers in the various zones and in Mauritius as a whole are presented in Table 4.1. The average pupil in Mauritius had a teacher who was 44.9 years. Across the zones the ages ranged from 36.7 years in Rodrigues to 45.8 years in Zone 4 (West and Vacoas). This average age was quite high probably because it is the most senior teachers who decide to take Standard 6.

In SACMEQ I the average Standard 6 pupil in Mauritius had a teacher who was 43.2 years and across the zones the ages ranged from 35.0 (in Rodrigues) to 46.0 in the West.

Table 4.1. Means, percentages, and sampling errors for age, gender, and socio-economic background of reading and mathematics teachers (SACMEQ II)

Zone	Class teacher					
	Age (years)		Gender (female)		Possessions at home (index)	
	Mean	SE	%	SE	Mean	SE
Zone 1 P/Louis & North	45.6	0.97	30.9	5.07	10.9	0.21
Zone 2 East & B/Bassin	44.3	1.03	29.0	6.12	10.9	0.17
Zone 3 South & Curepipe	45.2	1.23	21.0	5.56	10.6	0.25
Zone 4 West & Vacoas	45.8	0.93	26.1	5.74	11.3	0.13
Zone 5 Rodrigues	36.7	1.64	46.0	7.61	10.0	0.26
Mauritius	44.9	0.50	28.1	2.73	10.9	0.10

(b) Sex of teachers

Overall, only 28 percent of pupils had teachers who were female. There was large variation among zones ranging from 46 percent female teachers in Rodrigues to 21 percent in Zone 3 (Curepipe & South). The overall government policy has been to recruit more female teachers and in this sense it was gratifying to see that the percentage of female teachers in Standard 6 had increased since 1995 when it was only 20.5 percent.

(c) Possessions in the home

The same questions about home possessions were asked of teachers as were asked of pupils (see Chapter 3). The average number of possessions was 10.9, somewhat higher than the average number of possessions in pupils' homes. The highest number of possessions was in Zone 4, and the lowest in Rodrigues.

(d) Were the living conditions of the teachers acceptable?

Finally, the teachers were asked to rate their living conditions as

Generally poor or major repairs needed	1
Minor repairs needed or generally good	2

The percentages of pupils with teachers who answered that the conditions were generally good or that only minor repairs were required are given in Table 4.2 for both SACMEQ I and II.

It can be seen that nearly 94 percent of pupils had teachers who declared their living conditions to be acceptable. This means that very few teachers were worried about their daily living conditions and could therefore devote their full energy to teaching while in school.

Table 4.2. Percentages and sampling errors for teacher housing in acceptable conditions (SACMEQ I and SACMEQ II)

Zone	Teacher housing in acceptable conditions			
	SACMEQ I		SACMEQ II	
	Class teacher		Class teacher	
	%	SE	%	SE
Zone 1 P/Louis & North	91.9	2.28	94.6	2.37
Zone 2 East & B/Bassin	93.9	2.80	92.4	3.98
Zone 3 South & Curepipe	96.0	2.10	94.0	3.45
Zone 4 West & Vacoas	95.7	2.85	94.5	2.25
Zone 5 Rodrigues	88.3	5.19	83.4	7.94
Mauritius	93.7	1.23	93.5	1.49

What were the professional characteristics of Grade 6 teachers and did they consider in-service training to be effective in improving their teaching?

Teachers were asked about the number of years of teaching experience they had and also about the type of teacher training and education they had received. It can be seen that the average pupil had a teacher who had nearly 22 years of experience. As expected from the earlier information presented on age, the Rodrigues teachers had fewer years of experience. In 1995 the average number of years of teaching experience was 20.2.

Teachers were asked about the length of their training courses. The values from this question were recoded into years as follows:

No teacher training	0.0
Less than one year	0.5
One year	1.0
Two years	2.0
Three years	3.0
More than three years	4.0

The average pupil had a teacher with 2.2 years of training. The teacher training course lasts for two years and hence the figure of 2.2 reflects the actual position. A comparison of SACMEQ I and SACMEQ II data on the teaching experience and training of Standard 6 teachers seems to confirm the practice of allocating Standard 6 classes to senior teachers.

Table 4.3. Means and sampling errors for experience and training of reading and mathematics teachers (SACMEQ I and II)

Zone	Class teacher							
	SACMEQ I				SACMEQ II			
	Experience (years)		Training (years)		Experience (years)		Training (years)	
	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Zone 1 P/Louis & North	21.3	0.67	1.9	0.05	22.6	1.04	2.2	0.09
Zone 2 East & B/Bassin	19.2	1.00	1.9	0.08	20.7	1.06	2.2	0.12
Zone 3 South & Curepipe	18.7	1.21	2.0	0.08	22.1	1.11	2.4	0.12
Zone 4 West & Vacoas	23.0	0.82	2.1	0.12	22.3	1.10	2.2	0.08
Zone 5 Rodrigues	13.5	1.20	1.9	0.06	15.7	1.60	2.1	0.12
Mauritius	20.2	0.44	2.0	0.04	21.7	0.52	2.2	0.05

Policy suggestion 4.1: The School Management Unit should review criteria for allocation of teachers to Standard 6 classes. It is suggested that younger teachers who are more academically qualified, subject to a minimum number of years of experience, be encouraged to teach Standard 6.

Teachers were also asked about their academic education. The results are presented in Table 4.4. To become a primary school teacher in 2003, a teacher had to have completed at least up to the end of senior secondary school, which is eleven years of schooling.

Many go on to take the A level exam which constitutes another two years of schooling. It can be seen from Table 4.4 that 53.4 percent of pupils were taught by teachers who had completed senior secondary school and that forty-two percent of pupils were taught by teachers who had completed A levels. Only two percent had undertaken tertiary education.

At the time of publication of this report, the Ministry had already reviewed the minimum entry requirements for primary school teachers. To become a primary school teacher, one must hold two subjects at A-level.

Table 4.4. Percentages and sampling errors of pupils with teachers with different levels of academic education of Standard 6 teachers (SACMEQ II)

Zone	Primary		Junior secondary		Senior secondary		A-level		Tertiary	
	%	SE	%	SE	%	SE	%	SE	%	SE
Zone 1 P/Louis & North	0.0	0.00	0.0	0.00	57.3	5.23	41.1	5.24	1.5	0.79
Zone 2 East & B/Bassin	0.0	0.00	0.0	0.00	43.0	6.39	54.6	6.90	2.4	1.95
Zone 3 South & Curepipe	0.0	0.00	0.0	0.00	61.1	6.46	38.2	6.62	0.7	0.73
Zone 4 West & Vacoas	0.0	0.00	0.0	0.00	53.5	5.95	40.1	6.09	6.5	3.20
Zone 5 Rodrigues	0.0	0.00	0.0	0.00	77.2	7.67	19.1	7.56	3.6	3.64
Mauritius	0.0	0.00	0.0	0.00	55.0	2.83	42.4	2.93	2.6	0.82

How many in-service courses did Standard 6 teachers attend?

The teachers were asked to report the number of in-service courses they had attended in the past three years. From Table 4.5 it can be seen that the average pupil had a teacher who had attended 1.8 courses over the last three years. It can also be seen that Rodrigues' teachers had three in-service courses whereas Zone Port Louis and North teachers had only 1.2 courses. Teachers were also asked for how many days they had attended the courses and the average for three years was nearly 15 days, making an average of five days per year. All teachers attend three days of in-service courses each year to discuss the school results of the previous year. Textbook in-service courses are also popular and each course lasts for one or two days.

In SACMEQ I teachers were asked to report on the number of in-service courses they had attended in the course of their career. The results showed that the average Standard 6 pupil had a teacher who had attended 4.9 courses during their career, with Rodrigues teachers having attended 9.3 courses. One can assume that in-service courses were provided to Standard 6 teachers but were restricted to those whose school results for the previous year had been discussed.

Table 4.5. Means and sampling errors for teacher in-service courses and days attended in the last three years (SACMEQ II)

Zone	Class teacher			
	In-services courses		Days	
	Mean	SE	Mean	SE
Zone 1 P/Louis & North	1.2	0.18	13.6	2.71
Zone 2 East & B/Bassin	1.8	0.29	10.9	2.78
Zone 3 South & Curepipe	2.0	0.38	18.0	6.02
Zone 4 West & Vacoas	2.2	0.35	17.1	4.10
Zone 5 Rodrigues	3.0	0.63	9.2	2.81
Mauritius	1.8	0.14	14.5	1.85

The teachers were also asked to what extent they found these in-service courses useful. The percentages of pupils whose teachers responded that they found the courses effective or very effective are presented in Table 4.6.

Table 4.6. Percentages and sampling errors for the teachers' perception of effectiveness of in-service courses (SACMEQ II)

Zone	Effectiveness of in-service courses	
	%	SE
Zone 1 P/Louis & North	28.0	4.72
Zone 2 East & B/Bassin	39.4	6.71
Zone 3 South & Curepipe	35.9	6.52
Zone 4 West & Vacoas	34.3	5.78
Zone 5 Rodrigues	59.4	10.97
Mauritius	34.7	2.82

Only about 35 percent of pupils had teachers who had expressed satisfaction with the courses. This casts some doubt on the quality of the courses and it is suggested that a special study be undertaken to check on the quality of these in-service courses.

Policy suggestion 4.2: The Human Resource Development (HRD) unit should undertake a special study to assess the quality and relevance of the in-service courses being dispensed to the Standard 6 teachers

Policy suggestion 4.3: The Inspectorate should carry out a needs identification exercise in order to establish the requirements of teachers in terms of professional development.

How did Standard 6 teachers allocate their time among responsibilities concerned with teaching, preparing lessons, and marking?

Conscientious teachers spend a considerable amount of time preparing and marking lessons each week. A beginning teacher has to spend a lot of time preparing lessons. All teachers have to revise their lesson plans each term. All teachers have to correct homework all of the time.

How many periods did teachers teach and how long were these periods and how many hours per week did teachers spend in lesson preparation and marking?

Teachers were asked about how many hours, on average, they spent on lesson preparation and marking in a typical school week. The data are presented in Table 4.7.

Table 4.7. Means and sampling errors for the teacher time spent on lesson preparation (SACMEQ I and SACMEQ II)

Zone	SACMEQ 1 (hours)		SACMEQ 2 (hours)	
	Mean	SE	Mean	SE
Zone 1 P/Louis & North	7.3	0.54	11.1	0.92
Zone 2 East & B/Bassin	7.9	0.57	10.9	1.14
Zone 3 South & Curepipe	6.5	0.53	13.5	1.47
Zone 4 West & Vacoas	7.7	0.99	9.9	0.89
Zone 5 Rodrigues	8.6	0.84	10.7	1.13
Mauritius	7.4	0.30	11.3	0.54

As shown, there had been a decrease in the number of hours devoted to lesson preparation and marking lessons from 1995 to 2001. The average time that a teacher actually taught per week was 25 hours in 2001 (Table 4.9), meaning that a teacher's week totalled 36 hours, including about 11 hours of lesson preparation and marking. In 1995, a teacher's week was about 30 hours, including about seven hours of lesson preparation and marking. This reported increase in the time devoted to teaching is one of the Ministry's achievements.

Table 4.8. Means and sampling errors for the periods and time spent on teaching per week (SACMEQ I and SACMEQ II)

<u>Zone</u>	SACMEQ I				SACMEQ II			
	Periods per week		Hours per week		Periods per week		Hours per week	
	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Zone 1 P/Louis & North	24.8	0.51	22.9	0.37	24.0	0.47	19.6	0.18
Zone 2 East & B/Bassin	26.3	0.71	22.9	0.41	25.1	0.46	20.1	0.16
Zone 3 South & Curepipe	27.2	0.71	23.5	0.33	25.1	0.49	20.1	0.12
Zone 4 West & Vacoas	26.4	0.87	22.5	0.57	24.1	0.54	20.3	0.07
Zone 5 Rodrigues	31.0	0.64	25.0	0.38	24.2	0.83	20.3	0.15
Mauritius	26.2	0.31	23.1	0.20	24.5	0.24	20.0	0.08

What were Grade 6 teachers' views on (a) pupil activities within the classroom, (b) teaching goals (c) teaching approaches/strategies (d) assessment procedures, and (e) meeting and communicating with parents?

When teaching a subject, teachers usually prepare a set of *activities* to be carried out by pupils. These activities are meant to improve the children's reading. The teachers were asked to state whether they thought that the activities were 'not very important', 'important' or 'most important'. The percentages of pupils with teachers who rated the activities as 'most important' are presented in Table 4.9.

The activity regarded as 'most important' was 'reading for comprehension'. It was surprising that 'taking books home to read' and 'reading materials at home' were not rated as more important, since these are well-known predictors of good comprehension in reading. There were basically no changes in the pattern of ratings for the 'most important' activity between 1995 and 2001.

Seven *goals* of teaching were given and ratings requested. The results are presented in Table 4.10. There were three goals that were regarded as more or less equally important by the teachers. These were: 'making reading enjoyable', 'improving reading

comprehension', and 'developing a lasting interest in reading'. In SACMEQ II two new goals were added. These were: 'opening up career opportunities' and 'developing of life skills'. 'Developing life skills' attracted 12 percent of pupil's teachers but there was a drop between 1995 and 2001 of 20 percent for 'developing a lasting interest'.

Table 4.9. Percentages and sampling errors for the activities of teaching reading (SACMEQ I and SACMEQ II)

Activity	Activity rated as 'most important'			
	SACMEQ I		SACMEQ II	
	%	SE	%	SE
Listening to someone reading aloud	5.9	1.32	5.8	1.53
Silent reading	8.8	1.59	5.7	1.39
Learning new vocabulary from a text	4.7	1.30	4.9	1.23
Pronouncing or sounding words	3.0	0.79	5.0	1.32
Reading for comprehension	67.9	2.64	64.6	2.87
Taking books home to read	3.4	0.82	4.5	1.23
Reading materials in the home	6.4	1.35	6.2	1.41
Reading aloud in class *			3.3	1.15

* Only for SACMEQ II.

Table 4.10. Percentages and sampling errors for the goals of teaching reading (SACMEQ I and SACMEQ II)

Goals	Goal rated as 'most important'			
	SACMEQ I		SACMEQ II	
	%	SE	%	SE
Making reading enjoyable	23.6	2.54	24.0	2.43
Extending vocabulary	3.9	0.95	4.8	1.08
Improving word attack skills	1.5	0.79	0.6	0.45
Improving reading comprehension	20.4	2.47	25.9	2.44
Developing a lasting interest	50.6	3.13	27.5	2.71
Opening up career opportunities *			5.0	1.38
Developing of life skills *			12.1	2.15

* Only for SACMEQ II.

Strategies or approaches for teaching reading are also important. Six different often-used strategies were listed. The percentages of pupils having teachers who said they used these strategies ‘often’ are given in Table 4.11 below.

Table 4.11. Percentages and sampling errors for the strategies of teaching reading (SACMEQ I and SACMEQ II)

Approach or strategy	Percentage indicating ‘often used’			
	SACMEQ I		SACMEQ II	
	%	SE	%	SE
Introducing passage before reading	69.3	2.92	78.2	2.51
Asking questions to test comprehension	94.3	1.16	96.2	1.03
Asking questions to deepen understanding	79.7	2.58	85.8	2.01
Using materials made by teacher	17.3	2.06	27.6	2.83
Reading aloud to the class	76.8	2.56	87.8	1.76
Giving positive feedback*			80.3	2.14

- Only for SACMEQ II.

In all cases where a comparison between the SACMEQ I and II studies could be made it can be seen that each strategy was used more often in 2001 than in 1995. The most popular strategy was to ask questions to test the pupils’ understanding. But the strategies of ‘introducing passages before reading them’, ‘asking questions to deepen understanding’, reading aloud to the class’, and ‘giving positive feedback’ were all used often. The teachers did not yet seem to have adopted the habit of making their own materials to use with the class. In some countries it is those pupils whose teachers make their own materials who also have high reading comprehension achievement. The strategies selected were all conducive with good learning.

Policy suggestion 4.4: The Inspectorate should ensure that there is no mismatch between the strategies used by teachers for the teaching of reading and the goals they intend to achieve.

It can be argued that it is very important to have constant feedback from pupils on how they are faring with what they are learning. One way of doing this is through tests.

Teachers were asked how often they gave reading tests. The results have been given in Table 4.12.

Table 4.12. Percentages and sampling errors for the frequency of reading tests (SACMEQ I and SACMEQ II)

Zone	Frequency of reading tests											
	SACMEQ I						SACMEQ II					
	Less often		2/3 per month		1 + per week		Less often		2/3 per month		1 + per week	
	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE
Zone 1 P/Louis & North	35.7	4.77	21.7	3.96	42.6	4.92	36.6	5.29	27.6	5.00	35.8	5.04
Zone 2 East & B/Bassin	23.8	5.65	28.6	6.08	47.5	6.44	28.5	5.95	25.5	6.37	46.0	6.93
Zone 3 South & Curepipe	25.4	4.92	27.8	5.82	46.9	6.10	26.3	6.04	19.7	5.10	54.0	6.80
Zone 4 West & Vacoas	20.6	7.02	28.6	6.20	50.8	7.73	20.5	5.48	31.3	6.14	48.2	6.64
Zone 5 Rodrigues	39.8	10.81	33.1	10.79	27.2	8.26	46.6	11.93	28.8	7.53	24.6	8.50
Mauritius	28.2	2.65	26.4	2.58	45.4	2.92	29.9	2.82	26.2	2.72	43.8	2.99

We see that in 2001 there were 44 percent of pupils who had teachers who gave them tests once or more per week. Twenty-six percent had tests two or three times per month and just short of 30 percent were given tests less often. These figures had not changed since 1995. It would seem worthwhile examining what actually happens to those pupils whose teachers give tests less frequently and, if necessary, taking remedial action. It is suggested that the Ministry mount a small study to examine this matter.

Policy suggestion 4.5: It is suggested that the Inspectorate commission a small study to examine the feedback practices in the classrooms of those pupils who are given tests in reading less frequently than two or three times per month.

Which were the activities, goals, and approaches regarded as important by teachers when teaching mathematics? How often were mathematics tests given?

Similar questions to those asked about teaching reading were asked about mathematics teaching. The results have been tabulated in Tables 4.13 to 4.15. Mathematics was not tested in SACMEQ I and results are presented for SACMEQ II only.

Fifty percent of pupils had teachers who endorsed the activity of small group work or having pupils work in pairs. ‘Working alone’ was endorsed by the teachers of 12 percent of pupils, and ‘using practical equipment’ was endorsed by 13 percent. The other activities, namely ‘preparing projects to be shown to the class’, ‘homework assignments’, ‘studying and interpreting graphs’, ‘reciting tables, formulae etc., and ‘quizzes, tests, examinations etc.,’ received very little endorsement as the most important activities.

Table 4.13. Percentages and sampling errors for the activities of teaching mathematics (SACMEQ II)

Activity	Activity rated as ‘most important’	
	%	SE
Working in pairs or groups	50.5	3.02
Working alone	12.4	1.86
Preparing projects to be shown to the class	4.0	1.11
Using practical equipment	13.3	2.11
Homework assignments	7.2	1.41
Studying and interpreting graphs	1.2	0.57
Reciting tables, formulae, etc.	2.8	0.95
Quizzes, tests, examinations, etc.	8.6	1.66

Table 4.14. Percentages and sampling errors for the goals of teaching mathematics (SACMEQ II)

Goals	Goal rated as 'most important'	
	%	SE
Basic numeracy skills	13.2	1.98
Problem solving	41.2	2.93
Different ways of thinking	22.5	2.37
Confidence in solving problems	9.0	1.61
Satisfaction from doing Mathematics	4.3	1.08
Opening up career opportunities	4.2	1.11
Developing of life skills	5.6	1.41

None of the goals for teaching mathematics was resoundingly endorsed by the teachers. 'Problem solving' received 41 percent. 'Different ways of thinking' and 'basic numeracy skills' received 23 and 13 percent and all of the rest received under ten percent each. These included 'confidence in solving problems', 'satisfaction from doing mathematics', and 'development of life skills' and 'opening up career opportunities. The impression gained from the table is that the mathematics teachers go through the motions of teaching without being explicitly aware of the goals they are pursuing. It might be worthwhile having the Mauritius Institute of Education and the curriculum development personnel examine what the goals are and how explicitly the teachers are taught them.

Table 4.15. Percentages and sampling errors for the strategies of teaching mathematics (SACMEQ II)

Strategies and approaches	Percentage indicating 'often used'	
	%	SE
Using everyday problems	75.3	2.54
Teaching the whole class as a group	81.2	2.27
Teaching in a small group	24.7	2.61
Teaching individually	25.9	2.66
Teaching through question and answer technique	84.1	2.16
Giving positive feedback	79.7	2.23
Relating to everyday life situations	77.1	2.51
Basic skills training	86.7	1.83
Explaining mathematical processes	91.1	1.57
Using available local materials	80.7	2.31

With the exception of ‘teaching in a small group’ and ‘teaching individually’, all of the strategies were endorsed as being often used by teachers of high percentages of pupils. The multiplicity of strategies would seem to be a good thing. Again the issue of teaching small groups and individuals should be taken up with the curriculum and teacher training college personnel.

Policy suggestion 4.6: The curriculum division of the Ministry should examine the goals of the teaching of mathematics and, in consultation with the Inspectorate and the Mauritius Institute of Education, identify those strategies to which teachers should be exposed in order to incorporate them into their teacher training and in-service courses.

The matter of testing – one way in which teachers get feedback about their pupils’ learning - was also taken up for mathematics and the results are presented in Table 4.16. Twenty-four percent of pupils were given tests once or more per week. Thirty-seven percent had tests two or three times per month, but 39 percent were given tests less frequently. Again this is a matter for the Ministry to commission a small study to discover how the teachers of the 39 percent of pupils are obtaining their feedback

Table 4.16. Percentages and sampling errors for frequency of mathematics tests (SACMEQ II)

Zone	Frequency of mathematics tests					
	Less often		2/3 per month		1 + per week	
	%	SE	%	SE	%	SE
Zone 1 P/Louis & North	46.1	5.49	35.7	5.06	18.2	3.90
Zone 2 East & B/Bassin	36.9	6.06	39.5	6.61	23.7	6.26
Zone 3 South & Curepipe	38.3	5.98	25.9	5.48	35.8	6.37
Zone 4 West & Vacoas	30.4	5.50	46.1	6.41	23.5	5.23
Zone 5 Rodrigues	36.5	7.49	48.6	8.18	14.9	8.05
Mauritius	39.0	2.83	37.0	2.87	24.0	2.54

Policy suggestion 4.7: It is suggested that the Ministry of Education commission a small study to examine the feedback practices in the classrooms of those pupils who are given tests in mathematics less frequently than two or three times per month.

Parents obtain feedback on how their wards are learning at school through pupils' school reports. Teachers were asked whether the school report for each pupil included a specific section for comments by the teacher on marks and /or grades obtained by the pupil in reading and mathematics. The results are presented in table 4.17.

A comparison between SACMEQ I (1995) and SACMEQ II (2001) show an increase from 8.2 percent to 41.3 percent of pupils who had a specific section in their reports for comments on reading by the teacher. While this improvement is commendable, it would be desirable to extend this practice to cover all pupils.

From data for SACMEQ II it can be seen that overall 41.6 percent of Standard 6 pupils had in their report a specific section for the teacher's comments on mathematics.

Table 4.17. Percentages and sampling errors for the frequency of a specific section in pupil school report for reading and mathematics (SACMEQ I and SACMEQ II)

Zone	SACMEQ I		SACMEQ II			
	Reading section		English section		Mathematics section	
	%	SE	%	SE	%	SE
Zone 1 P/Louis & North	8.2	3.07	38.7	5.99	39.1	5.39
Zone 2 East & B/Bassin	6.9	3.47	46.0	7.25	42.8	7.22
Zone 3 South & Curepipe	10.6	5.48	49.8	7.04	50.5	7.19
Zone 4 West & Vacoas	7.9	3.81	31.9	5.80	35.7	6.49
Zone 5 Rodrigues	6.8	3.42	38.1	9.66	38.1	9.66
Mauritius	8.2	1.86	41.3	3.20	41.6	3.14

Policy suggestion 4.8: The Inspectorate should ensure that pupils' report books have a specific section for comments by the teacher on progress in all teaching areas.

To what extent did schools have special school activities associated with reading?

In each school there are activities over and above teaching that are meant to be conducive to pupils' learning. In the field of reading, for example, there were selected activities that were known from other research to help the children to read more. In a study by Elley (1992) it was found that in schools where pupils produced a school magazine or journal or had a debating society that, other things being equal, pupils in such schools had a higher reading performance than in schools without such activities. Equally, it was felt that some of the other activities listed might contribute to a school environment conducive to reading, which in turn would result in higher achievement. The percentages of pupils in schools where these various activities occurred are given in Table 4.18.

It is evident that only the open-door policy was truly popular in Mauritius. But there had been an increase in the percentage of schools undertaking all of the other three activities between 1995 and 2001. Unfortunately, the relationships with reading comprehension achievement were rather weak. The strongest correlation was with the school magazine, but this was only 0.06. It must be stressed that for reading to improve, the school must help to produce a general climate of reading for pleasure.

Table 4.18. Percentages and sampling errors for the school activities (SACMEQ I and SACMEQ II)

Activity	Percentage of school activities			
	SACMEQ I		SACMEQ II	
	%	SE	%	SE
School magazine	14.2	3.01	26.4	3.87
Public speaking day	9.6	2.46	22.5	3.49
Open-door policy	90.7	2.67	80.8	3.39
Formal debates or debating contests	11.7	2.64	16.3	3.16

Policy suggestion 4.9: The Inspectorate should monitor the insertion of a selected list of activities as a normal feature of the school life in primary schools.

How frequently did teachers meet parents?

Postlethwaite & Ross (1992) have shown that in many countries, the more the school head and teachers has contact with parents, the more effective the school is in promoting the reading achievement of pupils. Hence a question was asked about the frequency of teachers' meeting parents during the year. The results are presented in Table 4.18.

Table 4.18. Percentages and sampling errors for the frequency of teacher meetings with parents frequently (SACMEQ I and SACMEQ II)

Zone	Percentages of teacher meetings with parents frequently			
	SACMEQ I		SACMEQ II	
	%	SE	%	SE
Zone 1 P/Louis & North	66.4	5.88	69.3	5.24
Zone 2 East & B/Bassin	74.7	4.78	83.7	5.06
Zone 3 South & Curepipe	68.9	6.52	63.2	7.43
Zone 4 West & Vacoas	80.5	4.81	76.8	6.26
Zone 5 Rodrigues	75.1	9.14	83.5	9.20
Mauritius	71.8	2.76	73.2	2.91

Nearly three-quarters of Mauritian Standard 6 pupils had teachers who met frequently with their parents. Ideally, they should meet all parents frequently. Again, the heads should encourage all teachers to meet with all parents.

Policy suggestion 4.10: The Inspectorate should have school heads meet to establish a policy on the frequency of teacher meeting parents over an academic year.

Table 4.19. Percentages and sampling errors of parents meeting teachers each year (SACMEQ II)

Zone	Parents meet classroom teacher	
	%	SE
Zone 1 P/Louis & North	36.7	2.86
Zone 2 East & B/Bassin	37.3	3.10
Zone 3 South & Curepipe	37.8	4.03
Zone 4 West & Vacoas	46.5	4.49
Zone 5 Rodrigues	59.2	5.96
Mauritius	39.9	1.75

There is need to establish a constant dialogue between parents and teachers to effectively monitor pupils' learning. From Table 4.20 it can be seen that, overall, 21.2 percent of Standard 6 pupils were taught by teachers who requested parents to confirm 'by signing' that their children had completed their homework assignments. This is one way of ensuring parental interest and teachers should be encouraged to adopt this strategy.

Table 4.20. Percentages and sampling errors of teachers asking parents to sign homework (SACMEQ I and SACMEQ II)

Zone	SACMEQ I		SACMEQ II			
	Sign reading homework		Sign reading homework		Sign mathematics homework	
	%	SE	%	SE	%	SE
Zone 1 P/Louis & North	20.9	4.70	29.2	4.49	33.0	5.21
Zone 2 East & B/Bassin	24.4	5.87	16.4	4.80	29.0	6.32
Zone 3 South & Curepipe	16.8	5.17	24.8	5.66	33.8	5.86
Zone 4 West & Vacoas	24.5	7.17	38.0	6.58	36.9	6.18
Zone 5 Rodrigues	13.9	8.45	14.0	7.45	19.0	7.49
Mauritius	21.2	2.63	26.5	2.60	32.5	2.80

What was the availability of classroom furniture and classroom equipment in Grade 6 classrooms?

It is quite clear that where there is inadequate furniture and equipment it is much more difficult for teachers to teach and pupils to learn. Questions were therefore asked of teachers about these facilities and the results are presented in this section.

Were there sufficient sitting and writing places for the pupils?

Information was collected on the number of sitting and writing places but since *all* pupils had such places both in 1995 and in 2001, it is not worth producing a table just to show it.

Was there sufficient classroom equipment in the classrooms?

Information was sought from the teacher about the availability in their classrooms of a usable writing board, chalk, a wall chart of any kind, a cupboard, one or more bookshelves, a classroom library or book corner, a teacher table and a teacher chair. The information has been presented in Table 4.21 and Figure 4.1.

Table 4.21. Percentages and sampling errors for the availability of classroom resources (SACMEQ I and II)

Resource	SACMEQ I		SACMEQ II	
	Class		Class	
	teacher		teacher	
	%	SE	%	SE
A usable writing board	99.3	0.41	89.7	1.95
Chalk	99.8	0.15	89.7	1.95
A wall chart of any kind	74.5	2.73	73.9	2.67
A cupboard	84.3	2.37	84.6	2.3
One or more bookshelves	25.2	2.71	26.2	2.84
A classroom library or book corner	56.3	3.57	65.9	2.97
A teacher table	99.3	0.34	88.4	2.05
A teacher chair	99.8	0.11	88.2	2.05

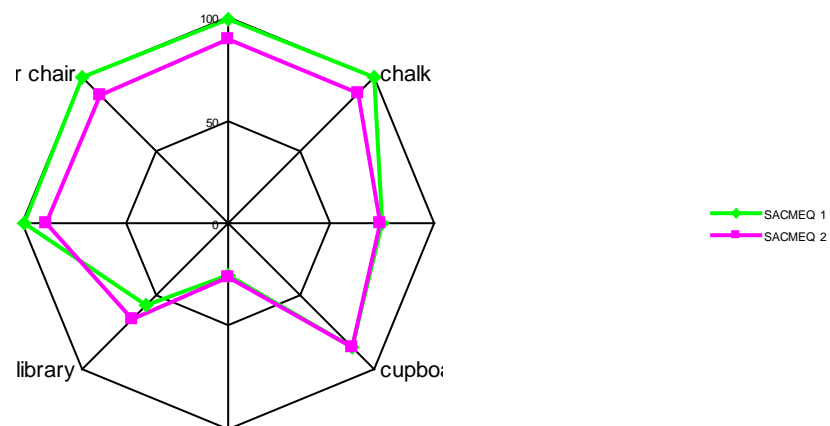


Figure 4.1: Percentages and sampling errors for the availability of classroom resources (SACMEQ I and II)

In Figure 4.1 the outer ring represents 100 percent and the centre of the circle represents zero percent. When the comparison is made between 1995 and 2001 it can be seen there was a decrease in availability of writing boards, chalk, and a teacher tables and chairs. Wall charts, cupboards, and bookshelves remained the same and there was a slight increase in the percentage of pupils being in classrooms having a classroom library or book corner. Bookshelf numbers are still very low and there are only 65 percent of pupils who are in classrooms with a library or book corner. One would have expected the response to availability of a usable blackboard and chalk to be 100 percent. However this gap can be explained by the fact that at the time of data collection some schools had damaged blackboards that needed to be replaced. Also during the year stores confirmed a shortage of chalk due to a delay at central level in renewing the contract for the provision of chalk to the Ministry.

If the equipment items in Table 4.21 are summed then it is possible to create an equipment supply index for each school. The figures across the zones are presented in Table 4.22. It can be seen that the average pupil in 1995 was in a classroom that had 6.4 out of the eight items on the list, but that in 2001 the number had decreased to 6.1 items. However, given the standard error of sampling, it is not possible to say that the difference was significant. It is also possible to note that provision in Zone 2, East & Beau Bassin provision, was a little low.

Table 4.22. Means and sampling errors for the classroom resources index (SACMEQ I and SACMEQ II)

Zone	SACMEQ 1		SACMEQ 2	
	Reading teacher		Reading teacher	
	Mean	SE	Mean	SE
Zone 1 P/Louis & North	6.1	0.14	6.1	0.22
Zone 2 East & B/Bassin	6.4	0.16	5.7	0.43
Zone 3 South & Curpipe	6.5	0.13	6.1	0.28
Zone 4 West & Vacoas	6.6	0.2	6.3	0.31
Zone 5 Rodrigues	6.7	0.29	6.3	0.49
Mauritius	6.4	0.08	6.1	0.15

Policy suggestion 4.11: The Ministry should keep up its effort to supply all classrooms in primary schools with a classroom library or book corner. The question of bookshelves should be further examined and if there is insufficient space to keep all of the classroom books and other materials then an effort should be made to supply the shelves.

How many books did teachers have in their classroom library or book corner?

In chapter 3 it was shown that in 2001 there were more pupils in classrooms equipped with class libraries as compared to 1995. But at the same time it is distressing to note, (see Table 4.23) that the number of class library books per pupil has fallen from 1.3 in 1995 (SACMEQ I) to 0.8 in 2001(SACMEQ II). Steps must be taken to ensure an adequate number of books in class libraries.

Table 4.23. Means and sampling errors of class library books per pupil (SACMEQ I and SACMEQ II)

Zone	Class library books per pupil			
	SACMEQ I		SACMEQ II	
	Mean	SE	Mean	SE
Zone 1 P/Louis & North	0.9	0.27	0.7	0.06
Zone 2 East & B/Bassin	1.1	0.34	0.7	0.08
Zone 3 South & Curpipe	2.3	0.72	0.8	0.12
Zone 4 West & Vacoas	1.3	0.28	1.0	0.14
Zone 5 Rodrigues	1.1	0.20	0.9	0.15
Mauritius	1.3	0.20	0.8	0.05

Did teachers have teaching aids e.g. a map, dictionary, geometrical instruments and teachers' guides?

Teachers were asked whether they had access to teaching aids such as a map, dictionary, geometrical instruments and teacher's guides in their school. The data on availability of these teaching aids is presented in Table 4.24. It can be seen that only 30.6 percent of pupils were being taught by teachers who had access to a teacher's guide for English in their school, and a smaller percentage of 26.0 percent of pupils had teachers who had a teacher's guide for mathematics. It is this Ministry's policy to provide every teacher with relevant teacher's guides, and there should be an investigation on whether a distribution problem exists or not.

Geometrical instruments such as a compass or protractor are essential tools for the teaching of mathematics. Only 34.2 percent of pupils were taught by teachers having these facilities. Steps should be taken to ensure that every school is equipped with basic teaching aids such as a map of the world, geometrical instruments and a teacher's guide.

Table 4.24. Percentages and sampling errors of reading teachers with teaching aids in the school (SACMEQ II)

Zone	Teaching aids									
	For teaching reading						For teaching mathematics			
	Map		English dictionary		Teacher's guide		Geometrical instruments		Teacher's guide	
	%	SE	%	SE	%	SE	%	SE	%	SE
Zone 1 P/Louis & North	83.5	3.72	90.7	2.99	26.8	4.97	43.6	5.63	24.1	5.22
Zone 2 East & B/Bassin	81.3	5.95	84.7	5.54	23.6	6.32	28.5	7.06	21.7	6.00
Zone 3 South & Curpipe	91.9	3.30	98.1	1.34	42.6	6.91	33.2	6.51	34.3	6.58
Zone 4 West & Vacoas	91.0	2.81	96.7	1.63	30.7	6.27	23.6	4.94	25.9	6.32
Zone 5 Rodrigues	88.6	6.40	88.6	6.40	22.7	9.84	43.5	9.95	22.7	9.84
Mauritius	86.4	2.06	92.0	1.70	30.6	2.88	34.2	2.99	26.0	2.88

Policy suggestion 4.12: The Curriculum Unit of the Ministry should ensure that teachers' guides for all subjects are distributed to all schools and that they are made accessible to teachers.

What professional support (in terms of inspections, advisory visits and school head inputs) was given to Standard 6 teachers?

To what extent did teachers find inspectors and educational advisors useful?

The Ministry of Education is in the process of establishing a National Inspectorate with the intention of overarching the inspection and advisory services to the primary and secondary education sub-sectors. An unstructured educational advisory service exists already, with inputs from different institutions such as the Mauritius Institute of Education, Mauritius Examination Syndicate, National Centre for Curriculum Development & Research, the zonal Directorates and coordinators of national projects. With the setting up of a Human Resource Development Unit at the Ministry the issue of professional development of teachers would be given a higher premium.

Table 4.25. Teachers' descriptions of the actions of the inspector and advisor (SACMEQ II)

Description of the actions	Percentage of teachers agreeing			
	Inspector		Advisor	
	%	SE	%	SE
Pedagogical role				
Bring new ideas	91.2	1.61	79.9	4.92
Clarify educational objectives	66.8	2.56	62.9	6.70
Recommend new teaching materials	65.5	2.97	69.2	6.30
Contributes little to my classroom teaching	23.3	2.71	10.6	4.00
Explain curriculum content	31.4	3.02	25.0	5.91
Suggest improving teaching methods	82.3	2.32	73.1	6.28
Critical versus advisory role				
Comes to advise	94.9	1.50	83.4	4.87
Comes to criticise	7.8	1.79	5.7	2.63
Finds faults and report them to the employer	7.9	1.78	33.2	7.33
Professional development role				
Provides information for teacher self-development	44.3	3.10	4.5	2.23
Encourage professional contacts with other teachers	26.9	2.75	39.4	6.87
Provides in-service training to teachers	39.5	2.94	32.6	6.57

Teachers participating in the study were asked to respond to questions about their perception of the actions of inspectors and advisors. The percentages of pupils with teachers agreeing to specific descriptions of the purpose of the visits of inspectors and advisors is presented in Table 4.25.

The data is grouped under three headings: pedagogical role, critical versus advisory role and professional development role. The results reveal important issues critical for the successful operation of the National Inspectorate. However, caution should be exercised in interpreting the responses to the advisory-oriented support as against the critical support as these may have been influenced by a tendency to provide ‘socially desirable’ measures. Major dissatisfaction has been expressed concerning the role of inspectors in ‘contribution to classroom teaching’ and ‘encouraging professional contact with other teachers’. Only about 31.4 percent of pupils had teachers who considered that inspectors helped to ‘explain the curriculum content’ while only 44 percent considered that inspectors ‘provide information that would assist with their professional development’. In Table 4.21 the responses for both SACMEQ I and SACMEQ II are given for these four items about which the teachers have been least positive.

Table 4.26. Teachers’ descriptions of the actions of the inspector and advisor (SACMEQ I & II) which were least positive

		Percentage of teachers agreeing			
		SACMEQ I		SACMEQ II	
		%	SE	%	SE
<i>Pedagogical role</i>	Contribution to classroom teaching	79.3	2.51	23.3	2.71
	Explaining curriculum content	65.1	2.95	31.4	3.02
<i>Professional development role</i>	Encouraging professional contacts with other teachers	51.0	3.09	26.9	2.75
	Provides information for professional self-development	67.7	2.89	44.3	3.10

Policy suggestion 4.13: The Inspectorate should hold a conference to discuss teacher perceptions of their role and to explore avenues to improve their performance with respect to explaining the curriculum and to providing more information to teachers about professional contacts and self-development opportunities.

Policy suggestion 4.14: The HRD unit should mount courses for the primary school inspectors with a view to enhancing their knowledge and skills in classroom practices for improved teaching/learning.

Did teachers receive advice from the School Heads?

Teachers can feel very isolated if they are left teaching in their own classrooms and never hear how they are performing except if an inspector visits the classroom. Most teachers welcome constructive comment from the school head and other colleagues. But this assumes that other colleagues and the head can see the teacher teach. Teachers were asked how frequently they received advice from the school head and those saying ‘sometimes’ or ‘often’ were grouped together. The results are presented in Table 4.27.

Table 4.27. Percentages and sampling errors for the frequency of advice to teachers from the school head (SACMEQ I and SACMEQ II)

Zone	Percentage of teachers receiving advice ‘sometimes’ or ‘often’			
	SACMEQ I		SACMEQ II	
	%	SE	%	SE
Zone 1 P/Louis & North	89.0	2.99	94.7	2.15
Zone 2 East & B/Bassin	88.4	4.82	91.7	2.96
Zone 3 South & Curepipe	79.2	7.11	88.4	5.09
Zone 4 West & Vacoas	96.6	2.43	84.7	3.73
Zone 5 Rodrigues	84.0	5.86	100.0	0.00
Mauritius	88.0	2.26	91.0	1.61

Teachers said that in general they received advice from school heads. In Zone 4 (West and Vacoas) there was a decrease between 1995 and 2001 and in Zone 5 (Rodrigues) there was an increase. It would be desirable if the management course attended by school heads were to emphasize the importance of their role in advising their teachers.

What were the main sources of teacher job satisfaction?

The motivation of teachers is a critical issue for any programme designed to improve the quality of education. In the SACMEQ countries there has been considerable interest in this issue - especially with respect to those factors that contribute most to job satisfaction. It is widely believed that satisfied teachers will tend to work harder for the benefit of the pupils and are less likely to leave the teaching profession.

Teachers in this study were asked to respond to 12 possible reasons for satisfaction with their jobs. These reasons have been grouped under five headings in Table 4.28 living conditions, school facilities/equipment, relationships with others, career advancement, and the educational outcomes of pupils. It is the percentages of pupils having teachers who said that the source of satisfaction was 'very important' that have been given.

It can be seen that the most important source of teacher satisfaction is 'seeing the pupils learn'. However, the quality of school buildings, the classroom furniture, the school management and administration, along with amicable relations with colleagues, expanded opportunities for promotion and professional development, and of course the level of salary, were all rated as very important by over 85 percent of teachers.

Teacher housing was not regarded by many as a major source of job satisfaction.

Table 4.28. Percentages and sampling errors for sources of teacher job satisfaction (SACMEQ I and SACMEQ II)

Source of satisfaction	SACMEQ 1		SACMEQ 2	
	%	SE	%	SE
Living conditions				
Travel distance to school	55.8	2.98	64.4	3.03
Availability of teacher housing	33.4	3.09	29.9	2.78
Quality of teacher housing	44.6	3.26	40.0	2.79
School facilities/equipment				
Quality of school buildings	82.7	2.21	87.1	2.07
Quality of classroom furniture	85.9	1.89	90.6	1.59
Relationships with others				
Quality of school management and administration	93.2	1.70	95.1	1.21
Amicable relations with staff	84.2	2.13	90.4	1.72
Good relation with community	67.1	2.97	78.7	2.38
Career advancement				
Expanded opportunities for promotion	87.7	1.97	92.5	1.43
Opportunities for professional development	85.4	2.04	89.8	1.83
Level of teacher salary	93.8	1.31	96.5	1.10
Educational outcomes of pupils				
Seeing pupils learn	96.6	0.93	98.6	0.74

Policy suggestion 4.15: The Management Unit should meet with Teacher Unions to discuss the responses of teachers concerning job satisfaction in order to identify strategies for addressing some of their national and zone-level concerns.

Conclusion

This chapter was designed to provide the reader with examples of baseline data on characteristics of Standard 6 teachers. The examples focus on age, gender and home possessions of Standard 6 teacher, their experience and training, in-service courses attended and how effective they were deemed to be, the main sources of job satisfaction and finally, how useful the teachers consider the visits of inspectors and advisors to be. The same data were collected in 1955 for the SACMEQ I project. A comparison of these two sets of data reveals some interesting changes that have occurred during the period 1995-2001. Policy suggestions 4.1 to 4.15 were intended to address certain issues where either there has been no improvement or where there has been some deterioration.

The first policy suggestion concerns the age of Standard 6 teachers. It is suggested that younger teachers be given the opportunity to teach the Standard 6 pupils. The second policy suggestion concerns the quality and relevance of in-service courses. Teachers have not responded positively as to the effectiveness of in-service courses. The dissatisfaction expressed by teachers is an indicator of the quality and relevance of these courses. There seems to be a gap in the expectations of teachers with regards to their professional upgrading through in-service courses. How far are the existing in-service courses relevant to the teachers' requirements in a profession that is becoming more and more demanding? In the third policy suggestion it is suggested that the teachers' requirements be examined with a view to incorporating them in the programme intended for their professional development. The next four suggestions aim at ensuring compatibility of strategies with goals of teaching reading and mathematics. Teachers obtain feedback about pupils' learning and this must be transmitted to parents. This could be done by having a specific section in pupils' reports set aside for teachers to make comments. Certain school activities, such as publishing school magazines or organizing an open-door policy and having frequent meetings of teachers with parents, are some of the strategies that could be adopted by schools not only to provide feedback to parents but also to generate parental interest in their children's learning. Policy suggestions 4.8 to 4.10 address these issues.

Availability of classroom resources is not only a source of satisfaction for teachers but also a measure of the quality of the classroom environment for teaching-learning to take

place. Policy suggestions 4.11 and 4.12 refer to the need to monitor distribution and provision of an adequate number of books for class libraries. The main roles of the inspector or advisor can be summarized as critical, advisory, pedagogical and developmental. This should tally with the perception of teachers themselves. However, if teachers feel that visits of inspectors and advisors contribute little to their teaching in the classroom, then it becomes important that inspectors carry out a self-appraisal. This issue is being addressed in policy suggestions 4.13 and 4.14. The next policy suggestion addresses the issue of job satisfaction. A conducive work environment will keep a teacher motivated. There is need for constant dialogue between the teacher and the Ministry to ensure the maintenance of a motivating work environment

Chapter 5

School Heads' Characteristics and their Views on Educational Infrastructure, the Organization and Operation of Schools, and Problems with Pupils and Staff

Introduction

In this chapter data describing the school heads and the schools that the Standard 6 pupils attended are presented. Again, as in Chapters 3 and 4, the aim is to provide contextual information for interpreting the achievement data presented later in the report. It should also allow educational planners to see how such inputs have changed over time.

The major questions to be answered in this chapter are:

1. What were the personal characteristics of school heads (for example, age and gender)?
2. What were the professional characteristics of school heads (in terms of academic, professional, experience, and specialized training)?
3. What were the school heads' viewpoints on general school infrastructure (for example, electrical and other equipment, water, and basic sanitation) and the condition of school buildings?
4. What were the school heads' viewpoints on (a) daily activities (for example, teaching, school-community relations, and monitoring pupil progress), (b) organizational policies (for example school magazine, open days, and formal debates), (c) inspections, (d) community input, (e) problems with pupils and staff (for example, pupil lateness, teacher absenteeism, and lost days of school)?

What were the personal characteristics of school heads?

The school head is often said to be the driving force of a school. It is sometimes said that if a good head is appointed then he or she attracts good staff and within four years the school becomes a good school. Conversely, if a poor head is appointed, then within four years, it is possible to detect deterioration in the academic and social life of the school. What then were

the characteristics of primary school heads in the year 2001 and were these different from 1995?

Age and gender of school heads

Table 5.1 presents information on the age and gender of the school heads.

The statistics in the tables are reported in terms of pupils. Thus, the percentage shown for female heads in Zone 1 in SACMEQ II means that 20.6 percent of pupils were in schools with heads who were female. The mean age means that the average Standard 6 pupil in Zone 1 was in a school whose head was 53.4 years old.

For all of Mauritius the average pupil had a head who was 53.5 years old. There was not much variation among the zones except that the heads in Rodrigues were slightly younger than those in the other zones.

Table 5.1. Means, percentages, and sampling errors for school heads' age and gender (SACMEQ I and SACMEQ II)

Region	SACMEQ I				SACMEQ II			
	Age (years)		Gender (female)		Age (years)		Gender (female)	
	Mean	SE	%	SE	Mean	SE	%	SE
Zone 1 P/Louis & North	54.3	0.32	21.6	6.84	53.4	0.49	20.6	6.14
Zone 2 East & B/Bassin	54.3	0.34	31.0	8.21	54.0	0.47	38.5	8.17
Zone 3 South & Curepipe	53.4	0.69	34.3	8.91	53.2	0.68	27.9	8.91
Zone 4 West & Vacoas	53.6	0.68	28.9	9.64	53.9	0.50	57.2	10.54
Zone 5 Rodrigues	53.9	1.08	83.3	11.24	49.8	1.43	37.8	13.96
Mauritius	54.0	0.23	30.7	3.94	53.5	0.27	33.8	3.82

The percentage of pupils having female school heads was 34 percent. There was some variation among zones with Zone 1, Port Louis & North, having only 20.6 percent female heads and Zone 4, West & Vacoas, having 57.2 female heads. In terms of equity the Ministry may wish to consider having a gender balance. With the increase of female teachers entering the profession it may well be possible to redress the balance gradually in all regions. It should be pointed out that there was no change between 1995 and 2001 for the percentage of female heads and in the average age of heads.

Policy suggestion 5.1: The Ministry should set up a task force to investigate strategies to address the equity issue of gender imbalance in the appointment of female school heads.

What were the professional characteristics of school heads?

Academic qualifications, teaching experience, teacher training and management training of school heads

It can be argued that school heads with more experience as teachers will be more versed in the ways of schools and therefore will be able to run their schools in a better way than those with less experience. It can further be argued that school heads that have received special management training to be a head, should run their schools better than those who have not had the management training. In Table 5.2 the means and standard errors for the years of teaching experience and the years of teacher training in both 1995 and 2001 have been presented as well as the percentage of pupils who had school heads in 2001 who had attended the management course.

Table 5.2. Means and sampling errors for the teaching experience and training of the school heads (SACMEQ I and SACMEQ II)

Zone	SACMEQ I				SACMEQ II					
	Experience (years)		Teacher training (years)		Experience (years)		Teacher training (years)		Specialised training (weeks)	
	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Zone 1 P/Louis & North	24.5	1.07	1.6	0.09	30.4	0.56	2.4	0.14	35.6	4.18
Zone 2 East & B/Bassin	23.5	0.99	2.0	0.09	31.7	0.62	2.3	0.12	35.8	5.65
Zone 3 South & Curpipe	24.5	0.95	1.9	0.12	30.8	0.71	2.5	0.17	47.3	6.44
Zone 4 West & Vacoas	21.3	1.27	1.9	0.20	32.7	0.97	2.4	0.16	36.0	6.35
Zone 5 Rodrigues	25.7	2.18	2.2	0.17	26.4	2.02	1.9	0.29	27.5	7.04
Mauritius	23.7	0.53	1.9	0.06	31.1	0.35	2.4	0.07	37.9	2.68

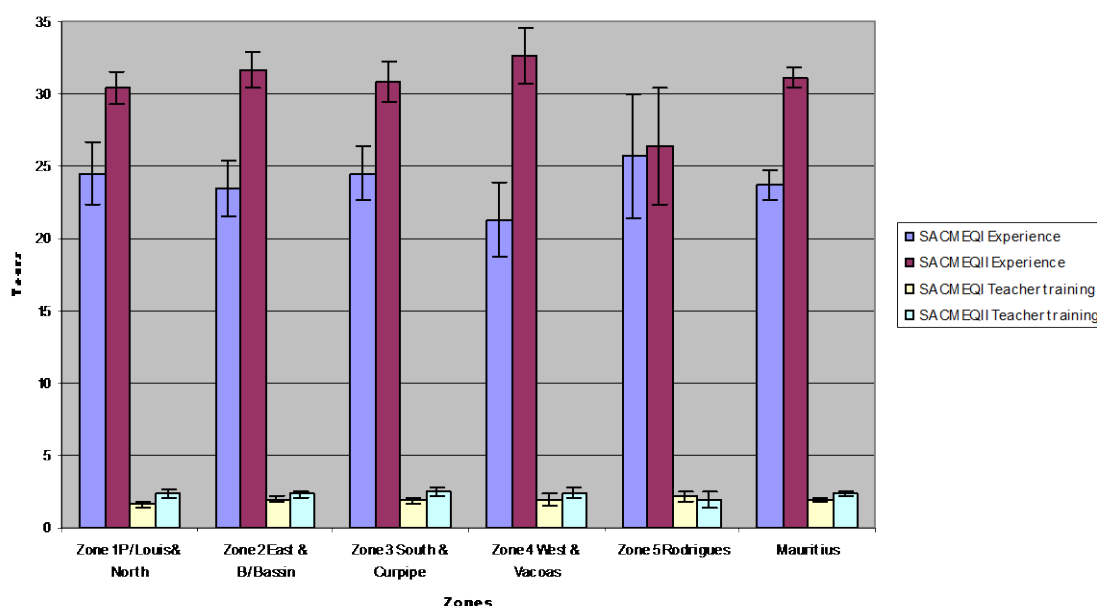


Figure 5.1: Years of teacher experience and teacher training (SACMEQ I & SACMEQ II)

It can be seen that in 2001 the average pupil in Mauritius had a head who had 31.1 years of teaching experience. This was seven years more than in 1995. The average number for years of teacher training was 2.4 years, slightly higher than in 1995. Thus there has been an improvement of the school heads' experience and training in the country as a whole. But in Rodrigues there were still one or two heads with less than two years' teacher training. One hundred percent of the school heads had attended a specialised training course. It can be seen that in 2001 these school heads had attended 37.9 weeks of management courses. These courses are held on the main island of Mauritius and they cover many weeks over a two-year period. Again it was the Rodrigues' heads who had attended courses for fewer weeks than heads from other zones.

The comparisons between 1995 and 2001 are depicted in Figure 5.1. The vertical bars are the equivalent of two standard errors of sampling. As a general rule of thumb it can be assumed that where there is no overlap of bars then the difference is significant. But where there is an overlap, then it is not significant. Thus, for teaching experience all differences are significant, except for Rodrigues. Similarly, for teacher training, all differences are significant except for Zones 2, 4 and 5.

Table 5.3. Means and sampling errors of school heads' years of experience as a school head (SACMEQ I and SACMEQ II)

Region	SACMEQ I				SACMEQ II			
	This school		<i>Altogether</i>		This school		<i>Altogether</i>	
	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Zone 1 P/Louis & North	2.0	0.20	4.2	0.51	2.0	0.19	3.3	0.30
Zone 2 East & B/Bassin	2.2	0.34	5.4	0.77	2.0	0.33	3.9	0.44
Zone 3 South & Curepipe	2.0	0.26	3.9	0.65	2.0	0.21	3.5	0.40
Zone 4 West & Vacoas	1.7	0.19	4.8	0.96	2.0	0.21	3.8	0.38
Zone 5 Rodrigues	3.2	0.69	7.9	1.82	2.1	0.33	2.9	0.51
Mauritius	2.1	0.13	4.7	0.34	2.0	0.12	3.6	0.18

In Table 5.3 information has been presented on the school heads' years of experience as a school head for over the period 1995-2001. It can be seen that overall in Mauritius in 1995 (SACMEQ I) the school head had been in his school for about 2.1 years and in 2001 (SACMEQ II) the school head had been in his school for 2.0 years. This result was expected, as every head who has worked in a particular school for four consecutive years is eligible for a transfer. From SACMEQ I and SACMEQ II data it can be seen that overall for Mauritius in 1995, a school head had altogether 4.7 years experience as a head compared to 3.6 years in 2001.

**** Table 5.4.** Years of academic education of school heads (SACMEQ I)

Region	School head academic education	
	Mean	SE
Zone 1 P/Louis & North	11.3	0.12
Zone 2 East & B/Bassin	11.0	0.03
Zone 3 South & Curepipe	11.4	0.19
Zone 4 West & Vacoas	11.3	0.25
Zone 5 Rodrigues	9.3	0.71
Mauritius	11.2	0.08

Table 5.5 Level of academic education of school heads (SACMEQ II)

Region	Level of academic education									
	Primary		Junior secondary		Senior secondary		A-level		Tertiary	
	%	SE	%	SE	%	SE	%	SE	%	SE
Zone 1 P/Louis & North	0.0	0.00	0.0	0.00	38.2	7.49	52.8	7.76	8.9	4.38
Zone 2 East & B/Bassin	0.0	0.00	0.0	0.00	63.9	8.77	36.1	8.55	0.0	0.00
Zone 3 South & Curepipe	0.0	0.00	0.0	0.00	59.4	9.17	34.2	8.79	6.4	4.53
Zone 4 West & Vacoas	0.0	0.00	0.0	0.00	64.6	9.39	35.4	9.39	0.0	0.00
Zone 5 Rodrigues	0.0	0.00	0.0	0.00	76.8	12.20	15.5	10.48	7.7	7.68
Mauritius	0.0	0.00	0.0	0.00	55.0	4.18	40.4	4.15	4.7	1.78

In 1995 (SACMEQ I) school heads were asked to report on the number of years of academic education they had. The data are presented in Table 5.4. The mean was 11.2 years for Mauritius, varying from 11.4 in Zone 3 (South & Curepipe), to 9.3 years in Zone 5 (Rodrigues). This implies that with the exception of Rodrigues, all heads in Mauritius had completed at least the O-level equivalence to 11 years of schooling, and a few of them had completed some post O-level education as well.

In 2001 (SACMEQ II) school heads were asked to report on the level of academic education they had reached. The results are in Table 5.5. While a direct comparison cannot be made between these two sets of data, it is interesting to note that in 2001 about 40.4 percent of school heads possessed an A-level as highest qualification and a further 4.7 percent had a tertiary level qualification. The academic qualification of school heads is expected to improve with the Ministry's decision to improve the entry requirements of the primary school teacher, the school head being a promotional post in the career structure of a primary school teacher.

Table 5.6. Percentages, means and sampling errors for the qualifications of the school staff (SACMEQ II)

Region	Post-secondary academic education		<i>Teacher training</i> (years)	
	%	SE	Mean	SE
Zone 1 P/Louis & North	4.0	2.37	2.2	0.11
Zone 2 East & B/Bassin	1.7	0.66	2.0	0.09
Zone 3 South & Curepipe	2.1	1.05	2.2	0.11
Zone 4 West & Vacoas	2.7	1.05	2.1	0.14
Zone 5 Rodrigues	0.5	0.48	2.1	0.06
Mauritius	2.7	0.86	2.1	0.05

What were the school heads' views on general school infrastructure and the condition of school buildings?

How well were the schools resourced?

In SACMEQ I it was found that the amount of school resources was very different in the schools in the various countries. Furthermore this amount was highly related to performance in reading. Information is presented in Table 5.7 for four categories of general school facilities: school buildings, school grounds, general services, and equipment. The data are given for both SACMEQ I and SACMEQ II.

The most remarkable change from 1995 to 2001 concerned the percentage of pupils in schools with computers. In 1995, this was 3.3 percent and in 2001 it was 97.2 percent. This was because the Ministry decided to provide a computer laboratory in every primary school. It was not surprising, therefore, to discover that there had been a drop in the percentage of pupils in schools with typewriters and duplicators, but that there was an increase in the number of photocopiers. There were about 35 percent fewer pupils in schools with cafeterias (canteens) and about 15 percent fewer in schools with sports areas/playgrounds.

After 1995 the Ministry adopted a policy of delegating the responsibility of contracting out the running of canteens in schools to the Parents Teachers Association (PTA). The annually, or at most, biennially elected PTA executive committee reviews the allocation of this contract. Very often it was found that the alternative adopted by the school PTAs (of whom the head is

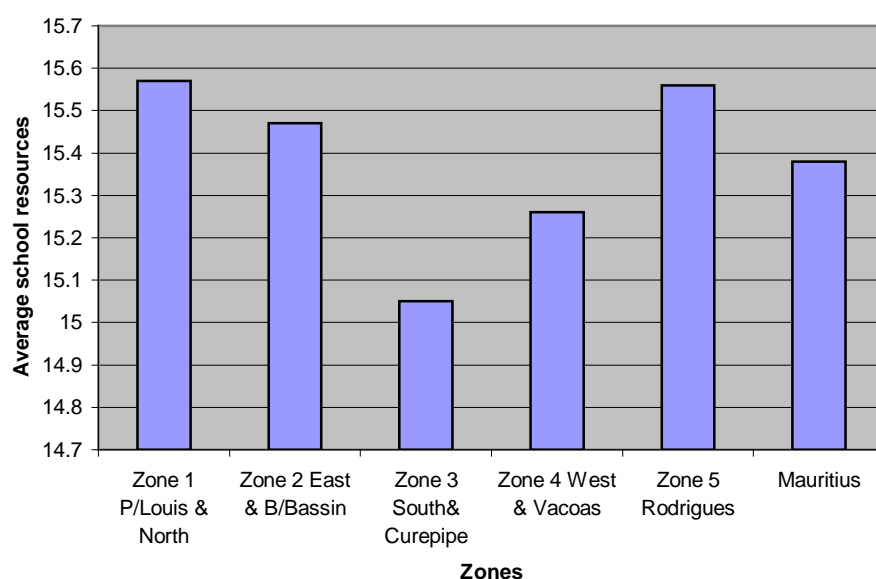
the advisor) was to allow hawkers to be on the school premises during the breaks. This may well the drop in the percentage of pupils in schools having canteens.

In the SACMEQ I survey (1995), 90.8 percent of pupils were in schools with playground facilities, whereas in 2001, this percentage dropped to 76.9. This may be accounted for by the yearly construction of additional classrooms in certain schools to meet the increasing demand of seats in those high-demand schools. Some 3-stream schools have been converted into 4 or even 5 stream schools, without any proportional increase in general facilities.

In general it can be said that the school resources were good. If the resources are added together to form a school resource index then it can be seen that there was some variation among the zones. Zones 3 (South & Curepipe) and Zone 4 (West & Vacoas) were less well resourced compared to the other three zones. These results are presented in Table 5.7.

Table 5.7 Percentages and sampling errors for schools with general facilities (SACMEQ I and SACMEQ II)

Facility	Percentage with facility			
	SACMEQ I		SACMEQ II	
	%	SE	%	SE
School buildings				
School library	96.5	1.64	90.8	2.33
School hall	10.9	2.53	11.6	2.64
Staff room	61.9	4.19	56.8	4.18
School head's office	88.2	2.82	82.6	3.45
Store room	92.3	2.27	89.2	2.67
Cafeteria	71.0	3.48	36.6	4.00
School grounds				
Sports area/ playground	90.8	2.49	76.9	3.58
School garden	46.4	4.10	39.1	4.25
General services				
Piped water/ well or bore-hole	98.0	1.22	100.0	0.00
Electricity	98.0	1.40	100.0	0.00
Telephone	95.3	1.49	99.2	0.79
Equipment				
First-aid kit	93.6	1.80	94.4	2.07
Fax machine	1.0	1.00	3.3	1.49
Typewriter	66.3	4.01	41.2	4.17
Duplicator	49.9	4.34	27.9	3.72
Radio	98.0	1.26	95.0	2.08
Tape recorder	87.6	2.89	76.3	3.83
Overhead projector	5.4	1.92	1.5	1.04
Television set	99.7	0.35	98.6	0.94
Video-cassette recorder	94.7	2.06	96.6	1.47
Photocopier	8.7	2.67	26.3	3.82
Computer	3.3	1.71	97.2	0.87

Figure 5.2: Total school resources by region (Maximum = 22)

How good were the school buildings and toilet facilities?

In some countries the maintenance of school buildings can be a problem. In some cases there is only a temporary structure in the first place. School heads were asked if, in their view, their school buildings needed to be completely rebuilt, needed major repairs, needed a lot of minor repairs, only a few minor repairs, or if the buildings were in good condition. The percentages of pupils in schools in the first two categories (needing a complete rebuilding or major repairs) were calculated and the results are presented in Table 5.8.

In Zone 2 the percentage of pupils in poor school buildings had increased, and in Zones 1 and 3 the percentage had decreased. In Mauritius as a whole there were 17.6 percent of pupils who were in schools needing complete rebuilding or major repairs. This must be of concern to the authorities and steps should be taken to plan for these repairs to be carried out over a number of years. In several African countries the provision and quality of toilets can be a problem. In some cases there are insufficient toilets. In other cases they are not cleaned regularly and can be unhygienic. In some cases when girls begin to mature they are absent from school for three or four days per month. Over a whole school year this can be the equivalent of more than a month's schooling. Questions were asked about the repair status of toilets and also about provision. Heads were asked about the number of toilets they had. This number was divided into the number of pupils attending the school in the largest shift. This provided a rough index of the number of pupils per toilet and the results have been presented in Table 5.8.

In 2001 the Ministry commissioned a survey on toilet facilities in schools in Mauritius. The report has recommended *inter alia* a review of the norms relating to the pupil-toilet ratio and upkeep and maintenance. Data on the cleaning schedule and the state of cleanliness of the toilets in the primary schools were not collected either in SACMEQ I or in SACMEQ II.

There was a small percentage increase for Mauritius of the number of pupils per toilet. In general, however, the toilet situation seemed to be in order. The increase in pupil-toilet ratio from about 34.3 in 1995 to 37.3 in 2001 indicates an increase in non-functional toilets over this period of time. The repair-status of toilets, with an average of about 17.6 percent for the whole of Mauritius, may not be alarming. However there is need to take appropriate measures and sustain them with a view to decelerating the rate of degradation of the toilets.

Table 5.8. General condition of buildings and toilet facilities (SACMEQ I and SACMEQ II)

Region	SACMEQ I				SACMEQ II			
	Need repair		Toilet provision		Need repair		Toilet provision	
	%	SE	Mean	SE	%	SE	Mean	SE
Zone 1 P/Louis & North	21.7	6.57	35.7	1.43	13.7	6.00	38.3	2.69
Zone 2 East & B/Bassin	12.2	5.08	31.3	2.20	24.8	8.15	36.3	3.03
Zone 3 South & Curepipe	21.9	8.08	33.6	3.64	9.4	5.36	37.6	3.74
Zone 4 West & Vacoas	24.5	10.38	38.5	3.40	23.8	8.46	39.8	3.08
Zone 5 Rodrigues	25.0	13.06	26.9	4.43	22.4	11.89	22.6	3.85
Mauritius	20.0	3.48	34.2	1.21	17.6	3.36	37.3	1.48

Policy suggestion 5.2: Zonal directors should further investigate the state of toilets in the schools and prioritise the works that need be undertaken. It is also suggested that the reviewed norms proposed by the study commissioned in 2002 be considered and implemented.

Classroom space

The number of square metres per pupil was calculated by dividing the total square metres available for classroom space available by the total school enrolment. This formula was adopted because in Mauritius there was only one shift. From Table 5.9 it can be seen that the average for Mauritius is 1.6 square metres per pupil. However it should be noted that this measure is probably an over-estimate of the space per pupil because in any one classroom there are items of furniture like cupboards, bookshelves, teacher table that take up considerable space. Furthermore, with the class size varying from a low 15 to a high 54, this measure is likely to be much lower in the overcrowded classrooms of high-demand schools. It

will be interesting to examine the impact of regionalisation of admission to primary schools together with the projected decline in admission on classroom space over time.

Table 5.9. Means and sampling errors of the classroom space available for pupils (SACMEQ II)

Zone	Classroom space	
	Mean	SE
Zone 1 P/Louis & North	1.6	0.52
Zone 2 East & B/Bassin	1.6	0.44
Zone 3 South & Curepipe	2.0	0.53
Zone 4 West & Vacoas	1.2	0.11
Zone 5 Rodrigues	1.6	0.10
Mauritius	1.6	0.23

What were the school heads' viewpoints on (a) daily activities (b) organizational policies (c) inspections (d) community input (e) problems with pupils and staff?

At the time of SACMEQ 1 in 1995 there was no teaching undertaken by school heads. But, in 1998/1999 there was a shortage of teachers and school heads had suddenly to teach in order to fill the timetable. It can be argued that a head should always teach several hours each week in different grades because in this way he or she 'really gets to know what is going on in the school' and does not have to rely solely in what the teachers tell the head.

How much did school heads teach?

Data was collected from heads of school as to the time that they allocated to themselves for teaching. The average number of minutes' teaching by heads is presented in Table 5.10

The average pupil was in a school where the school head taught for two hours and ten minutes per week. Given the large standard errors of sampling it is not possible to state that there were any significant differences among zones. It would be interesting to know from a small intensive study if the Heads did in fact profit from teaching regularly for the general benefit of the school.

Table 5.10. Means and sampling errors for amount of school head teaching per week (SACMEQ II)

Zone	School head teaching minutes per week	
	SACMEQ II	
	Mean	SE
Zone 1 P/Louis & North	146.7	18.26
Zone 2 East & B/Bassin	123.6	23.82
Zone 3 South & Curepipe	161.5	26.56
Zone 4 West & Vacoas	125.7	54.74
Zone 5 Rodrigues	99.0	30.47
Mauritius	131.3	14.16

Policy suggestion 5.3: The Inspectorate should carry out a small intensive study to confirm whether heads of primary schools are, in fact, teaching regularly.

Policy suggestion 5.4: The Ministry should ensure that for the general benefit of the school, heads are required to teach a minimum number of hours weekly

Table 5.11. The importance of various school head tasks (SACMEQ I and SACMEQ II)

Task	Percentage rating as 'very important'			
	SACMEQ I		SACMEQ II	
	%	SE	%	SE
Contact with community	87.4	2.89	75.0	3.69
Using progress Records *	91.4	2.43		
Monitoring pupils progress **			89.3	2.55
Administrative tasks	93.0	2.15	96.6	1.53
Discuss educational objectives with the teaching staff	97.4	1.42	86.8	2.96
Professional development (Teachers)	92.1	2.06	86.5	2.93
Professional development (School Heads)**			97.6	1.30

* Only in SACMEQ I

** Only in SACMEQ II

The perception of school heads on the importance of their various tasks is presented in Table 5.11 for SACMEQ I and SACMEQ II. In 1995, more than 90 percent of Standard 6 pupils were in schools whose heads rated as most important the tasks of ‘discussing educational objectives with the teaching staff’, ‘administrative tasks’ and the ‘professional development of teachers’. In 2001 more than 96 percent of Standard 6 pupils were in schools whose heads rated the ‘professional development of school heads’ and ‘administrative tasks’ as being most important. Further to organizing the social life of the school, the school head is seen to be the one responsible for improving and sustaining the academic performance of his school. This type of leadership may be enhanced through improved staff development programmes.

To what extent did schools have special school activities associated with reading?

In each school there are activities over and above teaching that are meant to be conducive to pupils’ learning. In the field of reading, for example, there were selected activities that from other research were known to help children to read more. In a study by Elley (1992) it was found that in schools where the pupils produced a school magazine or journal or had a debating society that, other things being equal, pupils in such schools had a higher reading performance than in schools without such activities. Equally, it was felt that some of the other activities listed might contribute to a school atmosphere conducive to reading which in turn would result in higher achievement. The percentages of pupils in schools where these various activities occurred are given, for both SACMEQ I and SACMEQ II, in Table 5.12.

It can be seen that only the open-door policy was truly popular in Mauritius. But there had been an increase in the percentage of schools undertaking all three of the other activities between 1995 and 2001. Unfortunately, the relationships with reading comprehension achievement were rather weak. The strongest correlation was with the school magazine, but this was only 0.06. It must be stressed that for reading to improve, schools must produce a general climate of reading for pleasure.

Table 5.12. Percentages and sampling errors for the school activities (SACMEQ I and SACMEQ II)

Activity	Percentage of school activities			
	SACMEQ I		SACMEQ II	
	%	SE	%	SE
School magazine	14.2	3.01	26.4	3.87
Public speaking day	9.6	2.46	22.5	3.49
Open-door policy	90.7	2.67	80.8	3.39
Formal debates or debating contests	11.7	2.64	16.3	3.16

Policy suggestion 5.5: The Inspectorate should monitor the insertion of a selected list of special activities as a normal feature of the school life in primary schools

How many days were lost in the last school year?

In Mauritius, it is common to have a number of school days set aside each year for special festivities. In 1995 the average figure was 7.9 days per year and in 2001 it was 6.2 days. The figures by zone are presented in Table 5.13. The data on the number of official school days lost in an academic year did not include the number of days that a particular class teacher stayed away from his class while availing himself/herself of his/her leave privileges. It is evident that the number of days that the Standard 6 teacher attended in-service courses would further impinge upon the number of official school days lost.

Table 5.13. Means and sampling errors for number of official school days lost (SACMEQ I and SACMEQ II)

Zone	Average of official school days lost			
	SACMEQ I		SACMEQ II	
	Mean	SE	Mean	SE
Zone 1 P/Louis & North	7.9	1.05	6.5	1.03
Zone 2 East & B/Bassin	7.2	1.17	5.7	1.13
Zone 3 South & Curepipe	8.6	1.33	4.2	1.02
Zone 4 West & Vacoas	7.4	1.11	7.3	1.30
Zone 5 Rodrigues	11.2	2.02	11.8	2.95
Mauritius	7.9	0.56	6.2	0.55

The number of official school days lost for schools in Zone 3 has been halved since 1995, but the number of school days lost in Rodrigues still remains high.

Policy suggestion 5.6: The Ministry should set up a task force to develop strategies to overcome the number of official school days lost in an academic year.

Which kinds of inspectors' visits took place over the last three years?

School heads were asked about how many times an inspector had visited the school and for what purposes in the last three years. The inspectorate in Mauritius is meant to visit each school at regular intervals. In Table 5.14 the percentages of pupils in schools that received at least one visit for different purposes in the last three years is presented.

Table 5.14. Percentages and sampling errors for school inspections (SACMEQ II)

Purpose of inspection	Inspection took place in past 3 years	
	%	SE
Full inspection	43.4	4.22
Routine inspection	87.7	2.73
Inspect teachers – <u>not</u> for promotion	71.7	3.73
Inspect teachers – <u>for</u> promotion	24.2	3.79
Assist teachers	78.7	3.37
Advise the school head	76.1	3.47
Address crisis/problem	61.7	4.14
Courtesy call	78.9	3.36

Eighty-eight percent of pupils were in schools that were visited at least once for the purpose of a routine inspection. Just over 40 percent of pupils were in schools that had had a full inspection. Only a quarter of the pupils were in schools where the inspector had called in order to inspect a teacher for promotion.

Every visit of an officer from the Inspectorate has to be entered in a logbook which is kept in the custody of the school head. The head teacher reported that his school received the visit of inspectors for various reasons. Seventy one percent of Standard 6 pupils were in schools that had received the visit of an inspector who came to inspect teachers (not for promotion). It would be interesting to know how feedback obtained from visits of inspectors is reported and what type of action is initiated wherever shortcomings are identified. The Standard 6 teachers, responding to questions about inspection visits, were less positive about inspectors' actions in

contributing to teaching in the classroom, explaining the curriculum content, or encouraging professional contacts with other teachers (Chapter 4).

Table 5.15 Parent/community contributions to the school (SACMEQ II)

Type of contribution	<i>Pupils in school with community contributing to</i>	
	%	SE
Building of school facilities	8.3	2.50
Maintenance of school facilities	34.7	4.14
Construction/maintenance and repair of furniture/equipment	66.4	3.96
The purchase of textbooks	30.1	4.00
The purchase of stationery	42.8	4.28
The purchase of other school supplies	64.6	4.08
Payment of examination fees	14.4	3.04
Payment of the salaries of additional teachers	0.0	0.00
Payment of an additional amount of the salary of teachers	0.0	0.00
Payment of the salaries of non-teaching staff	0.0	0.00
Payment of an additional amount of the salary of non-teaching staff	2.4	1.55
Extra-curricular activities	88.0	2.70
Assisting teachers in teaching without pay	4.2	1.85
Provision of school meals	6.5	1.89

The data presented in Table 5.15 provides a measure of the interest of parents and community in the local school. Eighty eight percent of Standard 6 pupils were in schools where parents/community contributed to organizing extra-curricular activities and about 60 percent of pupils were in schools where parents/community contributed to the construction/maintenance and repair of furniture/equipment and the purchase of other school supplies.

What were the major pupil and teacher behavioural problems?

There are few schools that do not have some problem or other with their pupils and/or teachers. In SACMEQ I some 12 percent of pupils were in schools that had problems with pupil absenteeism, and by 2001 this had risen to nearly 15 percent. Pupil absenteeism was strongly related to poor reading performance. In 2001, questions were asked about many more

types of behavioural problems that are sometimes encountered in schools. School heads were asked how frequently the problem occurred. The results are displayed in Table 5.16. The percentages are the percentages of pupils in schools where the head said that the problem never occurred.

**** Table 5.16.** Pupil behavioural problems (SACMEQ II)

Frequency of pupil behavioural problem	Indicating 'never' occurred	
	%	SE
Arriving late at school	5.0	1.95
Skiping classes	67.6	4.07
Dropping out of school	43.0	4.25
Classroom disturbance	16.3	3.19
Cheating	25.6	3.73
Use of abusive language	19.6	3.34
Vandalism	58.7	4.23
Theft	36.2	3.98
Intimidation of pupils	19.0	3.24
Intimidation of teachers/staff	76.6	3.76
Physical injury to staff	97.2	1.40
Sexual harassment of pupils	91.3	2.38
Sexual harassment of teachers	100.0	0.00
Drug abuse	99.3	0.70
Alcohol abuse	97.2	1.28
Fights	10.8	2.46
Health problems	2.4	1.28

The inverse of 'never occurred' is that it occurred sometimes or often. It can be seen that only 5 percent of pupils were in schools where the head said that the problem of pupils arriving late at school never occurred. It must then be inferred that 95 percent of pupils were in schools where the problem occurred sometimes or often. The most frequently cited problems were health, classroom disturbances, cheating, use of abusive language, theft, intimidation of pupils, and fights.

Good heads may have overemphasized the problems, but there are sufficient pupils in schools where the above-mentioned problems occurred to suggest that the Ministry commission a small study to determine the exact nature of these problems and to suggest steps that can be taken to diminish them.

Policy suggestion 5.7: It is suggested that the Ministry commission a small study to determine the exact nature of the problems of health and of pupils arriving late in school and to suggest steps that can be taken to diminish them.

Heads were also asked about behavioural problems associated with teachers. The results have been presented in Table 5.17.

Table 5.17. Teacher behavioural problems (SACMEQ II)

Frequency of teacher behavioural problem	Indicating 'never' occurred	
	%	SE
Arriving late at school	3.5	1.47
Absenteeism	55.4	4.26
Skiping classes	91.6	2.36
Intimidation or bullying of pupils	76.7	3.73
Sexual harassment of teachers	100.0	0.00
Sexual harassment of pupils	100.0	0.00
Use of abusive language	81.8	3.30
Drug abuse	100.0	0.00
Alcohol abuse	97.9	1.05
Health problems	21.3	3.55

Again, the percentages are of pupils in schools where the head stated that the problem never occurred. It can be seen that the major problems for teachers were teachers arriving late at school and also teacher health problems.

Some 3.5 percent of standard 6 pupils were in schools where the heads reported that teachers never arrived late. This implied that 96.5 percent of standard 6 pupils were in schools where there was a problem of teachers arriving late at school. It should be recalled that the official school days lost reported earlier (table 5.17) was on the high side. These two problems taken together indicated a substantial loss in contact hours. The school year extends over 37 weeks,

which leaves 15 weeks of yearly school holidays. It has been the practice to organize in-service courses during official school days. Furthermore every year the school teacher may avail himself during the official school days of the following leave privileges: 11 days of casual leave which is non-cumulative, 21 days' sick leave, of which an unused balance of up to a maximum of 11 days is cashable, and a minimum of 15 days of overseas leave which can be cumulated to a maximum of 120 days.

A school teacher who has completed a certain number of years of service can afford to stay away from his class for about 20 percent of the total number of official school days in a school year. Would 20 percent of teacher 'absenteeism' be considered tolerable?

The second major problem reported by the heads pertains to teachers' health. Just over 21 percent of Standard 6 pupils were in schools where the heads reported that teachers did not have a health problem. It can be inferred that 79 percent of standard 6 pupils were in schools where the heads reported that teachers had health problems. Yet again, this problem can be translated into one of teachers being physically absent from the class.

Policy suggestion 5.8: The Ministry should set up a task force to examine the issue of teachers' leave privilege and make suggestions as to what the situation should be.
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Policy suggestion 5.9: The Ministry should carry out a small study to examine the impact of teacher lateness and health problems on the loss of contact hours, and it should suggest steps to remedy this problem.

Conclusion

In this chapter indicators of age, gender, teaching experience, teacher training and management training of heads of primary schools were examined. Overall in Mauritius only 33.8 percent of pupils of standard 6 are in schools whose head was female. Furthermore there is a wide variation in the allocation of female head teachers among the zones. In terms of equity the Ministry of Education may wish to redress this imbalance, an issue addressed in the first policy suggestion. Some characteristics of the school environment of Standard 6 pupils relating to general school facilities were also examined. The policy suggestion focuses on the need to adopt a policy of upgrading and maintenance of sanitation and hygiene services in schools. Another policy suggestion is based on the premise that school heads who teach a minimum of hours weekly, in all the grades, really 'get the feel of what is going on in the

school' and do not have to rely solely on what the teacher has to tell. The contribution of certain activities such as 'formal debates or debating contests', 'public speaking day' and 'school magazine' in enhancing the school atmosphere of reading, and subsequently enhancing school achievement, was also stressed in a policy suggestion. Finally there are policy suggestions pertaining to frequency of teacher meeting parents, health and lateness problems of pupils and teachers, leave privileges of teachers and the need to monitor the deviation from declared school calendar in terms of official school days lost.

Some indicators relating to interactions between school heads and members of their teaching staff and some of the pupil and teacher behavioural problems were examined. Lateness was a problem for both pupils and teachers. This should be a matter of concern for the authorities. The health of both pupils and teachers was a major problem for school heads. The School Health Services could be requested to examine the health problems of pupils, which may well be only a "false" justification by pupils for their absences. The Ministry should examine the exact nature of these problems.

Chapter 6

Equity in the Allocation of Human and Material Resources among Zones and among Schools within Zones

Introduction

The Ministry's educational policies have always been centred around the improvement of overall learning outcomes and, at the same time, on the reduction of disparities in access to learning opportunities. The primary concern of the Ministry regarding equity has been to ensure that every child is given an equal opportunity to learn and to achieve high levels of performance. This chapter looks at how successful the Ministry has been in achieving an equitable provision of resource allocation to all schools in the different zones. When describing differences in resource allocation it is important to know whether variations in resource inputs are more pronounced among zones or whether they are larger among schools within zones. This will help locate the level at which decisions must be taken in order to address any uneven distribution of resources.

Two specific questions that have been posed are:

- (i) Have human resources (for example, qualified and experienced teachers and school heads) been allocated in an equitable fashion among zones and among schools within zones?
- (ii) Have material resources (for example, classroom teaching materials and school facilities) been allocated in an equitable fashion among zones and schools within zones?

Two approaches to the measurement of equity

(a) Variation among zones

The coefficient of intra-class correlation, denoted by ρ , is used to divide the variation of resource inputs into two components: (a) among zones, and (b) among schools within zones. ρ can range from nearly zero to 1.00. When used in this way, ρ is the ratio that measures the percentage of total variation among schools that can be attributed to variation among zones.

To illustrate the meaning of ρ , consider two hypothetical school systems A and B. Assume that in school system A resources are allocated equally or nearly equally to all schools. When one calculates average resource levels for the zones in the system, one finds that they are

more or less the same – except perhaps for minor chance deviations. For such a school system, the value of rho would be close to zero because of the small variation among zones. In this situation most of the variation would be among schools within zones.

On the other hand, in school system B, suppose that because of administrative decisions, historical factors, or geographical differentiation of social class groups, there are large variations among the zones. In this case the value of rho would be close to unity. The majority of the variation among schools would be due to variations among zones and there would be little variation among schools within zones.

The above examples are two extremes to illustrate the interpretation of rho. It is common practice to express rho as a percentage. For example, a rho value of, say 0.20 means that 20 percent of the variation is among zones and 80 percent among schools within zones.

(b) Variation among schools within zones

It is also possible to quantify the differences among schools within a particular zone by making a comparison with the variation among schools at the national level. This can be achieved by using the formula below:

$$\text{Variation among schools within zones} = \frac{\text{standard deviation for schools in a zone}}{\text{standard deviation for schools in the nation}} \times 100$$

The standard deviation of an indicator for a particular zone measures the amount of variation among schools within that zone, whereas the standard deviation of an indicator for the whole country measures the amount of variation among schools for the nation. The ratio of the standard deviation of an indicator for a zone to that for the nation, expressed as a percentage, provides a measure of the degree of equity within a zone compared with the national picture.

To illustrate the interpretation of this ratio, consider two hypothetical Zones A and B. Assume that the levels of a resource are measured by an indicator that has a ratio value of 50 percent for Zone A and 150 percent for Zone B. This would mean that the variation in resource levels among schools in Zone A is 50 percent less than the variation in resource levels among schools for the whole nation; and the variation in Zone B is 50 percent higher than for the nation. It can be said that there has been equitable allocation among schools within Zone A. In contrast the Ministry should be concerned about Zone B because there is clear evidence of

major inequities among schools in Zone B when compared with differences among schools for the whole country.

Have human resources been allocated in an equitable fashion among zones and among schools within zones?

Were qualified and experienced Grade 6 teachers and school heads distributed equitably among zones and among schools within zones?

The two indicators used as a measure of human resources allocation were the qualifications and experience of Standard 6 teachers and school heads, and the pupil-teacher ratio. The rho value and the variation among schools within zones are presented in Table 6.1 and 6.2 for SACMEQ I (1995) and SACMEQ II (2001) respectively. It can be seen that the values of rho are relatively low for both sets of data, indicating that there was little variation in human resource allocation that could be attributed to differences among zones. However, in Zone 3 significant variations were observed among schools for class teacher professional qualifications and school head experience.

The pupil-teacher ratio is an overall measure of staff efficiency. Very large differences could be seen among the schools in Zone 1 for the pupil-teacher ratio. The other zones showed equitable allocation of teachers.

Table 6.1. Equity of human resource allocation as assessed by (a) variation among schools within zones, and (b) variation among zones (SACMEQ I)

Human resources	Variation among schools within zones					Variation among zones (rho x 100)
	1	2	3	4	5	
Classroom teacher professional qualification	100.1	72.5	50.1	125.4	118.0	0.0
Classroom teacher experience	100.4	77.9	61.2	108.2	115.6	7.2
School head professional qualification	64.6	94.1	93.9	120.3	111.1	5.2
School head experience	91.7	102.0	121.8	99.1	93.8	2.1
Inspector/advisor visits	89.1	96.7	69.3	104.1	121.7	0.9
Pupil/teacher ratio	118.5	81.4	68.3	105.5	100.4	0.7

Note: 1= Zone 1 P/Louis & North, 2 = Zone 2 East & B/Bassin, 3= Zone 3 South & Curepipe, 3= Zone 4 West & Vacoas, 5= Zone 5 Rodrigues

Table 6.2. Equity of human resource allocation as assessed by (a) variation among schools within zones, and (b) variation among zones (SACMEQ II)

Human resources	Variation among schools within regions					Variation among zones (rho x 100)
	1	2	3	4	5	
Classroom teacher professional qualification	109.7	96.6	70.5	107.2	98.1	0.0
Classroom teacher experience	96.2	98.7	84.7	91.9	106.4	6.0
School head professional qualification	79.6	95.1	120.9	111.9	101.3	1.3
School head experience	88.6	76.2	166.4	81.3	101.2	10.6
Pupil/teacher ratio	208.0	36.6	33.7	33.1	37.6	0.0

Note: 1= Zone 1 P/Louis & North, 2 = Zone 2 East & B/Bassin, 3= Zone 3 South & Curepipe, 3= Zone 4 West & Vacoas, 5= Zone 5 Rodrigues

Were general school infrastructure, classroom equipment and classroom teaching materials distributed equitably among zones and among schools within zones?

The level of material resource inputs was measured in terms of classroom furniture, toilets per pupil, classroom library, classroom space per pupil and school resources. Data on these indicators is presented in Tables 6.3 and 6.4 for SACMEQ I (1995) and SACMEQ II (2001). The relatively low value of rho for the period 1995 and 2001 is an indication that there was very little variation in material resource allocation that could be attributed to differences among zones. This means that the Ministry has been successful in establishing and maintaining equitable distribution of inputs among zones. However when looking at variation among schools within zones, slight variation could be observed in Zone 1 in the allocation of classroom furniture and in Zone 2 in the classroom space per pupil.

Table 6.3. Equity of material resource distribution to schools as assessed by (a) variation among schools within zones, and (b) variation among zones (SACMEQ I)

Material resources	Variation among schools within regions					Variation among zones (rho x 100)
	1	2	3	4	5	
Classroom furniture index	108.6	89.9	128.3	92.1	99.4	0.2
Toilets per pupil	97.3	75.0	114.0	113.9	109.2	1.7
Classroom library	101.2	97.2	96.2	94.8	94.3	7.1
Classroom space per pupil	138.3	79.9	67.5	91.1	77.5	2.4
School resources index	93.1	89.8	108.1	116.4	97.0	0.2

Note: 1= Zone 1 P/Louis & North, 2 = Zone 2 East & B/Bassin, 3= Zone 3 South & Curepipe, 3= Zone 4 West & Vacoas, 5= Zone 5 Rodrigues

Table 6.4. Equity of material resource allocation as assessed by (a) variation among schools within zones, and (b) variation among zones (SACMEQ II)

Material resources	Variation among schools within regions					Variation among zones (rho x 100)
	1	2	3	4	5	
Classroom furniture index	130.3	79.0	98.4	88.7	104.6	0.0
Toilets per pupil	93.9	105.5	88.2	89.4	104.4	3.8
Classroom library	106.6	96.9	95.1	99.7	104.7	0.0
Classroom space per pupil	99.3	139.2	13.4	107.5	25.6	0.0
School resources index	109.0	92.3	112.3	92.7	104.8	0.0

Note: 1= Zone 1 P/Louis & North, 2 = Zone 2 East & B/Bassin, 3= Zone 3 South & Curepipe, 3= Zone 4 West & Vacoas, 5= Zone 5 Rodrigues

Conclusion

There is very little variation between zones in the allocation of both human and material resources. There is slightly higher variation among schools within a zone in the allocation of classroom furniture, availability of classroom space per pupil and class teacher professional qualifications. Significant variations were observed among schools within a zone for school head experience and pupil-teacher ratio. But, in general, the Ministry has done a very good job for the allocation of resources.

Chapter 7

Achievement Levels of Standard 6 Pupils in Reading and Mathematics

Introduction

In any system of education, probably the most important aspect is “whether or not the pupils are learning” or, stated in a slightly more nuanced way, “to what extent have the pupils learned what they were meant to learn”. In earlier chapters this report examined the home backgrounds of pupils, the classrooms in which they learned, the teachers they had, and finally the conditions of the schools they attended. But, in the end, the important question is “how well did the pupils learn?” In this chapter, a proxy measure for learning has been examined - the pupils’ achievement measured towards the end of their time in Standard 6. It is, in a way, the culmination of learning that has taken place up to the end of Standard 6 and is an indication of the state of learning at the end of primary education in Mauritius. This chapter is structured around the following major questions: What did the tests measure and how is this reported?

1. What percentages of pupils reached the different levels of skills in reading and mathematics and what were the differences between subgroups by gender, socio-economic levels and school location?
2. What percentages of pupils reached the benchmark levels in reading and mathematics and what were the differences between subgroups by gender, socio-economic levels and school location?
3. What were the test scores in reading and mathematics and what were the differences in test scores in both reading and mathematics between subgroups by gender, socio-economic level and school location?

What did the tests measure and how is this reported?

Details of how the tests were constructed were presented in Chapter 2. It is sufficient to repeat here that the tests were developed by teams of specialists from the SACMEQ ministries of education following the curriculum specifications in each country. They ensured that the test items measured both the existing curricula as well as any changes foreseen for the immediate future. Where appropriate, test passages and items were used from SACMEQ I so that the two test measures (from 1995 and 2001) would have items in common and hence the pupils from

both testing periods could be compared on the same scale. The items were subjected to several reviews by panels in each of the countries. They were tested out on sample groups of pupils and the psychometric properties of each item were calculated using Rasch procedures.

The tests were shown to have high reliability and validity.

Three uses were made of the test items: the specification of hierarchical skill levels, the creation of competence benchmarks and the creation of scaled scores.

(i) Skill levels

The skill levels were described in detail in Chapter 2. There were eight skill levels for each subject area, arranged hierarchically. They can be used to identify the skills that the pupils have and have not acquired.

(ii) Benchmarks

Using the benchmarks developed in SACMEQ I for minimum and desirable levels of achievement, it was possible to calculate the percentages of pupils in each country meeting these benchmarks. The SACMEQ benchmarks used in this study were the average of the SACMEQ I countries' different benchmarks. Two benchmark levels¹ were also established. They were based on the pupil's ability to cope with reading and mathematics tasks encountered in everyday life. A second benchmark was based on an estimation of a pupil's ability to cope with the reading and mathematics tasks in the next grade of education, Grade 7. The two benchmarks helped to identify three groups of pupils; namely, pre- functional, functional and independent.

A group of pupils were described as pre-functional because they had not yet reached a benchmark demonstrating reading or mathematics required for everyday activities in Mauritian society. The label used in the tables is 'Pre-functional'; it does not mean that a pupil is illiterate or non-numerate. There are basic skills that these pupils can demonstrate, but

¹ The experts in SACMEQ I had made two ratings for each item in the tests. The first was the probability that a pupil would need to be able to master this item if he or she was to be able to cope with life in society. The second was the probability that a pupil who had adequate skills to cope with Grade 7 learning, could obtain the correct answer to each item. Thus the two cut-off points resulted in three groups of pupils: those who did not reach the minimum level, those reaching the minimum but not the desirable level, and those reaching the desirable level.

the skill level is not yet deemed by experts to be at a sufficient level to enable the person to be an effective member of Mauritian society.

A second group of pupils was identified as those who could demonstrate the kinds of skills needed to cope with life in Mauritius. They were found to be above this lower benchmark but had not yet reached the second benchmark. These pupils were designated as “*functional*” in terms of their capacity to participate in Mauritian society. However it was felt that this group would need some remedial assistance to be able to cope with the reading and mathematics required at Standard 6 level.

This third group of pupils, whose performances above the second benchmark, were described as demonstrating the kinds of skills that were desirable in order to learn independently at the next level of schooling, without needing remedial assistance. The label used in the tables was '*independent*'.

It must be remembered that these benchmarks for SACMEQ II were decided by SACMEQ I panels. They were applied to the Mauritius data.

(iii) Scaled scores (the 500 scores)

A scaled score was used to analyse and interpret differences in performances between groups. Each country's achievement data were scaled to a mean of 500 and a standard deviation of 100. Further to this the countries' means were also placed on a scale where using data from all countries. Each country's data set was given a weight of 1.0, thus ensuring that countries were not weighted according to the number of pupils tested in the country. The mean of all countries was fixed at 500 and the standard deviation at 100.

a) Pupils' scores on each test and sub domain were converted to a new, neutral common scale allowing estimates of relative educational importance of differences between groups. Thus there was a scale with a mean of 500 and a standard deviation of 100. This is a frequently used conversion of scores. The scaled score is used to examine differences between sub groups in the sample. In education, differences of 0.2 standard deviations are often considered to be large and educationally important. With very large samples such as in this study, very small differences can be statistically significant and this is often mistaken for educational

importance. Using the scale with a mean of 500 and a standard deviation of 100 provides a simple way of interpreting differences. Scores below 500 are below the national average and scores over 500 are above the national average. Differences between groups of more than 20 points deserve to be examined in detail for possible explanation as they may be of some educational importance

What percentages of pupil reached the different levels of skills in reading and mathematics and what were the differences between subgroups by gender, socio-economic levels and school location?

The skill levels have been examined at a) the national level, b) the zonal level and c) by subgroups

a) At the national level

The percentage distributions of pupils attaining each of the eight skill levels in reading are shown in Table 7.1. It is worth mentioning here that pupils at a particular level not only demonstrate the knowledge and skills associated with that level but also possess the proficiencies required at lower levels. For example all pupils attaining level 3 also demonstrate the skills required at levels 1 and 2. Combining levels 1 and 2 in Table 7.1, it can be observed that, at the national level, 18.7 percent of standard 6 pupils had acquired pre reading or emergent reading skills as their highest level of attainment. This implies that 18.7 percent of standard 6 pupils had not acquired skills that would enable them to undertake basic reading. While this does not mean that these pupils are illiterate, such pupils would experience difficulty in demonstrating the basic skills that would enable them to be effective members of Mauritian Society.

This result compares unfavourably with data from SACMEQ I study, where this percentage was at 7.2 percent only.

At the other end of the skills hierarchy, 26.3 percent of pupils were capable of complex reading tasks such as analytical and critical reading, corresponding to levels 7 and 8. An almost equal percentage of pupils had reached this level in 1995.

In 2001, the national examinations at the end of Grade 6 showed a pass rate of about 65 percent. Translated along the skill levels rating, this would be equivalent to interpreting level 4 as the minimum level that a pupil should reach to be able to cope with Grade 7 learning.

Comparison with data from SACMEQ I indicates that in the period 1995 -2001 there was a rise in the percentage of standard 6 pupils at the lower end of the skills levels.

Table 7.1. Percentages of pupils reaching the different skill levels in reading.

Reading skill levels	SACMEQ I		SACMEQ II	
	Percent	SE	Percent	SE
Level 1 Pre reading: Matches words and pictures involving concrete concepts and everyday objects, and follows short simple written instructions.	1.5	0.26	6.6	0.62
Level 2 Emergent reading: Matches words and pictures involving prepositions and abstract concepts; uses cuing systems (by sounding out, using simple sentence structure, and familiar words) to interpret phrases by reading on.	5.7	0.51	12.1	0.91
Level 3 Basic reading: Interprets meaning (by matching words and phrases, completing a sentence, or matching adjacent words) in a short and simple text by reading on or reading back	15.6	0.92	13.7	0.84
Level 4 Reading for meaning. Reads on or reads back in order to link and interpret information located in various parts of the text.	20.3	0.97	14.5	0.81
Level 5 Interpretive reading: Reads on and reads back in order to combine and interpret information from various parts of the text in association with external information (based on recalled factual knowledge) that "completes" and contextualizes meaning.	17.1	0.87	14.7	0.84
Level 6 Inferential reading: Reads on and reads back through longer (narrative, document or expository) in order to combine information from various parts of the text so as to infer the writer's purpose.	12.5	0.68	12.1	0.80
Level 7 Analytical reading: Locates information in longer (narrative, document or expository) texts by reading on and reading back in order to combine information from various parts of the text so as to infer the writer's personal beliefs (value systems, prejudices, and/or biases).	15.9	0.98	16.0	1.03
Level 8 Critical reading: Locates information in a longer (narrative, document or expository) texts by reading on and reading back in order to combine information from various parts of the text so as to infer and evaluate what the writer has assumed about both the topic and the characteristics of the reader - such as age, knowledge, and personal beliefs (value systems, prejudices, and/or biases).	11.4	1.28	10.3	1.10

The test results are reported in developmental or criterion referenced terms. This is because criterion-referenced interpretations of performances have meaning for the kind of assistance

needed by pupils, teachers and curriculum developers as the new curriculum is ushered into the system and the schools. This developmental assessment strategy illustrated in this chapter provides powerful diagnostic and substantive information about pupil performance and related curriculum.

In 1995, Standard 6 pupils were not tested in mathematics. In Table 7.2 the percentages of pupils demonstrating the different skill levels in mathematics in year 2001 is presented.

The highest percentage of pupils (21.8 percent) had reached level 3 i.e. they could demonstrate basic numeracy skills such as translating verbal information (presented in a sentence, simple graph or table) using one arithmetic operation in several repeated steps, translating graphical information into fractions etc. Since the levels are hierarchical these pupils had also acquired skills described in levels 1 and 2. Overall 42 percent of Standard 6 pupils clustered at levels 1, 2 and 3. It is to be noted that 2.4 percent of Standard 6 pupils had reached only level 1 and 18.2 percent of Standard 6 pupils had reached only level 2. Taken cumulatively there were 20.6 percent of Standard 6 pupils who were innumerate.

Towards the top end of the hierarchy of levels there were 17.4 percent who were mathematically skilled or had demonstrated problem solving skills (levels 7 and 8).

Table 7.2. Percentages of pupils reaching the different skill levels in mathematics.

Mathematics skill levels SACMEQ II only	Percent	SE
Level 1 Pre numeracy: Applies single step addition or subtraction operations. Recognizes simple shapes. Matches numbers and pictures. Counts in whole numbers.	2.4	0.32
Level 2 Emergent numeracy. Applies a two-step addition or subtraction operation involving carrying, checking (through very basic estimation), or conversion of pictures to numbers. Estimates the length of familiar objects. Recognizes common two-dimensional.	18.2	1.11
Level 3 Basic numeracy. Translates verbal information (presented in a sentence, simple graph or table using one arithmetic operation in several repeated steps. Translates graphical information into fractions. Interprets place value of whole numbers up to thousands. Interprets simple common everyday units of measurement.	21.8	1.03
Level 4 Beginning numeracy. Translates verbal or graphic information into simple arithmetic problems. Uses multiple different arithmetic operations (in the correct order) on whole numbers, fractions, and/or decimals.	16.7	0.83
Level 5 Competent numeracy. Translates verbal, graphic, or tabular information into an arithmetic form in order to solve a given problem. Solves multiple-operation problems (using the correct order of arithmetic operations) involving everyday units of measurement and/or whole and mixed numbers. Converts basic measurement units from one level of measurement to another (for example metres to centimetres).	12.2	0.82
Level 6 Mathematically skilled. Solves multiple-operation problems (using the correct order of arithmetic operations) involving fractions, ratios, and decimals. Translates verbal and graphic representation information into symbolic, algebraic, and equation form in order to solve a given mathematical problem. Checks and estimates answers using external knowledge (not provided within the problem).	11.2	0.72
Level 7 Problem solving. Extracts and converts (for example, with respect to measurement units) information from tables, charts, visual and symbolic presentations in order to identify, and then solves multi-step problems.	10.4	0.81
Level 8 Abstract problem solving. Identifies the nature of an unstated mathematical problem embedded within verbal or graphic information, and then translates this into symbolic, algebraic, or equation form in order to solve the problem.	7.0	0.93

Policy suggestion 7.1: The Ministry might wish to consider the introduction of curriculum and assessment frameworks and benchmarks written in a criterion referenced (profile) format. This could be done as the new curriculum is being introduced. Such a framework would encourage a competency-based developmental interpretation of pupil performances.

Policy suggestion 7.2: The Ministry might wish to use developmental assessment procedures to plan intervention programs for specific groups of pupils and teachers.

b) At the zonal level

It is useful to examine to what extent the competence levels reached by standard 6 pupils varied across the different zones. The percentages of standard 6 pupils having reached the defined eight reading competence levels in different zones are presented in Tables 7.3 (SAQMEQ I) and 7.4 (SAQMEQ II).

The percentages of standard 6 pupils having demonstrated the lowest competence level i.e. pre reading varied from 5.1 in Zone 2 East & Beau Bassin to 8.6 percent in Zone 1 Port Louis & North while overall for Mauritius the percentage was 6.6 percent. This compares unfavourably with the figures for year 1995 (SACMEQ I) from Table 7.3 where values ranged between 0.9 and 2.6 for Zone 1 Port Louis and North and Zone 5 (Rodrigues) respectively.

When levels 1 and 2 were combined, Zone 1 Port Louis & North had a higher percentage of pupils (23.0 percent) at this level compared with the other zones. The highest percentage of pupils performing at levels 7 and 8 was in Zone 4 West & Vacoas.

It is interesting to note that whereas in 1995, no standard 6 pupil in Zone 5 Rodrigues demonstrated the competence level of critical reading (level 8), in the year 2001 the percentage recorded was 7.0 percent.

Table 7.3. Percentages and sampling errors for literacy levels of pupils (SACMEQ I)

Zone	Percentage of pupils reaching the reading competence level															
	1		2		3		4		5		6		7		8	
	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE
Zone 1 P/Louis & North	2.0	0.64	6.0	0.98	16.2	1.98	21.2	1.81	17.5	1.60	10.7	1.15	14.7	1.59	11.7	2.63
Zone 2 East & B/Bassin	0.9	0.34	4.6	0.87	14.6	1.95	19.9	2.02	17.1	1.62	13.3	1.24	18.8	2.31	10.9	1.77
Zone 3 South & Curepipe	1.6	0.46	6.6	1.27	16.7	1.84	20.0	1.91	17.4	1.86	15.8	1.75	12.9	1.74	9.0	1.90
Zone 4 West & Vacoas	1.2	0.47	4.5	1.08	13.2	1.35	17.8	2.19	14.4	2.37	11.6	1.32	19.7	2.61	17.5	4.26
Zone 5 Rodrigues	2.6	1.50	10.2	2.75	21.4	2.20	27.2	3.50	23.2	3.20	9.1	2.64	6.3	2.14	0.0	0.00
Mauritius	1.5	0.26	5.7	0.51	15.6	0.92	20.3	0.97	17.1	0.87	12.5	0.68	15.9	0.98	11.4	1.28

Table 7.4. Percentages and sampling errors for literacy levels of pupils (SACMEQ II)

Zone	Percentage of pupils reaching the reading competence level															
	1		2		3		4		5		6		7		8	
	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE
Zone 1 P/Louis & North	8.6	1.41	14.4	1.74	15.9	1.15	14.2	1.32	13.4	1.39	10.7	1.40	15.1	1.87	7.6	1.52
Zone 2 East & B/Bassin	5.1	1.17	9.9	1.58	13.1	1.89	14.6	2.01	15.5	1.86	14.7	1.83	17.6	2.49	9.5	2.36
Zone 3 South & Curepipe	6.3	1.19	13.2	1.94	12.6	1.97	14.9	1.97	15.5	1.67	11.0	1.85	16.2	2.05	10.1	2.15
Zone 4 West & Vacoas	5.6	0.94	9.6	2.07	10.8	2.22	13.2	1.54	14.3	2.28	12.9	1.60	16.9	2.24	16.7	3.22
Zone 5 Rodrigues	5.2	1.89	11.1	3.18	18.5	2.82	19.8	2.76	17.2	3.12	11.6	2.59	9.6	2.25	7.0	4.63
Mauritius	6.6	0.62	12.1	0.91	13.7	0.84	14.5	0.81	14.7	0.84	12.1	0.80	16.0	1.03	10.3	1.10

The figures for mathematics are given in Table 7.5. There was no significant variation across the zones for the percentages of pupils who had attained only the pre-numeracy level, i.e. level 1. The modal competence level attained by standard 6 pupils in Mauritius was level 3, i.e. basic numeracy, and the percentage varied from 19.3 percent in Zone 4 West & Vacoas to 30.4 percent in Zone 5 Rodrigues. At the other end of the scale the highest percentage of pupils performing at levels 7 and 8 was found to be in Zone 4 West & Vacoas.

In the SACMEQ I study pupils were not tested in mathematics and hence no comparison could be made.

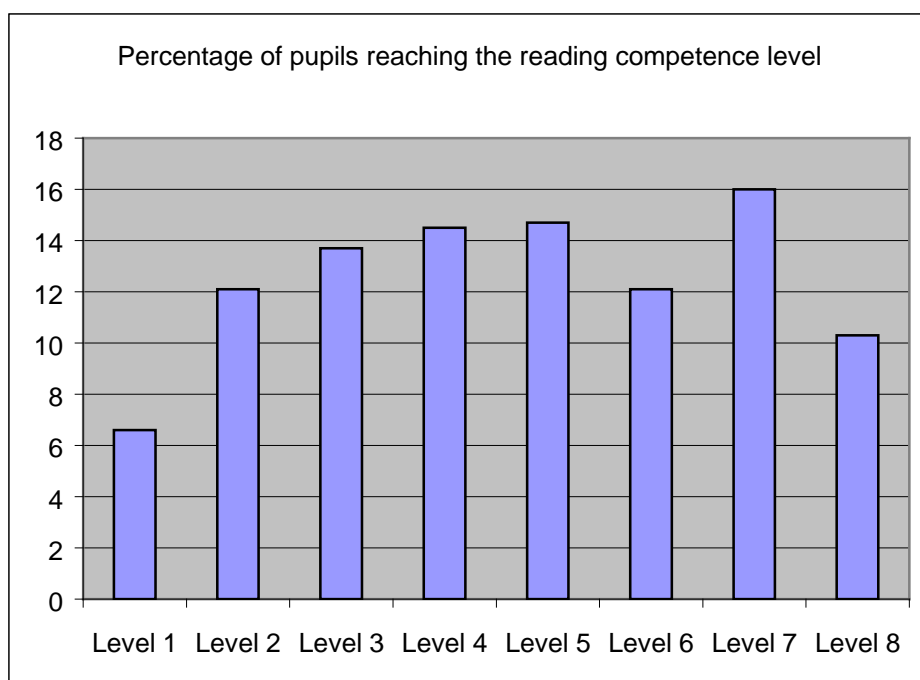


Figure 7.1: Percentage of pupils reaching the reading competence level

Table 7.5 Percentages and sampling errors for numeracy levels of pupils (SACMEQ II)

Zone	Percentage of pupils reaching the mathematics competence level															
	1		2		3		4		5		6		7		8	
	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE
Zone 1 P/Louis & North	2.7	0.60	22.2	2.42	20.6	1.75	16.5	1.57	11.4	1.65	11.5	1.36	9.7	1.54	5.4	1.30
Zone 2 East & B/Bassin	2.7	0.91	13.5	1.68	24.0	2.37	19.2	1.67	14.0	1.74	9.5	1.39	10.2	1.60	6.9	1.89
Zone 3 South & Curepipe	2.2	0.48	18.7	2.33	22.1	1.85	16.2	1.45	12.3	1.68	11.4	1.67	11.3	1.74	5.8	1.65
Zone 4 West & Vacoas	1.6	0.52	14.6	2.16	19.3	2.60	14.7	2.18	11.8	1.61	13.2	1.54	12.4	1.85	12.4	3.02
Zone 5 Rodrigues	2.9	1.12	23.8	2.56	30.4	5.01	17.2	2.23	10.9	2.29	8.5	2.02	4.4	2.08	2.0	1.97
Mauritius	2.4	0.32	18.2	1.11	21.8	1.03	16.7	0.83	12.2	0.82	11.2	0.72	10.4	0.81	7.0	0.93

(c) By sub-groups

Three sub-groups of pupils were identified as being of interest in terms of possible differences in achievement. The first was gender (boys and girls), the second was the socio-economic levels of the pupils and finally the school location (rural and urban groups of pupils). The results have been presented in Table 7.6 (SACMEQ I, 1995) and Table 7.7 (SACMEQ II, 2001).

In 2001, 22.7 percent of boys were at levels 1 and 2 only in reading as compared with 14.5 percent for girls. Almost equal percentages of boys and girls were found to be at level 8. Overall, more girls tended to achieve higher levels of reading competence than boys (58.4 percent of girls reached levels 5 to 8 as compared to 48.1 per cent of boys).

In 1995 there was no difference between the number of boys and girls performing at the lowest levels. The same observation could be made for performance at the highest level.

When examined by socio-economic index more pupils coming from a high socio-economic status (SES) home background attained higher levels of reading competence than those coming from a low SES home background. It was noted that 45.8 percent of pupils coming from a high SES home background were at levels 6,7 and 8 combined as compared with only 27.4 percent of those coming from a low SES home background. The percentage of standard 6 pupils coming from a high SES home background demonstrating only levels 1 and 2 reading competence was 16.1 percent as compared to 22.8 percent for those coming from a low SES background. A similar trend was observed in 1995.

In Chapter 3 it was shown that nearly half of the Standard 6 pupils were in urban schools.

Overall, the percentages of pupils reaching the different levels of reading competence indicate that there was no significant difference between pupils coming from schools from the three different school locations i.e. isolated/rural areas, small towns and large cities. This could be expected because of the small size of Mauritius and the homogeneous nature of rural areas, small towns and large cities.

Table 7.6 Percentages and sampling errors for literacy levels of pupils by sub-groups (SACMEQ I)

Sub-groups	Percentage of pupils reaching the reading competence level															
	1		2		3		4		5		6		7		8	
	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE
Gender																
Boys	1.5	0.32	5.7	0.66	18.0	1.25	21.8	1.26	16.6	1.38	11.1	0.92	13.9	1.22	11.5	1.47
Girls	1.6	0.35	5.8	0.71	13.1	1.11	18.7	1.35	17.6	1.03	14.0	1.06	17.9	1.35	11.4	1.51
Socio-economic level																
Low SES	2.2	0.43	7.2	0.76	19.4	1.27	23.6	1.36	18.8	1.24	10.5	1.04	12.7	1.28	5.6	0.79
High SES	1.0	0.32	4.6	0.69	12.8	1.16	17.9	1.25	15.8	1.17	13.9	1.02	18.2	1.28	15.7	1.90
School location																
Isolated/Rural	2.0	0.37	7.3	0.78	17.6	1.07	21.2	1.11	20.0	1.12	11.3	0.83	13.4	1.10	7.2	0.92
Small town	0.3	0.35	6.0	1.64	13.9	3.06	20.2	3.99	14.2	2.98	10.8	1.87	23.8	4.33	10.7	4.10
Large city	1.2	0.47	3.6	0.72	13.5	1.76	19.1	1.79	14.0	1.50	14.5	1.28	17.0	1.71	17.1	2.81
Mauritius	1.5	0.26	5.7	0.51	15.6	0.92	20.3	0.97	17.1	0.87	12.5	0.68	15.9	0.98	11.4	1.28

Table 7.7. Percentages and sampling errors for literacy levels of pupils by sub-groups (SACMEQ II)

Sub-groups	Percentage of pupils reaching the reading competence level															
	1		2		3		4		5		6		7		8	
	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE
Gender																
Boys	7.7	0.86	15.0	1.20	16.5	1.11	12.7	0.95	13.3	1.12	11.1	0.93	14.0	1.06	9.7	1.21
Girls	5.5	0.72	9.0	1.01	10.7	1.04	16.4	1.10	16.1	1.18	13.2	1.08	18.2	1.36	10.9	1.23
Socio-economic level																
Low SES	8.1	0.93	14.7	1.21	16.6	1.19	15.8	1.16	17.4	1.23	9.9	1.08	11.7	1.30	5.8	0.88
High SES	5.7	0.69	10.4	1.07	11.8	0.98	13.6	1.03	12.8	0.94	13.6	0.98	18.9	1.28	13.3	1.46
School location																
Isolated/Rural	6.4	0.80	11.8	1.04	13.8	1.07	16.1	1.24	15.2	1.15	13.0	1.26	15.3	1.43	8.3	1.30
Small town	7.3	1.85	12.9	3.53	14.1	3.21	16.7	2.21	15.0	2.27	9.4	1.58	15.4	2.91	9.1	3.05
Large city	6.7	1.12	12.3	1.62	13.5	1.41	11.9	1.20	13.8	1.43	11.8	1.23	17.0	1.75	13.0	2.08
Mauritius	6.6	0.62	12.1	0.91	13.7	0.84	14.5	0.81	14.7	0.84	12.1	0.80	16.0	1.03	10.3	1.10

Table 7.8. Percentages and sampling errors for numeracy levels of pupils by sub-groups (SACMEQ II)

Sub-groups	Percentage of pupils reaching the mathematics competence level															
	1		2		3		4		5		6		7		8	
	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE
<i>Gender</i>																
Boys	2.7	0.49	20.3	1.30	22.2	1.26	16.4	1.04	10.2	0.98	10.9	0.99	9.9	1.03	7.3	1.08
Girls	2.1	0.44	15.9	1.36	21.4	1.28	17.0	1.07	14.4	1.17	11.6	0.96	11.0	1.02	6.7	1.03
<i>Socio-economic level</i>																
Low SES	3.5	0.58	22.5	1.41	25.0	1.49	18.4	1.19	12.2	1.22	7.7	0.85	7.1	0.89	3.6	0.66
High SES	1.7	0.38	15.3	1.37	19.7	1.25	15.5	0.96	12.2	0.93	13.6	0.95	12.6	1.10	9.4	1.30
<i>School location</i>																
Isolated/rural	2.3	0.37	16.8	1.33	24.1	1.45	18.2	1.23	13.0	1.18	10.8	1.02	9.7	1.16	5.0	0.98
Small town	3.1	0.69	19.4	3.30	22.5	3.22	14.4	1.97	12.4	1.71	10.0	2.20	10.0	2.11	8.3	2.65
Large city	2.4	0.65	19.5	2.14	18.8	1.66	15.5	1.34	11.2	1.42	12.1	1.15	11.5	1.37	9.1	1.89
Mauritius	2.4	0.32	18.2	1.11	21.8	1.03	16.7	0.83	12.2	0.82	11.2	0.72	10.4	0.81	7.0	0.93

The percentages of Standard 6 pupils in Mauritius at the different competence levels in mathematics by sub-groups are presented in Table 7.8.

The modal competence level demonstrated by both boys and girls was level 3 with 22.2 per cent of boys against 21.4 percent of girls. For levels 1 and 2 combined, it can be seen that 23 percent of boys as against 18 percent of girls were still at the level of emergent numeracy. Beyond this level there was no big difference in terms of gender.

Again, as for reading, Standard 6 pupils coming from a high SES home backgrounds demonstrated higher competence in mathematics than those from lower socio-economic levels. The percentage of pupils from high SES home background showing competence at levels 7 and 8 combined was 22 per cent compared to 10.7 percent for those coming from a low SES home background. More pupils from low SES home background were at the lowest levels as compared to their counterparts from high SES home background, with 17 percent achieving levels 1 and 2 combined as against 26 percent of Standard 6 pupils coming from a low SES home background.

There was no significant difference between the percentages of pupils coming from different school locations and reaching the eight different skill levels in mathematics

What percentages of pupil reached the benchmarks levels in reading and mathematics and what were the differences between sub-groups by gender, socio-economic levels and school location?

In addition to the distribution of skills within school location and zone, it is instructive to examine how well pupils are prepared at the end of Standard 6 to enter the community as independent citizens or to begin the next grade of school. It is also important to see how this achievement compares in different zones in Mauritius.

In order to do this, the benchmarks were examined at a) the national level, b) the zonal level and c) between sub-groups. As a brief overview, the findings showed that in 2001, 28.8 percent of Standard 6 pupils reached the desirable level in reading described as '*independent*', 26.8 per cent of Standard 6 pupils reached a level in reading that would enable functional participation in Mauritian Society, whereas 44.4 percent were at the pre-functional level, which was considered to be below what was deemed sufficient to enable them to become effective members of Mauritian society.

a) At the national level

From Table 7.9, it can be seen that in the period 1995 to 2001 :

- (a) The percentage of those standard 6 pupils that were described as pre-functional had increased from 40.1 per cent to 44.4 percent;
- (b) The percentage of pupils who needed some remedial assistance to be able to cope with the reading tasks in the next grade of education had dropped from 30.5 percent to 26.8 percent; and
- (c) The percentage of pupils who had reached a level in reading that would enable them to cope successfully with the reading in the next grade had slightly decreased from 29.4 percent to 28.8 percent.

b) At the zonal level

The differences between zones in terms of pupil benchmark levels in reading are presented in Table 7.10. It can be seen that for Mauritius overall the percentage of Standard 6 pupils having attained the *minimum* reading level of mastery in 2001 was 55.6 percent and the percentage of those having attained the *desired* reading level of mastery was 28.8 percent. In

1995 (SACMEQ I), 59.7 percent achieved the minimum level of mastery and 29.4 percent the desired levels, There was a slight deterioration in the percentages of pupils reaching the minimum and desired levels from 1995 to 2001.

This decline in the percentages of pupils reaching minimum and desirable levels of mastery in reading occurred across all the zones with the exception of Zone 5 (Rodrigues). In the period 1995-2001 the percentage of Standard 6 pupils in Zone 5 who reached the minimum reading level of mastery increased from 39.8 per cent to 49.5 percent, and the percentage of pupils who reached the desirable reading level of mastery also increased from 7.6 to 18.6 percent.

Table 7.9. Percentages and sampling errors of pupils reaching minimum and desirable reading levels of mastery (SACMEQ I and SACMEQ II)

Zone	SACMEQ I				SACMEQ II			
	Pupils reaching minimum level of mastery		Pupils reaching desirable level of mastery		Pupils reaching minimum level of mastery		Pupils reaching desirable level of mastery	
	%	SE	%	SE	%	SE	%	SE
Zone 1 P/Louis & North	57.6	3.90	28.4	3.60	49.2	3.53	24.6	3.07
Zone 2 East & B/Bassin	63.0	3.74	32.7	3.73	59.4	3.92	30.4	3.83
Zone 3 South & Curepipe	58.6	3.06	23.7	3.19	56.1	4.08	29.5	3.68
Zone 4 West & Vacoas	66.3	2.77	39.1	4.31	62.9	4.30	35.7	4.73
Zone 5 Rodrigues	39.8	3.38	7.6	2.43	49.5	6.98	18.6	5.72
Mauritius	59.9	1.76	29.4	1.83	55.6	1.93	28.8	1.82

c) By sub-groups

The percentages of pupils reaching minimum and desirable reading levels of mastery by sub-groups -- namely, gender, socio-economic level and school location, are given in Table 7.10. It can be seen that in year 2001, 49.9 percent of boys as compared with 61.6 percent of girls demonstrated the minimum level of mastery in reading, and 25.6 percent of boys and 32.3 percent of girls reached the desired level of mastery in reading. In the period 1995 to 2001, a general decrease in both percentages was noted and the trend of girls performing better than boys persisted.

There was a significant difference in the performance of pupils coming from a high SES (socio-economic status) background as compared with those coming from a low SES

background measured in terms of percentages achieving both the minimum and the desirable levels of mastery in reading.

Table 7.10. Percentages and sampling errors of pupils reaching minimum and desirable reading levels of mastery by sub-groups (SACMEQ I and SACMEQ II)

Sub-groups	SACMEQ I				SACMEQ II			
	Pupils reaching minimum level of mastery		Pupils reaching desirable level of mastery		Pupils reaching minimum level of mastery		Pupils reaching desirable level of mastery	
	%	SE	%	SE	%	SE	%	SE
<i>Gender</i>								
Boys	56.2	2.24	26.8	2.12	49.9	2.19	25.6	1.91
Girls	63.8	1.86	32.1	2.14	61.6	2.08	32.3	2.04
<i>Socio-economic level</i>								
Low SES	50.8	1.87	19.9	1.57	47.7	2.14	19.0	1.60
High SES	66.5	2.19	36.4	2.51	60.8	2.27	35.4	2.24
<i>School location</i>								
Isolated/Rural	54.4	1.87	22.6	1.70	54.5	2.54	26.6	2.20
Small town	61.9	7.34	36.1	6.33	52.5	5.84	26.6	5.51
Large city	66.5	3.35	36.6	3.76	57.7	3.41	32.2	3.35
Mauritius	59.9	1.76	29.4	1.83	55.6	1.93	28.8	1.82

What were the test scores in reading and mathematics and what were the differences in test scores between boys and girls and between pupils in rural and urban areas?

This third measure (the 500 measure) was developed in order to enable exploration and explanation of differences between and within the groups of pupils. It cannot be interpreted directly in terms of the skills or the preparation to enter independently the community or secondary education. It does, however, enable many new analyses to be carried out in order to identify where important differences exist and to use other variables to explain those differences. The test scores were converted to a scale with a mean of 500 and a standard deviation of 100. These 500 scores were examined at a) the zonal level, and b) by gender, and c) by rural/urban location.

a) At the zonal level

Table 7.11. Means and sampling errors for the reading and mathematics test scores of pupils with all items (SACMEQ I and SACMEQ II)

Zone	Pupil performance on all items					
	SACMEQ I			SACMEQ II		
	Reading		Mean	SE	Mathematics	
	Mean	SE			Mean	SE
Zone 1 P/Louis & North	546.3	11.36	519.7	9.65	571.1	10.90
Zone 2 East & B/Bassin	557.3	9.79	543.6	10.93	586.4	12.03
Zone 3 South & Curepipe	540.5	9.48	535.0	10.98	581.8	11.50
Zone 4 West & Vacoas	574.6	11.92	562.3	13.65	618.4	17.56
Zone 5 Rodrigues	489.1	6.79	519.2	19.24	538.2	17.16
Mauritius	550.2	5.26	536.4	5.49	584.5	6.31

Note: The pooled SACMEQ II reading and mathematics test scores were transformed to a mean of 500 and a standard deviation of 100.

Because the sample is very large, if statistically significant differences were to be used in the comparison of means, then many of the differences would be significant. It was felt that when mean scores were being compared it would be advisable to ensure that the difference of the means would constitute an educationally significant difference. This was estimated to be the equivalent of 0.20 of a standard deviation or 20 points in the 500 score scale. Thus differences have been reported in terms of 0.20 of a standard deviation. The first comparisons have been presented in Figure 7.2.

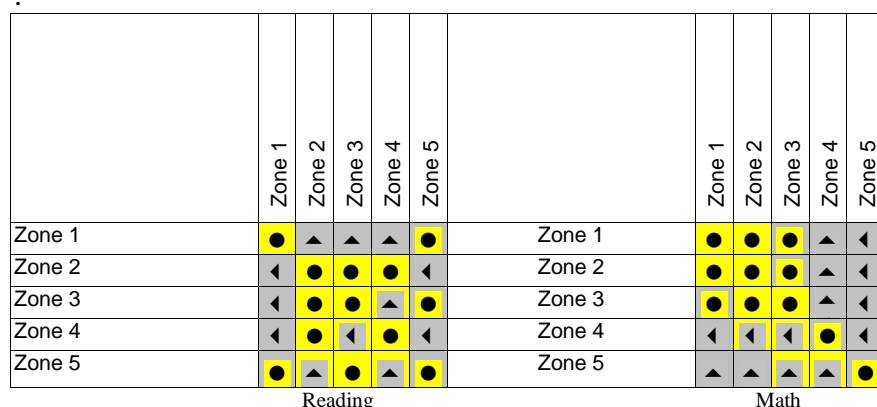


Figure 7.2: Total scores in reading and mathematics by zone

Reading down a column and across a row enables a comparison of every zone with every other zone in a series of paired comparisons. The symbol '●' indicates that there is no educationally important difference between the zonal means in that column and row. The arrow head symbol '◄' points to the zones with the higher score and hence the table shows that for performance in mathematics, Zone 4 had a higher average than all the other zones. The symbol '▲' also points to the zones with the higher average. For example, the mean mathematics performance of pupils in Zone 5 was lower than for every other zone.

(b) By sub-groups

Table 7.12. Means and sampling errors for the reading and mathematics test scores of pupils by sub-groups (SACMEQ I and SACMEQ II)

Sub-groups	Pupil performance on all items					
	SACMEQ I			SACMEQ II		
	Reading		Reading		Mathematics	
	Mean	SE	Mean	SE	Mean	SE
<i>Gender</i>						
Boys	544.3	6.43	523.1	6.06	579.2	6.82
Girls	556.3	5.75	550.7	5.67	590.1	6.80
<i>Socio-economic level</i>						
Low SES	521.4	4.10	508.4	5.02	550.0	5.65
High SES	571.2	7.15	555.0	6.67	607.6	7.82
<i>School location</i>						
Isolated/Rural	530.4	4.62	531.3	6.47	577.5	6.82
Small town	557.9	17.82	530.4	17.20	584.1	20.79
Large city	573.9	11.04	544.3	10.29	593.3	12.38
Mauritius	550.2	5.26	536.4	5.49	584.5	6.31

After taking into account the 20 points on the 500 scale, it can be seen that girls are performing slightly better than boys in reading. No statistical difference was observed between the performance of boys and girls in mathematics.

While there were significant differences in performance in both reading and mathematics in favour of pupils coming from home background of high SES, performance did not vary significantly across the different school locations.

Conclusion

This chapter was designed to provide information on the achievement of Standard 6 pupils on the basis of tests administered to them in reading and mathematics. Several approaches were used to interpret the level of achievement reached. A framework was developed to assess the reading and numeracy levels achieved by pupils at the end of the six-year primary cycle. The definition of eight hierarchical levels of skills for each of the two subject areas of reading and mathematics provided a framework for the interpretation of pupils' performance in terms of skill competencies acquired. The implications for curriculum development and teaching strategies are obvious. The first policy suggestion referred to the introduction of curriculum and assessment frameworks and benchmarks with a view to encouraging a competency-based interpretation of pupil performance. The second policy suggestion referred to the need to use developmental assessment procedures to plan intervention programmes.

The pass rate at the Certificate of Primary Education (CPE), which is the examination at the end of the primary cycle, was about 65 percent in 2001. It could be assumed that the 35 percent of failures were pupils who had not acquired basic numeracy skills (level 3) in mathematics and also had not reached the level of basic reading where they showed understanding of texts. (level 4).

About 20 percent of the Standard 6 pupils were at levels 1 and 2 only. This is a matter of concern to policy-makers. Comparison with data from SACMEQ I indicates that in the period 1995 -2001 there had been a rise in the percentage of Standard 6 pupils at the lower end of the skills levels. In other words, achievement levels were decreasing.

More girls tended to achieve higher levels of reading competence than boys. Pupils from low SES home background tended to have lower performance than those coming from high SES home background. School location did not seem to be a predictor of performance.

Chapter 8

Analysis of Effective Schools

Introduction

An effective school is one that achieves better-than-expected results given its intake of pupils. That is to say, on average the pupils achieve better than could be expected given the relationship between achievement and home background for all Standard 6 pupils in the country. By definition, an ineffective school is therefore one that achieves less well than expected given its intake of pupils. What is meant by 'given its intake of pupils'? In general, pupils from better homes have higher achievement scores than pupils from poorer homes. What is meant by a 'good or poor home'? Good homes are those where the parents have a high level of education, where there are many possessions in the home because the parents have sufficient money to buy the possessions. A good home is in better physical condition in terms of its roof, floor, and walls, and therefore children can have a more stable life.

In the preceding chapters, the differences between good schools and poor schools in terms of achievement have been presented. But, at the same time, it is important to examine the differences between the more and less effective schools. Those schools with a poor intake of pupils in socio-economic terms and yet performing well can point to what policies may be followed by the authorities to improve the effectiveness of all schools.

There were 159 schools in the sample. In the analysis, the 15 most effective schools and the 15 least effective schools were identified and the differences between these two extreme groups for many of the variables measured were calculated.

Method of analysis

A home background factor (a principal component) was formed of the following variables with the following loadings:

Variable	Loading
Parental education	.563
Total possessions at home	.654
Floor material	.538
Wall material	.606
Roof material	.647

The correlation between home environment and reading achievement was 0.36, and with mathematics achievement it was 0.34. As expected, pupils with higher values on the home background tended to obtain higher scores both in reading and in mathematics.

A simple bivariate regression line was established between the home background factor and the pupil scores on a) the reading test, and b) the mathematics test. The pupils placed above the regression line were interpreted as having reading scores (or mathematics) scores that were better than could be expected – after taking the home background into account. Conversely, pupils placed below the line had scores that were worse than might be expected.

The residual (actual minus predicted scores) scores were then averaged over schools so that a school with a very high mean residual score was identified as a ‘more effective’ school because it had many pupils whose achievement scores were much higher than expected. (This procedure also avoids aggregation effects that would have occurred if the procedure had been carried out at the between school level only).

It is important to note that this definition of a ‘more effective’ school made it possible for a school to be designated as effective even if it had a relatively low raw mean score – perhaps even considerably lower than the average for all schools in the country. Similarly, a school with a relatively high mean score might after considering the home background of its pupils be designated as a ‘less effective’ school.

For each score (reading and mathematics), the top 10 percent of ‘more effective’ school (15 schools in total) are grouped as ‘most effective’ school, while the bottom 10 percent of ‘less effective’ school (15 schools in total) are grouped as ‘least effective’ school. Variables, which were different between these two groups, were identified. In Figures 9.1 and 9.2 below, the most effective schools have been marked in blue. It can be seen that they are well above the regression line. In reading (Figure 9.1) it can be seen that there are four schools with relatively low home background scores and yet have relatively high mean reading scores. The least effective schools have been marked in red. It can be seen that there are some schools with a socio-economic background that is quite high (+0.5) and yet their reading achievement was low (a Rasch mean score of 400 to 450). One wonders why these schools are performing at such a low level. There is a similar picture for mathematics.

It should also be noted that there are some schools with a high home background measure and that are still performing better than expected. These must be remarkable schools.

It should be pointed out that the aim of this comparison of the more and less effective schools was not to establish precise measures of the effects of various variables on mean pupil reading scores as might be undertaken using complex and hierarchical causal modelling. Rather, the aim was to identify a summary list of variables that would be of interest to planners and to others undertaking further analyses of the data.

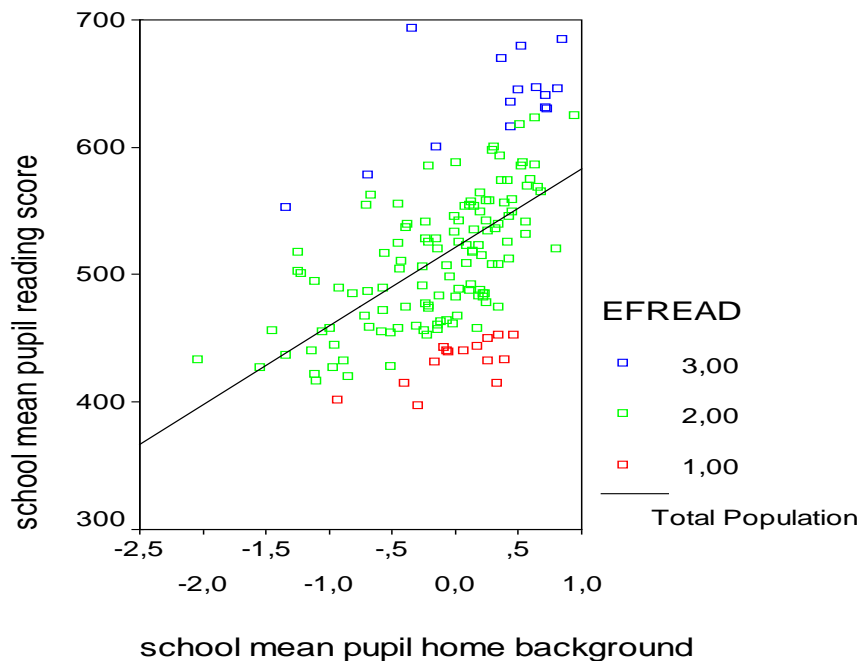


Figure 9.1: Scatter plot of school mean home background and reading scores

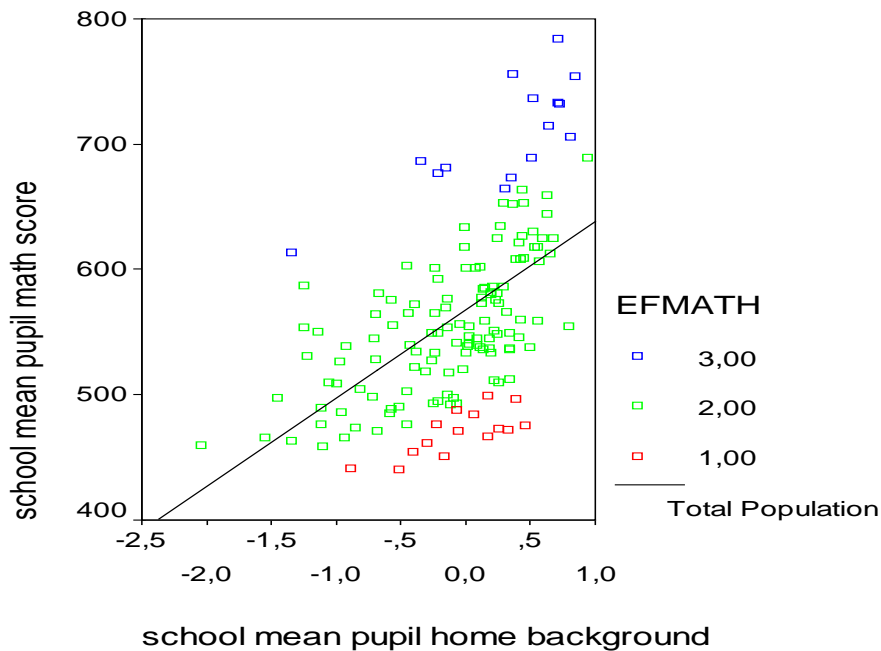


Figure 9.2: Scatter plot of school mean home background and mathematics scores

Identification of schools

After completing the analyses mentioned above in order to identify the 15 least and 15 most effective schools, they were listed in Table 9.1. The schools for reading are on the left hand side of the table and the schools for mathematics on the right. In each case the zone and school IDs appear in the first two columns. The residual score is in the third column. The residual is the actual score (in the fourth column) minus the predicted score that has not been reproduced here. For the first school in the reading table the ID is 106. It had an actual reading score of 416.56. Its predicted score (the score it should have obtained given its socio-economic intake of pupils) was 535.40. It was scoring 119.84 less than it should have been achieving. It was the least effective school in these analyses.

When examining the least effective schools for reading and for mathematics it can be seen that there were eleven out of the fifteen schools that were the same. There were ten schools common for mathematics and reading among the most effective schools. This suggests that some schools are in general underachieving or overachieving. These schools are well known to the inspectorate in Mauritius and this analysis confirms the inspectorate's views.

Table 9.1 Bottom 15 and top 15 schools

Zone	School ID	Read residual	Read score	Region	School ID	Math residual	Math score
MAU:PLN	106	-119,84	415,56	MAU:WEV	623	-114,04	475,23
MAU:PLN	132	-110,59	397,52	MAU:EBB	604	-111,11	466,39
MAU:PLN	108	-104,43	433,56	MAU:PLN	106	-110,29	471,91
MAU:SOC	519	-99,19	433,14	MAU:PLN	211	-109,74	451,08
MAU:PLN	130	-88,54	415,26	MAU:SOC	519	-106,72	473,31
MAU:WEV	623	-87,86	453,18	MAU:PLN	105	-103,43	440,44
MAU:EBB	604	-84,24	444,53	MAU:PLN	130	-102,58	454,24
MAU:PLN	238	-83,27	440,77	MAU:SOC	524	-98,63	471,12
MAU:PLN	225	-83,15	453,02	MAU:PLN	132	-91,16	461,82
MAU:PLN	211	-82,37	431,85	MAU:PLN	108	-87,49	496,64
MAU:EBB	601	-82	450,24	MAU:PLN	238	-86,62	484,61
MAU:SOC	400	-78,65	402,04	MAU:PLN	127	-86,36	440,97
MAU:SOC	524	-78,5	440,19	MAU:SOC	445	-81,62	476,27
MAU:WEV	630	-77,75	440,48	MAU:WEV	630	-76,88	488,2
MAU:PLN	102	-74,25	443,03	MAU:PLN	222	-76,64	499,72
Zone	School ID	Read residual	Read score	Region	School ID	Math residual	Math score
MAU:EBB	305	76,27	616,15	MAU:PLN	206	81,98	664,19
MAU:PLN	109	77,81	630,69	MAU:EBB	616	89,53	673,15
MAU:WEV	619	79,69	631,72	MAU:EBB	608	99,89	689,4
MAU:PLN	118	86,28	601,03	MAU:WEV	507	100,12	705,77
MAU:SOC	435	87,7	578,62	MAU:WEV	514	107,68	614,01
MAU:WEV	621	88,46	640,72	MAU:WEV	618	117,6	715,16
MAU:WEV	514	89,94	552,78	MAU:WEV	504	118,18	676,79
MAU:WEV	507	90,19	646,67	MAU:PLN	118	123,26	681,72
MAU:PLN	121	95,52	635,59	MAU:PLN	109	128,26	732,66
MAU:WEV	618	98,41	647,27	MAU:WEV	619	131,83	732,76
MAU:EBB	357	102,71	645,44	MAU:ROD	702	134,31	686,89
MAU:SOC	520	127,48	685,27	MAU:EBB	341	144,71	737
MAU:WEV	516	133,19	669,99	MAU:SOC	520	147,47	754,51
MAU:EBB	341	135,86	679,75	MAU:WEV	516	171,17	755,96
MAU:ROD	702	187,32	693,78	MAU:WEV	621	182,14	784,18

Results

Comparisons were then made between the groups of schools for many of the variables in the study. The results are presented in Table 9.2. For each variable the mean of the top 15 schools (the most effective schools) is presented. This has been followed by the mean of the 15 least effective schools and then the overall standard deviation. Finally, the difference is presented. Where the difference between the values for the most and least effective schools was greater than one standard deviation,

cells are coloured in blue; for half a standard deviation they are yellow. Where the difference was smaller than half a standard deviation, the difference cell has been left white.

Table 9.2: Differences between most and least effective schools

Reading					Math					
	Bottom 15	Top 15	SD	Difference		Bottom 15	Top 15	SD	Difference	
Pupil age in months	136,32	134,84	5,85	-0,25	Pupil age in months	136,48	134,64	5,85	-0,31	
Pupil sex (ratio female)	0,47	0,49	0,50	0,05	Pupil sex (ratio female)	0,47	0,50	0,50	0,05	
Speak English outside school (ratio speaking)	0,48	0,79	0,48	0,66	Speak English outside school (ratio speaking)	0,44	0,80	0,48	0,73	
Books at home (books)	22,45	59,47	51,09	0,72	Books at home (books)	23,60	59,57	51,09	0,70	
Meals per week (meals)	11,41	11,68	1,05	0,26	Meals per week (meals)	11,42	11,69	1,05	0,26	
Days absent (days)	2,16	1,46	2,48	-0,28	Days absent (days)	2,20	1,46	2,48	-0,30	
Repeat grades (times)	0,24	0,11	0,39	-0,34	Repeat grades (times)	0,24	0,10	0,39	-0,36	
Place to sit (ratio having)	1,00	1,00	0,00	0,00	Place to sit (ratio having)	1,00	1,00	0,00	0,00	
Place to write (ratio having)	1,00	1,00	0,00	0,00	Place to write (ratio having)	1,00	1,00	0,00	0,00	
Make sure for homework	3,52	3,45	0,62	-0,12	Make sure for homework	3,50	3,32	0,62	-0,29	
Help for homework	3,13	3,17	0,55	0,08	Help for homework	3,09	3,08	0,55	-0,02	
Ask to read	2,23	2,23	0,60	-0,01	Ask to read	2,13	2,19	0,60	0,10	
Ask to do mathematical calculations	1,99	2,26	0,57	0,48	Ask to do mathematical calculations	1,94	2,25	0,57	0,55	
Ask questions about reading	2,11	2,29	0,58	0,32	Ask questions about reading	2,15	2,16	0,58	0,03	
Ask questions about mathematics	2,12	2,26	0,58	0,24	Ask questions about mathematics	2,10	2,20	0,58	0,17	
Look at the work done in school	2,21	2,37	0,61	0,26	Look at the work done in school	2,20	2,30	0,61	0,15	
English extra tuition	1,74	1,78	0,42	0,10	English extra tuition	1,71	1,71	0,42	0,01	
Math extra tuition	1,73	1,81	0,42	0,20	Math extra tuition	1,70	1,74	0,42	0,10	
Other extra tuition	1,75	1,92	0,38	0,46	Other extra tuition	1,72	1,87	0,38	0,41	
Take extra tuition	0,79	0,97	0,34	0,51	Take extra tuition	0,77	0,93	0,34	0,46	
Paying extra tuition (ratio paying)	0,81	0,91	0,27	0,39	Paying extra tuition (ratio paying)	0,85	0,89	0,27	0,15	
Get Reading homework	3,09	3,11	0,85	0,02	Get Reading homework	3,03	3,12	0,85	0,10	
Reading homework corrected	3,94	3,42	1,17	-0,45	Reading homework corrected	3,96	3,65	1,17	-0,26	
Get Math homework	3,69	3,79	0,63	0,16	Get Math homework	3,51	3,75	0,63	0,39	
Math homework corrected	4,67	4,53	0,88	-0,15	Math homework corrected	4,66	4,47	0,88	-0,21	
Math textbooks used	4,94	4,88	0,30	-0,17	Math textbooks used	4,94	4,83	0,30	-0,36	
Teacher sex (1=male 2=female)	1,26	1,26	0,45	0,00	Teacher sex (1=male 2=female)	1,21	1,23	0,45	0,02	
Teacher age	43,67	46,08	8,02	0,30	Teacher age	43,30	46,99	8,02	0,46	
Teacher academic education	3,46	3,46	0,58	0,01	Teacher academic education	3,48	3,31	0,58	-0,28	
Teacher professional training	4,11	4,22	0,86	0,13	Teacher professional training	4,22	4,17	0,86	-0,06	

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Teacher teaching years (years)	21,69	23,70	8,60	0,23	Teacher teaching years (years)	20,43	24,68	8,60	0,49	
Number of teacher in-service courses (courses)	1,83	2,55	2,43	0,30	Number of teacher in-service courses (courses)	2,18	1,69	2,43	-0,20	
Days of teacher in-service courses (days)	8,48	23,51	31,57	0,48	Days of teacher in-service courses (days)	12,20	26,14	31,57	0,44	
Effectiveness of teacher in-service courses	2,16	3,03	1,40	0,62	Effectiveness of teacher in-service courses	2,32	2,62	1,40	0,21	
Books in class (books)	21,96	41,04	30,86	0,62	Books in class (books)	23,53	39,01	30,86	0,50	
Sitting places (places)	34,96	40,93	7,35	0,81	Sitting places (places)	35,05	41,49	7,35	0,88	
Writing places (places)	34,75	41,05	7,53	0,84	Writing places (places)	34,82	41,58	7,53	0,90	
Periods of teaching per week (periods)	24,37	24,47	3,58	0,03	Periods of teaching per week (periods)	25,12	23,86	3,58	-0,35	
Minutes teaching per period (minutes)	50,78	49,29	7,00	-0,21	Minutes teaching per period (minutes)	49,77	50,29	7,00	0,07	
Hours spent for preparation and marking per week (hours)	8,88	14,55	8,16	0,70	Hours spent for preparation and marking per week (hours)	8,29	14,04	8,16	0,71	
Frequency of meeting parents	2,58	3,18	0,80	0,75	Frequency of meeting parents	2,69	3,02	0,80	0,41	
Percentage of meeting parents	28,15	58,49	26,40	1,15	Percentage of meeting parents	27,39	50,71	26,40	0,88	meet more parents,
Advice from school heads	3,36	3,03	0,92	-0,36	Advice from school heads	3,62	3,27	0,92	-0,38	
Total classroom resources (max=8)	6,07	6,47	2,26	0,18	Total classroom resources (max=8)	6,29	6,39	2,26	0,04	
READING ACTIVITY-LISTEN	2,86	2,98	0,34	0,36	MATH ACTIVITY-PAIRS	2,66	2,67	0,51	0,03	
READING ACTIVITY-SILENT READING	2,81	2,91	0,37	0,25	MATH ACTIVITY-ALONE	2,31	2,58	0,61	0,44	
READING ACTIVITY-NEW VOC	2,96	3,00	0,19	0,23	MATH ACTIVITY-POSTERS	2,49	2,44	0,56	-0,09	
READING ACTIVITY-SOUND WORDS	2,92	2,97	0,28	0,17	MATH ACTIVITY-EQUIPMENT	2,81	2,76	0,36	-0,14	
READING ACTIVITY-COMPREHENSION	2,97	3,00	0,13	0,20	MATH ACTIVITY-HOMEWORK	2,78	2,52	0,48	-0,54	
READING ACTIVITY-HOME READ	2,83	2,96	0,30	0,43	MATH ACTIVITY-GRAPHS	2,74	2,63	0,54	-0,20	
READING ACTIVITY-MATERIAL HOME	2,73	2,95	0,34	0,66	MATH ACTIVITY-RECITE	2,50	2,47	0,63	-0,05	
READING ACTIVITY-READ ALOUD	2,80	2,94	0,43	0,31	MATH ACTIVITY-QUIZZ	2,79	2,78	0,43	-0,03	
READING GOAL-ENJOY	2,99	2,93	0,25	-0,26	MATH GOAL-NUMERARY	3,00	2,95	0,21	-0,24	
READING GOAL-VOCABULARY	2,86	2,97	0,29	0,38	MATH GOAL-PROBLEM SOLVE	2,99	2,93	0,19	-0,30	
READING GOAL-WORD ATTACK	2,80	2,91	0,44	0,24	MATH GOAL-THINKING	2,95	2,95	0,28	-0,02	
READING GOAL-COMPREHENSION	2,98	2,99	0,20	0,02	MATH GOAL-CONFIDENCE	2,82	2,91	0,36	0,23	
READING GOAL-INTEREST	2,96	2,88	0,27	-0,29	MATH GOAL-SATISFACTION	2,76	2,82	0,38	0,15	
READING GOAL-CAREER	2,40	2,61	0,61	0,35	MATH GOAL-CAREER	2,56	2,42	0,56	-0,26	
READING GOAL-LIFE SKILLS	2,59	2,68	0,51	0,18	MATH GOAL-LIFE SKILLS	2,77	2,61	0,48	-0,32	
READING APPROACH-BKGD	2,85	2,68	0,46	-0,38	MATH APPROACH-EVERYDAY	2,65	2,80	0,45	0,32	
READING APPROACH-COMPREH	2,89	2,95	0,25	0,26	MATH APPROACH-WHOLE CLASS	2,79	2,77	0,42	-0,03	
READING APPROACH-UNDERSTAND	2,79	2,95	0,38	0,42	MATH APPROACH-SMALL GRP	2,22	2,15	0,56	-0,12	
READING APPROACH-MATERIALS	2,25	2,24	0,59	-0,01	MATH APPROACH-INDIVIDUAL	2,09	2,27	0,64	0,29	
READING APPROACH-READ ALOUD	2,82	2,97	0,36	0,41	MATH APPROACH-Q&A	2,85	2,76	0,39	-0,23	

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READING APPROACH-FEEDBACK	2,80	2,85	0,43	0,12	MATH APPROACH-FEEDBACK	2,80	2,77	0,42	-0,06	
Reading test given	5,14	5,16	0,95	0,02	MATH APPROACH-RELATE	2,77	2,80	0,44	0,06	
Ask parents to sign the completion of home assignment	1,18	1,40	0,45	0,50	MATH APPROACH-BASIC SKILL	2,91	2,92	0,39	0,02	
					MATH APPROACH-PROCESS	2,93	2,98	0,30	0,16	
					MATH APPROACH-LOCAL MAT	2,75	2,85	0,42	0,25	
					Math test given	5,02	5,10	0,84	0,10	
					Ask parents to sign the completion of home assignment	1,14	1,44	0,47	0,64	
School head sex (1=male 2=female)	1,41	1,45	0,47	0,08	School head sex (1=male 2=female)	1,33	1,44	0,47	0,23	
School head age	52,98	53,13	3,53	0,04	School head age	52,37	53,49	3,53	0,32	
School head academic education	3,67	3,44	0,63	-0,36	School head academic education	3,53	3,56	0,63	0,05	
School head teacher training	4,36	4,35	0,83	-0,02	School head teacher training	4,28	4,47	0,83	0,23	
School head having special training (weeks)	30,35	26,89	30,93	-0,11	School head having special training (weeks)	24,00	28,22	30,93	0,14	
School head years of teaching (years)	30,78	31,79	4,23	0,24	School head years of teaching (years)	29,94	31,83	4,23	0,45	
School head periods of teaching per week (periods)	1,96	5,45	3,56	0,98	School head periods of teaching per week (periods)	2,71	4,89	3,56	0,61	
School head teaching minutes per period (minutes)	35,84	40,03	9,80	0,43	School head teaching minutes per period (minutes)	33,88	40,13	9,80	0,64	
Being school head in this school (years)	1,95	1,95	1,41	0,00	Being school head in this school (years)	1,60	2,41	1,41	0,57	
Being school head altogether (years)	3,13	4,01	2,21	0,40	Being school head altogether (years)	2,67	4,91	2,21	1,01	
Type of school (1=government 2=private)	1,13	1,26	0,41	0,32	Type of school (1=government 2=private)	1,08	1,19	0,41	0,28	
Year school established	1947,98	1956,95	31,47	0,28	Year school established	1948,33	1949,04	31,47	0,02	
Distance from clinic (km)	1,76	2,67	1,84	0,49	Distance from clinic (km)	1,49	2,23	1,84	0,40	
Distance from tarmac road (km)	1,00	1,00	0,11	0,00	Distance from tarmac road (km)	1,00	1,00	0,11	0,00	
Distance from public library (km)	4,20	2,20	3,98	-0,50	Distance from public library (km)	4,83	2,01	3,98	-0,71	
Distance from book shop (km)	4,14	1,99	3,45	-0,62	Distance from book shop (km)	3,81	1,42	3,45	-0,69	
Distance from secondary school (km)	4,31	3,80	3,72	-0,14	Distance from secondary school (km)	2,91	3,11	3,72	0,05	
Distance from market (km)	3,14	1,47	2,30	-0,73	Distance from market (km)	2,41	1,19	2,30	-0,53	
School location (1=isolated 2=rural 3=town 4=city)	3,23	3,37	0,95	0,15	School location (1=isolated 2=rural 3=town 4=city)	3,23	3,55	0,95	0,35	
Permanent male teachers (teachers)	9,75	14,20	6,43	0,69	Permanent male teachers (teachers)	8,34	14,39	6,43	0,94	
Permanent female teachers (teachers)	11,01	19,36	6,79	1,23	Permanent female teachers (teachers)	11,05	19,22	6,79	1,20	
Temporary male teachers (teachers)	0,00	0,00	0,20	0,00	Temporary male teachers (teachers)	0,00	0,00	0,20	0,00	
Temporary female teachers (teachers)	0,00	0,06	0,54	0,11	Temporary female teachers (teachers)	0,00	0,06	0,54	0,11	
Student male teachers (teachers)	0,49	0,57	0,75	0,11	Student male teachers (teachers)	0,55	0,51	0,75	-0,05	
Student female teachers (teachers)	0,96	2,41	2,04	0,71	Student female teachers (teachers)	1,15	2,94	2,04	0,88	
Total number of teachers (teachers)	22,21	36,61	11,94	1,21	Total number of teachers (teachers)	21,09	37,12	11,94	1,34	
Up to secondary teachers (teachers)	20,39	32,64	10,60	1,16	Up to secondary teachers (teachers)	19,25	32,83	10,60	1,28	

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Tertiary teachers (teachers)	0,36	0,99	2,29	0,27	Tertiary teachers (teachers)	0,14	0,84	2,29	0,30	
No teacher training teachers (teachers)	0,00	1,67	2,20	0,76	No teacher training teachers (teachers)	0,00	2,00	2,20	0,91	
Short course training teachers (teachers)	1,03	0,13	1,27	-0,71	Short course training teachers (teachers)	0,00	0,13	1,27	0,10	
1 year training teachers (teachers)	1,57	3,07	4,69	0,32	1 year training teachers (teachers)	1,54	4,41	4,69	0,61	
2 years training teachers (teachers)	18,16	25,32	12,40	0,58	2 years training teachers (teachers)	17,85	21,29	12,40	0,28	
3 years training teachers (teachers)	0,00	2,42	6,55	0,37	3 years training teachers (teachers)	0,00	2,45	6,55	0,37	
3+ years teacher training teachers (teachers)	0,00	1,02	6,99	0,15	3+ years teacher training teachers (teachers)	0,00	3,39	6,99	0,48	
Number of boys	277,07	460,84	172,14	1,07	Number of boys	261,48	451,70	172,14	1,11	bigger school, better
Number of girls	253,67	447,04	162,60	1,19	Number of girls	241,02	446,00	162,60	1,26	
Number of G6 boys	62,54	89,51	35,45	0,76	Number of G6 boys	62,44	85,83	35,45	0,66	
Number of G6 girls	56,90	86,01	31,54	0,92	Number of G6 girls	55,77	85,60	31,54	0,95	
Number of classes	15,87	22,36	6,81	0,95	Number of classes	15,30	22,49	6,81	1,06	
Number of G6 classes	3,54	4,41	1,44	0,61	Number of G6 classes	3,54	4,28	1,44	0,51	
Pupils in session1	530,73	907,88	331,72	1,14	Pupils in session1	502,50	897,70	331,72	1,19	
Classes in session1	15,87	22,36	6,81	0,95	Classes in session1	15,30	22,49	6,81	1,06	
Number of inspections since 1998	57,23	23,46	47,78	-0,71	Number of inspections since 1998	55,60	37,74	47,78	-0,37	
Number of full inspections	3,50	0,84	9,98	-0,27	Number of full inspections	4,81	6,96	9,98	0,22	
Number of routine inspections	48,78	48,81	34,60	0,00	Number of routine inspections	40,50	51,83	34,60	0,33	
Number of teacher (non promotion) inspections	49,86	25,45	37,23	-0,66	Number of teacher (non promotion) inspections	40,82	34,08	37,23	-0,18	
Number of teacher (promotion) inspections	0,42	0,54	7,95	0,02	Number of teacher (promotion) inspections	2,22	1,08	7,95	-0,14	
Number of assist teaching inspections	37,73	25,83	32,26	-0,37	Number of assist teaching inspections	39,74	23,76	32,26	-0,50	
Number of advice management inspections	25,45	21,66	22,07	-0,17	Number of advice management inspections	24,27	21,62	22,07	-0,12	
Number of addressing problem inspections	2,43	1,61	4,25	-0,19	Number of addressing problem inspections	2,50	3,48	4,25	0,23	
Number of other inspections	9,87	7,44	14,36	-0,17	Number of other inspections	10,22	11,86	14,36	0,11	
Importance of activity-CONTACT local community	2,94	2,62	0,47	-0,66	Importance of activity-CONTACT local community	2,94	2,43	0,47	-1,08	less effective school
Importance of activity-MONITOR	3,00	3,00	0,21	0,00	Importance of activity-MONITOR	3,00	3,00	0,21	0,00	
Importance of activity-ADMIN	3,00	2,94	0,34	-0,19	Importance of activity-ADMIN	3,00	2,94	0,34	-0,19	
Importance of activity-DISCUSS	3,00	3,00	0,18	0,00	Importance of activity-DISCUSS	3,00	3,00	0,18	0,00	
Importance of activity-TEACHERS PROF. DEV	3,00	2,87	0,37	-0,35	Importance of activity-TEACHERS PROF. DEV	2,93	2,87	0,37	-0,15	
Importance of activity-HEAD PROF.DEV	2,94	2,87	0,39	-0,17	Importance of activity-HEAD PROF.DEV	2,93	2,87	0,39	-0,14	
Total pupil problems	30,55	26,94	4,32	-0,84	Total pupil problems	31,57	26,39	4,32	-1,20	
Total teacher problems	13,29	12,53	1,62	-0,47	Total teacher problems	13,45	12,45	1,62	-0,62	
Total school resources	14,83	15,81	2,07	0,47	Total school resources	14,37	15,56	2,07	0,57	
Production of school magazine	1,20	1,39	0,44	0,43	Production of school magazine	1,14	1,33	0,44	0,43	

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Public speaking day	1,00	1,47	0,42	1,13	Public speaking day	1,13	1,41	0,42	0,65	
Open-door policy at any day	1,86	1,94	0,39	0,20	Open-door policy at any day	1,86	1,93	0,39	0,19	
Open-door policy for a special day	1,55	1,56	0,49	0,02	Open-door policy for a special day	1,54	1,61	0,49	0,15	
Debating contests	1,06	1,34	0,37	0,77	Debating contests	1,12	1,21	0,37	0,24	
School days lost	7,36	6,97	6,65	-0,06	School days lost	7,03	6,56	6,65	-0,07	
Permanent classrooms	18,10	24,94	7,13	0,96	Permanent classrooms	17,56	24,66	7,13	1,00	
Temporary classrooms	0,26	0,60	0,76	0,46	Temporary classrooms	0,32	0,61	0,76	0,38	
Open-air classrooms	0,00	0,07	0,26	0,28	Open-air classrooms	0,00	0,07	0,26	0,28	
Permanent areas	1124,69	955,90	1124,91	-0,15	Permanent areas	1044,87	984,05	#####	-0,05	
Temporary areas	9,21	16,52	26,11	0,28	Temporary areas	6,74	16,75	26,11	0,38	
School building conditions	3,86	3,84	1,11	-0,02	School building conditions	3,77	3,64	1,11	-0,11	
Toilets for boys	1,00	1,00	0,19	0,00	Toilets for boys	1,00	1,00	0,19	0,00	
Toilets for girls	1,00	1,00	0,19	0,00	Toilets for girls	1,00	1,00	0,19	0,00	
Toilets for staffs	1,00	1,00	0,17	0,00	Toilets for staffs	1,00	1,00	0,17	0,00	
Can borrow books	2,68	2,75	0,62	0,10	Can borrow books	2,47	2,75	0,62	0,46	
Community contribution	2,96	4,59	1,79	0,91	Community contribution	3,25	4,24	1,79	0,55	
Lack of cooperation from the community	2,18	1,34	0,71	-1,19	Lack of cooperation from the community	2,19	1,47	0,71	-1,02	Cooperation from co

The most important variables are highlighted in yellow and blue. Thus, schools having both subjects marked in colour were more effective in 2001 than others in Mauritius, and can be said to have the following characteristics.

(a) Home and community

Despite the fact that the material conditions of the home and parental education were used as a measure of home background it nevertheless emerged that schools with pupils whose parents spoke English more at home and also had more books at home were more effective in both subject areas. The more the school head perceived the parents to be contributing to the school and the more the parents co-operated with the school, then the more effective the schools were. Schools that were nearer to public facilities tended to be among the more effective schools.

(b) School-community interactions

The higher the percentage of parents met by teachers, the more effective was the school. The less the school head perceived that his having regular contact with the community (but since effective schools have parents that co-operate, then this must mean that in schools where parents do not co-operate, Heads see it as more important to establish contacts with the community), the more effective was the school

(c) Classrooms and teachers

More effective schools had more classroom libraries, sufficient sitting and writing places, and teachers who spent more time marking homework and preparing lessons.

(d) Schools and School heads

Effective schools had school heads who taught more each week and, as mentioned above, who interacted with the community and parents. Effective schools tended also to be the larger schools with more teachers and pupils.

Table 9.3 Bottom 15 and top 15 schools

Reading			Mathematics		
Region	School ID	School name	Region	School ID	School name
MAU:PLN	106	La Tour Koenig GS (New)	MAU:WEV	623	Belle Rose RC
MAU:PLN	132	Marcel Cabon GS	MAU:EBB	604	Rose Hill Central GS
MAU:PLN	108	Dr O. Beugeard GS	MAU:PLN	106	La Tour Koenig GS (New)
MAU:SOC	519	Rev E. Noel GS	MAU:PLN	211	P. aux Piments GS
MAU:PLN	130	E. Anquetil GS	MAU:SOC	519	Rev E. Noel GS
MAU:WEV	623	Belle Rose RC	MAU:PLN	105	Pointe aux Sables GS
MAU:EBB	604	Rose Hill Central GS	MAU:PLN	130	E. Anquetil GS
MAU:PLN	238	Sir S. Ramgoolam GS	MAU:SOC	524	Wooton GS
MAU:PLN	225	Grand Bay GS	MAU:PLN	132	Marcel Cabon GS
MAU:PLN	211	P. aux Piments GS	MAU:PLN	108	Dr O. Beugeard GS
MAU:EBB	601	Stanley GS	MAU:PLN	238	Sir S. Ramgoolam GS
MAU:SOC	400	Sainte Cecile RC	MAU:PLN	127	La Briquetterie GS
MAU:SOC	524	Wooton GS	MAU:SOC	445	Bel Ombre GS
MAU:WEV	630	Bambous 'A' GS	MAU:WEV	630	Bambous 'A' GS
MAU:PLN	102	Cite Valljee GS	MAU:PLN	222	S.K. Kanhye GS
Reading			Mathematics		
Region	School ID	School name	Region	School ID	School name
MAU:EBB	305	Bon Accueil GS	MAU:PLN	206	Fond du Sac GS
MAU:PLN	109	Raoul Rivet GS	MAU:EBB	616	Andre Glover GS
MAU:WEV	619	Beau Sejour GS	MAU:EBB	608	N.D des Victoires RC
MAU:PLN	118	Labourdonnais GS	MAU:WEV	507	Ecole de Lorette
MAU:SOC	435	Charles Telfair GS	MAU:WEV	514	Pandit Sahadeo GS
MAU:WEV	621	Sir V. Ringadoo GS	MAU:WEV	618	Baichoo Madhoo GS
MAU:WEV	514	Pandit Sahadeo GS	MAU:WEV	504	N.Saddul GS
MAU:WEV	507	Ecole de Lorette	MAU:PLN	118	Labourdonnais GS
MAU:PLN	121	N.D de la Paix RC	MAU:PLN	109	Raoul Rivet GS
MAU:WEV	618	Baichoo Madhoo GS	MAU:WEV	619	Beau Sejour GS
MAU:EBB	357	St Pierre RC	MAU:ROD	702	Oyster Bay GS
MAU:SOC	520	Hugh Otterbarry GS	MAU:EBB	341	Mohunlall Mohit GS
MAU:WEV	516	P.C.K.Aryan Vedic Aided	MAU:SOC	520	Hugh Otterbarry GS
MAU:EBB	341	Mohunlall Mohit GS	MAU:WEV	516	P.C.K.Aryan Vedic Aided
MAU:ROD	702	Oyster Bay GS	MAU:WEV	621	Sir V. Ringadoo GS

Chapter 9

An Agenda For Action

Introduction

This chapter seeks to bring together all the research-based policy suggestions that have been made throughout this report. In undertaking this synthesis every effort has been taken to produce an ‘agenda for action’ that is both meaningful and feasible for the Ministry of Education in Mauritius. However, it is important to note that this chapter should not be seen as a judgement of the Mauritian education system but rather as a starting point for constructive discussion for future educational policy options.

Mauritius has a complex pluricultural society, and as a result its education system tends to be bounded by unique sets of social, economic and political environments. All questions of educational reform, therefore, need to be based on sound information. For this reason all policy suggestions presented in this report are based on a scientific analysis of reliable data.

Classification of policy suggestions

There were a total of 36 suggestions made in Chapters 3 to 7 as shown in Table 8.1. These suggestions were prepared on the basis of a careful interpretation of the data, and with the added benefit of consultations with decision-makers at different levels of the education system. It would not have been helpful for the Ministry of Education to receive these policy suggestions as a simple list, for that would have ignored implementation differences in time and cost. Instead, it was decided to classify the suggestions according to their operational implications for the ministry, because this would help with setting priorities and selecting realistic avenues of action. Five main groups of policy suggestions emerge from this analysis. Group 1 called upon the ministry to have major consultation with the stakeholders in the education system.

Group 2 contained suggestions that identify established practices in the policy and planning area that needed to be reviewed and evaluated.

Group 3 contained suggestions that required the ministry to collect important information that would be useful for planning purposes.

Group 4 contained suggestions that identified an educational policy research programme for the Ministry.

Group 5 contained suggestions that required the Ministry to mobilize and/or reallocate funds for investment in infrastructure and human resources.

Table 8.1:

Policy Suggestion	Category	Responsibility	Time	Cost
<p><i>Policy suggestion 3.1</i> The Ministry should plan to continue the survey of the same target population employed during SACMEQ I (1995) and SACMEQ II (2001) to examine changes in important educational indicators over time</p>	Education policy research projects	Planning Unit	Medium	Moderate
<p><i>Policy suggestion 3.2</i> The Planning Unit should investigate the possibility of allowing some more flexibility in the age of entry to primary school with a view to decreasing the average age of entry to the primary level</p>	Review of existing planning and policy procedures	Planning Unit	Short	Low
<p><i>Policy suggestion 3.3</i> In the light of the reforms being implemented the Planning Unit should investigate into the practice of grade repeating at <u>Standard 6 level</u> in order to determine whether this extra year can be justified on educational grounds</p>	Data collection for planning purposes	Planning Unit	Medium	Low
<p><i>Policy suggestion 3.4</i> The Ministry should ensure that learners are able to borrow books to take home to read. To compensate for the limited educational resources available in the homes of learners of Zone 5 (Rodrigues), the responsible authority should provide mobile libraries</p>	Consultation with staff, community and experts	Curriculum Division	Medium	Moderate
<p><i>Policy suggestion 3.5</i> The Ministry should identify those schools where absenteeism seems to be a problem and organize special teacher-parent workshops to</p>	Consultation with staff, community and experts	Inspectorate	Short	Low

sensitise parents on this issue It is suggested that such workshops should be a regular feature in all primary schools for all parents of new entrants

Policy suggestion	Category	Responsibility	Time	Cost
<i>Policy suggestion 3.6</i> The Ministry should establish a taskforce in order to examine whether grade repetition can be justified on either educational or cost effective grounds	Review of existing planning and policy procedures	Planning Unit	Medium	Low
<i>Policy suggestion 3.7</i> The Inspectorate should establish a taskforce to look into the formulation of a policy on homework and homework correction	Review of existing planning and policy procedures	Inspectorate	Short	Low
<i>Policy suggestion 3.8</i> The Ministry should establish a task force to identify strategies for strengthening links with the homes in order to sensitise and motivate parents to show more interest in both the classwork and homework of learners.	Consultation with staff, community and experts	School Management Unit	Short	Low
<i>Policy suggestion 3.9</i> The Ministry should ensure that every pupil has his or her own textbook for each subject area	Data collection for planning purposes	Curriculum Division	Short	Low
<i>Policy Suggestion 3.10</i> The Ministry should ensure that every learner has the basic learning tools such as an exercise book, a notebook, a pencil and an eraser to guarantee the active participation of every learner in class work	Review of existing planning and policy procedures	Inspectorate	Short	Low
<i>Policy suggestion 3.11</i> The curriculum unit should conduct	Data collection for planning purposes	Curriculum Division	Short	Low

a national book audit to assess (a) book availability and (b) book quality.

Policy Suggestion	Category	Responsibility	Time	Cost
<i>Policy suggestion 3.12</i> The Inspectorate should be asked to ensure that if schools have either classroom or school libraries then standard 6 pupils are permitted to borrow books to take them home to read.	Consultation with staff, community and experts	Inspectorate	Short	Low
<i>Policy suggestion 3.13</i> It is suggested that the Ministry of Education commission a small study to examine the issues related to extra tuition	Education policy research projects	Planning Unit	Medium	Low
<i>Policy suggestion 4.1</i> The School Management Unit should review criteria for allocation of teachers to Standard 6 classes. It is suggested that younger teachers who are more academically qualified, subject to a minimum number of years of experience, be encouraged to teach Standard 6.	Review of existing planning and policy procedures	School Management Unit	Short	Low
<i>Policy suggestion 4.2</i> The Human Resource Development (HRD) Unit should undertake a special study to assess the quality and relevance of the in-service courses being dispensed to the Standard 6 teachers	Data collection for planning purposes	Human Resource Development Unit	Short	Low
<i>Policy suggestion 4.3</i> The Inspectorate should carry out a	Data collection for planning purposes	Inspectorate	Short	Low

needs identification exercise in order to establish the requirements of teachers in terms of professional development

Policy suggestion 4.4

The Inspectorate should ensure that there is no mismatch between the strategies used by teachers for the teaching of reading and the goals they intend to achieve

Consultation with staff, community and experts

Inspectorate

Medium

Low

Policy Suggestion

Category

Responsibility

Time

Cost

Policy suggestion 4.5

It is suggested that the Inspectorate commission a small study to examine the feedback practices in the classrooms of those pupils who are given tests in reading less frequently than two or three times per month

Education Policy Research Projects

Inspectorate

Medium

Low

Policy suggestion 4.6

The curriculum division of the Ministry should examine the goals of the teaching of mathematics and in consultation with the Inspectorate and the Mauritius Institute of Education identify those strategies to which teachers should be exposed in order to incorporate them in their teacher training and in-service courses

Consultation with staff, community and experts

Curriculum Division

Medium

Low

Policy suggestion 4.7

It is suggested that the Ministry of Education commission a small study to examine the feedback practices in the classrooms of those pupils who are given tests in mathematics less frequently than two or three times per month

Education Policy Research Projects

Inspectorate

Short

Low

<i>Policy suggestion 4.8</i> The Inspectorate division should ensure that pupils' report books have a specific section for comment by the teacher on progress in all teaching areas	Review of existing planning and policy procedures	Inspectorate	Short	Low
<i>Policy suggestion 4.9</i> The Inspectorate should monitor the insertion of a selected list of activities as a normal feature of the school life in primary schools	Review of existing planning and policy procedures	Inspectorate	Short	Low

Policy Suggestion	Category	Responsibility	Time	Cost
<i>Policy suggestion 4.10</i> The Inspectorate should have school heads meet to establish a policy on the frequency of teacher meeting parents over an academic year	Consultation with staff, community and experts	Inspectorate	Short	Low
<i>Policy suggestion 4.11</i> The Ministry should keep up the effort to supply all classrooms in primary schools with a classroom library or book corner. The question of bookshelves should be further examined and if there is insufficient space to keep all of the classroom books and other materials then an effort should be made to supply the shelves	Data collection for planning purposes	Planning Unit & Stores Div.	Short	Low
<i>Policy suggestion 4.12</i> The Curriculum Unit of the Ministry should ensure that teacher's guides for all subjects are distributed to all schools and they	Data collection for planning purposes	Curriculum Division	Short	Low

are made accessible to teachers

Policy suggestion 4.13

The Inspectorate should hold a conference to discuss teacher perceptions of their role and to explore avenues to improve their performance with respect to explaining the curriculum and to providing more information to teachers about professional contacts and self-development opportunities

Consultation with staff, community and experts

Inspectorate

Short

Low

Policy suggestion 4.14

The Human Resource Development Unit HRD unit should mount courses for the primary school inspectors with a view to enhancing their knowledge and skills in classroom practices for improved teaching/learning.

Human Resource Development Unit

Medium

Low

Policy Suggestion

Policy suggestion 4.15

The Management Unit should meet with Teacher Unions to discuss the responses of teachers concerning job satisfaction in order to identify strategies for addressing some of their national and zone-level concerns

Category

Consultation with staff, community and experts

Responsibility

School Management Unit

Time

Short

Cost

Low

Policy suggestion 5.1

The Ministry should set up a task force to investigate strategies to address the equity issue of gender imbalance in the appointment of female school heads

Review of existing planning and policy procedures

Planning Unit

Short

Low

Policy Suggestion 5.2

Zonal directors should further investigate the state of toilets in the schools and prioritise the works that

Data collection for planning purposes

Zonal directors

Medium

Low

need be undertaken. It is also suggested that the reviewed norms proposed by the study commissioned in 2002 be considered and implemented

Policy suggestion 5.3

The Inspectorate should carry out a small intensive study to confirm whether heads of primary schools are, in fact, teaching regularly

Education policy research projects

Inspectorate

Short

Low

Policy suggestion 5.4

The Ministry should ensure that for the general benefit of the school, Heads are required to teach a minimum number of hours weekly

Review of existing planning and policy procedures

Inspectorate & School Management Unit

Short

Low

Policy Suggestion 5.5

The Inspectorate should monitor the insertion of a selected list of special activities as a normal feature of the school life in primary schools

Review of existing planning and policy procedures

Inspectorate

Short

Low

Policy Suggestion 5.6

The Ministry should set up a task force to develop strategies to overcome the number of official school days lost in an academic year

Review of existing planning and policy procedures

School Management Unit

Short

Low

Policy Suggestion

Category

Responsibility

Time

Cost

Policy suggestion 5.7

It is suggested that the Ministry commission a small study to determine the exact nature of the problems of health and of pupils arriving late in school and to suggest steps that can be taken to diminish them

Education Policy Research Projects

School Management Unit

Short

Low

Policy suggestion 5.8

The Ministry should set up a task force to examine the issue of teachers' leave privilege and make

Review of existing planning and policy procedures

School Management Unit

Short

Low

suggestions as to what the situation should be

<i>Policy suggestion 5.9</i> The Ministry should carry out a small study to examine the impact of lateness and health problems of teachers on the loss of contact hours and it should suggest steps to remedy this problem	Education Policy Research Projects	School Management Unit	Short	Low
<i>Policy suggestion 7.1</i> The Ministry might wish to consider the introduction of curriculum and assessment frameworks and benchmarks written in criterion referenced (profile) format. This can be done as the new curriculum is introduced. This will encourage a competency-based developmental interpretation of pupil performances	Review of existing planning and policy procedures	Curriculum Division	Medium	Moderate
<i>Policy suggestion 7.2</i> The Ministry might wish to use developmental assessment procedures to plan intervention programs for specific groups of pupils and teachers	Review of existing planning and policy procedures	Inspectorate	Medium	Moderate

The policy suggestions listed in Table 8.1 require major expenditures. It would be unrealistic to make an immediate start on all the 36 policies. It is therefore important to make an attempt at creating a preliminary priority order for the policy suggestions so as to move towards a feasible schedule of implementation.

It is important to examine the suggestions and break them down into low cost, medium cost and high cost, and also link them to short, medium and long-term time frames. With this information a staged implementation plan can be prepared.