CHAPTER 4

SACMEQ IN MOZAMBIQUE

INTRODUCTION

The purpose of this chapter is firstly to give a summary in table form of cross-national studies such as Progress in International Reading Literacy Study (PIRLS), Programme for International Student Assessment (PISA) and Third International Mathematics and Science Study (TIMSS) as a background to understanding the SACMEQ study. Secondly, the chapter aims to describe the main characteristics of the SACMEQ study in Mozambique, examining particularly at the crucial design and methodological issues involved in the implementation of the SACMEQ study, namely the planning of the study, instruments construction, sampling, data collection, data entry and data cleaning.

4.1 CROSS-NATIONAL STUDIES

Before describing the SACMEQ study, it is essential to set the context for cross-national studies internationally, particularly as nowadays there are several cross-national studies which monitor the quality of education in many countries across the world.

The International Association for the Evaluation of Educational Achievement (IEA) was founded in 1958 by a group of European and American researchers (Grisay and Griffin, 2004). Benjamin Bloom, one of founding fathers of IEA, and other members wanted to measure the achievement of comparable samples of students in different subjects and in different school systems, with a view of investigating the relationships between possible differences in achievement and differences in inputs, processes and educational contexts.

Most of the IEA comparisons are based on so-called “age/grade” samples. That is, the target population in each participating country is defined as all students attending the grade where most of the students in a given age cohort can be found. Table 4.1 below provides a summary of International Comparative Studies of Education.

Table 4.1

Summary of International Comparative Studies of Education[5]

Name of Study	Organisation	Year	Age of pupils	Content area	Number of countries
Pilot study	IEA	1959 - 1962	13	Mathematics, science, reading comprehension, geography, non-verbal reasoning	12
First International Mathematics Study (FIMS)	IEA	1961 - 1965	13, FS	Mathematics	12
The six-subjects study	IEA	1967 - 1976	10,14, FS	Science, reading comprehension, literature education, foreign languages (French & English), Civic Education	19 15 10 8, 10 10
Classroom Environment Study (CES)	IEA	1980-1984	9-15	Classroom Environment (mathematics, science and history)	11
Second International Mathematics Study (SIMS)	IEA	1976-1989	13, FS	Mathematics	20
Second International Science Study (SISS)	IEA	1979 - 1991	10, 14	Science	24
Written composition study	IEA	1980-1988	10, 14-16, FS	Written composition	14
First International Assessment of Educational Progress (IAEP)	IAEP[6] / ETS[7]	1988	13	Mathematics, science	5
Computers in Education Study	IEA	1986 - 1993	10,13	Computers in Education	21
Pre-Primary project (three phases)	IEA	1986-2002	3-5	Pre-primary education	11 – 15
Second International Assessment of Educational Progress	IAEP / ETS	1990-1991	9,13	Mathematics, Science	20
Reading Literacy Study	IEA	1985 - 1994	9,14	Reading literacy	31
TIMSS – Third International Mathematics and Science Study	IEA	1991-1998	9, 13, FS	Mathematics, science	45 - 55

[5] Some information is drawn from: (i) Goldstein, H. (1995). *Interpreting international comparisons of student achievement*. Educational studies and documents 63. Paris: UNESCO publishing; (ii) IEA Website. NOTE: the number of participating countries in a study may vary dependent on the phase or stage of a study.
[6] Source: Greaney and Kellaghan (1996). Monitoring the Learning Outcomes of Education Systems, World Bank, pp.25-27.

Name of Study	Organisation	Year	Age of pupils	Content area	Number of countries
Monitoring Learning Achievement I[8]	UNESCO	1992-1998	9	Numeracy, Literacy & Life Skills	50
Language Education Study	IEA	1993 - 1996	15 - 18	Second and Foreign Languages	25
SACMEQ I	IIEP	1995-1999	10	Reading	7
Monitoring Learning Achievement II	UNESCO	1999	9	Numeracy, Literacy & Life Skills	18[9]
Civics Education Study	IEA	1994 - 2002	14, FS	Civic Education	31
SITES (two modules)	IEA	1997-2003	Primary & Secondary	Information & Communication Technology in Education	26, 28
PISA	OECD	1997-2001	15	Reading, mathematics, science	31
TIMSS-Repeat	IEA	1997-2001	13	Mathematics, science	38
SACMEQ II	IIEP	2000-2004	10	Reading and mathematics	14
Trends in Mathematics & Science Study (TIMSS)	IEA	2001-2004	9,13	Mathematics, science	26,49
PIRLS I	IEA	1999-2004	10	Reading Literacy	35
PIRLS II	IEA	2003-2007	10	Reading literacy	45
PISA II	OECD	1997-2005	15	Reading, mathematics, science	41

Source: Howie and Plomp, 2005, pp.6-7

Legend: FS – Final year of schooling varies across countries
ETS – Education and Testing Service, Princeton, USA.
Year – refers to the duration of the project (from approval to formal closure)

The IAEP studies were international replications of the USA's National Assessment of Educational Progress (NAEP) programme. These were organised by the Educational Testing Service in the USA. Only 2 surveys of science and mathematics were undertaken with the principal decision-making located in Education Testing Services (ETS). No future studies are planned.

As can be seen in Table 4.1 above, from 1959 to the present day there have been several cross-national studies focusing on pre-primary to secondary education and teacher training. These studies have covered several subjects such as mathematics, geography, science, reading comprehension, reading literacy, non-verbal reasoning, literature education, foreign languages (French and English), civic education, written composition, computers in education, life skills, pre-primary education, the classroom environment (mathematics, science and history), and information and communication technology in education. These studies were coordinated by many organizations

[8] This study was not intended as an international comparative study as data were collected over varying periods of time and were therefore not comparable at one point in time.
[9] The 1999 project involved 18 countries in Africa. The data is available for only 11 of the 18 countries.

and involved many countries. One such study was the SACMEQ study and general information about SACMEQ in Mozambique is provided in the next section.

4.2 SACMEQ IN MOZAMBIQUE

Since Mozambique's independence in 1975, many small research studies, which have not been nationally representative, have been undertaken by the Ministry of Education and the universities. One exception to this observation is a nationally representative study conducted under the auspices of the Southern and Eastern Africa Consortium for Monitoring Educational Quality (SACMEQ), which was implemented in 2000.

4.2.1 Overview of the SACMEQ Study in Mozambique

The Southern and Eastern Africa Consortium for Monitoring Educational Quality consortium (SACMEQ) represents fifteen Ministries of Education in fourteen countries across the Southern African region, namely Botswana, Kenya, Lesotho, Malawi, Mauritius, Mozambique (since 1996), Namibia, Seychelles, South Africa, Swaziland, Tanzania (Mainland), Tanzania (Zanzibar), Uganda, Zambia, and Zimbabwe. The International Institute for Educational Planning (IIEP) became a member of SACMEQ in 1997.

The first two educational policy research projects undertaken by SACMEQ, commonly known as *SACMEQ I* (1995) and *SACMEQ II* (2000), were designed to provide assessment information about conditions in primary schools and the quality of education provided by the primary education systems. The two projects gathered overlapping data in 1995 and 2000, two different time points, with the result that SACMEQ I provided valuable baseline information for SACMEQ II.

Five Ministries of Education completed the SACMEQ I project in 1998 (Mauritius, Namibia, Tanzania/Zanzibar, Zambia and Zimbabwe) and two in 2000 (Kenya and Malawi). In the year 2000 fourteen Ministries completed SACMEQ II field work. In 2004 the SACMEQ National Research Co-ordinators prepared national educational policy reports on the findings of this research, which were subsequently published by the IIEP. These reports suggested policy agendas for government action on issues related to baseline indicators for educational inputs, the general conditions of schooling, equity assessments for human and material resource allocations among schools, and pupil literacy levels.

The importance and benefits of SACMEQ can be seen from two different perspectives. One perspective covers the Mozambican national system of education whilst the other is related to

broader benefits for education systems within the entire Southern African region. SACMEQ II is one of the few known research projects that have carried out a cross-national study in Mozambique using a truly representative sample. Generally, the studies carried out in the field of education in Mozambique are restricted in scope and do not employ truly representative national samples in their design (Passos, Nahara, Magaia and Lauchande, 2005, p.9). Consequently SACMEQ II promised to provide not only a great training opportunity for local team members on how to conduct a large-scale research project, but also to provide valid and reliable data on which important decisions could be based. Specifically, SACMEQ II promised to provide relevant, high quality data about the academic profile of teachers, the level of performance in the areas assessed, school management and other issues that are relevant for policy making.

Many advantages are apparent within the educational context of the region also. As a Portuguese speaking country, Mozambique has a unique history, tradition and system of education that is different from that of the other participating countries. The data collected through SACMEQ II can be considered to be of vital importance for Mozambique's education system, since it can provide the country with important data to promote a reflection on its primary education sector, identify the position of Mozambique's education system within the region, and work towards its improvement.

Despite these clear benefits, a practical implementation problem arose from the SACMEQ study in Mozambique. The school children in Mozambique, being more experienced in answering short answer type questions, were not used to multiple-choice questions, which formed a central part of the SACMEQ assessments. This unfamiliarity could have affected pupils' achievement results (Passos, Nahara, Magaia and Lauchande, 2005, p.10).

4.2.2 Planning of the SACMEQ II Study

This section refers to SACMEQ II specifically. The phases and stages described in Figure 4.1 below were followed in all of the SACMEQ countries, as the countries used standardised procedures to carry out the study[10].

[10] Further information relate to methodology of SACMEQ II study can be found in Chapter II of the SACMEQ II Country Reports available at : www.sacmeq.org.

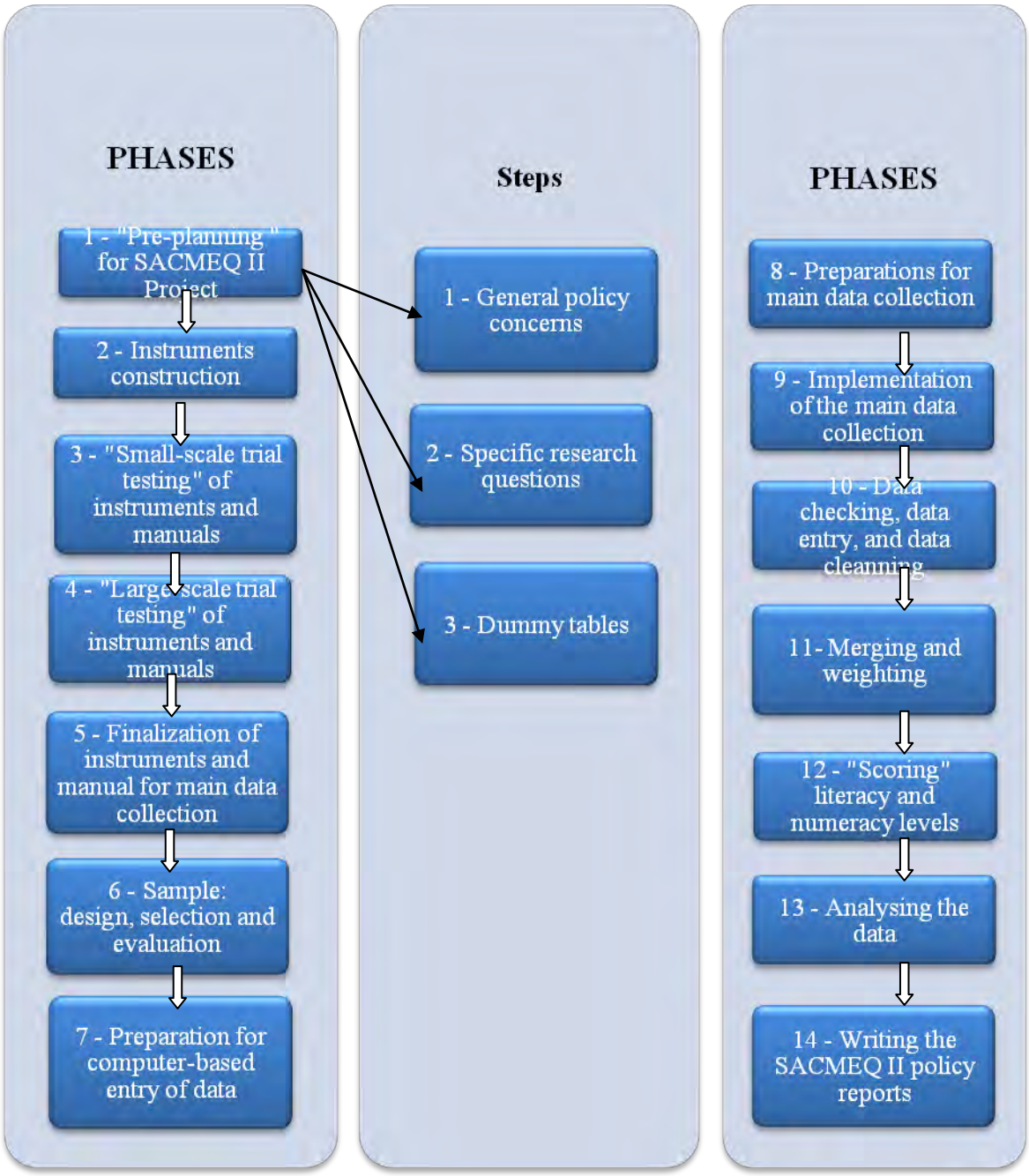


Figure 4.1 Outline of standardised phases and stages for the SAQMEC II study

As indicated in Step One of Figure 4.1, the very first stage was to identify the major policy concerns that were of interest to the Ministries of Education in the fourteen countries actively participating in SACMEQ II. These policy concerns and the specific research questions emanating from them had to be identified before the study could begin. In each of the countries, the SACMEQ National Research Co-ordinators (NRCs) were responsible for discussions with the senior members in their ministries of education about the high-priority policy concerns associated with their education systems. The responses were then analysed in order to identify groups of so-called

'General Policy Concerns'. In all, twenty general policy concerns were identified. These were summarised under five themes:

- Pupils' characteristics and their learning environments.
- Teachers' characteristics and their views about teaching, classroom resources, professional support, and job satisfaction.
- School Heads' characteristics and their views about educational infrastructure, the organization and operation of schools, and problems with pupils and staff.
- Equity in the allocation of human and material resources among regions and among schools within regions.
- The reading and mathematics achievement levels of pupils and their teachers.

Specific research questions were developed for each of the twenty general policy concerns, and a dummy table was developed for each specific research question. The main reasons for producing the 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 (d) design and justify the data tabulation templates to be used in reporting the data analyses. It is essential to note that this approach meant that the study was based solely on what the participating ministries had deemed to be important within the general policy concerns. All in all, there were 20 general policy concerns that encompassed 75 specific research questions and resulted in around 150 dummy tables (Passos, Nahara, Magaia and Lauchande, 2005, p.11).

4.2.3 Instrument Construction

This section presents and discusses the construction process undertaken to develop instruments for the SACMEQ study.

4.2.3.1 Dummy table construction

Each of the 150 dummy tables included the names of variables to be used as well as the form in which they would be analysed. These variables were listed and most of them could be regarded as variables for which information would be required from pupils, teachers, or school Heads using questionnaires. A few of the variables required information to be collected from pupils and teachers using tests (Passos, Nahara, Magaia and Lauchande, 2005, p.12).

4.2.3.2 Questionnaire construction

The variables in the dummy tables were listed and a decision had to be made for each variable about the number of questions that would be required to construct each variable. In some cases (e.g. pupil gender) only one question was needed. For another variable (e.g. school enrolment) two questions were combined (boys' enrolment and girls' enrolment). In yet other cases, several variables had to be formed into a construct (e.g. 'possessions in the home,' 'quality of home' and 'parental education' to form a construct known as 'home background'). Since many of the variables were to be used for examining change over time it was important to use the same questions as had been used in SACMEQ I as far as possible. Questions were developed for each variable or each sub-part of a variable as required. These questions were then trialled in the pilot study and, where necessary, revised (Passos, Nahara, Magaia and Lauchande, 2005, p.12).

4.2.3.3 Test construction

Tests had to be constructed in reading and mathematics both for pupils and for teachers. The two sets of tests (for pupils and teachers) had to be calibrated so as to be on the same scale. For the pupil tests, there was also the intention to compare reading scores with the International Association for the Evaluation of Educational Achievement (IEA) Reading Literacy study, and mathematics scores with the IEA's Third International Mathematics and Science Study (TIMSS). Hence, there had to be common items**.** These tests aligned to the IEA studies. Most importantly, the pupil tests were designed to be 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 selection of teacher test items had to cover the full range of pupil item difficulties and did not contain too many easy pupil test items. In addition, in order not to overburden teachers with an extended testing session, the teacher tests had a much smaller number of test items than the pupil tests (Passos, Nahara, Magaia and Lauchande, 2005, p.13).

Immediately after the test blueprints had been developed, the NRCs 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. Twice as many items as required were prepared for each cell, 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 process 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.

Reading tests

For the reading test component, "reading literacy" was defined as "the ability to understand and use those written language forms required by society and/or valued by the individual" (Passos, Nahara, Magaia and Lauchande, 2005). This definition had been used in SACMEQ I and also in the IEA Reading Literacy Study. The reading domains to be assessed were:

- **Narrative prose:** Continuous text in which the writer aims to tell a story – whether this story 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; and
- 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.

At the same time, a hierarchy of skills was proposed (a dimension of increasing competence) that could be applied to both of the SACMEQ studies. There was a total of 83 test items in the final version of the SACMEQ II reading test for pupils (Passos, Nahara, Magaia and Lauchande, 2005, p.13), whose distribution is shown in the Box 1.

Box 1 Reading domain and skill levels for pupils

	Domains				**Skill levels**					
Reading	**Narrative**	**Expository**	**Documents**	**Total**	**1**	**2**	**3**	**4**	**5**	**Total**
	32	26	25	83	6	22	26	18	11	83

Mathematics tests

A similar exercise was undertaken for mathematics, except that as there had been no SACMEQ I test in mathematics, there was no historical basis for comparisons. The domains decided upon were:

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

In the final version of the SACMEQ II pupil mathematics test, there was a total of 63 test items distributed in three domains and five skill levels, as outlined in Box 2 (Passos, Nahara, Magaia and Lauchande, 2005, p.14).

Box 2 Mathematics domain and skill levels for pupils

	Domains				**Skill levels**					
Mathema-tics	**Number**	**Measurement**	**Space-Data**	**Total**	**1**	**2**	**3**	**4**	**5**	**Total**
	27	18	18	**63**	6	20	17	12	8	**63**

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 important 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.

Several passages were selected in the reading test for teachers 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 required in the Grade 6 pupil tests.

The "extra" reading and mathematics items for teachers were expected to assess the higher competence levels of teachers without these items being 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 interest only young children.

The extended levels of competence in the teachers' reading test focused mainly 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. The extended levels of competence in the teachers' mathematics test 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:

(1) to identify the nature of the problem; (2) to transform the problem into mathematical language; and (3) to solve the problem. In some cases, this expectation required the rearrangement of information, and in others it meant translating the problem into one or more equations and then solving the equations (Passos, Nahara, Magaia and Lauchande, 2005, p.14).

4.2.4 The Mozambican Sample

The desired target population for Mozambique was all pupils enrolled in Grade 6 in the ninth month of the school year (i.e., in September 2000) which resulted in 509 schools with 112 279 pupils in Grade 6. However, it was decided to exclude certain pupils in Mozambique. These were pupils in schools having fewer than 20 Grade 6 pupils enrolled for the year, and pupils in schools for learners with special educational needs. Overall, 106 pupils from nine schools were excluded based on these criteria, which amounted to 0.1 percent of all potential pupil participants. After excluding the 0.1 percent of pupils, the defined population from which a sample had to be drawn consisted of 112 173 pupils from 500 schools. The net enrolment ratio in Mozambique in 2000 was 54.7%.

The number of schools required in the sample was, in part, a function of the intra-class correlation (rho), which is an indicator of the proportion of variation (in achievement in this case) among schools of total variation. The following is the formula often used for estimating the value of rho in situations where two-stage cluster sampling is employed using (approximately) equal sized clusters (Passos, Nahara, Magaia and Lauchande, 2005, p.21):

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

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. An rho of 0.40 was used. This meant drawing a sample of at least 172 schools, but additional schools were selected with the aim of achieving reasonably stable sample estimates within regions. It was planned that 179 schools would participate in the Mozambican study.

The number of schools (179) and pupils in the planned and achieved samples is presented in Table 4.2. The sample was stratified into provinces, school location, school characteristics and the number of schools required for each region.

Table 4.2

Number of schools and pupils in the planned and achieved samples

Provinces	Planned		Achieved		Percent achieved	
	Schools	Pupils	Schools	Pupils	Schools %	Pupils %
Cabo Delgado (1)	10	200	10	182	100	91
Cabo Delgado (2)	4	80	4	75	100	94
Gaza	15	300	15	296	100	99
Inhambane	15	300	14	255	93	85
Maputo Cidade (1)	14	280	14	248	100	89
Maputo Cidade (2)	6	120	6	100	100	83
Manica (1)	11	220	11	194	100	88
Manica (2)	4	80	4	78	100	98
Maputo Província (1)	13	260	13	247	100	95
Maputo Província (2)	2	40	2	34	100	85
Nampula (1)	16	320	16	282	100	88
Nampula (2)	4	80	4	72	100	90
Niassa (1)	12	240	12	190	100	79
Niassa (2)	3	60	3	45	100	75
Sofala (1)	13	260	13	236	100	91
Sofala (2)	2	40	2	39	100	98
Tete (1)	12	240	12	215	100	90
Tete (2)	3	60	3	56	100	93
Zambézia (1)	18	360	16	294	89	82
Zambézia (2)	2	40	2	39	100	98
Mozambique	**179**	**3580**	**176**	**3177**	**98**	**89**

Source: Data from SACMEQ II database, 2004

In total, 89% of the planned number of pupils was represented in the final sample drawn from 98% of the schools. The reason for the shortfall in learner numbers was the absenteeism of some learners in some of the schools on the day of data collection. The reason for the shortfall in school numbers was that some schools had been integrated into others and other schools were in inaccessible areas. However, sampling weights were used to correct for disproportionality among strata in the calculation of all statistics.

Sample validity

Sampling validity gives information on the extent to which the sample represents the population. Table 4.3 shows the sample validity in Mozambique.

Table 4.3

Sample validity in Mozambique

Provinces	No. of schools		Age		Gender (female)	
			Mean Years	Mean years		
	Country	Sample	Country	Sample	Country	Sample
CAB	31	14	14.8	16.7	30.6	26.8
GAZ	73	15	14.2	14.8	47.3	49.2
INH	70	15	14.1	14.7	43.5	43.7
MAC	42	20	13.8	14.2	48.7	48.8
MAN	39	15	13.9	14.8	32.9	33.5
MAP	38	15	14.1	14.4	49.7	54.1
NAM	72	20	14.3	15.0	28.2	29.5
NIA	25	15	14.4	15.3	28.9	31.9
SOF	42	15	13.5	14.3	37.1	34.5
TET	37	15	13.6	14.6	33.9	38.3
ZAM	77	20	13.9	15.0	27.3	32.0
MOZ	**546**	**179**	**14.0**	**14.7**	**38.5**	**40.3**

Source: Data from MINED Direcção de planificação

Table 4.3 compares the socio-demographic information like age and gender relating to the sample with that relating to the population of Grade 6 pupil in the country as a whole. It seems as if there is no significant difference between the sample mean age (14.7) and the population mean (14) of Grade 6 pupils for the country. However, there are some differences among the provinces. For instance, in Cabo Delgado the difference is close to two years. The pattern is similar to that in the gender variable.

4.2.5 Data Collection

Fieldworkers were employed to collect data. Data collection manuals had been written indicating what the data collectors had to do from when they entered a school to when they returned the package of instruments to the regional office. A team of 24 data collection team leaders was centrally trained in Maputo in August 2000 to ensure uniformity in data collection throughout the country. The training was repeated in the provinces for more familiarity with the data collection manual and for the benefit of the assistant data collectors. The schools were notified about the data collection several weeks in advance. When the data collectors arrived at the school, they had to meet with the School Head to verify the details of the school and what was required. They had to ensure a testing room in which 20 well-placed sitting and writing places were available. They then had to further ensure that the class registers were available and that the selected learners were present (Passos, Nahara, Magaia and Lauchande, 2005, p.23).

Reliability

Some of the domains and constructs in the framework are composed of several indicators. Principal components analysis (PCA) was used in order to group the indicators into one factor. Reliability was calculated for those groups of variables. The Cronbach's alpha-coefficient was computed for each group of items using PCA. The bench mark 0.7 was used as a reliability dimension or component.

The main data collection took place on two consecutive days, 28 August and 1 September 2000. On the first day, fieldworkers administered the learner questionnaire and the reading test in addition to the school Head questionnaire, the teacher questionnaire and the teacher test. Upon leaving the school, fieldworkers had to check all of the information collected before returning to the school the following day for the administration of the learner mathematics test.

4.2.6 Data Entry and Data Cleaning

A ten-person team (university students, teachers and data-centre keyboard operators) was recruited and trained in the use of WINDEM, a special data entry package used by SACMEQ to enter all of the data. The data entry took about two months.

At the end of this procedure, the data files were sent by email to the unit "Monitoring Educational Quality" at the IIEP in Paris. Many consistency checks were made for many variables as well as for the identification codes used. The first data files were sent to Paris in February 2001, and after 2 years of exchanges between national teams and IIEP staff, the files were finally declared to be clean on 27 January 2003 (Passos, Nahara, Magaia and Lauchande, 2005, p.24). The reason for this delay was that there was no data verification during the data entry process.

4.2.7 The Calculation of Scale Scores (Rasch)

The data from the trial-testing phase were subjected to Rasch[11] analysis, if item that did not fit the Rasch Model, possibly it did not measure the construct in question. In other words, through investigating differential item functioning one could also detect items that were "behaving differently" across subgroups of respondents defined by gender and country. The poor quality test

[11] Georg Rasch developed the Rasch model in the 1950s. It is a probabilistic model by which linear measures are created to be used in subsequent parametric tests. One of the assumptions of the Rasch model is that a relatively stable latent trait or construct underlies test results (Boone and Rogan, 2005). The Rasch model may also be the only model whereby a scale can be constructed that is separable or invariant to the abilities of the persons tested (Bond and Fox, 2007).

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 included 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," but only the SACMEQ II pupils and SACMEQ II teachers completed these tests.

Although data were gathered at different time points for the SACMEQ I (1995-1997) and SACMEQ II (2000-2002) projects, 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, as shown in Box 3. 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 (Passos, Nahara, Magaia and Lauchande, 2005, p.16).

Box 3 Distribution of items over SACMEQ tests

	SACMEQ 1	**SACMEQ II**	**SACMEQ II TEACHERS**	**More than 1 test**	**TOTAL**
Reading	36	52 of 83	26	34	**148**
Mathematics		50 of 83	28	13	**91**

For the 148-item "composite" reading test, there were 36 items that came only from the SACMEQ I pupil reading test, 52 test items that came only from the SACMEQ II pupil reading test, and 26 items that came only from the SACMEQ II teacher reading test. An additional 34 items were located in more than one test. For the 91-item "composite" mathematics test, there were 50 items that came only from the SACMEQ II pupil mathematics test, and 28 items that came only from the SACMEQ II teacher mathematics test. An additional 13 items were located in both tests.

Both the reading and mathematics data matrices were analysed using computer software that applied the Rasch Model of measurement (Andrich and Luo, 2000, as cited in Ross, Saito, Dolata, Ikeda and Zuze, 2004). 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. The results of the calibration were then used to calculate reading and mathematics scores for all pupils and teachers in all countries.

The final test was deemed to be valid. In each of the SACMEQ countries, the Ministry specialists were asked to identify those items that were in the curriculum. These items were named 'essential' items, and formed a subset of all the items in the test. The correlation between the 'essential' items and all items was 0.99. Indeed, in order to ensure that it was fair to compare all countries on the total test score the correlations between the "essential" items and all items were calculated in every country, and in all cases the results were between 0.98 and 1.00, which confirmed that the tests were valid for Mozambique and also for other countries.

For both reading and mathematics, the mean for all SACMEQ countries was set at 500 (from 1000) and the standard deviation at 100. For Mozambique, the mean pupil score for reading was 517. The mean teacher reading score for all SACMEQ countries was 733, while the mean for Mozambican teachers was 715. This set of outcomes meant that in reading, the Mozambican learners scored above the SACMEQ mean while the teachers scored below the SACMEQ mean (Passos, Nahara, Magaia and Lauchande, 2005, p.17).

4.2.8 The Identification of 'Derived' Skill Level

For each set of tests (pupil and teacher for reading and pupil and teacher for mathematics), the 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 or clusters 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 (1) defining specific skills for each test item; (2) identifying groups of items with similar difficulties; and then (3) naming the "theme" (or competency level) linked with each group were extremely difficult. This difficulty arose because it required the National Researchers Co-ordinators (NRCs) to first reach agreement on how the respondents arrived at correct solutions, and then to name the competency required. These tasks required the NRCs to use their practical knowledge of the ways in which pupils solve problems, and then to portray this insight with a meaningful description of the thought processes that had been applied. The skills audit for the reading and mathematics tests resulted in the identification of eight levels of competence for each test. This number of levels 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.

An abbreviated version of skill levels has been presented in Table 4.4. It will be seen that the levels are hierarchical. The low level represents the pre-reading level in which the pupil matches words and pictures, while the highest level represents the critical reading in which the pupil locates information in longer texts and combines information to infer and evaluate it. It is then possible to calculate the percentage of pupils reaching any one level. These levels have been presented in Chapter 8 in this thesis. These levels can be regarded as being more meaningful than other scores because the competency levels descriptions indicate exactly what pupils can and cannot do (Passos, Nahara, Magaia and Lauchande, 2005, p.8).

Table 4.4

The final skill levels for the SACMEQ reading and mathematics tests

Level	Reading	Mathematics
1	Pre-reading: Matches words and pictures involving concrete concepts and everyday objects. Follows short simple written instructions	Pre-numeracy: Applies single step addition or subtraction operations. Recognises simple shapes. Matches numbers and pictures. Counts in whole numbers.
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.	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. Recognises common two-dimensional shapes.
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.	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.
4	Reading for meaning: Reads on or reads back in order to link and interpret information located in various parts of the text.	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.
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.	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).
6	Inferential reading: 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.	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).
7	Analytical reading: Locates information in longer texts (narrative, document, or expository) by reading on and reading backing 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).	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.
8	Critical reading: Locates information in longer texts (narrative, document, and 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 the topic and the characteristics of the reader – such as age, knowledge, and personal beliefs (values systems, prejudices, and/or biases).	Abstract Problem Solving: 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.

Source: SACMEQ II database, 2004

In SACMEQ I, each of the Ministries of Education established expert national committees that included inspectors, teacher leaders, and teachers. The committees were asked to identify the reading performances that they would expect from a pupil who (a) would barely survive during the next year of schooling (the "Minimum" level), and (b) was guaranteed to succeed during the next year of schooling (the "Desirable" level). It was the average cut-off levels that were established in SACMEQ I that were used in SACMEQ II. However, this process occurred only for reading,

because reading was the only subject matter tested in the SACMEQ I Project. It was thought that this comparison of SACMEQ's would be one further indicator of importance for policy-makers (Passos, Nahara, Magaia and Lauchande, 2005, p.20).

Some of the domains and constructs of which the conceptual framework is composed consist of several indicators. Principal components analysis (PCA) was used in order to group the items in one indicator, and reliability (need more explanation) was calculated for those groups of variables.

4.3 SUMMARY

As indicated in this chapter, SACMEQ used the same instruments, common definitions of target population and standardised procedures to measure pupils' achievement and teacher performance. The steps described in this chapter were undertaken in all SACMEQ countries participating in the study. Planning activities, the construction of the instruments (tests and questionnaires), sampling, data collection, capturing and analysis procedures as steps in the SACMEQ research process were discussed. The main findings associated with the data are described in Chapters 6, 7 and 8.

CHAPTER 5

THE CONCEPTUAL FRAMEWORK, RESEARCH DESIGN AND METHODS

INTRODUCTION

The aim of this chapter is to describe and discuss the conceptual framework of the study, which was adapted from Cheng and Tsui's (1998) model of total teacher effectiveness, to reflect the African educational context and the available SACMEQ database, inclusive of provincial-, national- and regional-level data. Cheng and Tsui's model includes important components relating to teacher competence and pupil performance, such as the internal and external teaching context, pre-existing pupil characteristics, and student experiences. The model also includes cognitive, affective and behavioural domains on three levels, those levels being the school, the group and the individual.

A conceptual framework is like a map (Dewey, 1938, p.402) which assists the researcher in navigating through the process of research. Some conceptual frameworks are ready-made but some must be created or adapted from the theory.

The research design, a secondary study using data from the SACMEQ II study conducted in Mozambique and other SAQMEC countries in 2000, is also described and discussed in this chapter. The conceptual framework is discussed in Section 5.1. This discussion is followed by the outlining of the research questions in Section 5.2. Design issues, specifically sampling, the instruments and procedures are then presented in Section 5.3. Finally, the data analysis plan is summarized in Section 5.3.6 and a summary of the chapter is presented in Section 5.4.

5.1 THE PURPOSE OF THE RESEARCH

The purpose of this study is to describe and explore the main factors that have an effect on Grade 6 teacher competence and pupil performance in the mathematics and reading tests in the SACMEQ II study conducted in Mozambique and some other SACMEQ countries. The first part of the study describes teacher performance and teacher competence as measured by pupil performance in

Mozambique and the other SACMEQ countries in the mathematical and reading tests. The analysis will take into consideration the multiple factors that may influence teacher and pupil performance, such as pupil background, school conditions, parents' education and the availability of textbooks, for example. In the second part of the study, contextual factors are explored and analysed in relation to teacher competence, in an attempt to identify significant predictors of teacher competence in Mozambique and selected SACMEQ countries.

5.2 CONCEPTUAL FRAMEWORK

To understand the conceptual framework and continue the discussion in this chapter, it is important to make a distinction between three central concepts used throughout, competence, competency and competencies, as defined below:

> *Competence can be regarded as a matter of degree. In other words, the more competencies a teacher has, the more competent the teacher is. Competence is conceived of as a matter of repertoire.*
>
> *Competency is defined in terms of what the teacher knows, believes, or can do, not in terms of what the teacher can get pupils to do. "Skill in classroom management" can be a competency whereas "Ability to manage a class" cannot. Competency does occur in the plural. It is customary to regard a competency as something that is either present or absent.*
>
> *Competencies refer to the knowledge, skills, and beliefs in a teacher's repertoire* (Medley, 1982, p.1894).

A review of the literature, as described in the previous chapter, has led to Tomlinson's (1995, p.181) definition of competence, namely:

> *Competence or skill signifies a more or less consistent ability to realise particular sorts of purposes to achieve desired outcomes. A competent person is capable of certain acts or actions: such a person is capable of the actions required to achieve the kind of intended outcome in question.*

Tomlinson's definition has been adapted for this research to include the focus of the study in terms of the specific outcomes of reading and mathematics in the following manner:

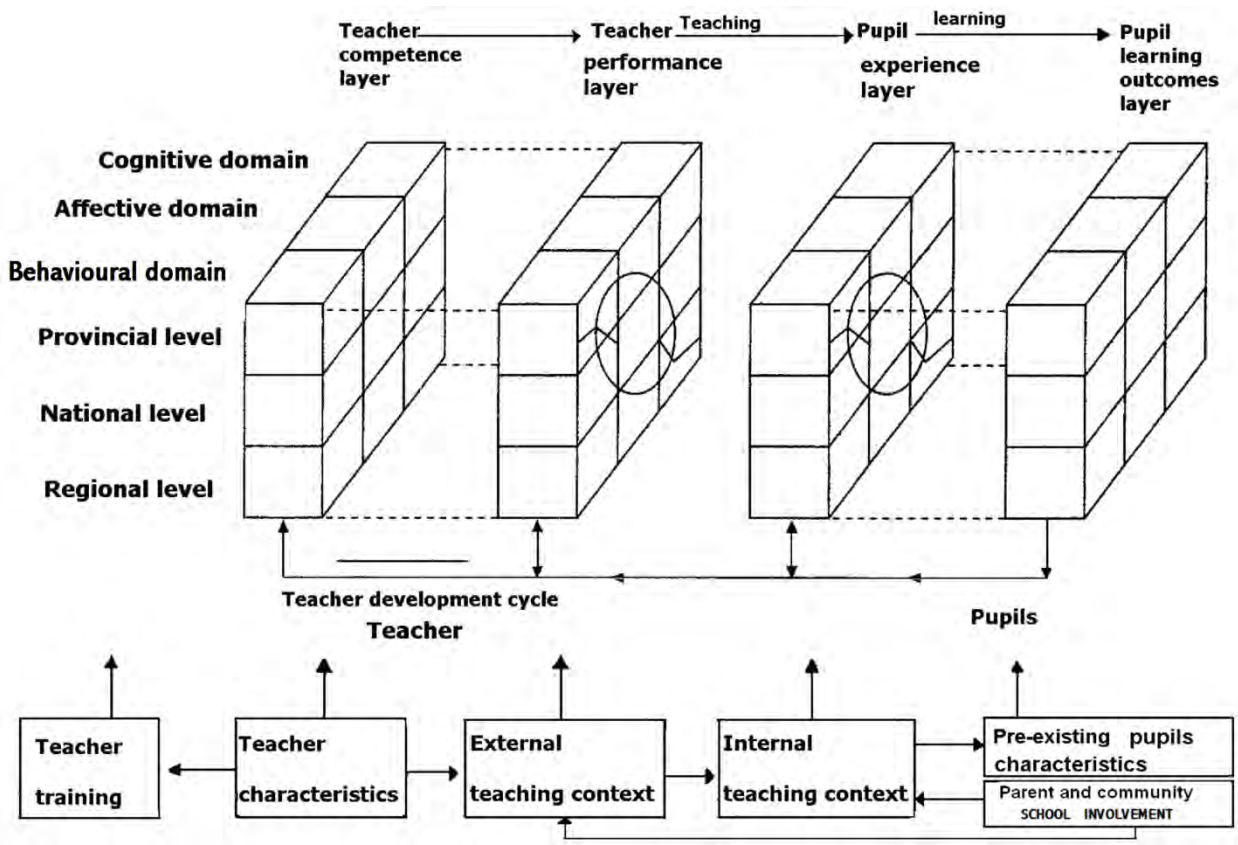
Teacher competence is the consistent ability to realise particular sorts of purposes to achieve desired outcomes in reading and mathematics.

Many models of teacher effectiveness have informed this study. As explained in Chapter 3, two significant models have emerged, the first by Medley (1982) and the second by Cheng and Tsui (1998), who further develop Medley's model. The conceptual framework for this study, as adapted from Cheng and Tsui (1998), will be presented and discussed in the following sections.

5.3 ADAPTED MODEL OF TOTAL TEACHER EFFECTIVENESS

As indicated in Chapter 3, it became clear after analysis of the existing frameworks on total teacher effectiveness, that there were explicit gaps in the literature. These gaps were addressed in Section 3.4 of Chapter 3, and are now further discussed in the conceptual framework for this study, which is a total teacher effectiveness model based on the two models previously referred to.

In this study, the term teacher effectiveness will refer to the results that the teacher or pupils achieved in the SAQMEC II reading and mathematics tests. Cheng and Tsui's (1998) model has been modified and adapted so as to relate it to the African education systems and social contexts under study and to align it to the data available for this study. Figure 5.1 reflects the changes that have been made to the model, which will now be discussed.



Source: Adapted from Cheng and Tsui, 1998

Figure 5.1 Key elements related to teacher effectiveness

- The three levels "individual," "group" and "school" were changed and renamed as the provincial, national and regional levels to reflect the existing SACMEQ database.
- The original model refers to pupils as students. To reflect the terminology used in Mozambique, all labels using 'student' within the model illustration were changed to "pupil." For example, the label "student experience layer" and the "student learning outcomes layer" were changed to the "pupil experience layer" and "pupil learning outcomes" respectively to adjust to the language conventions of Mozambique.
- Teacher characteristics were added due to the variation of these characteristics in the Mozambican context and the belief that their characteristics are essential to explain and understand teacher competence. Outside Mozambique, teacher characteristics are also referred to in the literature as an important variable related to teacher performance. For example, see Murphy (1993). The interaction between teacher characteristics and teacher education leads to teacher competence.
- Teacher training was added because it is an important component for teacher competence.

- In this model, the external teaching context includes the school, the school library, leadership, parents and community role, all of which are factors which can modify or improve the internal teaching context.
- The internal teaching context consists of such matters as text books and equipment, as well as the time spent on tasks. Such elements can influence pre-existing pupil characteristics and consequently improve pupils' performance.
- Parental involvement refers to the role of parents in modifying the internal and external teaching context. The interaction between the teacher, parents and the community is an important aspect as it can result in the modification of the condition of schools and classrooms and, as a result, improve pupils' performance.

This adapted model reflects the belief that teacher competence is part of the overall effectiveness of a teacher in the classroom. The model also displays the interaction between competence and other key components that culminate in teacher effectiveness. Furthermore, it illustrates how the different layers, namely teacher competence, teacher performance, pupil experience and pupil learning outcomes, are related to the cognitive, affective and behavioural domains in the three levels, that is the provincial, national and regional levels. This model is appropriate as the conceptual framework for this study as it reflects most of the variables and concepts that are available in the SACMEQ II database.

Other important information that has an impact on pupil performance such as pre-existing pupil characteristics (gender, age, social status, background), teacher training, the internal teaching context (available classroom furniture, equipment, the time spent on a task), the external teaching context (school facilities, tuition, leadership), and teacher characteristics (sex, age, social status, background) are also included in the model.

Each of the layers in the model will now be described in terms of their content and their relationships with other components of the model.

The Teacher competence layer is the total behavioural, affective and cognitive competence of teachers at provincial, national and regional levels. This layer represents the total static quality of teachers (Cheng and Tsui, 1998). The teachers' level of competency is one of the factors that directly affect the quality of teaching and consequently pupil performance. In order to apply progressive methods of teaching, methods that favour pupil-centred learning based on discovery and consequently on the construction of knowledge by the pupils themselves, teachers are required to have professional training and a level of competence in terms of subject knowledge (Shulman, 1986).

The **Teacher performance layer** is the total performance of a teacher in the three domains at the three levels. It represents the dynamic quality of the teacher in the teaching process. The relationship between two layers can be moderated by the influence of the external teaching context (e.g. organisational factors, leadership and the school environment). Teacher performance is also related to the teachers' professional competence and the level of academic knowledge they have acquired. As stated by Ribeiro (1993, as cited in Passos, Navesse and Chiau, 2000), a high level of academic knowledge is essential for professional teacher training because it is not possible to train good teachers if they do not know the subject matter knowledge that they have to teach. A combination of teachers' high level of academic knowledge and high level of professional training provides the conditions for high teacher performance (Shulman, 1986).

The **Pupil experience layer** represents the total learning experience of pupils in the three domains, namely the cognitive, behavioural and affective at provincial, national and regional levels.

The **Pupil learning outcome layer** represents the pupils' total learning outcomes in the three domains at the three levels. The expected outcomes are determined by relevant real-life needs and are aimed at ensuring an integration of the knowledge, competencies, and orientation needed by pupils to become critical, competent and responsible future citizens.

The **Pre-existing pupil characteristics** (antecedents) are the pupils' experience, gender, age, background, possessions and social status.

The **Internal teaching context** represents the classroom furniture and equipment, the time available for a task, the size of a class, and the textbooks in each classroom.

The **External teaching context** represents the total school resources, the condition of the school, the staff, the nature of the tuition offered, and the role of the parents and the community. The latter is very important, as the parents' role is critical to pupil performance.

Teacher characteristics represent the teachers' age, gender, possessions, background, personal home conditions, knowledge, experience and the approach of a teacher within the three domains at the provincial, national and regional levels.

Teacher training represents the academic and professional training that teachers have acquired in the three domains.

Provincial level teacher effectiveness refers to the overall effectiveness of teachers per province in attempting to achieve objectives in reading and mathematics.

National level teacher effectiveness refers to the effectiveness of a group or team of teachers in attempting to achieve national objectives in reading and mathematics.

Regional level teacher effectiveness refers to the effectiveness of all teachers in the region as a whole in attempting to achieve aims and objectives in reading and mathematics in each SACMEQ country.

This model was chosen on the one hand because the process as a whole could be analysed, and on the other hand because analyses of the variables in each domain could be utilised. In addition, the contents of the SACMEQ reading and mathematics tests are related to the domain classification of the model as defined in Bloom's taxonomy, another component of the conceptual framework which will be discussed in the next subsection. Bloom's classification (1956) of the cognitive domain, in which he includes knowledge, comprehension, application, synthesis, analysis and evaluation, serves a useful function. The research analysis will also give information about the level of pupil difficulties at each skill level (refer to Table 4.4 in Chapter 4) and according to performance as related to overall provincial, national and regional levels.

5.3.1 The Integration of Bloom's Taxonomy

As Cheng and Tsui (1998) do not explicitly define the affective, cognitive and behavioural domains in their model, it is necessary to refer to what a committee of colleagues, led by Bloom, defined as the three domains of educational activity:

The Cognitive domain: mental skills (Knowledge)
The Affective domain: growth in feelings areas (Attitudes)
The Psychomotor domain: manual or physical skills (Skills).

Hauenstein (1998) redefined some of the categories within Bloom's existing domains and added an additional domain, the behavioural domain. However, Gronlund's (2000) adaptation of Bloom's taxonomy is used for the purposes of this study as it is a more refined taxonomy than Hauenstein's (1998) earlier revision. Gronlund's (2000) adaptation has a clear description of the behavioural domain, which is vital for this study. According to Gronlund's (2000) modification of Bloom's Taxonomy, the cognitive, affective and behavioural domains should be described as follows.

The cognitive domain involves mental processes such as knowledge (the recognition and recall of information), comprehension (the interpretation, translation or summarising of given information), application (using information in situations different from the that in which it was learnt), analysis (the separation of wholes into parts, until the relationships among them are clear), synthesis (the combination of elements to form new entities), and evaluation (involving acts of decision making based on a number of criteria or a rationale, or the ability to judge the value of material).

The affective domain has to do with attitudes, opinions, interests, appreciations, values, and emotions (Bloom, Krathwohl and Masia, 1964). Affective learning is about gaining new perceptions (e.g. self-confidence, responsibility, respect, dependability, and sound personal relations). The taxonomy includes receiving (the willingness to receive or attend to particular phenomena or stimuli), responding (as in active participation on the part of the student rather than passive disengagement), valuing (the student sees worth or value in a subject, activity, or assignment), organization (being committed to a set of values as displayed by one's behaviour) and characterizing (total behaviour consistent with internalised values) (Kibler, Cegala, Barker and Miles, 1974).

The **behavioural domain** as defined by Hauenstein (1998, p.3) is a composite of the redefined cognitive, affective and psychomotor domains. The rationale for introducing this new composite domain into the model is that individuals learn as whole persons. The simplified behavioural taxonomy should be useful in classroom and laboratory applications. For example, it could be useful in lesson planning, with levels of behavioural outcomes, the identification of critical information, inputs to achieve outcomes, and the assessment of learning outcomes, as well as in curriculum planning for the development of the individual.

Bloom's taxonomy will be taken into consideration to analyse pupil and teacher performance in terms of the cognitive, affective and behavioural domains. In fact, itemising the factors which make up the quality of a teacher may result in a comprehensive list of essential characteristics, including content knowledge, pedagogical skills, reflection, empathy, managerial competency, commitment, moral conduct, the ability to adjust and improvise, the ability to collaborate with other teachers, and the ability to advance the profession of teaching and to contribute to society at large. Most importantly, the "real" quality of teachers should also be evaluated by their impact on their students.

In general, the quality of the teacher performance layer as a whole has a positive impact on the quality of the student learning experience layer and the latter has a positive relationship with the quality of the student outcomes layer. The relationships may be affected by the characteristics of

the internal teaching context (including the student subculture, the classroom climate, the student ability grouping, the learning environment, etc.) and pre-existing student characteristics (such as IQ, family background, etc.)

The next section presents and discusses the research questions of the study.

5.4 RESEARCH QUESTIONS

As stated earlier, the purpose of this study is to describe and explain the relationship between teacher competence and pupil performance in mathematics and reading in upper primary schools in Mozambique and other SACMEQ countries.

The study adopts a quantitative approach which "is one in which the investigator primarily uses postpositivist claims for developing knowledge (i.e. cause and effect thinking, reduction to specific variables and hypotheses and questions, use of measurement and observation, and the test of theories), employs strategies of inquiry such as experiments and surveys, and collects data on predetermined instruments that yield statistical data" (Creswell, 2003, p.18). The research was initiated by collecting data using predetermined instruments and tests that yielded quantitative, statistical data for the SACMEQ study of 2000. The instruments included closed-ended questionnaires for teachers, pupils and principals, as well as tests in reading and mathematics for teachers and their Grade 6 pupils.

5.4.1 The Research Questions

The purpose of this study is to investigate the effect of teacher competence on pupil performance in Mozambican upper primary schools and other SACMEQ countries. Three main questions direct this project. Each of the questions is derived from and related to the variables in the conceptual framework illustrated in Figure 5.1. To answer Question One would mean providing information related to the quality of education in Mozambique in terms of teacher competence and its relationship to pupil performance, where the overall results are described by province and nationwide. Question Two's results are described by country and region, and Question Three provides information about the main factors influencing education quality in Mozambique and other SACMEQ countries in terms of teacher competence and its relationship to pupil performance:

1. What is the relationship between teacher competence and pupil performance in reading and mathematics in upper primary school in Mozambique?

2. How does the relationship between teacher competence and pupil performance in reading and in mathematics compare across the different Southern Africa Consortium for Monitoring Educational Quality (SACMEQ) countries?
3. What were the main predictors of pupil performance in reading and in mathematics in upper primary in Mozambique and in other SACMEQ countries?

5.4.2 Phase 1 and 2 Research Questions

A number of sub-questions were formulated in initiating the first two phases of the research, answering of which would contribute to arriving at answers to the main research questions. Phase 1 is the descriptive component of the research, which will be addressed in Chapters 6, 7 and 8 below, while Phase 2 is an exploratory analysis, which will be addressed in Chapter 9 (see Appendix 1 for more details).

Phase 1 Descriptive component

These Phase 1 sub-questions are aimed at describing the results of the SACMEQ study and the characteristics of the sample in Mozambique and other countries in terms of context. They assisted in identifying variables to include in the analysis of performance for the first two main research questions. They are:

1. What were the characteristics of the pupils and teachers and schools in Mozambique and in the SACMEQ countries?
2. What were the performances of pupils and teachers in reading and mathematics in Mozambique and in other SACMEQ countries?

To address the first main research question: **What were the characteristics of the pupils and teachers and schools in Mozambique and in the SACMEQ countries?** The related sub-questions need elaboration:

a) *What were the characteristics of the schools that participated in the SACMEQ II study?*

The question is derived from the conceptual framework and is related to the external teaching context. The answer to this question provides information related to school quality in terms of buildings, equipment, the resource centre and the library, and also includes inspection, tuition, and the roles of the parents and the community. The overall results for Mozambique are compared with

those of the other SACMEQ countries involved in the study. The results are described by province, nation and region (see Chapter 7, Tables 7.5, 7.6, 7.8, 7.9 and 7.11, and Figures 7.5, 7.6 and 7.7).

b) What were the characteristics of the classrooms in the schools that participated in the SACMEQ II study?

This question is directly linked with the internal teaching context in the conceptual framework. The answer to this question provides information related to the classroom background in Mozambique and in other SACMEQ countries in terms of classroom furniture and equipment, the time spent on tasks, class size and textbooks. The overall results are compared with those of the other SACMEQ countries involved in the study. The results are described by province, nation and region (see Chapter 7, Tables 7.1, 7.2, 7.3 and 7.4, and Figures 7.1, 7.2, 7.3, 7.4, 7.5 and 7.6).

c) What were the characteristics of pupils involved in the SACMEQ II study?

The question is related to pupil characteristics as seen in the conceptual framework. The answer to this question provides information related to the pupils' background in Mozambique and in other SACMEQ countries, such as pupils' gender, age, possessions and social status. The overall results are compared with those of the other SACMEQ countries involved in the study. The results are described by gender and age, province, nation and region (see Chapter 6, Tables 6.16 and 6.20).

d) What were the characteristics of the teachers involved in the SACMEQ II study?

The question is related to teacher characteristics as seen in the conceptual framework. The answer to this question provides information related to the teachers' background in Mozambique, such as teachers' gender, age, possessions, experience, academic level and social status. The overall results are compared with those of the other SACMEQ countries involved in the study. The results are described by gender and age, province, nation and regional (see Chapter 6, Tables 6.1 and 6.4, and Figures 6.1, 6.2, 6.3 and 6.4).

e) What were the professional profiles of the teachers involved in the SACMEQ II study?

The question is related to the teachers' training, as seen in the conceptual framework. The answer to this question provides information related to the teachers' professional profile in Mozambique. The overall results are compared with those of the other SACMEQ countries involved in the study. The results are described by gender and age, province, nation and region (see Chapter 6, Tables 6.4

and 6.11). This information is a foundation for the understanding and interpretation of the results described in Chapters 8 and 9.

The second question is **"What were the performances of pupils and teacher in Mozambique and in SACMEQ countries?"** To address this, specific questions informed by the conceptual framework were formulated as follows:

f) How did teachers perform in the mathematics and reading tests in Mozambique and in the other SACMEQ countries?

The question is related to teacher performance, as seen in the conceptual framework. The answer provides information about the performance of teachers in the SACMEQ tests in Mozambique and in the other countries participating in the study. The overall results are compared with those of the other SACMEQ countries involved in the study. The results are described by gender, socio-economic status and school location by nation and regional (see Chapter 8, Figures 8.1, 8.2, 8.17 and 8.18).

g) How did pupils perform in the mathematics and reading tests in Mozambique and in other SACMEQ countries?

The question is related to the pupils' learning outcomes as seen in the conceptual framework. The answer provides information related to the pupils' performance in the SACMEQ tests in Mozambique and in the other countries participating in the study. The overall results are compared with those of the other SACMEQ countries involved in the study**.** The results are described by gender and age, province, nation and region (see Chapter 8, Figures 8.3 to 8.16 and Figures 8.19 to 8.32).

The relationship between teacher competence and pupil performance is explored in Phase 2.

Phase 2 – Exploratory analysis

One of the issues to be explored in the second phase is the relationship between teachers' professional training and pupils' performance in reading and in mathematics. An analysis was undertaken to see whether or not there is a significant difference in pupil performance between pupils with trained or untrained teacher. The analysis was also concerned with the interrelationship between pupil performance and other factors. As previously stated, the second phase is the exploratory part of the study, the purpose of which is to address the central research question, namely: What is the effect of teacher competence on pupil performance in reading and in

mathematics in upper primary school in Mozambique and in other SACMEQ countries? This question was ramified as follows:

What is the relationship between teacher competence and pupil performance in reading and in mathematics in upper primary school in Mozambique?

Specific questions are:

1. *How did pupils perform in reading in upper primary schools in Mozambique?*
2. *How did pupils perform in mathematics in upper primary schools in Mozambique?*

How does the relationship between teacher competence and pupil performance in mathematics and reading compare across the different SACMEQ countries?

Specific questions are:

3. *How did pupils perform in reading in upper primary schools in SACMEQ countries?*
4. *How did pupils perform in mathematics in upper primary schools in SACMEQ countries?*

To address these questions an exploratory analysis of variables at different levels was conducted using correlation and multivariate regression. The aim of the exploration was to identify the relationship between teacher competence and pupil performance as well as the main predictors of pupil performance in reading and mathematics.

Research Question 3 provides information about the main predictors influencing education quality in Mozambique and other SACMEQ countries in terms of teacher competence and its effects on pupil performance (see Chapter 9 Tables 9.1 to 9.21).

To what extent does teacher competence predict pupil performance in reading and in mathematics in upper primary schools in Mozambique and in other SACMEQ countries?

To address critical question number 3, specific questions were formulated as follows:

a) *What were the main predictors of pupil performance in reading in Mozambique?*
b) *What were the main predictors of pupil performance in mathematics in Mozambique?*

c) *What were the main predictors of pupil performance in reading in SACMEQ countries?*

d) *What were the main predictors of pupil performance in mathematics in SACMEQ countries?*

The questions are derived from the conceptual framework and are related to the main predictors of pupil performance in reading and mathematics in Mozambique and in other SACMEQ countries.

The answers to these questions provide information related to the factors that have the strongest influence on pupil performance in Mozambique and in other SACMEQ countries. The overall results of Mozambique are compared with those of the other SACMEQ countries involved in the study. The results are described nationwide and regionally (see Chapter 9 Tables 9.22 to 9.29).

The aim of the exploration was an attempt to ascertain which of the variables in the conceptual framework has the strongest influence on pupil performance in reading and in mathematics in Mozambique and in other SACMEQ countries. Evidence from previous research suggests that there is a relationship between teacher competence and pupil performance, as confirmed by Sander and Horn (1998) when they emphasized the linkage between teacher competence and student achievement. For Châu (1996), the teacher's level of competence is one of the factors that directly affect the quality of teaching. Some researchers, such as Steyn (1999) and Dimmock (1990) confirm the important role of teacher competence in determining the quality of pupil performances. According to Botha and Hite (2000), a competent teacher will focus, with his learners, on particular predetermined results or outcomes (see Chapter 3). However, it should be stressed that pupil performance is determined by other factors such as the pupils' background, school conditions and home language, just to mention a few. Therefore, the variables related to pupil performance will be explored to determine whether, and if so, how they affect pupil performance. The study is highly descriptive and exploratory and an analysis will be performed to establish the extent of the relationship between teacher competence and pupil performance. This aspect is discussed in Chapter 9 on the basis of the results of correlation and Multi Regression Model.

5.5 SOME DESIGN ISSUES

The sample, the instruments, the procedures and the analysis plan used for this study are presented and discussed in this section. General information related to the SACMEQ design has already been given in Chapter 4.

5.5.1 Design Origins

The research design for the SACMEQ study was standardised across all participating countries. The design itself is discussed in detail by Ross, Saito, Dolata, Ikeda and Zuze (2004). However, for convenience's sake the design is outlined in this section too, to assist the reader in understanding the research process that was initiated for the SACMEQ II study. The data from the SACMEQ II study is used for further analysis in this thesis.

5.5.2 Reasons for Sample Focus

The SACMEQ I and II projects focused on the Grade 6 level for three main reasons, these being:

i. Grade 6 was identified as a point near the end of primary schooling where school participation rates were reasonably high for most of the seven countries. For this reason, Grade 6 represented a point that was suitable for assessing the contribution of primary schooling towards the literacy and numeracy levels of a broad cross-section of society.
ii. The National Co-ordinators (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.
iii. 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 specific key "explanatory" variables. For example, the NRCs felt that children at lower grade levels would not know how many years of education their parents had received, and they would also have difficulty in accurately describing the socio-economic environment of their own homes (for example, the number of books at home) (Ross, Saito, Dolata, Ikeda and Zuze, 2004, p.21).

5.5.3 Desired, Excluded and Defined Target Populations

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 school (Ross, Saito, Dolata, Ikeda and Zuze, 2004, p.21).

The use of the word "mainstream" in the definition of the desired target population automatically indicated that special schools for those with disabilities should be excluded from the SACMEQ II data collection. In addition, a decision was taken to exclude small schools, that is, schools having fewer 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. These schools were also known to be mostly located in very isolated areas that were associated with high data collections costs, and it was determined that these schools could be excluded without leading to major distortions in the study population (Ross, Saito, Dolata, Ikeda and Zuze, 2004).

5.5.4 The Numbers of Schools and Pupils required for the SACMEQ II Study

The SACMEQ II study used the same instruments, common definitions of target populations, and standardised procedures in order to measure student achievement in each of the participating countries. As stated in Chapter 3, the number of schools required in the sample is in part a function of the intra-class correlation (rho). The values of rho for educational achievement measures are usually higher for education systems where pupils are allocated differentially to schools based on 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 (Ross, Saito, Dolata, Ikeda and Zuze, 2004, p.26).

The following is the formula often used for estimating the value of rho in situations where two-stage cluster sampling is employed using approximately equal-sized clusters.

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

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 intra-class correlation for

most of the countries involved in the SACMEQ II Project. An exception was made for Namibia, where calculations based on SACMEQ I data indicated that a value of rho = 0.6 should be used (Ross, Saito, Dolata, Ikeda and Zuze, 2004, p.27).

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, where value of rho = 0.6 applied 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 (Ross, Saito, Dolata, Ikeda and Zuze, 2004, p.28).

5.5.5 Sample

Table 5.1 below presents the number of schools and pupils in the desired, defined, excluded, planned and achieved populations in each country for the SACMEQ II project. The table also presents the net enrolment as well as the gross enrolment in each country.

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 was involved), to 275 in Namibia (where the known magnitude of the coefficient of intra-class 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.

As can be seen in Table 5.1, of the fourteen countries involved, six reached the planned number of schools, namely Botswana, Kenya, Malawi, Mauritius, Namibia and the Seychelles. South Africa realised the lowest proportion of the planned sample schools, delivering on only 169 schools instead of the 185 schools planned for (91% of the intended sample). The delivery in the other countries ranged from 99% in Swaziland, Uganda and Zambia to 96% in Zanzibar.

Table 5.1

Sampling in the SACMEQ countries

Coun-tries	Net/Gross E.R. 2000		Desired, Defined and Excluded Populations							Planned and Achieved Samples					
			Desired		Defined		Excluded			Schools			Pupils		
	NER	GER	Schools	Pupils	Schools	Pupils	Schools	Pupils	Pupil %	Plan-Ned	Achieved No	Achieved %	Planned	Achieved No	Achieved %
BOT	87.6*	117.9*	720	41 408	589	39 773	131	1 635	3.9	170	170	100	3 400	3 322	98
KEN	86.5	96.3	15 439	631 544	13 313	607 900	2 126	23 644	3.7	185	185	100	3 700	3 299	89
LES	83.0*	91.8*	1 170	40 493	947	39 212	223	1 281	3.2	180	177	98	3 600	3 155	88
MAL	91.6*	109.9*	3 663	219 945	3 368	212 046	295	7 899	3.6	140	140	100	2 800	2 333	83
MAU	97.0	104.0	277	26 510	274	26 481	3	29	0.1	159	159	100	3 180	2 945	93
MOZ	54.7	92.1	509	112 279	500	112 173	9	106	0.1	180	176	98	3 600	3 177	88
NAM	91.3	119.4	849	48 567	767	47 683	82	884	1.8	275	275	100	5 500	5 048	92
SEY	100	101.0	25	1 577	24	1 571	1	6	0.4	24	24	100	1 546	1 484	96
SOU	97.0	99.0	17 073	962 350	11 997	920 020	5 076	42 330	4.4	185	169	91	3 700	3 163	85
SWA	76.1*	100.5*	498	19 940	458	19 541	40	399	2.0	170	168	99	3 400	3 139	92
TAN	58.8	77.6	10 786	529 296	9 516	511 354	1 270	17 942	3.4	185	181	98	3 700	2 854	77
UGA	110.7	128.3	9 688	517 861	8 425	499 127	1 263	18 734	3.6	164	163	99	3 280	2 642	81
ZAM	65.6	77.9	3 858	180 584	3 090	176 336	768	4 248	2.4	175	173	99	3 500	2 611	75
ZAN	71.0	92.2	161	22 179	151	22 041	10	138	0.6	151	145	96	3 020	2 514	83
TOT	**-**	**-**	**64 716**	**3 354 533**	**53 419**	**3 235 258**	**11 297**	**119 275**	**3.6**	**2 343**	**2 305**	**98**	**47 92 6**	**41 686**	**87**

Source: Data from SACMEQ database, 2004.

(*) The figures were estimated by the NRCs from raw data.

Legend: TOT= Total; NER=Net Enrolment Ratios; GER=Gross Enrolment Ratios
Enrolment in EP1 - is the proportion between the total number of pupils schooling at EP1 and the official age group supposed to be schooling at EP1 (age group of 6-10) (MEC, DP, 2005, p.5)
Net Enrolment in EP1 – is the proportion between the pupils schooling at EP1 with the official age for that level (6-10 years) and the population in that age group) (MEC, DP, 2005, p.5).
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.
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 (Ross, Saito, Dolata, Ikeda and Zuze, SACMEQ database, 2004,pp.21 & 24).

No countries reached the planned sample of pupils. Botswana had the highest percentage of pupil that participated in the test (98%) and Zambia had the lowest percentage of pupils that took part in the tests. Of the 180 schools planned for, Mozambique reached 168, giving a total of 3 177 pupils of the 3 600 intended. Because of an rho of 0.6, Namibia had the highest number of schools (275 planned and achieved) and pupils (5 500 planned and 5 048 achieved) involved in the study. In all of the SACMEQ countries taken together, out of the 2 343 schools planned for, 2 305 were reached (98%), and of the 47 926 pupils anticipated, 41 686 (87%) were reached.

5.5.6 Instruments

The information to be used in this study comprises school head questionnaires, teacher and pupil questionnaires and information related to teacher and pupil performance in the SACMEQ II tests in mathematics and in reading (see Appendix 2 for more details). As stated before, all of the countries used the same instruments for the SACMEQ study and followed the same methodology for data collection. In addition to the description in Chapter 3 of the instruments used in the SACMEQ II study, it is necessary to note that because of the language of instruction in Tanzania and Zanzibar, these pupil instruments were translated into Swahili. In Mozambique, where Portuguese is the official language and the language of instruction from Grade One, all of the instruments were translated into Portuguese. All of the instruments were administered in English in the rest of the countries.

5.5.7 Procedures

According to Ross, Saito, Dolata, Ikeda and Zuze (2004), the main SACMEQ II data collection occurred for twelve of the fifteen SACMEQ Ministries of Education in the period September to December 2000. The Mauritian data collection was completed in July 2001, and the Malawian data collection in September 2002.

The Rasch scaling could be conducted only after all countries' data files had been cleaned. Some countries took a long time with this cleaning process, and it was only in May 2003 that the final country's data file was ready and the scaling and scoring could begin. Once this had been completed, then the calculations required for the dummy tables could be undertaken. This tabling was produced by the Paris "Monitoring Educational Quality" team, and the dummy tables were sent out to all SACMEQ countries (Ross, Saito, Dolata, Ikeda and Zuze, 2004).

Data Analysis

The analysis of the data is descriptive in the first phase of the research, and forms the background to the understanding and interpreting of the second phase, in which an explorative analysis of variables at different levels was conducted. The aim of the exploration is to identify the relationship between teacher competence and pupil performance in reading and mathematics using correlation analysis and a multiple regression model.

The descriptive analysis[12] focused on using measures of central tendency (means, percentages) and variation (standard errors) to describe pupil and teacher performance in the SACMEQ reading and mathematics tests, as well as the condition of the schools and the pupils' and teachers' measurable characteristics. The second phase comprises two stages, the first of which was an inferential analysis in which statistics were generated using the t-test and F-test to analyse variations in pupil performance in relation to factors such as gender and school location. This stage also includes bivariate correlations and partial correlation analysis such as correlations between pupil performance and teacher profile and the condition of the schools. The focus of the second stage was the multivariate statistical analyses, specifically multiple regression analysis and principal component analysis (PCA). Multiple regressions of the teacher profile (teacher knowledge, professional training, academic level and teacher experience) and school conditions as factors influencing pupil performance were conducted. The analyses were performed at national and regional level. Some of the variables were reduced using PCA. Each of the techniques used in the third part of the analysis are elaborated in the following Sections, as also the rationale for using them.

Analysis Plan

The analysis of the data was structured as follows:

Weighted data was used in order to compare the results from different countries for this study (see phase 11 in chapter 4 section 4.2.2). The first step was an exploratory analysis using basic statistics to summarize and describe the pupil and teacher performance, the condition of the schools, and the socio-demographic characteristics of the SACMEQ countries. This information highlights the context in which the study was conducted and it also forms the background for supporting and understanding the results in Chapter 9.

Principal components analysis (PCA) was then used to group the number of items into constructs which could then be directly related to each domain according to the Cheng and Tsui model[13].

[12] This thesis is a secondary study. The problem of missing data could therefore not be addressed.
[13] There was a need to aggregate the variables at school level as the pupils and teachers belong to schools.

Apart from using principal component analysis as a method to explore construct-related validity, the reliability of a measure would also speak to the validity of inferences being made. In this regard, internal consistency reliability is used namely Cronbach alpha. In addition by undertaking reliability analysis the level of measurement error can also be estimated. Values of Cronbach coefficient greater that 0.8 is an indication of good reliability (Kline, 2003)

Next, an exploratory analysis of the correlations between the indicators in each domain and pupil performance was performed, to have a first indication of the variables that are most likely to be predictors of pupil performance. Finally, a stepwise regression analysis was used to explore to what extent the data fits the Cheng and Tsui model.

The analysis started with univariate statistics of all important variables linked with the research questions (see Appendix 3 for more information). An exploratory principal component analysis was used in the next stage. Scale analysis and a reliability coefficient were used to develop valid constructs described in the conceptual framework, which are the constructs that capture the three domains defined by Cheng and Tsui (1998), namely the cognitive, affective and behavioural domains. For each domain, a construct was developed for pupils and teachers. Other constructs were included, in addition to the Cheng and Tsui (1998) domains and levels, such as pupil characteristics, the internal teaching context, the external teaching context, teachers' characteristics, teacher training, and parental and community involvement.

Before undertaking Multivariate regression the descriptive statistics were analysed as was described in Chapters 6 and 7. Furthermore, correlation analyses was undertaken to ascertain which relationships (see Chapter 9) should be explored in the regression analyses.

A stepwise multivariate regression model was used to analyse the variation in pupil performance indicated by the predictors. These results made it possible to understand the extent to which the data and the relationships are explained by the conceptual framework. The variables and the descriptive statistics (described in Chapters 6 and 7) include a correlation matrix (reported in Chapter 9) to provide initial relationships for further analysis of the effect of teacher competence on pupil performance. [14].

[14] There was a need to aggregate the variables at school level as the pupils and teachers belong to schools.

Multiple Regression

The Multiple regression model is one of the recommended approach to see to what extent the Cheng and Tsui model fit the data. In this approach the research population consisted of schools and pupils within the schools. The sampling procedure took place in two stages. Firstly, a sample of schools was drawn and subsequently a sample of pupils within each school was drawn. For instance, pupils in the same schools tend to be similar to one another, because of the selection process in the area that feeds the school. Some schools may attract pupils from a higher socio-economic status (SES) while others attract more pupils from a lower socio-economic status. As a result, the average correlation (the inter-class correlation) between variables measured on pupils from the same schools may be higher than the average correlation between variables measured on pupils from different schools. Raudenbush and Willms (1995) have used the statistical model to analyse the school effect, "where the outcome variable (Y) as arising from the influence of school practice (P), school context (C), student background (S), and random error (e) according to the additive model

$$Y_{ij} = \mu + P_{ij} + C_{ij} + S_{ij} + e_{ij}$$

where Y_{ij} = the outcome for student *i* in school j; μ = the grand mean of Y; P_{ij} = the effect of school practice (including, for example, school resources, organizational structure, and instructional leadership) on student*i* in school j; C_{ij} = the contribution of school context (including, for example, the mean socioeconomic level of the school's pupils/student and the unemployment rate of the community) (Raffe and Willms, 1989, as cited in Raudenbush and Willms, 1995, p.313); S_{ij} = the influence of the measured pupil background variables (including, for example, pre-entry aptitude or socioeconomic status); and e_{ij} = a random unmeasurable sources of a particular student's/pupil outcome, assumed statistically independent of P, C, and S with zero mean and a homogeneous variance $\sigma^2(e)$" (Raudenbush and Willms, 1995, p.313).

The Ordinary Least Squares (OLS) regression model had to be used at school level owing to the existence of various constraints, but bearing in mind its limitations. This model indicated the extent to which pupil performance at school level could be explained by the construct of the Tsui and Cheng (1998) model[15]. According to Woodhouse and Goldstein (1988), the Ordinary Least Squares Regression has a widely-known limitation giving rise to its inability to cope with the hierarchical nature of school and pupil-based data. In the OLS model, the hierarchical nature of the data is generally ignored and it is assumed that individual pupils' outcomes within a school are independent of each other. Because of this weakness, it is argued that OLS regression can lead to an inaccurate and poorly estimated model (Shuttleworth, 1995, p.494).

[15] The inter-class correlation is high in some countries, implying that variation between schools is stronger than that within schools.

The school-level regression model is used in this research. The equation for the regression model is presented below. The response variable, Y, and q predictor variables, x_1, x_2, ,x_q are expressed in a linear model:

$$Y_i=\beta_o+\sum\beta_{ij}x_{ij}+e_{ij}$$

where Y_i is the school average and x_i is the indicator of each domain or construct j, namely the cognitive, affective and behavioural domains, and constructs such as teacher training, teachers' characteristics, the internal teaching context, the external teaching context, pupils' characteristics, and parent and community involvement. In some cases, the indicator is a result of the principal component analysis. β_i is the estimated partial regression coefficient, which measures the magnitude effects of the indicator on pupil performance at school level, and x_i represents the predictor within each domain or construct in the conceptual framework.

The following assumptions were made (as referred to by Mendenhall and Sincich, 1996):

Assumption one: the variance of the probability distribution of ε is constant for all settings of the independent variable x.

Assumption two: the probability distribution of ε is normal. Tests of normality will be used to check this assumption.

Assumption three: the errors associated with any two different observations are independent. That is, the error associated with one value of y has no effect on the error associated with other y values was used to check this assumption.

According to Mendenhall and Sincich (1996), multiple regression analysis is recognized by the practitioners as a powerful tool for modelling a response y, and is widely used. However, there are a number of pitfalls which had to be considered in this study, as follows.

Multicollinearity issues arise due to the fact that the indicators are correlated in many cases. One of the consequences of multicollinearity is a higher r^2 with few independent variables being significant. This artefact is likely to occur in the case of this research due to the fact that most predictors are correlated. Mendenhall and Sincich (1996) discussed ways of detecting multicollinearity. The estimation of the Variation Inflaction Factor (VIF) is one of the methods used to measure the level of multicollinearity. The quantity $(1/\ (1-R^2_i))$ is called the variance

inflation for the parameter β_1, denoted $(VIF)_1$ (Mendenhall and Sincich, 1996, p.356). A large R^2 means that the independent variables x_i are strongly related to the other independent variables. A high VIF (more than 10) VIF means that the variables are strongly correlated. In this research, a VIF of less than 10 will be used as a criterion to select predictors.

Heteroscedasticity *y*: at each level of the predictor variable(s), the variance of the residual terms should be constant. This means that the residuals at each level of the predictor(s) should have the same variance (homoscedasticity). When the variances are unequal this is referred to as heteroscedasticity, a condition which has consequences for the robustness of the model. In the presence of a higher level of heteroscedasticity the t-test and f-test might be questionable. Heteroscedasticity will be detected in this study through the examination of patterns of residual plots. The pattern of residual plots often suggests the appropriate variance-stabilizing transformation[16] to use. A correlation between the predictors and the residual was also used to explore heteroscedasticity.

Principal Component Analysis

Principal component analysis (PCA) identifies common components (or factors) underlying a set of items in survey data. It can be used to analyse interrelationships among a large number of variables and explain these variables in terms of their underlying factors. With this approach, the information contained in the original variables is condensed into a smaller set of constructs (Smith, 2002). This small number of constructs was estimated (as exploratory variables) using a multi regression model (MRM).

Some of the domains comprised more than 20 indicators, for example the external teaching context, which had 25 indicators. PCA was applied to group the indicators into a reduced number of variables. Those constructs or components were used as explanatory variables in a regression model to analyse the extent to which the various dimensions predicted the pupil performance.

Criteria for the selection of the predictors for Multiple Regressions Model (MRM)

Various steps were taken to select the predictors for inclusion in the MRM. The first was the analysis of the bivariate correlation between pupil performance and the various indicators in each domain. Correlation coefficient with an absolute value equal to or higher than 0.15 with achievement (reading and mathematics), was taken as the cut-off point for inclusion in the MRM. The variables related to teacher qualifications were also included. For the second step, MRM was run by using the predictors selected in the first step. The analysis of the results shows that some of

[16] Logarithmic transformation is one way of stabilising the variance.

the predictors that were supposed to explain pupil performance did not show a significant regression coefficient. The existence of multicollinearity is one of the possible reasons for not getting a significant partial regression coefficient. Stepwise regression was therefore used to address this problem in order to identify the most important predictors of pupil performance in Mozambique and in the SACMEQ countries. The most commonly used stepwise regression procedure available in most popular statistical software packages works as follows: The user first identifies the response, y, and then the set of potentially important independent variables, x_1, $x_{2...}x_n$, where **n** is generally large. The stepwise procedure essentially uses a forward selection procedure during analysis. Thus, at each point during the analysis the variable with a highest correlation is added to the model. The first variable is added based solely on the highest correlation while the variables added thereafter is added based on the highest correlation after *Y* has been adjusted for based on the effect of the first variable added. It is also important to note that it is possible for variables included in initial stages of the regression to be deleted in later stages, as different levels of significance are assumed for the inclusion and exclusion of variables (Chatterjee and Hadi, 2006).

5.6 SUMMARY

The conceptual framework for this study was adopted and adapted from Cheng and Tsui's model (1998), which was adapted from Medley (1982). The adaptations to Cheng and Tsui's model were necessary to reflect language usage in the relevant countries and to reflect the practices in schools. The research questions, as related to the conceptual framework and in terms of their functions, were outlined in detail.

The study involves all participating SACMEQ countries. Some countries attained the intended sample of schools, but none achieved the intended sample of pupils. Mozambique, Tanzania and Zanzibar translated the instruments into Portuguese and Swahili respectively.

The analysis of the information is descriptive initially, and this is followed by an explorative analysis of variables at different levels. The aim of the exploration is to identify the relationship between teacher competence and pupil performance in reading and mathematics using correlation analysis and MRM.

The next chapter describes the conditions of the schools, and pupils' and teachers' characteristics in Mozambique and in other SACMEQ countries. Chapter 6 also provides information related to the level of teachers' professional and personal satisfaction.

CHAPTER 6

TEACHER AND PUPIL CHARACTERISTICS IN MOZAMBIQUE AND IN OTHER SACMEQ COUNTRIES

INTRODUCTION

The aim of this chapter is to describe the characteristics in terms of gender, age, social status, academic education, professional training and professional experience reported by teachers at the Grade 6 level in primary schools in Mozambique and SACMEQ countries, as well as of their pupils, and the problems that they encounter. This information is presented firstly, to provide a context for the subsequent analysis and interpretation of teacher and pupil performance discussed in Chapter 8, and secondly, so that teacher characteristics can be related to a teacher and pupil performance. In addition, the results presented in this chapter are largely based on the Mozambican report (see Passos, Nahara, Magaia and Lauchande, 2005) and use data from the SACMEQ database archive (2004). These results serve as background information for the analysis in Chapters 8 and 9.

The information presented in Section 6.1 describes teacher characteristics, namely sex, age and socio-economic status, in Mozambique and SACMEQ countries. In addition, job satisfaction, teachers' qualifications and experience as well as professional training and experience are presented. In Section 6.2, pupil characteristics, such as age and sex, is discussed, as well as the problems they encounter with their socio-economic status in Mozambique and other SACMEQ countries. Section 6.3 draws this discussion to a conclusion.

6.1 TEACHERS' CHARACTERISTICS IN MOZAMBIQUE AND IN SACMEQ COUNTRIES

Mozambican and regional teacher characteristics are presented and discussed in the next section in order to provide a background to this study and in order to address the research questions.

6.1.1 Teacher Characteristics in Mozambique

The quality of teacher training is one of the controversial issues under discussion among the stakeholders in the Ministry of Education and Culture. Mozambique has had, since 1975, many models of teacher training curricula, but until 2008, the Ministry of Education and Culture has not had an ideal model for teacher training. As a result, the poor levels of effectiveness of the education system may, in some way, be explained by the lack of a coherent teacher training policy.

Teacher Education is provided at the Lower Primary School Teacher Training Colleges (CFPP), and Primary School Teacher Training Institutes (IMP before 1992 and IMAP since 1992). The entry qualification for lower primary school teacher training colleges is Grade 7 and the teachers are trained for three years, enabling them to teach in lower primary schools from Grades 1 to 5. The entry qualification for primary school teacher training institutes is Grade 10 and the teachers are trained to teach in both lower and upper primary schools**.** The duration of this course is two years.

Sex, age and socio-economic status of teachers in Mozambique

To assist in developing a picture of teachers in Mozambique, characteristics such as sex, age and their socio- economic status (SES) is discussed. The means, percentages, and sampling errors for age, gender, and socio-economic background of reading and mathematics teachers across the 11 provinces in Mozambique, are presented in Table 6.1. To facilitate readability, these figures are rounded off when referred to in the text.

Table 6.1

Mean, percentages, and sampling errors for age, gender, and socio-economic status of reading and mathematics teachers

Region	Reading teachers						Mathematics teachers					
	Age (years)		Gender (female)		Possessions at home (index)		Age (years)		Gender (female)		Possessions at home (index)	
	Mean	SE	%	SE	Mean	SE	Mean	SE	%	SE	Mean	SE
Cabo Delgado	35.7	1.05	9.4	9.46	3.0	0.42	32.3	1.02	0.0	0.00	3.2	0.24
Gaza	33.1	1.84	44.5	13.45	3.9	0.65	28.8	1.90	32.1	12.36	3.2	0.30
Inhambane	29.2	2.18	27.8	11.03	3.2	0.56	30.0	2.22	23.5	10.71	4.6	0.42
Maputo Cidade	33.8	0.99	46.1	8.85	4.1	0.32	33.1	0.78	45.7	9.02	4.6	0.54
Manica	35.2	2.22	23.8	9.58	4.7	0.49	32.4	1.61	15.9	6.95	4.3	0.41
Maputo Província	31.5	1.17	20.8	8.38	5.3	0.50	30.5	1.24	42.6	11.01	4.1	0.51
Nampula	34.4	1.92	15.7	5.23	3.7	0.31	31.0	1.33	8.7	3.68	2.7	0.32
Niassa	28.2	0.87	9.2	6.25	3.4	0.30	29.9	0.53	0.0	0.00	3.3	0.35
Sofala	35.3	1.49	50.1	8.90	4.4	0.39	33.1	0.87	39.4	7.73	5.1	0.41
Tete	32.1	1.57	34.4	11.07	4.1	0.36	31.5	1.58	21.6	8.59	3.4	0.41
Zambézia	32.0	1.31	14.7	8.36	3.9	0.29	30.1	0.94	12.6	5.42	3.5	0.33
Mozambique	**32.7**		**29.9**		**3.9**		**31.1**		**26.0**		**3.8**	**0.15**

Source: SACMEQ database, 2004

Maputo Cidade, one of the provinces and the capital of the country, has a high level of social and economic development compared with the other provinces. Socio-economic status is one of the variables that may have a positive impact on teacher and pupil performance. This issue is taken into consideration in the analysis of the results across provinces.

Focusing on Grade 6 reading and mathematics teachers in Mozambican schools, the SACMEQ study found that the teachers of reading were on average almost 33 years old compared to mathematics teachers, who were 31 years of age. The ages ranged from 28 years old in Niassa to 36 years old in Cabo Delgado for reading teachers, and, from 29 years in Gaza to 33 years in Maputo Cidade and Sofala for mathematics teachers.

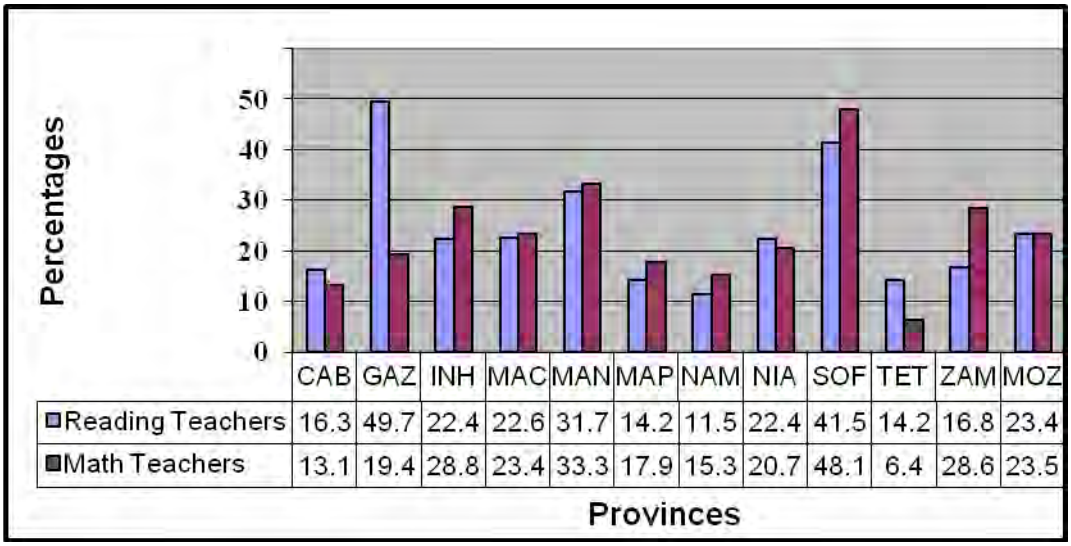
Just less than one third (30%) of Grade 6 pupils were taught reading by female teachers, and this percentage ranged from 50% of reading teachers in Sofala to a mere 9% in Niassa being female. In contrast, a quarter of the pupils were taught mathematics by teachers who were female. Across the provinces, this percentage varies immensely, from 46% in Maputo Cidade to 0% in Niassa and

Cabo Delgado, where the mathematics teachers were predominantly male. It is anticipated that the implementation of the MEC Strategy Plan (1998), which identified areas of concern, will over the years reduce the gender imbalance between provinces and presumably also over the entire country.

In SACMEQ II, several items have been selected to measure the social and economic status (SES) of teachers in Mozambique. These items include the personal possessions of the teachers at home, such as the daily newspaper, a weekly or monthly magazine, a radio, a TV set, a video cassette recorder (VCR), a cassette player, a telephone, a refrigerator/freezer, a car, a motorcycle, a bicycle, piped water, electricity (mains, generator, solar), a table to write on, and livestock. Possessions are one of the indicators of social status because they provide information about living conditions and, consequently, the quality of life.

An index for socio-economic status (SES) was compiled to provide a score for the combined items (listed above). The minimum score is 0 if a teacher does not have any items in the list, and the maximum is 13, if a teacher has all of items in the list. The average number of possessions for reading teachers was 3.9, and for mathematics teachers it was 3.8. These low means indicates a low SES among these teachers. The poorest reading teachers were found in Cabo Delgado (3) and the richest (5.3) in Maputo Província, and the mathematics teachers ranged from the poorest (2.7) in Nampula to the richest (5.1) in Sofala.

Housing, an indicator of socio-economic status, is an important factor to take into consideration in terms of job satisfaction. Teachers usually build cheaper houses made of mud with roofs that are thatched with grasses. Figure 6.1 shows the percentage of teachers who felt that their housing was in an acceptable condition, from which one could conclude that they are comfortable with their current living conditions (see Appendix 6 for more details).



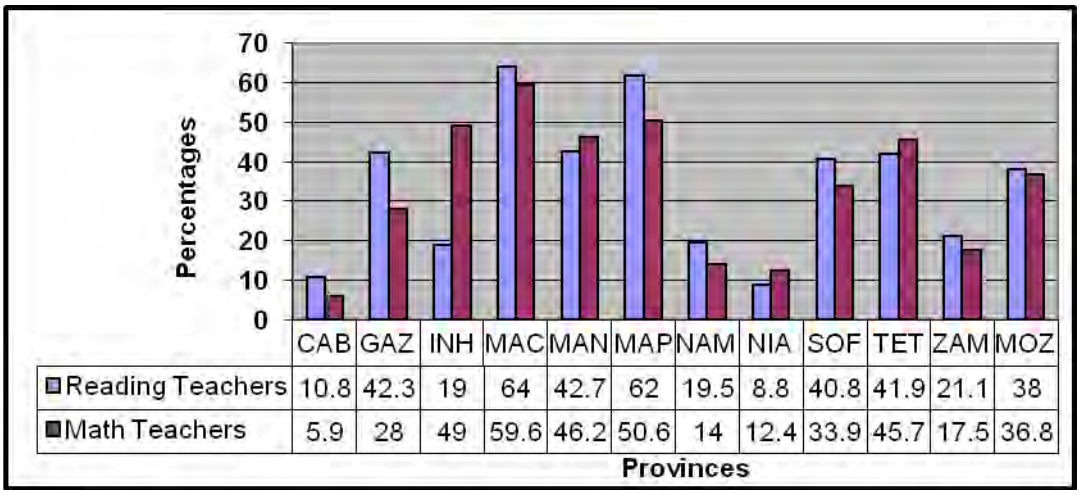
	CAB	GAZ	INH	MAC	MAN	MAP	NAM	NIA	SOF	TET	ZAM	MOZ
Reading Teachers	16.3	49.7	22.4	22.6	31.7	14.2	11.5	22.4	41.5	14.2	16.8	23.4
Math Teachers	13.1	19.4	28.8	23.4	33.3	17.9	15.3	20.7	48.1	6.4	28.6	23.5

Source: Data from SACMEQ database, 2004

Figure 6.1 Percentages of teachers whose housing is perceived to be in an acceptable condition

Just under a quarter (only 24%) of Grade 6 pupils were taught by reading and mathematics teachers who indicated that their living conditions were acceptable. Some provinces revealed large differences between reading and mathematics teachers, the largest difference being seen in Gaza with 50% amongst their reading teachers and 19% amongst their mathematics teachers being satisfied with their living conditions.

A further indicator of socio-economic status is the type of lighting that the teacher has access to at home. Figure 6.2 shows the percentage of teachers who had electricity installed in their homes (see Appendix 7 for more details).



	CAB	GAZ	INH	MAC	MAN	MAP	NAM	NIA	SOF	TET	ZAM	MOZ
Reading Teachers	10.8	42.3	19	64	42.7	62	19.5	8.8	40.8	41.9	21.1	38
Math Teachers	5.9	28	49	59.6	46.2	50.6	14	12.4	33.9	45.7	17.5	36.8

Source: Data from SACMEQ database, 2004

Figure 6.2 Percentage of teachers that had electricity at home

In Mozambique, the majority of mathematics and reading teachers in upper primary schools do not have electricity at home. An average of just over a third of both mathematics teachers (37%) and reading teachers (38%) have electricity in their homes. This percentage varied enormously in the provinces, ranging from a low 6% in Cabo Delgado to 60% in Maputo Cidade for mathematics teachers and from 9% in Niassa to 64% in Maputo Cidade for reading teachers. The more northern provinces tend not to have been supplied with electricity in contrast to the Maputo Cidade which is more economically developed with a better infrastructure.

Job satisfaction in Mozambique

Various conditions should be favourable in order for teachers to do their jobs adequately. To ascertain whether teachers were satisfied with their present conditions of teaching, teachers were asked to respond to 16 possible reasons for job satisfaction. Table 6.2 shows the percentage and sampling error for teachers' rating of elements for job satisfaction.

Table 6.2

Percentages and sampling errors for teacher ratings of reasons for job satisfaction in Mozambique

Reason given	**Reading teachers**		**Math teachers**	
	%	SE	%	SE
Travel distance to school	6.3	1.47	7.8	1.56
Location of school	4.9	0.65	2.4	0.74
Quality of the school buildings	2.5	1.00	1.2	0.17
Availability of teacher housing	**13.8**	2.44	**9.8**	1.49
Quality of teacher housing	2.8	1.49	1.2	0.62
Availability of classroom furniture	3.8	1.14	2.5	1.12
Quality of classroom furniture	0.3	0.10	1.6	0.75
Level of teacher salary	**39.4**	3.19	**45.4**	3.17
Timely payment of salaries	4.5	1.59	4.1	1.35
Seeing pupils learn	**10.2**	1.90	**12.0**	2.45
Availability of classroom supplies	5.0	1.52	2.6	0.94
Quality of school management and administration	0.6	0.34	1.3	1.17
Amicable working relationships	1.5	0.87	0.6	0.48
Good relationships with the community	0.3	0.33	0.0	0.00
Expanded opportunities for promotion	1.3	0.59	0.2	0.17
Opportunities for professional development	2.9	0.98	7.1	1.94

Source: SACMEQ database, 2004

Table 6.2 shows that in Mozambique both reading and mathematics teachers see the level of their salary as the main indicator of job satisfaction. For instance, 39% and 45% of reading and mathematics teachers respectively see the level of salary linked to job satisfaction. The level of salary is followed by the availability of teacher housing (14%) and by seeing pupils learn (10%) for reading teachers, while for mathematics teachers these reasons are reversed with seeing pupils learn (12%) following the level of salary, and then the availability of teacher housing (10%). Apparently, the quality of the classroom furniture, school management and administration, amicable working relationships, good relationships with the community and expanded opportunities for promotion were not seen as related to the teachers' job satisfaction.

6.1.2 Teacher Characteristics in SACMEQ Countries

In reporting the results, it should be emphasized that reading and mathematics teachers have had various types of teacher training and as a result, have attained different academic levels. Therefore, although some comparisons have been made among SACMEQ countries, these results must be

interpreted with caution because they are based on different systems, different types of teacher training and different levels of socio-economic development. However, not all SACMEQ countries have separate subject teachers, such as for mathematics and reading. In countries such as Botswana, Lesotho, Mauritius and Zambia, mathematics and reading are taught by the same teacher.

Education in all SACMEQ countries is founded on the British education tradition, except in Mozambique, which followed the Portuguese system, with Portuguese being the official language and medium of instruction from Grade 1. In 2004, Mozambique changed to bilingual education, using local languages in some schools in rural and homogeneous areas. Hence, by the time pupils reach Grade 6 they have had at least 6 years of schooling in Portuguese. Language, specifically the official languages, the home languages and language of instruction must be taken into account in other SACMEQ countries. Usually there is more than one official language, one of them being English. All of these countries offer bilingual education, and the local language is the medium of instruction in the lower grades of the primary school. In Tanzania and Zanzibar, Kiswahili is the language of instruction until Grade 7, but Uganda has introduced English as the language of instruction from Grade 1. Mauritius has a parallel language programme starting in Grade 1. Teaching in Portuguese from Grade 1 in Mozambique should ensure that the level of comprehension and knowledge is good when compared with that of pupils in other SACMEQ countries, where English is introduced as the language of instruction only later on in the primary phase. However, because the majority of pupils in Mozambique do not speak Portuguese as a mother tongue, Portuguese is taught from Grade 1 using methodology for second language teaching to ensure that the pupils firstly acquire the language, and then develop it.

As previously stated, there are three significant variables to take into consideration in teacher performance: the first one is the academic level of the teacher, the second is the level of professional teacher training, and the third one is the extent of teaching experience.

Table 6.3 below summarises the training and qualifications of primary school teachers in SACMEQ countries, as well as the language of instruction.

Table 6.3

A summary of primary school teacher training qualifications in SACMEQ countries

Coun-tries	School System (General Education: Primary and Secondary)	**Language medium of Instruction (Grade)**		***TEACHER TRAINING COURSES***			**Grades To Teach**	**References**
		Local	**English Portuguese Kiswahili Afrikaans French**	**Current Courses**	**Entr. Level**	**Du**		
BOT	7-3-2	1-4	**5+**	Diploma Primary Education	12	3	1-7	Keitheile and Mokubung, 2005
KEN	8-4	1-3	4+	Primary teacher Certificate	12	2	1-8	Onsomu, Nzomo and Obiero,2005
LES	7-5	**1-3**	**4**	Primary Teacher Certificate (PTC)	12	2	1-7	Mothibeli and Maema, 2005
MAL	8-4	1-4	5+	**Primary Teaching Certificate**	12	2	1-8	Chimombo, Kunje, Chimuzu and Mchikoma, 2005
MAU	6-5-2	-	1+	Primary Teacher Training	11	2	1-6	Kulpoo and Soonarane, 2005
MOZ	7-3-2	-	1+	Instituto do Magistério Primário	10	2	1-7	Passos, Nahara, Magaia and Lauchande, 2005
NAM	7-3-2	1-4	5+	Basic Educ Teacher Diploma	12	3	1-10	Makuwa, 2005
SEY	6-5	**1-2**	**3+**	**Diploma of Education**	11	4	1-6	Leste, Valentin and Hoareau, 2005
SOU	3-3-3	1-3*	4+*	Diploma in Education	12	4	1-7	Moloi and Strauss, 2005
SWA	7-3-2	1-3	4+	Diploma Primary Education	12	3	1-7	Shabalala, 2005
TAN	7-4-2	1-7	-	Certificate Education Training	12	2	1-7	Mrutu, Ponera and Nkumbi, 2005
UGA	7-4-2	-	1+	Primary Teacher College	11	2	1-7	Byamugisha and Ssenabulya, 2005
ZAM	9-3	1-3	4+	Primary Certificate	12	2	1-9	Ministry of Education, 1996
ZAN	7-3-2-2	1-7	-	Certificate Teacher for Primary Schools	12	2	1-7	Nassor, Abdallah, Said and Salim, 2005

Source: SACMEQ II Policy Reports, 2005

Legend: Educ. = Education; Entr. = Entrance level; Du = Duration

* In South Africa from Grade 1 to 3, the policy gives power to school governing bodies to decide. The recommendation is to use mother tongue.

From 4+ the policy gives power to school governing bodies to decide. Currently either English or Afrikaans is used.

Table 6.3 illustrates that Grade 12 is the entrance level for teacher training colleges in all SACMEQ countries, except in Mozambique, where the entrance level is Grade 10. This low level of entry and the two-year duration of the course, which is shorter than duration in the other countries, could explain the relatively weak performance of Mozambican teachers in the SACMEQ II tests. In two countries, namely Seychelles and South Africa, the duration of the course is four years and the entrance requirements are Grades 11 and 12 respectively, which means that these teachers tend to be better qualified. In contrast, the duration of the teacher training course is two or three years in the remaining SACMEQ countries.

Taking into consideration that teachers in primary school have to teach from Grades 1 to 6, 7 or 8, the trainees should have a high academic level in order to ensure that they know the subject matter that they have to teach. However, if they encounter problems in terms of subject knowledge, it is crucial to consider extra lessons or an enrichment programme during the teacher training process, which would improve their content knowledge of primary school subjects.

The academic level of trainee teachers is thus an important factor as it provides the basis for professional training, contributing to the capacity of understanding and analysing the social objectives within the socio-cultural and organisational context where this function takes place. It is essential to note that the academic level is a necessary foundation for the future role of the teacher in school and in the society where the schools are located. Teacher training institutions should thus be made aware that in training teachers of high quality teachers, it is vital to consider the academic entry level of the candidate as well as the duration of the course. Entry quality and duration are factors to take into consideration during the planning of teacher training curricula.

Sex, age and socio-economic status of teachers in SACMEQ countries

As referred to in Section 6.1.2, Botswana, Lesotho, Mauritius and Zambia, mathematics and reading are taught by the same teacher which is the reason for the appearance of the results for one subject.

When examining teacher performance, the sex, age and socio-economic status of teachers need to be considered. Table 6.4 shows the means, percentages and sampling errors for age, gender, and socio-economic background (which is reflected in the index of compiled items, under possessions at home) of reading and mathematics teachers in SACMEQ countries.

Table 6.4

Means, percentages, and sampling errors for age, gender, and socio-economic background of reading and mathematics teachers

Country	**Reading teachers**						**Mathematics teachers**					
	Age (years)		Gender (female)		**Possessions** at home (index)		Age (years)		Gender (female)		**Possessions** at home (index)	
	Mean	SE	%	SE	Mean	SE	Mean	SE	%	SE	Mean	SE
Botswana	34.9	0.46	66.7	2.68	7.3	0.18	-	-	-	-	-	-
Kenya	37.6	0.72	46.0	4.00	5.0	0.16	37.7	0.67	24.4	3.19	4.9	0.15
Lesotho	41.1	0.72	75.1	3.38	5.0	0.17	-	-	-	-	-	-
Malawi	32.4	0.68	30.3	4.18	4.3	0.19	33.1	0.59	28.1	4.02	4.2	0.19
Mauritius	44.9	0.50	28.1	2.71	10.9	0.10	-	-	-	-	-	-
Mozambique	32.8	0.51	29.7	2.99	4.0	0.14	31.2	0.43	26.1	2.76	3.9	0.15
Namibia	34.8	0.46	52.1	3.22	6.9	0.17	36.8	0.48	48.9	3.07	6.5	0.15
Seychelles	38.6	0.23	98.8	0.20	9.2	0.05	32.0	0.16	80.8	0.78	8.9	0.05
South Africa	38.9	0.88	57.8	4.25	9.2	0.19	38.2	0.63	52.5	4.48	9.1	0.20
Swaziland	34.7	0.64	68.5	4.06	6.5	0.20	34.0	0.59	51.7	4.48	6.7	0.23
Tanzania	38.0	0.67	51.9	4.11	4.2	0.16	37.0	0.56	23.9	3.42	3.9	0.17
Uganda	33.1	0.69	17.4	3.29	3.6	0.16	31.9	0.55	7.8	2.70	3.4	0.16
Zambia	35.8	0.65	52.9	4.25	5.1	0.22	-	-	-	-	-	-
Zanzibar	33.7	0.08	63.0	0.50	4.2	0.04	34.4	0.08	57.9	0.45	4.2	0.03
SACMEQ	**36.5**		**52.7**		**6.1**		**34.6**		**40.2**		**5.57**	

Source: Data from SACMEQ II database, 2004

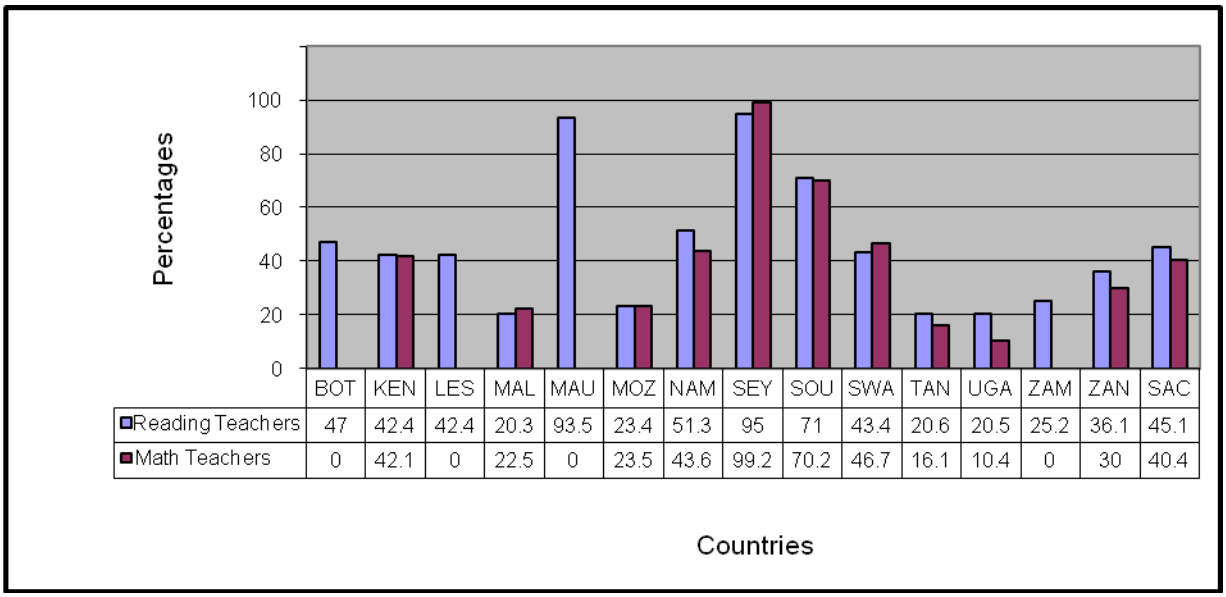
As indicated in Table 6.4, the pupils in SACMEQ countries were taught by reading teachers who were on average 36.5 years old and by mathematics teachers who were on average 34.6 years old. The ages ranged from about 33 years in Malawi to 45 years in Mauritius for reading teachers, and for mathematics teachers the ages ranged from 31 in Mozambique to 38 years in South Africa. Mozambique had the youngest teachers in the region, which could be related to the need for them to find jobs which offered better salaries and could thus increase the number of possessions at home (4.0 in 2000). Older, more experienced teachers therefore tend to leave the profession in search of better paying positions in other professions.

The gender of the teacher also needs to be taken into account. Just over half of the pupils in Grade 6 (53%) were taught reading by teachers who were female. However, large variations occurred among the SACMEQ countries, ranging from a high proportion of female reading teachers (99%) in Seychelles to a low proportion (17%) in Uganda. Mathematics presented a different picture, with

fewer pupils (40.2%) being taught mathematics by teachers who were female. There were also large variations among the SACMEQ countries, ranging from only 8% of pupils in Uganda being taught by female teachers, to 81% in Seychelles.

An index for socio-economic status (SES) was compiled (see Section 6.1.1.1). The average number reflecting the social status for reading teachers was 6.1 (out of 13) and for mathematics 5.6. There were some variations in the means of this index among the SACMEQ countries, reading teachers ranging from 4 in Mozambique to 10.9 in Mauritius, and mathematics teachers ranging from 3.4 in Uganda to 9.1 in South Africa. In spite of problems with the economic development level in all of the SACMEQ countries, the fact that Mauritian teachers were the oldest and had more years of experience while Mozambican teachers were the youngest may make a difference in terms of teacher possessions at home.

Figure 6.3 shows the percentage of teachers in the SACMEQ countries who consider that they are living in acceptable conditions (see Appendix 8).



	BOT	KEN	LES	MAL	MAU	MOZ	NAM	SEY	SOU	SWA	TAN	UGA	ZAM	ZAN	SAC
Reading Teachers	47	42.4	42.4	20.3	93.5	23.4	51.3	95	71	43.4	20.6	20.5	25.2	36.1	45.1
Math Teachers	0	42.1	0	22.5	0	23.5	43.6	99.2	70.2	46.7	16.1	10.4	0	30	40.4

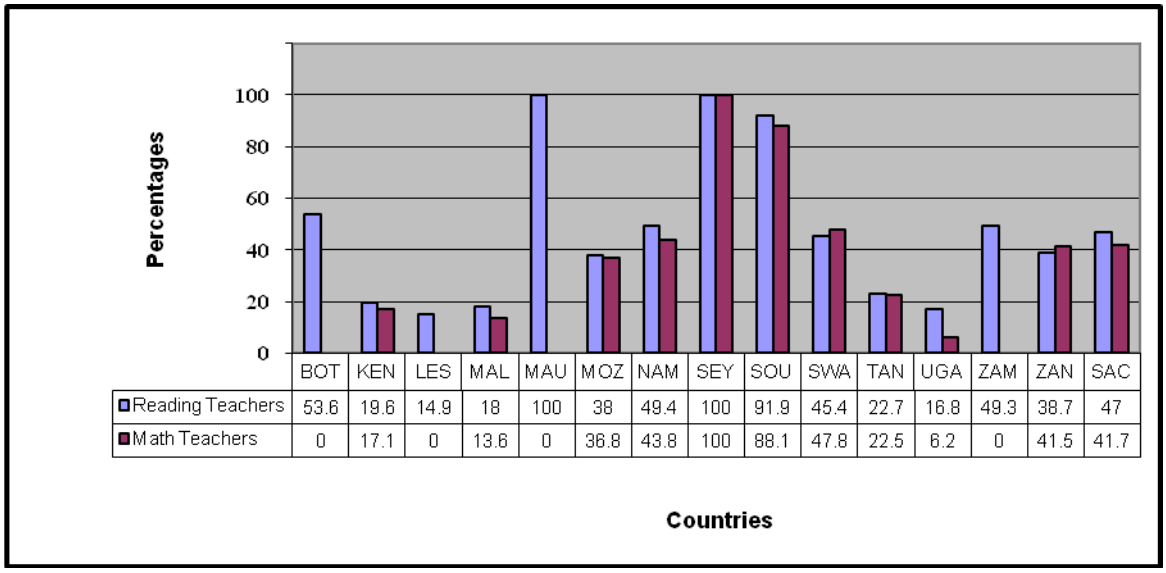
Source: Data from SACMEQ II database (2004)

Figure 6.3 Percentages for teacher housing in acceptable conditions (SACMEQ II)

Figure 6.3 indicates that 45% of Grade 6 reading and 40.4% of mathematics teachers reported their living conditions were acceptable. This summary means that more than half of the reading and mathematics teachers were not satisfied with their living conditions**.** Some SACMEQ countries exhibited different percentages for reading and mathematics teachers, such as Namibia (51% and 44%), Tanzania (21% and 16%) and Uganda (21% and 10%). There were variations in the

percentage of teachers who felt that they were living in acceptable conditions from 20% in Malawi to 95% in Seychelles for reading teachers, and from 10.4% in Uganda to 99% in Seychelles for mathematics teachers.

Figure 6.4 shows the percentage of homes with electricity in reading and mathematics teachers' homes (see Appendix 9).



	BOT	KEN	LES	MAL	MAU	MOZ	NAM	SEY	SOU	SWA	TAN	UGA	ZAM	ZAN	SAC
Reading Teachers	53.6	19.6	14.9	18	100	38	49.4	100	91.9	45.4	22.7	16.8	49.3	38.7	47
Math Teachers	0	17.1	0	13.6	0	36.8	43.8	100	88.1	47.8	22.5	6.2	0	41.5	41.7

Source: Data from SACMEQ II database (2004)

Figure 6.4 Percentage of teachers that had electricity at home

Figure 6.4 illustrates the percentage of Grade 6 teachers who had electricity as a source of light in their homes. More than half of the pupils had mathematics (58%) and reading teachers (53%) who relied on candles or oil lamps for lighting in their homes, meaning that on average only 42% of mathematics teacher and 47% of reading teachers had electricity in their homes. A large variation was seen between teachers that used candles or oil lamps as a source of lighting, ranging from 94% in Uganda to 0% in Mauritius and Seychelles for mathematics teachers. With reading teachers, the variation ranged from 84% in Lesotho to 0% in Mauritius and Seychelles. These results show that Mauritian and Seychellois mathematics and reading teachers had the highest percentage usage (100%) of electricity as a source of lighting. In contrast, Uganda recorded the lowest percentage of electricity in homes, with 6% and 15% for mathematics and reading teachers respectively.

Job satisfaction in SACMEQ countries

Teacher motivation plays an important role in developing teacher and pupil interaction, particularly in assisting the learning process, which should be pupil-centred. SACMEQ has paid special attention to the issue of motivation particularly focusing on the factors that contribute most to job satisfaction, because it is believed that if teachers are satisfied with their work and work environment, they tend to work more effectively.

The SACMEQ study compiled a comprehensive list of indicators of job satisfaction (as seen in Table 6.2) but for this part of the study, only those two indicators identified by the teachers in SACMEQ countries as the most important source for job satisfaction were selected for discussion. Table 6.5 presents each country's choice of indicators.

Table 6.5

Percentages and sampling errors for teacher ratings of most commonly occurring reasons for job satisfaction

COUN-TRIES	'Most common' indicator of job satisfaction	Reading teachers		Mathematics teachers	
		%	SE	%	SE
BOT	Opportunities for professional development	2.38	20,2	-	-
	Seeing pupils learn	2.23	19.6		
KEN	Level of teacher salary	30.7	3.69	31.2	3.60
	Seeing pupils learn	23.8	3.64	-	-
	Availability of classroom supplies	-	-	18.7	3.40
LES	Quality of school management and administration	3.08	15.7	-	-
	Seeing pupils learn	2.93	16.9	-	-
MAL	Level of teacher salary	26.3	3.95	27.4	3.99
	Seeing pupils learn	16.4	3.42	-	-
	Availability of classroom supplies	-	-	11.9	3.00
MAU	Level of teacher salary	50.3	3.22	-	-
	Seeing pupils learn	24.1	2.65	-	-
MOZ	Level of teacher salary	39.4	3.19	45.4	3.17
	Availability of teacher housing	13.8	2.44	-	-
	Seeing pupils learn	-	-	12	2.45
NAM	Availability of classroom supplies	17.3	2.49	16.5	2.33
	Quality of school management and administration	16.3	2.48	18.1	2.36
SEY	Seeing pupils learn	52.1	0.89	58.8	0.91
	Quality of school management and administration	22.2	0.83	-	-
	Level of teacher salary	-	-	22.2	0.66
SOU	Seeing pupils learn	34.9	3.85	32.4	3.78
	Level of teacher salary	12.1	3.68	-	-
	Availability of classroom supplies	-	-	14.1	2.91
SWA	Seeing pupils learn	22.2	3.37	18.5	3.18
	Quality of school management and administration	16.6	3.20	14.2	3.06
TAN	Level of teacher salary	32.2	3.69	32.6	3.74
	Availability of classroom supplies	13.5	2.62	12.4	2.74
UGA	Level of teacher salary	44.5	4.44	43.2	5.32
	Seeing pupils learn	12.0	2.62	-	-
	Opportunities for professional development	-	-	8.6	3.16
ZAM	Level of teacher salary	37.7	3.93	-	-
	Seeing pupils learn	14.9	2.32	-	-
ZAN	Level of teacher salary	31.3	0.57	30.6	0.43
	Timely payment of salaries	17.6	0.52	20.7	0.48

Source: Data from SACMEQ II database, 2004

In summary, Table 6.5 shows that the most important and most commonly occurring sources of job satisfaction in some SACMEQ countries for the majority of Grade 6 reading and mathematics teachers, was seeing pupils learn. The variation among countries ranged from 52% in Seychelles to 2% in Botswana for reading teachers and from 59% in Seychelles to 12% in Mozambique for mathematics teachers. The second most important source of job satisfaction for teachers was the level of salary, and here the variations ranged from 50% in Mauritius to 12% in South Africa for reading teachers and from 45% in Mozambique to 22% in Seychelles for mathematics teachers.

There were some countries whose teachers gave the quality of school management and administration and the availability of classroom supplies as the main source of job satisfaction.

Those findings were consistent with the results of the study carried out in Jamaica by Rodgers-Jenkinson and Chapman (as cited in Fraser, Draper and Taylor 1998, p.62), which showed that:

> *teachers who worked in higher prestige schools characterised by good working conditions, who enjoyed good relationships with other teachers and parents, and who felt a part of school structure, tended to report high levels of job satisfaction.*

In contrast, the Mozambican results are consistent with the observations made earlier, that the few possessions that teachers had (reflecting their low income) and the generally low quality of teacher housing affects job satisfaction.

Generally speaking, the level of economic and social status in SACMEQ countries is very low. This low SES may affect the motivation of the teachers. But, in spite of the economic and social status problem, teachers in SACMEQ countries show high levels of professionalism when they state that pupil achievement is one of the reasons for job satisfaction. Despite their poor working conditions evident in the lack of resources, classroom equipment, books and even basic services such as electricity, teachers are committed to educating the youth.

The next section described teachers' qualification in Mozambique and in SACMEQ countries in terms of academic and professional training as well as their professional experience

6.1.3 Teachers' Qualification and Experience in Mozambique

There are three important variables to take into consideration in teacher performance: the first one is the academic level of the teacher, the second is the professional teacher training, and the third one is the teacher experience.

Academic level in Mozambique

The academic level attained by teachers is one of the indicators considered as making a difference in teacher performance and consequently pupil performance.

Table 6.6 shows the level of academic education of reading and mathematics teachers in Grade 6.

Table 6.6

Academic level of reading and mathematics teachers in Mozambique

Provinces	Academic level																			
	Reading Teachers										Mathematics Teachers									
	Primary		Junior Secondary		Senior Secondary		A-Level		Tertiary		Primary		Junior Secondary		Senior Secondary		A-Level		Tertiary	
	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE
CAB	1.9	0.75	11.2	5.67	83.9	6.33	2.9	2.94	0.0	0.00	8.9	8.94	13.8	8.22	77.2	11.22	0.0	0.00	0.0	0.00
GAZ	2.7	2.75	33.4	11.38	63.9	11.35	0.0	0.00	0.0	0.00	6.7	6.68	28.8	9.93	64.5	10.77	0.0	0.00	0.0	0.00
INH	8.05	5.50	15.3	7.64	76.7	10.11	0.0	0.00	0.0	0.00	8.7	6.19	42.6	15.44	48.7	14.56	0.0	0.00	0.0	0.00
MAC	4.4	4.35	1.7	1.66	75.9	9.18	18.1	5.60	0.0	0.00	0.0	0.00	4.1	4.09	95.9	4.09	0.0	0.00	0.0	0.00
MAN	0.0	0.00	38.1	12.47	61.9	12.47	0.0	0.00	0.0	0.00	0.0	0.00	28.3	10.23	71.7	10.23	0.0	0.00	0.0	0.00
MAP	3.3	3.33	10.2	7.98	77.2	9.06	9.2	4.65	0.0	0.00	0.0	0.00	18.7	8.45	81.3	8.45	0.0	0.00	0.0	0.00
NAM	2.7	2.66	7.4	2.04	77.8	7.44	9.4	6.44	2.7	2.68	0.0	0.00	8.2	4.61	81.8	7.65	10.0	6.86	0.0	0.00
NIA	0.0	0.00	16.2	5.94	83.8	5.94	0.0	0.00	0.0	0.00	0.0	0.00	35.0	10.00	65.0	10.00	0.0	0.00	0.0	0.00
SOF	0.0	0.00	19.8	7.42	80.2	7.42	0.0	0.00	0.0	0.00	2.0	2.02	7.6	4.98	89.7	5.03	0.7	0.72	0.0	0.00
TET	0.0	0.00	14.5	5.30	85.5	5.30	0.0	0.00	0.0	0.00	12.1	5.92	10.2	4.40	77.7	8.80	0.0	0.00	0.0	0.00
ZAM	11.5	8.17	40.8	9.37	47.7	9.70	0.0	0.00	0.0	0.00	0.0	0.00	23.1	8.41	76.9	8.41	0.0	0.00	0.0	0.00
MOZ	4.0	1.48	17.2	2.20	72.7	3.06	5.8	1.51	0.3	0.33	2.7	1.00	17.9	2.59	78.1	2.73	1.3	0.84	0.0	0.00

Source: SACMEQ database, 2004 n = n =

Very few children are taught by tertiary educated teachers (0.3% in reading and 0% in mathematics) and small percentages are taught by teachers with A-levels (6% in reading and 1% in mathematics). About 1 in 5 pupils (17%) in Mozambique are taught by reading teachers who have undergone the required basic level of education (junior secondary schooling) while 18% of pupils are taught by mathematics teachers with the required basic level of education. Zambézia and Inhambane provinces had the highest percentage of reading teachers who had only primary education, 12% and 8% respectively. Tete (12%), Cabo Delgado (9%), Inhambane (9%), and Gaza (7%) had the highest percentage of pupils being taught by mathematics teachers who had only primary school education.

However, the results show that 96% of reading teachers and 97% of mathematics teachers in Mozambique meet government policy requirements of a basic level of education. According to the regulations of the MEC, to become a teacher in upper primary education, at least the junior secondary education, which is 10 years of schooling, must have been completed. However, this criterion means that teachers with primary education are on the same academic level as the pupils they are teaching, a fact which could result in high risk and serious consequences in terms of the quality of the education.

Professional training and teacher experience in Mozambique

As stated previously, teacher training and teacher experience are important factors to consider when assessing and evaluating teacher and pupil performance. Table 6.7 provides the number of years of teaching experience and teacher training of Mozambican reading and mathematics teachers.

Table 6.7

Average number of years of training for reading and mathematics teachers, and years of experience

Provinces	Reading Teachers				Mathematics Teachers			
	Experience (Years)		Training (Years)		Experience (Years)		Training (Years)	
	Mean	SE	Mean	SE	Mean	SE	Mean	SE
CAB	12.1	1.42	1.6	0.23	8.8	1.51	1.7	0.26
GAZ	10.2	2.16	0.8	0.22	7.1	1.46	1.7	0.29
INH	7.7	2.03	1.5	0.37	7.8	2.11	1.2	0.34
MAC	11.4	1.09	2.4	0.25	11.9	1.06	2.5	0.12
MAN	11.6	1.50	2.0	0.32	9.8	1.20	2.2	0.25
MAP	7.4	1.16	1.5	0.31	7.7	1.19	1.9	0.30
NAM	8.6	1.54	1.9	0.28	8.6	1.37	2.1	0.24
NIA	5.5	0.96	1.1	0.18	6.6	0.76	1.7	0.20
SOF	14.3	1.77	2.6	0.13	11.1	1.04	2.5	0.09
TET	9.5	1.85	1.6	0.29	10.1	1.65	1.8	0.27
ZAM	9.3	1.80	1.3	0.28	7.0	0.73	0.9	0.25
MOZ	**9.9**	**0.52**	**1.8**	**0.09**	**9.1**	**0.43**	**1.9**	**0.07**

Source: SACMEQ database, 2004

Table 6.7 shows that Grade 6 Mozambican pupils were being taught by reading teachers who averaged 9.9 years of experience. In Sofala province, teaching experience was slightly higher at 14.3 years of experience whereas teachers in Niassa have much less experience, with 5.5 years of teaching experience. The experience of Grade 6 mathematics teachers followed a pattern similar to that of the reading teachers, except that Maputo Cidade has the most experienced teachers (11.9 yrs).

Taking into consideration that the duration of a teacher training course is two or three years, it appears that just under a quarter of all Mozambican Grade 6 teachers (23%) had not received any teacher training (Passos, Nahara, Magaia and Lauchande, 2005). Sofala province's reading teachers have received the most training (2.6 years) and the same is true of their mathematics teachers (2.5 years). Maputo Cidade's teachers (2.4 and 2.5 years) had received almost the same amount of training. Gaza has the least trained reading teachers (0.8 years) and Zambézia the least trained mathematics teachers (0.9 years).

6.1.4 Teachers' Qualifications and Experience in SACMEQ Countries

Teacher qualifications and experience play a major role in education, but as previously indicated, teacher qualifications are compromised by their academic level in terms of the highest grade level

that student teachers achieved at school, as well as their professional training at teacher training institutions. A competent teacher must possess the requisite knowledge and skills and be able to use them to achieve the intended goals (Shulman, 1986). Table 6.8 illustrates the wide range of academic education levels of reading and mathematics teachers across SACMEQ countries.

Academic level in SACMEQ countries

Table 6.8 shows that in the SACMEQ countries, on average, Grade 6 pupils were taught by reading teachers of whom the majority (45%) had senior secondary education, with about 22% completing A-levels. However, 12% had only primary education. Unfortunately for the region, a mere 6% had undertaken tertiary education. Lesotho had the highest percentage of reading teachers that had only primary education (51%) while Mauritius had the lowest (0.2%).

Table 6.8

Percentages and sampling errors for academic level of reading and mathematics teachers

Coun-try	Reading Teachers										Mathematics Teachers									
	Primary		Junior Secondary		Senior Secondary		A-Level		Tertiary		Primary		Junior Secondary		Senior Secondary		A-Level		Tertiary	
	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE
BOT	8.2	1.56	47.4	2.97	30.1	2.57	8.4	1.48	5.8	1.30	-	-	-	-	-	-	-	-	-	-
KEN	1.0	0.70	2.2	0.99	76.3	3.30	17.3	2.92	3.3	1.49	0.0	0.00	2.03	0.96	80.1	3.04	17.3	2.88	0.3	0.29
LES	50.9	3.97	12.2	2.50	15.3	2.97	16.5	2.90	5.1	1.73	-	-	-	-	-	-	-	-	-	-
MAL	1.5	1.09	40.7	4.56	57.8	4.58	0.0	0.0	0.0	0.0	0.0	0.00	30.6	4.17	69	4.17	04	0.44	0.0	0.0
MAU	0.2	0.19	1.4	0.69	53.4	2.80	42.4	2.92	2.6	0.61	-	-	-	-	-	-	-	-	-	-
MOZ	4	1.48	17.2	2.20	72.7	3.06	5.8	1.5	0.3	0.32	2.7	1.00	17.9	2.59	78.1	3.73	1.3	0.84	0.0	0.0
NAM	13.6	2.18	9.2	1.81	46.5	3.18	17.8	2.38	13	1.96	17.8	2.42	8.5	1.72	45.6	3.19	17.9	2.39	10.2	1.70
SEY	1.1	0.26	7.2	0.55	32.1	0.77	53.6	0.83	6	0.36	0.0	0.00	2.1	0.31	18.7	0.62	75.7	0.71	3.5	0.41
SOU	27.1	3.77	4.6	1.61	18.8	3.36	24	3.58	25.5	4.33	33.2	4.07	2.6	1.06	18.8	3.30	18	3.26	27.4	4.18
SWA	9.7	2.6	3.1	1.33	13.5	2.97	60.9	4.34	12.8	3.23	8.8	2.31	1.0	0.63	18.5	3.63	61.3	4.32	10.4	2.50
TAN	25.2	3.34	71.3	3.45	0.9	0.70	2.1	0.96	0.5	0.45	7.7	2.09	87.4	2.60	2.9	1.31	1.9	0.94	0.0	0.00
UGA	4.4	1.59	1.4	1.05	55.4	4.32	36.1	4.15	2.8	1.30	0.4	0.39	0.8	0.75	62.5	5.05	29.6	4.69	6.8	2.80
ZAM	10.2	1.85	6.0	1.56	71.6	3.39	11.6	2.47	0.6	0.47	-	-	-	-	-	-	-	-	-	-
ZAN	0.9	0.19	7.1	0.30	83.9	0.51	8.0	0.40	0.0	0.0	0.7	0.00	9.8	0.35	83,2	0.40	6.2	0.24	0.0	0.00
SAC	**11.2**		**16.5**		**44,8**		**21.7**		**6**		**7.13**		**16.2**		**47.7**		**23.3**		**6**	

Source: Data from SACMEQ II database, 2004

Botswana (with 48%) and Tanzania (71% - reading and 87% - mathematics) had the most reading and mathematics teachers with junior secondary education. The majority of reading and mathematics teachers in Seychelles had A-levels (54% and 76%) as well as in Swaziland (61% and 61% respectively). South Africa had the highest percentage of reading (26%) and mathematics teacher (27%) with tertiary education. Table 6.8 illustrates that the academic education of mathematics teachers of Grade 6 followed a very similar pattern to that of reading teachers.

Overall, in the SACMEQ countries 48 % of Grade 6 pupils were taught by mathematics teachers who had completed senior secondary education, 7% of pupils had mathematics teachers with only primary education (which is a concern for education), 23% had teachers who had completed A-levels, but only 6% of pupils had mathematics teachers who had tertiary education.

Among the various countries and at all levels, there were large variations in the number of mathematics teachers at specific levels of academic education. Teachers with only primary education ranged from none in Kenya, Malawi and Seychelles to 33% in South Africa. Teachers with A-Levels ranged from none in Malawi to 76% in Seychelles. Malawi, Mozambique, Tanzania and Zanzibar had no teachers with a tertiary education, compared with South Africa, which had the most tertiary educated teachers (27%).

The fact that 51% of Lesotho's reading teachers and 33% of South African mathematics teachers had only primary education may negatively affect the quality of education, because one of the conditions for the high performance of teachers is a deep knowledge of the subject content that the teachers have to teach. Seychelles is at the opposite end of the scale for mathematics teachers. There, the majority of the teachers had A-levels, a fact which may positively affect and enhance the quality of education.

Professional training and teachers' experience in SACMEQ countries

Table 6.9 presents means and sampling errors for the experience and training of reading and mathematics teachers in SACMEQ II.

Table 6.9 shows that SACMEQ Grade 6 pupils were taught by teachers who on average had 12.9 and 10.8 years of experience for reading and mathematics teachers respectively. Some variations were recorded, ranging from 21.7 years in Mauritius to 7.7 years in Malawi in reading, and from 13.8 years in Kenya to 6.4 years of experience in Uganda in mathematics.

Table 6.9

Means and sampling errors for experience and training of reading and mathematics teachers

Country	Reading teachers				Mathematics teachers			
	Experience (years)		Training (years)		Experience (years)		Training (years)	
	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Botswana	10.8	0.40	2.2	0.05				
Kenya	14.0	0.64	2.1	0.04	13.8	0.56	2.1	0.04
Lesotho	16.6	0.80	2.7	0.11				
Malawi	7.7	0.51	1.5	0.09	7.8	0.50	1.4	0.10
Mauritius	21.7	0.52	2.2	0.05	-	-	-	-
Mozambique	9.9	0.52	1.8	0.09	9.1	0.43	1.9	0.07
Namibia	10.0	0.42	2.7	0.06	11.7	0.48	2.6	0.05
Seychelles	20.0	0.25	2.9	0.02	12.1	0.18	3.3	0.02
South Africa	14.2	0.66	3.2	0.06	13.6	0.59	3.2	0.07
Swaziland	10.1	0.58	2.7	0.07	9.7	0.58	2.5	0.07
Tanzania	14.1	0.62	2.2	0.05	12.5	0.53	2.2	0.05
Uganda	8.6	0.72	2.3	0.08	6.4	0.43	2.3	0.09
Zambia	11.5	0.63	2.0	0.04				
Zanzibar	13.1	0.09	1.7	0.01	11.5	0.09	1.8	0.01
SACMEQ	**12.9**		**2.2**		**10.8**		**2.3**	

Source: Data from SACMEQ II database, 2004

The mean of professional training in SACMEQ countries was 2.2 years in reading and 2.3 in mathematics. Taking into consideration the duration of the current courses, it seems that some countries had inadequately trained teachers, or that the duration of some of the courses was previously less than is currently the case. The variations in professional training ranged from 3.2 in South Africa to 1.5 years of training in Malawi for reading teachers, and from 3.3 in Seychelles to 1.4 years of training in Malawi for mathematics teachers.

Taking into consideration that the teachers are teaching from Grades 1 to 6 or 7, it seems that the duration of the current courses in some countries such as Lesotho, Malawi, Mauritius, Mozambique, Uganda and Zanzibar is insufficient for the initial professional development given the curriculum, the subject knowledge development, and the methodological expertise needed in order to train teachers effectively to teach all of the subjects required in lower and upper primary schools. In SACMEQ countries such as Malawi and Uganda, many teachers in the profession are not highly experienced, possibly meaning that teachers seldom stay in the profession, a phenomenon which could be related to the level of salary and possessions, as referred to

previously. Mauritius, for instance, had the oldest teachers in the region, the highest level of economic status (10.9 possessions at home) and teachers with highest years of experience (21.7 yrs). The same situation exists in Seychelles (38.6 yrs of age, 20 yrs of experience and 9.2 possessions at home) and South Africa (38.9 yrs of age, 14.2 yrs of experience and Level 9.2 possessions at home). The two variables, age and years of experience, seem to be related to job satisfaction and the number of possessions at home.

Cross tabulation of the professional training and academic level of reading teachers in Mozambique and in other SACMEQ countries was computed for a more detailed analysis, and is shown in Tables 6.10 and 6.11.

6.1.5 Teachers' Academic and Professional Qualification in Reading in Mozambique

Table 6.10 show the percentages for professional training and academic level of reading teachers in Mozambique

Table 6.10

Percentages for professional training and academic level of reading teachers in Mozambique

			TEACHERS' ACADEMIC QUALIFICATION					
			Prim.	**Jun. sec**	**Sen. Sec.**	**A-lev.**	**Tert.**	**Total**
	No teacher training	Count (No of teachers)	0 0	10	70	0 6	0 0	86
		% within t/qual-prof	0.0	11.6	81.4	7.0	.0	100
		% within t/qualif-aca	0.0	14.9	24.5	28.6	.0	22.0
		% of total	**0.0**	**2.6**	**17.9**	**1.5**	**.0**	**22.0**
	less than one year	Count (No of teachers)	0 4	2	45	5	0	56
		% within t/qual-prof	7.1	3.6	80.4	8.9	.0	100
		% within t/qualif-aca	25.0	3.0	15.7	23.8	.0	14.3
		% of total	**1.0**	**.5**	**11.5**	**1.3**	**.0**	**14.3**
	one year	Count (No of teachers)	0 1	6	5	1	0	13
		% within t/qual-prof	7.7	46.2	38.5	7.7	.0	100
T/ PROF QUAL		% within t/qualif-aca	6.3	9.0	1.7	4.8	.0	3.3
		% of total	**0.3**	**1.5**	**1.3**	**.3**	**.0**	**3.3**
	two years	Count (No of teachers)	0 2	20	68	0	0	90
		% within t/qual-prof	2.2	22.2	75.6	.0	.0	100
		% within t/qualif-aca	12.5	29.9	23.8	.0	.0	23.0
		% of total	**0.5**	**5.1**	**17.4**	**.0**	**.0**	**23.0**
	three years	Count (No of teachers)	07	22	85	0 7	0 0	121
		% within t/qual-prof	5.8	18.2	70.2	5.8	.0	100
		% within t/qualif-aca	43.8	32.8	29.7	33.3	.0	30.9
		% of total	**1.8**	**5.6**	**21.7**	**1.8**	**.0**	**30.9**
	More than three years	Count (No of teachers)	2	7	13	2	1	25
		% within t/qual-prof	8.0	28.0	52.0	8.0	4.0	100
		% within t/qualif-aca	12.5	10.4	4.5	9.5	100.0	6.4
		% of total	**.5**	**1.8**	**3.3**	**.5**	**.3**	**6.4**
		Count (No of teachers)	16	67	286	21	1	391
		% within t/qualprof	4.1	17.1	73.1	5.4	.3	100
TOTAL		% within t/qual-aca	100.0	100.0	100.0	100.0	100.0	100
		% of TOTAL	**4.1**	**17.1**	**73.1**	**5.4**	**.3**	**100**

Source: Data from SACMEQII database, 2004

The analysis of the cross tabulation between professional training and academic qualifications in Table 6.5 shows that 22% of Grade 6 reading teachers in Mozambique had no professional training at all, and 14% had less than one year of professional training. The majority of the teachers had three years of professional training.

The majority of the reading teachers (73%) in Mozambique had senior secondary education. Of these, about 18% had no professional training. A mere 6% of teachers had completed 3 years of teacher training or more. Of the remaining teachers less than 6% had either A-level or tertiary education.

The results of the cross tabulation on the varied teacher training modules reflects the different policies, curriculum, syllabus and teacher training profiles as referred to in Chapter 2. The situation for mathematics teachers follows a similar pattern. However, more teachers have 3 years of training and a larger percentage has completed Senior Secondary education.

6.1.6 Teachers' academic and professional qualification in reading in SACMEQ countries

A cross tabulation of the professional training and academic level of reading teachers for all SACMEQ countries was conducted. Table 6.11 shows the percentage for professional training and the academic level of reading teachers in SACMEQ countries.

Table 6.11

Percentages of teachers, for professional training and academic level of reading teachers in SACMEQ countries

			READING TEACHERS' ACADEMIC QUALIFICATIONS					
			Prim.	**Jun. sec**	**Sen. Sec.**	**A-lev.**	**Tert.**	**Total**
T/QUA -PROF	**No teacher training**	Count (No of teachers)	0 2	31	184	31	09	257
		% within t/qual-prof	0.8	12.1	71.6	12.1	3.5	100
		% within t/qualif-aca	0.3	3.4	7.5	2.6	2.9	4.7
		% of total	**0.0**	**0.6**	**3.3**	**0.6**	**0.2**	**4.7**
	less than one year	Count (No of teachers)	0 9	41	194	14	0 2	260
		% within t/qual-prof	3.5	15.8	74.6	5.4	0.8	100
		% within t/qualif-aca	1.4	4.5	7.9	1.2	0.6	4.7
		% of total	**0.2**	**0.7**	**3.5**	**0.3**	**0.0**	**4.7**
	one year	Count (No of teachers)	21	82	142	34	11	290
		% within t/qual-prof	7.2	28.3	49.0	11.7	3.8	100
		% within t/qualif-aca	3.4	8.9	5.8	2.8	3.6	5.3
		% of total	**0.4**	**1.5**	**2.6**	**0.6**	**0.2**	**5.3**
	two years	Count (No of teachers)	217	591	1399	445	40	2692
		% within t/qual-prof	8.1	22.0	52.0	16.5	1.5	100
		% within t/qualif-aca	34.7	64.4	56.8	37.1	13.0	48.8
		% of total	**3.9**	**10.7**	**25.4**	**8.1**	**0.7**	**48.8**
	three years	Count (No of teachers)	291	124	365	381	88	1249
		% within t/qual-prof	23.3	9.9	29.2	30.5	7.0	100
		% within t/qualif-aca	46.6	13.5	14.8	31.8	28.6	22.7
		% of total	**5.3**	**2.3**	**6.6**	**6.9**	**1.6**	**22.7**
	More than three years	Count (No of teachers)	85	48	178	294	158	763
		% within t/qual-prof	11.1	6.3	23.3	38.5	20.7	100
		% within t/qualif-aca	13.6	5.2	7.2	24.5	51.3	13.8
		% of total	**1.5**	**0.9**	**3.2**	**5.3**	**2.9**	**13.8**
TOTAL		Count (No of teachers)	625	917	2462	1199	308	5511
		% within t/qualprof	11.3	16.6	44.7	21.8	5.6	100
		% within t/qual-aca	100.0	100.0	100.0	100.0	100.0	100
		% of TOTAL	**11.3**	**16.6**	**44.7**	**21.8**	**5.6**	**100**

Source: Data from SACMEQ II database, 2004

The majority of reading teachers in SACMEQ countries (45%) had senior secondary education but only 5% had no professional training. About 5% percent of reading teachers had one year or less while 49%, the majority, had two years of professional training. About 14% had more than three years. Of particular interest is the high percentage of teachers (22%) that had A-Levels. Among this group, about 5% had three years or more of teacher training. In SACMEQ countries overall, 11% of teachers had primary education while 6% had completed tertiary education.

6.1.7 Percentage of Teachers' Academic and Professional Qualification in Reading in each SACMEQ country

Table 6.12 shows the percentages for professional training and the academic level of reading teachers in each SACMEQ countries.

Table 6.12

Percentages for professional training and academic level of reading teachers in each SACMEQ country

COUN-TRY	Teacher Professional	Qualification-	READING TEACHERS' ACADEMIC QUALIFICATIONS					
			Primary	Jun Sec.	Sen. Sec.	A-level	Tertiary	Total
BOT	No teacher training	% of Total	0.0	0.3	4.5	0.0	0.0	**4.8**
	Less than 1 year	% of Total	0.0	0.8	0.5	0.0	0.0	**1.3**
	2 years	% of Total	7.3	43.0	18.8	4.0	1.5	**74.5**
	3 years	% of Total	0.5	2.0	4.0	3.3	0.8	**10.5**
	More than 3 years	% of Total	0.5	1.5	2.3	1.0	3.8	**9.0**
	% of total		**8.3**	**47.5**	**30.0**	**8.3**	**6.0**	**100**
KEN	No teacher training	% of Total	0.0	0.0	1.1	0.3	0.0	**1.3**
	Less than 1 year	% of Total	0.0	0.0	0.8	0.0	0.0	**0.8**
	1 year	% of Total	0.0	0.0	0.5	0.0	0.0	**0.5**
	2 years	% of Total	0.8	1.9	67.2	15.9	1.9	**87.6**
	3 years	% of Total	0.0	0.3	5.8	0.8	0.8	**7.7**
	More than 3 years	% of Total	0.3	0.0	0.8	0.5	0.5	**2.1**
	% of total		**1.1**	**2.1**	**76.2**	**17.5**	**3.2**	**100**
LES	No teacher training	% of Total	0.5	2.2	4.9	1.2	0.0	**8.8**
	Less than 1 year	% of Total	0.4	0.2	1.1	0.6	0.0	**2.3**
	1 year	% of Total	0.8	0.6	1.2	0.0	1.8	**4.4**
	2 years	% of Total	5.0	2.3	0.0	0.2	0.0	**7.5**
	3 years	% of Total	31.1	3.3	4.4	7.2	1.1	**47.0**
	More than 3 years	% of Total	11.7	3.4	2.6	9.3	2.8	**29.8**
	% of total		**49.6**	**12.0**	**14.2**	**18.5**	**5.7**	**100**
MAL	No teacher training	% of Total		0.0	0.0	6.3		**6.3**
	Less than 1 year	% of Total		0.0	5.0	15.8		**20.8**
	1 year	% of Total		0.0	11.0	11.3		**22.3**
	2 years	% of Total		0.8	5.0	1.0		**6.8**
	3 years	% of Total		0.0	1.8	1.3		**3.0**
	More than 3 years	% of Total		1.5	40.6	57.9		**100**
	% of total			**1.5**	**40.6**	**57.9**		**100**
MAU	No teacher training	% of Total	0.0	0.0	0.0	0.0	0.3	**0.3**
	Less than 1 year	% of Total	0.3	0.0	0.3	0.3	0.0	**0.8**
	1 year	% of Total	0.0	1.3	7.5	2.0	0.3	**11.0**
	2 years	% of Total	0.0	0.3	35.8	29.3	1.8	**67.0**
	3 years	% of Total	0.0	0.0	3.0	3.5	0.0	**6.5**
	More than 3 years	% of Total	0.0	0.0	6.8	7.5	0.3	**14.5**
	% of total		**0.3**	**1.5**	**53.3**	**42.5**	**2.5**	**100**
MOZ	No teacher training	% of Total	0.0	2.6	17.9	1.5	0.0	**22.0**
	Less than 1 year	% of Total	1.0	0.5	11.5	1.3	0.0	**14.3**
	1 year	% of Total	0.3	1.5	1.3	.3	0.0	**3.3**
	2 years	% of Total	0.5	5.1	17.4	.0	0.0	**23.0**
	3 years	% of Total	1.8	5.6	21.7	1.8	0.0	**30.9**
	More than 3 years	% of Total	0.5	1.8	3.3	0.5	0.3	**6.4**
	% of total		**4.1**	**17.1**	**73.1**	**5.4**	**0.3**	**100**

Table 6.12 (Continued)

COUN-TRY	Teacher Qualification	Professional	READING TEACHERS' ACADEMIC QUALIFICATIONS					
			Primary	Jun Sec.	Sen. Sec.	A-level	Tertiary	Total
NAM	No teacher training	% of Total	0.3	0.0	1.8	0.0	1.5	**3.5**
	Less than 1 year	% of Total	0.5	0.5	0.5	0.3	0.5	**2.3**
	1 year	% of Total	0.0	0.8	2.5	1.0	0.0	**4.3**
	2 years	% of Total	7.3	4.0	11.5	3.3	0.3	**26.3**
	3 years	% of Total	5.0	3.5	22.8	10.8	2.8	**44.9**
	More than 3 years	% of Total	0.5	0.3	7.5	2.5	8.0	**18.8**
	% of total		**13.5**	**9.0**	**46.6**	**17.8**	**13.0**	**100**
SEY	No teacher training	% of Total	.0	.0	.0	.5	.0	**.5**
	Less than 1 year	% of Total	.0	.0	2.8	.0	.0	**2.8**
	1 year	% of Total	.0	.5	2.0	2.8	.0	**5.3**
	2 years	% of Total	.0	6.5	14.6	3.5	1.3	**25.9**
	3 years	% of Total	1.3	.0	8.3	18.8	1.8	**30.2**
	More than 3 years	% of Total	.0	.0	4.5	27.9	3.0	**35.4**
	% of total		**1.3**	**7.0**	**32.2**	**53.5**	**6.0**	**100**
SOU	No teacher training	% of Total	.0	.0	.0	.0	.5	**.5**
	1 year	% of Total	1.3	.0	.8	.0	.5	**2.6**
	2 years	% of Total	7.0	1.8	4.1	2.1	1.0	**16.0**
	3 years	% of Total	13.7	1.8	7.8	9.6	9.8	**42.6**
	More than 3 years	% of Total	5.2	1.0	5.9	12.4	13.7	**38.2**
	% of total		**27.1**	**4.7**	**18.6**	**24.0**	**25.6**	**100**
SWA	No teacher training	% of Total	.0	.0	2.3	.6	.0	**2.9**
	Less than 1 year	% of Total	.0	.0	.7	.0	.0	**.7**
	1 year	% of Total	.7	.0	.0	.2	.6	**1.5**
	2 years	% of Total	1.3	3.4	3.7	22.8	.0	**31.3**
	3 years	% of Total	6.8	.0	5.5	35.4	6.4	**54.1**
	More than 3 years	% of Total	.0	.0	.7	3.7	5.2	**9.6**
	% of total		**8.7**	**3.4**	**12.8**	**62.8**	**12.3**	**100**
TAN	Less than 1 year	% of Total	.0	1.3	.0	.0	.0	**1.3**
	1 year	% of Total	1.0	3.4	.0	.0	.0	**4.4**
	2 years	% of Total	10.8	53.0	.9	2.2	.7	**67.6**
	3 years	% of Total	13.2	10.6	.0	.1	.0	**23.9**
	More than 3 years	% of Total	1.7	1.1	.0	.0	.0	**2.9**
	% of total		**26.8**	**69.4**	**.9**	**2.2**	**.7**	**100**
UGA	No teacher training	% of Total	.0	.0	1.6	2.6	.0	**4.1**
	Less than 1 year	% of Total	.0	1.0	2.6	.8	.0	**4.4**
	1 year	% of Total	.0	.0	2.1	1.3	.0	**3.4**
	2 years	% of Total	3.6	.0	33.6	17.8	1.6	**56.6**
	3 years	% of Total	.0	.0	7.8	4.9	.0	**12.7**
	More than 3 years	% of Total	.8	.5	7.8	8.5	1.3	**18.9**
	% of total		**4.4**	**1.6**	**55.3**	**35.9**	**2.8**	**100**
ZAM	No teacher training	% of Total	.0	.0	2.3	.0	.0	**2.3**
	Less than 1 year	% of Total	.0	.0	.8	.0	.0	**.8**
	1 year	% of Total	.3	.3	.8	.3	.0	**1.5**
	2 years	% of Total	10.1	5.7	66.8	9.0	.5	**92.0**
	3 years	% of Total	.0	.0	.3	1.0	.0	**1.3**
	More than 3 years	% of Total	.0	.0	1.0	1.0	.0	**2.1**
	% of total		**10.3**	**5.9**	**71.9**	**11.3**	**.5**	**100**
ZAN	No teacher training	% of Total	.0	2.6	3.6	.5		**6.7**
	Less than 1 year	% of Total	.0	.8	11.8	.0		**12.6**
	1 year	% of Total	.8	.5	5.4	.5		**7.2**
	2 years	% of Total	.0	3.1	62.3	5.9		**71.3**
	3 years	% of Total	.0	.0	.3	.0		**.3**
	More than 3 years	% of Total	.0	.5	.5	1.0		**2.1**
	% of total		**.8**	**7.4**	**83.8**	**7.9**		**100**
SAC	No teacher training	% of Total	.0	.6	3.3	.6	.2	**4.7**
	Less than 1 year	% of Total	.2	.7	3.5	.3	.0	**4.7**
	1 year	% of Total	.4	1.5	2.6	.6	.2	**5.3**
	2 years	% of Total	3.9	10.7	25.4	8.1	.7	**48.8**
	3 years	% of Total	5.3	2.3	6.6	6.9	1.6	**22.7**
	More than 3 years	% of Total	1.5	.9	3.2	5.3	2.9	**13.8**
	% of TOTAL		**11.3**	**16.6**	**44.7**	**21.8**	**5.6**	**100**

Source: Data from SACMEQ II database, 2004

As previously stated, almost half of the reading teachers within SACMEQ countries had a senior secondary qualification (45%) and two years of professional training (49%). It can therefore be observed that in 7 out of the 14 systems of education within SACMEQ countries reading teachers had on average 2 years of professional training (Botswana, Kenya, Mauritius, Tanzania, Uganda, Zambia and Zanzibar). In 5 systems of education more than 30% of the reading teachers had 3 years of professional training (Lesotho, Mozambique, Namibia, South Africa and Swaziland). However, one out of every 5 reading teachers in Malawi had only one year of training. In contrast, 35% of Seychellois reading teachers had more than 3 years of professional training. Finally, the percentage of reading teachers without any training varies from 0.3% in Mauritius to 22% in Mozambique.

Furthermore, the academic level of reading teachers varies greatly from primary to tertiary education. However, in the majority of reading teachers in (9 out 14 systems of education) had completed senior secondary and A-level education (Kenya, Malawi, Mauritius, Namibia, Seychelles, Swaziland, Uganda, Zambia and Zanzibar). Only two systems of education (Botswana and Mozambique) had most of their reading teachers with only junior secondary or senior secondary. A significant percentage of teachers in Lesotho (50%) and South Africa (27%) were found to have only primary education. In contrast, the pupils also had teachers with A-levels (Lesotho 19%) and education at tertiary level (South Africa 26%). An exception was Tanzania, in that 27% of its teachers had completed primary education and 70% junior secondary (see Appendix 10 for full explanation).

The next section presents and discusses the percentages for professional training and the academic level of mathematics teachers in Mozambique and in SACMEQ countries as a whole as well as in each SACMEQ country.

6.1.8 Teachers' Academic and Professional Qualification in Mathematics in Mozambique

Table 6.13 presents teachers' academic and professional qualification in mathematics in Mozambique.

Table 6.13

Percentages for professional training and academic level of mathematics teachers in Mozambique

			MATH TEACHERS' ACADEMIC QUALIF.				
			Prim.	**Jun. sec**	**Sen. Sec.**	**A-lev.**	**Total**
T/QUA -PROF	**No teacher training**	Count (No of teachers)	1	6	64	0	71
		% within t/qual-prof	1.4	8.5	90.1	.0	100
		% within t/qualify-aca	10.0	8.7	21.1	.0	18.3
		% of total	**.3**	**1.6**	**16.5**	**.0**	**18.3**
	less than one year	Count (No of teachers)	0	6	35	2	43
		% within t/qual-prof	.0	14.0	81.4	4.7	100
		% within t/qualify-aca	.0	8.7	11.5	50.0	11.1
		% of total	**.0**	**1.6**	**9.0**	**.5**	**11.1**
	one year	Count (No of teachers)	0	10	4	0	14
		% within t/qual-prof	.0	71.4	28.6	.0	100
		% within t/qualify-aca	.0	14.5	1.3	.0	3.6
		% of total	**.0**	**2.6**	**1.0**	**.0**	**3.6**
	two years	Count (No of teachers)	6	21	70	0	97
		% within t/qual-prof	6.2	21.6	72.2	.0	100
		% within t/qualify-aca	60.0	30.4	23.0	.0	25.1
		% of total	**1.6**	**5.4**	**18.1**	**.0**	**25.1**
	three years	Count (No of teachers)	3	21	120	2	146
		% within t/qual-prof	2.1	14.4	82.2	1.4	100
		% within t/qualify-aca	30.0	30.4	39.5	50.0	37.7
		% of total	**.8**	**5.4**	**31.0**	**.5**	**37.7**
	More than three years	Count (No of teachers)	0	5	11	0	16
		% within t/qual-prof	.0	31.3	68.8	.0	100
		% within t/qualify-aca	.0	7.2	3.6	.0	4.1
		% of total	**.0**	**1.3**	**2.8**	**.0**	**4.1**
TOTAL		Count (No of teachers)	10	69	304	4	387
		% within t/qualprof	2.6	17.8	78.6	1.0	100
		% within t/qual-aca	100.0	100.0	100.0	100.0	100
		% of TOTAL	**2.6**	**17.8**	**78.6**	**1.0**	100

Source: Data from SACMEQ II database, 2004

Table 6.13 shows that 18% of teachers in Grade 6 had no professional training, with the majority (38%) having had three years of professional training and just 4% having more than three years of professional training.

Cross tabulation results also show that the majority (78.6%) of mathematics teachers in Grade 6 in Mozambique had achieved a senior secondary academic level in which almost a third (31%) had 3 years of professional training, but almost 17% had no professional training at all. At one end of the scale, a mere 1% had A-level and at the other end, 2.6% of Mozambican teacher had only primary education.

6.1.9 Teachers' Academic and Professional Qualification in Mathematics in SACMEQ countries

Table 6.14 shows the percentages for professional training and the academic level of mathematics teachers in SACMEQ countries.

Table 6.14

Percentages for professional training and academic level of mathematics teachers in SACMEQ countries

			TEACHERS' ACADEMIC QUALIFICATIONS					
			Prim.	**Jun. sec**	**Sen. Sec.**	**A-lev.**	**Tert.**	**Total**
T/QUA -PROF	**No teacher training**	Count (No of teachers)	0 1	28	197	20	13	259
		% within t/qual-prof	0.4	10.8	76.1	7.7	5.0	100
		% within t/qualif-aca	0.2	3.1	7.9	1.7	4.6	4.8
		% of total	**0.0**	**0.5**	**3.6**	**0.4**	**0.2**	**4.8**
	less than one year	Count (No of teachers)	07	40	140	11	05	203
		% within t/qual-prof	3.4	19.7	69.0	5.4	2.5	100
		% within t/qualif-aca	1.3	4.4	5.6	.9	1.8	3.8
		% of total	**0.1**	**0.7**	**2.6**	**0.2**	**0.1**	**3.8**
	one year	Count (No of teachers)	18	66	124	22	06	236
		% within t/qual-prof	7.6	28.0	52.5	9.3	2.5	100
		% within t/qualif-aca	3.3	7.3	5.0	1.8	2.1	4.4
		% of total	**0.3**	**1.2**	**2.3**	**0.4**	**0.1**	**4.4**
	two years	Count (No of teachers)	195	602	1451	423	32	2 703
		% within t/qual-prof	7.2	22.3	53.7	15.6	1.2	100
		% within t/qualif-aca	35.5	66.8	58.5	35.4	11.3	50.0
		% of total	**3.6**	**11.1**	**26.8**	**7.8**	**0.6**	**50.0**
	three years	Count (No of teachers)	254	108	400	369	88	1 219
		% within t/qual-prof	20.8	8.9	32.8	30.3	7.2	100
		% within t/qualif-aca	46.2	12.0	16.1	30.9	31.2	22.5
		% of total	**4.7%**	**2.0**	**7.4**	**6.8**	**1.6**	**22.5**
	More than three years	Count (No of teachers)	75	57	167	351	138	788
		% within t/qual-prof	9.5	7.2	21.2	44.5	17.5	100
		% within t/qualif-aca	13.6	6.3	6.7	29.3	48.9	14.6
		% of total	**1.4**	**1.1**	**3.1**	**6.5**	**2.6**	**14.6**
TOTAL		Count (No of teachers)	550	901	2479	1196	282	5408
		% within t/qualprof	10.2	16.7	45.8	22.1	5.2	100
		% within t/qual-aca	100	100	100	100	100	100
		% of TOTAL	**10.2**	**16.7**	**45.8**	**22.1**	**5.2**	**100**

Source: Data from SACMEQ II database (2004)

Table 6.14 shows that the majority (46%) of mathematics teachers had senior secondary level education. Only 5% of Grade 6 mathematics teachers had tertiary education and 22% had A-levels, whilst 10% had only primary education.

In SACMEQ countries, 5% of mathematics teachers had no professional training at all, 4% had one year or less, the majority of teachers (50%) had two years of professional training, and 23% had three years or more of professional training.

These results are further broken down and examined in more depth, country by country. Table 6.15 presents the results of cross-tabulations in each SACMEQ country in mathematics.

6.1.10 Teachers' Academic and Professional Qualification in Mathematics in each SACMEQ country

Table 6.15 shows the percentages for professional training and the academic level of teachers in mathematics each SACMEQ countries.

Table 6.15

Percentages for professional training and academic level of mathematics teachers in each SACMEQ country

COUN-TRY	Teacher Professional	Qualification-	MATH TEACHERS' ACADEMIC QUALIFICATIONS					
			Primary	Jun Sec.	Sen.Sec.	A-level	Tertiary	Total
BOT	No teacher training	% of Total	.0	.3	4.3	.0	.0	**4.5**
	Less than 1 year	% of Total	.0	.8	.3	.0	.0	**1.0**
	2 years	% of Total	6.8	42.8	18.8	4.0	1.5	**73.8**
	3 years	% of Total	.5	2.0	4.0	3.8	.8	**11.0**
	More than 3 years	% of Total	.5	1.5	3.0	.8	4.0	**9.8**
	% of total		**7.8**	**47.3**	**30.3**	**8.5**	**6.3**	**100**
KEN	No teacher training	% of Total		.0	2.1	.0	.0	**2.1**
	Less than 1 year	% of Total		.0	.8	.3	.0	**1.0**
	1 year	% of Total		.0	.3	.0	.0	**.3**
	2 years	% of Total		1.8	67.9	16.3	.3	**86.3**
	3 years	% of Total		.5	5.7	.0	.0	**6.2**
	More than 3 years	% of Total		.0	3.6	.5	.0	**4.1**
	% of total			**2.3**	**80.3**	**17.1**	**.3**	**100**
LES	No teacher training	% of Total	.5	2.2	5.4	1.2	.0	**9.4**
	Less than 1 year	% of Total	.4	.2	.6	.6	.0	**1.8**
	1 year	% of Total	.8	.6	1.2	.0	1.8	**4.4**
	2 years	% of Total	5.0	2.3	.0	.2	.0	**7.5**
	3 years	% of Total	30.5	3.3	5.4	7.2	1.6	**48.1**
	More than 3 years	% of Total	12.2	2.9	2.2	8.7	2.8	**28.8**
	% of total		**49.6**	**11.4**	**14.8**	**17.9**	**6.2**	**100**
MAL	No teacher training	% of Total		1.8	8.0	.0		**9.8**
	Less than 1 year	% of Total		4.7	17.6	.0		**22.2**
	1 year	% of Total		8.3	11.9	.0		**20.2**
	2 years	% of Total		11.6	23.8	.5		**35.9**
	3 years	% of Total		2.6	4.7	.0		**7.2**
	More than 3 years	% of Total		1.6	3.1	.0		**4.7**
	% of total			**30.5**	**69.0**	**.5**		**100**
MAU	No teacher training	% of Total	.0	.0	.0	.0	.3	**.3**
	Less than 1 year	% of Total	.3	.0	.3	.3	.0	**.8**
	1 year	% of Total	.0	1.3	7.5	2.0	.3	**11.0**
	2 years	% of Total	.0	.3	35.8	29.3	1.8	**67.0**
	3 years	% of Total	.0	.0	3.0	3.5	.0	**6.5**
	More than 3 years	% of Total	1	6	**213**	170	10	**400**
	% of total		**.3**	**1.5**	**53.3**	**42.5**	**2.5**	**100**
MOZ	No teacher training	% of Total	.3	1.6	16.5	.0		**18.3**
	Less than 1 year	% of Total	.0	1.6	9.0	.5		**11.1**
	1 year	% of Total	.0	2.6	1.0	.0		**3.6**
	2 years	% of Total	1.6	5.4	18.1	.0		**25.1**
	3 years	% of Total	.8	5.4	31.0	.5		**37.7**
	More than 3 years	% of Total	.0	1.3	2.8	.0		**4.1**
	% of total		**2.6**	**17.8**	**78.6**	**1.0**		**100.0**

Table 6.15 (Continued)

COUN-TRY	Teacher Professional	Qualification-	MATH TEACHERS' ACADEMIC QUALIFICATIONS					
			Primary	Jun Sec.	Sen.Sec.	A-level	Tertiary	Total
	No teacher training	% of Total	.0	.3	1.3	.3	.8	**2.5**
	Less than 1 year	% of Total	.8	.3	.3	.3	.8	**2.3**
NAM	1 year	% of Total	1.0	.3	3.5	.0	.3	**5.0**
	2 years	% of Total	11.3	1.5	14.3	2.8	.0	**29.8**
	3 years	% of Total	4.3	5.5	19.0	12.5	3.0	**44.3**
	More than 3 years	% of Total	.5%	.8%	7.5%	2.0%	5.5%	**16.3%**
	% of total		**17.8**	**8.5**	**45.8**	**17.8**	**10.3**	**100.0**
	No teacher training	% of Total		.0	1.0	.0	.0	**1.0**
	2 years	% of Total		2.2	7.7	9.2	.0	**19.2**
SEY	3 years	% of Total		.0	5.2	14.7	3.5	**23.4**
	More than 3 years	% of Total		.0	4.7	51.7	.0	**56.5**
	% of total			**2.2**	**18.7**	**75.6**	**3.5**	**100**
	No teacher training	% of Total	.0	.0	.3	.0	.5	**.8**
	1 year	% of Total	1.3	.0	.0	.0	.0	**1.3**
	2 years	% of Total	9.0	.5	3.4	1.9	.3	**15.1**
SOU	3 years	% of Total	18.3	.5	9.5	6.9	9.8	**45.0**
	More than 3 years	% of Total	4.5	1.6	5.6	9.5	16.7	**37.8**
	% of total		**33.1**	**2.6**	**18.8**	**18.3**	**27.2**	**100**
	No teacher training	% of Total	.0	.0	3.6	.8	.6	**5.1**
	1 year	% of Total	.6	.0	.6	1.3	.0	**2.5**
	2 years	% of Total	2.5	1.4	8.2	21.4	1.9	**35.3**
SWA	3 years	% of Total	6.0	.0	3.6	37.2	5.0	**51.9**
	More than 3 years	% of Total	.0	.0	.0	1.8	3.4	**5.2**
	% of total		**9.2**	**1.4**	**16.0**	**62.6**	**10.9**	**100**
	No teacher training	% of Total	.0	.0	.0	.1		**.1**
	1 year	% of Total	.0	3.5	.0	.0		**3.5**
	2 years	% of Total	2.6	69.6	2.9	1.0		**76.0**
TAN	3 years	% of Total	6.1	9.4	.0	.0		**15.5**
	More than 3 years	% of Total	.0	3.8	.0	1.1		**4.9**
	% of total		**8.7**	**86.2**	**2.9**	**2.2**		**100**
	No teacher training	% of Total	.0	.7	1.0	.7	1.3	**3.7**
	Less than 1 year	% of Total	.0	.0	2.4	.0	1.0	**3.4**
UGA	1 year	% of Total	.0	.0	.0	2.0	.0	**2.0**
	2 years	% of Total	.0	.0	43.8	13.1	1.0	**57.9**
	3 years	% of Total	.0	.0	13.1	7.4	.0	**20.5**
	More than 3 years	% of Total	.3	.0	2.4	6.4	3.4	**12.5**
	% of total		**.3**	**.7**	**62.6**	**29.6**	**6.7**	**100**
	No teacher training	% of Total	.0	.0	2.3	.0	.0	**2.3**
	Less than 1 year	% of Total	.0	.0	.8	.0	.0	**.8**
ZAM	1 year	% of Total	.3	.3	.8	.3	.0	**1.5**
	2 years	% of Total	9.2	5.9	66.2	9.7	.5	**91.6**
	3 years	% of Total	.0	.0	.3	1.0	.0	**1.3**
	More than 3 years	% of Total	.0	.0	1.0	1.5	.0	**2.6**
	% of total		**9.5**	**6.1**	**71.4**	**12.5**	**.5**	**100**
	No teacher training	% of Total	.0	.0	4.1	1.8		**6.0**
	Less than 1 year	% of Total	.0	2.8	4.7	.3		**7.8**
	1 year	% of Total	.5	.3	4.1	.3		**5.2**
ZAN	2 years	% of Total	.0	5.4	69.2	3.4		**78.0**
	3 years	% of Total	.3	.0	.5	.3		**1.0**
	More than 3 years	% of Total	.0	1.0	.8	.3		**2.1**
	% of total		**.8**	**9.6**	**83.4**	**6.2**		**100**
	No teacher training	% of Total	.0	.5	3.6	.4	.2	**4.8**
	Less than 1 year	% of Total	.1	.7	2.6	.2	.1	**3.8**
	1 year	% of Total	.3	1.2	2.3	.4	.1	**4.4**
SAC	2 years	% of Total	3.6	11.1	26.8	7.8	.6	**50.0**
	3 years	% of Total	4.7	2.0	7.4	6.8	1.6	**22.5**
	More than 3 years	% of Total	1.4	1.1	3.1	6.5	2.6	**14.6**
	% of TOTAL		**10.2**	**16.7**	**45.8**	**22.1**	**5.2**	**100**

Source: Data from SACMEQ II database, 2004

As previously observed, almost half of the mathematics teachers in SACMEQ countries had senior secondary education (46%) and two years of professional training (50%). In 8 out of 14 systems of education, almost two thirds (71%) of the mathematics teachers had on average only 2 years of professional training (Botswana, Kenya, Malawi, Mauritius, Tanzania, Uganda, Zambia, and Zanzibar). In 5 systems of education, fewer than half of the mathematics teachers had 3 years of professional training (Lesotho, Mozambique, Namibia, South Africa and Swaziland). It is noteworthy that over half (57%) of the mathematics teachers in the Seychellois system had more than 3 years of professional training. Finally, the percentage of teachers without any training varies from 0.1% in Tanzania and Mauritius to 18% in Mozambique.

In addition, the academic level of the teachers varies from primary to tertiary education in the SACMEQ countries. However, half of the systems (7 out 14) had teachers who had completed senior secondary and A-level academic levels of education (Kenya, Mauritius, Namibia, Seychelles, Swaziland, Uganda and Zambia). The majority of the mathematics teachers in four systems of education (Botswana, Malawi, Mozambique and Zanzibar) had junior secondary or senior secondary education. The majority of the mathematics teachers in Lesotho (50%) and South Africa (33%) had primary education, but at the other end of the scale, almost 18% of Lesotho's mathematics teachers had completed A-level education and 27% of South African mathematics teachers had a tertiary level qualification. As with the pattern for teachers of reading, 9% of Tanzania's mathematics teachers had completed only primary education, and 86.2% junior secondary (see appendix 11 for more details).

6.2 PUPIL CHARACTERISTICS AND BACKGROUND

Pupils' backgrounds and the problems they encounter in Mozambique and other SACMEQ countries are presented and discussed in the next section.

6.2.1 Characteristics and Problems of Pupils in Mozambique

Many factors affect pupil performance, such as the quality of teachers, the condition of schools, and the pupils' background, to mention a few. Table 6.16 attempts to illustrate the characteristics of Grade 6 Mozambican pupils during 2000 by taking into account age, gender, the number of books at home, possessions at home, meals, and parental education.

Table 6.16

Means, percentages, and sampling errors for pupil age, sex, and home-related characteristics

Provinces	Age (months)		Sex (female)		Books at home (number)		Possessions at home (index)		Meals (index)		Parent education (index)	
	Mean	SE	%	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
CAB	199.8	2.56	26.8	3.48	25.3	8.03	2.7	0.28	10.8	0.15	5.7	0.24
GAZ	177.5	2.04	49.2	3.22	29.6	14.38	3.6	0.33	10.8	0.18	6.0	0.26
INH	176.0	1.79	43.7	4.38	19.0	7.01	3.5	0.33	10.9	0.16	5.4	0.19
MAC	170.9	1.46	48.8	2.93	29.8	4.22	5.1	0.16	10.3	0.17	6.6	0.13
MAN	177.7	1.75	33.5	3.74	12.2	1.99	4.2	0.29	11.2	0.10	5.7	0.24
MAP	172.3	2.45	54.1	3.43	29.3	6.80	5.4	0.30	10.8	0.17	6.4	0.22
NAM	180.1	1.26	29.5	2.98	19.9	4.06	3.2	0.22	10.9	0.11	5.5	0.26
NIA	183.1	2.80	31.9	3.99	22.8	4.58	3.7	0.24	11.0	0.16	5.9	0.26
SOF	171.9	2.15	34.5	4.15	38.1	6.76	4.1	0.32	10.0	0.22	5.9	0.22
TET	174.6	2.02	38.3	3.90	18.8	3.99	3.6	0.29	10.2	0.18	5.5	0.29
ZAM	180.0	2.34	32.0	3.52	22.1	4.82	3.1	0.30	10.2	0.21	5.4	0.22
Mozambique	176.7	0.63	40.3	1.16	24.9	2.13	4.0	0.08	10.6	0.06	5.9	0.07

Source: SACMEQ II database 2004

Age

The mean age of Mozambican pupils in Grade 6 in 2000 was 176.7 months (14.7 years). The official age of entry into schooling in Mozambique is 6 years. That is, pupils enter school in January in the year they will turn 6 years old before 31 December. The expected age of a Grade 6 pupil should be 132 months (11 years), but the average age of the pupils in the study was 4 years older than expected. There were also large variations among the regions. For instance, Cabo Delgado had the oldest pupils at an average of 199.8 months (almost 16.7 years) and Maputo Cidade the youngest at 170.9 months (14.2 years). The high numbers of over-age pupils were due to a combination of factors such as the high levels of grade repetition and late entry into the first grade. The Ministry of Education and Culture has initiated an attempt to reduce the repetition and dropout rate by introducing a new curriculum in 2004 and revitalizing the School Clusters known as "Zona de influencia pedagogica (ZIPs)" to support teachers in their practice and improve their professional performance.

Gender

Table 6.16 indicates that the percentage of girls in Grade 6 was 40% in 2000. There was a large variation between provinces, ranging from 27% in Cabo Delgado to 54% in Maputo Provincia. The

northern provinces of Nampula, Niassa and Cabo Delgado had the lowest percentage of girls in Grade 6, whereas the southern provinces of Inhambane, Gaza, Maputo Provincia (54.1%) and Maputo Cidade showed percentages that were above the average. Apart from the cultural aspects related to girls' education, parents tend to give priority to boys' being educated rather than girls. Other factors such as the absence of upper primary schools near many communities also have an impact on children's education. For pupils in such communities to continue their studies in upper primary schools they have to move to nearby villages and board with other families, or live in hostels (SACMEQ II). This practice tends to be necessary in the Northern provinces of Mozambique and there are fewer girls who continue with further education as a result. More often than not, parents are unwilling to send their girl children to hostels, since the conditions in most hostels are adverse. Some pupils live in hostels in Cabo Delgado (38%), Niassa (16%) and Nampula (11%), but in general hostel buildings are in poor condition, the sanitation is inadequate, they are overcrowded, the diet is meagre, and they are not well supervised (Passos, Nahara, Magaia and Lauchande, 2005).

To reduce the gender imbalance in education, the Ministry of Education has introduced policies such as scholarships for girls and the upgrading of the lower primary schools (Grades 1 – 5) to complete primary schools (Grades 1 – 7). This improvement ensures that pupils do not need to leave their villages to move to towns in order to attend upper primary school. Upgrading allows for the completion of primary school (lower and upper primary) and is the best available way of reducing the gender imbalance.

Socio-Economic Status (SES)

The socio-economic status of the pupils is usually highlighted as a factor to take into consideration with pupil performance. Because it is impossible to ask the children about their parents' salaries, indirect methods of assessing the wealth of the home were used. One component introduced was home possessions. Another was the intellectual milieu as characterized by the level of education of the parents and the number of books they have at home, particularly as both can be of use to the child's learning.

Books in the home

The information summarized in Table 6.16 shows that the average Grade 6 pupil had 30 books at home. The variation in the provinces ranges from a low of 12 books for Manica to a high of 38 books for Sofala. It is essential for pupils to be able to read at home to improve their reading skills, and it is therefore disappointing to learn that some pupils had few books at home or at school.

If there are few books in the home, then the Ministry may wish to overcome this deficit by ensuring that children can take library books home from school to read, and the Ministry can also provide mobile libraries that visit villages at least once every two weeks (Passos, Nahara, Magaia and Lauchande, 2005, p.32).

Index of possessions

Several items were selected to indicate the socio-economic status (SES) of pupils in Mozambique. The pupil questionnaire asked about thirteen items that they might possess in the home. These items included a daily newspaper, a weekly or monthly magazine, a radio, a TV set, a video cassette recorder (VCR), a cassette player, a telephone, a car, a motorcycle, a bicycle, piped water, electricity (mains, generator, solar), and a table to write on.

The various items were grouped under categories with a specific score provided for each category. The lowest score possible was zero if a pupil did not have any item on the list, and the highest was 13. The average number of possessions for pupils was 4, and the same average applied to both reading teachers (4.0) and mathematics teachers (3.9) and roughly one third of the highest number (13). Maputo Provincia was the highest with 5.4 possessions, and Cabo Delgado was the lowest with 2.7 possessions. The provinces of Maputo Cidade, Manica, Maputo Provincia and Sofala were above the average, whereas the rest of provinces were below the average.

Nutrition

As indicated in Table 6.16, questions concerning the nutrition of the pupils in terms of their having three meals a day (a morning meal, a mid-day meal and an evening meal) were included in the pupil questionnaire to establish how many times a week they ate. No questions were asked about the nutritional value of each meal. The lowest score possible was 3, which meant that they did not eat at all, and the highest possible score was 12, which indicated that they ate every meal each day. The results summarized in Table 6.16 show that the average was 10.6 meals, which indicated that Grade 6 pupils in Mozambique had enough to eat. The average in Sofala was the lowest in the country (10.0 meals), with Maputo Cidade also recording a low of 10.3 meals, which falls below the average. Manica and Niassa had the highest scores of 11.2 and 11.0 meals per week respectively.

Parental Education

Another variable influencing pupil performance is the level of parental education. Separate questions were asked about the mother's and father's education level, and the results are summarized in Table 6.16. A score of '0' indicated that neither parent had received any school education, and a score of 6 indicated that both parents had completed senior secondary and tertiary

education. The parental education average was 5.9 in Mozambican Grade 6 schools. There was a small variation among the provinces. The highest score was 6.6 in Maputo Cidade, and the lowest was 5.4 in Inhambane, Tete, and Zambézia.

Pupils' homes

One of the ways to measure the quality of pupils' home is to assess the materials that are used in the construction of the homes and in particular the floors, walls and roofs of the houses where they live. SACMEQ constructed an index for the general quality of the Grade 6 pupils' homes from the sum of the indices for (a) lighting, (b) the condition of the floors, (c) the condition of the walls and (d) the condition of the roof. For each of the factors (a) to (d), the minimum value of the index was 1 for absolutely basic or poor condition, and the maximum was 4 if the condition was perfect. Therefore, the minimum value of the index for general quality was 4 if all of the factors were absolutely basic or poor, and the maximum was 16 if all the aspects were perfect. Table 6.17 shows the general quality of pupils' home.

Table 6.17

Means and sampling errors for the general quality of pupils' homes

Provinces	**General quality of pupil's homes (index)**	
	Mean	**SE**
CAB	8.3	0.26
GAZ	9.6	0.32
INH	8.1	0.46
MAC	11.7	0.23
MAN	8.6	0.33
MAP	11.8	0.24
NAM	8.3	0.38
NIA	8.2	0.28
SOF	9.3	0.47
TET	8.4	0.44
ZAM	7.4	0.45
MOZ	**9.4**	**0.12**

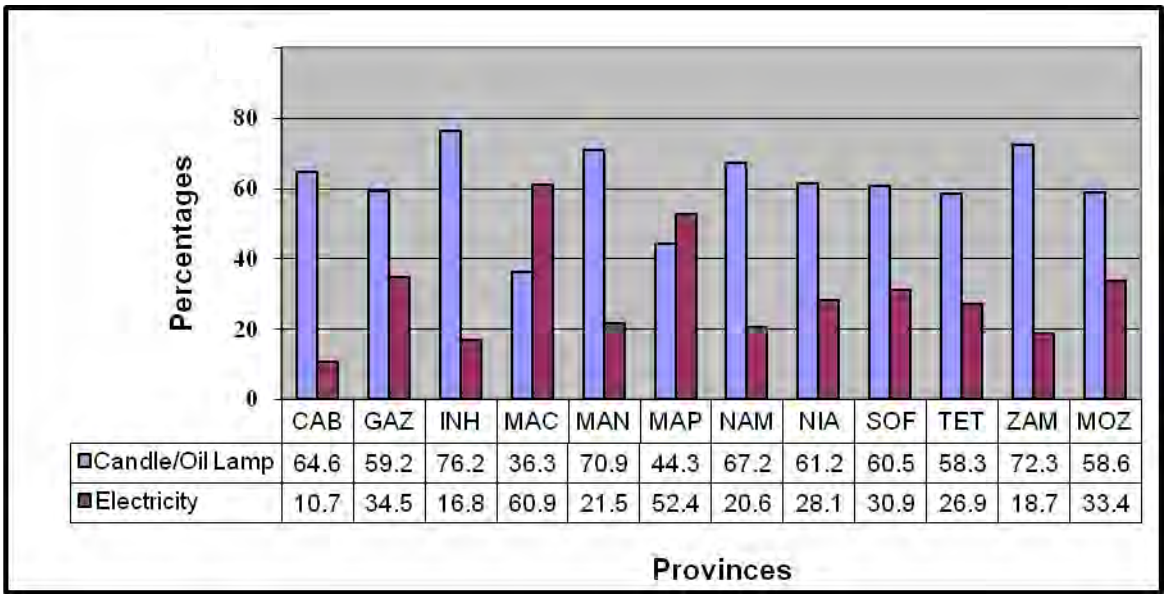
Source: SACMEQ II database, 2004

It can be observed in Table 6.17 that in terms of the average, the general quality of Mozambican pupils' homes in Grade 6 was 9.4. There was some variation among provinces, ranging from 11.8 in Maputo Province to 7.4 in Zambézia. Maputo Province (11.8), Maputo Cidade (11.7) and Gaza (9.6) were the three provinces where the index of the quality of pupils' home was higher than the

average. As stated in the SACMEQ report, the results reflect the imbalance in income distribution in Mozambique. This finding is consistent with that of the human development index (HDI) for Mozambique, where the index for Maputo Cidade in 2000 was 0.51 while that for Zambézia was 0.18 (UNDP, 2001).

Lighting

Another indicator of the socio-economic status is the type of lighting that the pupils use at home. The figure below shows the percentage of pupils that had candles/oil lamps or electricity in their homes (see Appendix 12).



	CAB	GAZ	INH	MAC	MAN	MAP	NAM	NIA	SOF	TET	ZAM	MOZ
Candle/Oil Lamp	64.6	59.2	76.2	36.3	70.9	44.3	67.2	61.2	60.5	58.3	72.3	58.6
Electricity	10.7	34.5	16.8	60.9	21.5	52.4	20.6	28.1	30.9	26.9	18.7	33.4

Source: Data from SACMEQ database, 2004

Figure 6. 5 Percentage of pupils that had candles/oil lamps or electricity at home

Figure 6.5 demonstrates that most pupils in upper primary school in Mozambique do not have electricity at home. An average 33% and 59% of pupils had electricity and candles/oil lamps, respectively, as a source of lighting in their homes. There was a large variation in the provinces in the proportion of pupils that used electricity as a source of lighting, ranging from 11% in Cabo Delgado to 61% in Maputo Cidade as well as a variation ranging from 36% in Maputo Cidade to 76% in Inhambane of pupils that used candles/oil lamps.

Location of school

Seventy-five percent of the Mozambican Grade 6 pupils were attending an urban school in 2000, as most Grade 6 and 7 schools were located in urban areas.

Language spoken at home

One of the factors to take into consideration in pupil performance is how often pupils speak the language of instruction at home. In Mozambique the language of instruction is Portuguese. Pupils' proficiency in the language is related to how often they speak the language. The percentage of pupils who spoke Portuguese at home is presented in Table 6.18 in terms of 'sometimes,' 'often' and 'all of the time'.

Table 6.18 reflects the fact that an average of 95% of the pupils spoke Portuguese at home at least sometimes. The variation among provinces ranged from 84% in Niassa to 98% in Maputo Provincia. This percentage meant that 16% of the pupils in Niassa and 2% of the pupils in Maputo Provincia never spoke Portuguese at home. Maputo Provincia, Maputo Cidade, Manica and Inhambane were provinces where the percentage of pupils that spoke Portuguese at home was higher than the average. Mozambique is a multilingual country and has, according to Sitoe and Ngunga (2000), 18 Bantu languages, each of which has many dialects. Taking into consideration that Portuguese is a second language for the majority of the pupils in Grade 6, the percentage of pupils that spoke Portuguese, at least sometimes at home, is very high. The location of upper primary school in urban areas and the fact that Portuguese is the language of instruction in Mozambique from Grade 1 onwards may contribute to the high percentage of pupils speaking Portuguese at home.

Table 6.18

Percentages, mean, and sampling errors for language, days absent, and repetition

Provinces	Speak Portuguese		Days absent		Repetition	
	%	SE	Mean	SE	%	SE
CAB	93.9	1.85	3.0	0.22	65.3	2.73
GAZ	93.8	1.85	2.5	0.35	83.1	2.55
INH	94.9	1.77	1.5	0.27	83.6	3.25
MAC	97.5	1.10	2.8	0.26	85.3	2.34
MAN	97.4	1.75	2.9	0.28	78.9	2.72
MAP	98.4	0.62	2.5	0.26	83.9	2.81
NAM	93.3	2.01	3.4	0.38	70.9	3.17
NIA	83.9	2.92	4.0	0.27	68.8	3.47
SOF	93.6	1.64	2.8	0.27	69.3	4.33
TET	90.4	2.04	2.6	0.30	67.6	4.46
ZAM	92.7	1.40	3.0	0.26	79.2	2.72
MOZ	**94.5**	**0.50**	**2.7**	**0.10**	**78.2**	**0.98**

Source: SACMEQ database, 2004

Absenteeism and repetition

Another question related to pupil performance was the number of days that the pupils were absent during the month preceding the testing. Yet another was related to pupil repetition. Pupils were asked if they had repeated a grade at least once. Table 6.18 shows that Grade 6 pupils in Mozambique were absent for 2.7 days during the month preceding the testing. The variation among provinces ranged from 1.5 days in Inhambane to 4.0 in Niassa. Absenteeism can be seen as a problem in Niassa because 4 days represent more or less a week in one month. From these results one can conclude that a large number of days are lost every year. With the HIV pandemic rife in the region, the problem of absenteeism can be expected to increase. The SACMEQ study did not confirm the problem of HIV as the reason for absenteeism, but most of the absenteeism was declared as being related to illness and family reasons.

The repetition rate is very high in Mozambique, with 78% of the pupils having repeated a grade at least once. There were some variations among provinces, ranging from 65% in Cabo Delgado to 85% in Maputo Cidade. According to the SACMEQ report, this repetition rate may be related to the teachers' academic and professional qualifications.

Distance to school

Table 6.19 shows that the distance from home to school is an important factor to consider, as in Mozambique more that 60% of the population lives in rural areas. The country is large and in addition, it has a poor transport and communication network. Generally, the rural areas have poor access to basic services and infrastructure such as piped water, electricity and good roads. To find the average distance between home and school, the school director was asked 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 combined and called 'rural' and the latter two categories were also combined and called 'urban.' A further question asked about how many kilometres it was from the school to a health clinic, a tarmac road, a public library, a bookshop and a secondary school, and these distances were averaged for each school.

The gross school enrolment ratio by level in 2000 was as follows:

Lower Primary school (Grades 1 to 5)	88.9%
Upper Primary school (Grades 6 and 7)	8.1%
Junior Secondary (Grades 8 to 10)	3.1%
Senior Secondary (Grades 11 and 12)	0.4%

To add to the picture of schooling in Mozambique, Table 6.19 illustrates the location of schools across provinces within the country.

Table 6.19

School location

Province	Urban		Distance (Km)	
	%	SE	Mean	SE
CAB	46.7	12.46	25.8	7.83
GAZ	71.1	12.61	9.5	4.21
INH	63.1	14.83	8.3	3.77
MAC	100.0	0.00	2.3	0.41
MAN	80.0	13.79	12.6	3.70
MAP	72.7	12.18	5.9	1.22
NAM	64.2	10.91	27.5	7.16
NIA	58.4	11.05	18.3	7.46
SOF	86.2	9.26	11.1	3.63
TET	58.6	11.44	23.4	9.42
ZAM	73.9	10.59	19.5	7.52
MOZ	**74.5**	**3.27**	**13.2**	**1.59**

Source: Passos, Nahara, Magaia and Lauchande, 2005, p.39

As can be seen in Table 6.19, most Grade 6 schools were located in urban areas. For instance, in 2000 75% of the Grade 6 pupils in Mozambique were in urban schools. Cabo Delgado was the only province where most of pupils were in rural schools. However, there is an ongoing programme by the Ministry of Education to expand access to the full cycle of basic education throughout the country. The average distance that a Grade 6 pupil has to walk to go to school is 13.2 km. There was a large variation among the provinces. In Maputo Cidade and Maputo provinces, the Grade 6 pupil travels 2.3 and 5.9 kilometres respectively, while in Nampula he or she needs to travel 27.5km. There is a huge imbalance among provinces in terms of school distribution. It seems that the further north you go, the greater the distance the Grade 6 pupil has to travel.

6.2.2 Characteristics and Problems of Pupils in SACMEQ Countries

The Mozambican pupils' background is compared with that of the pupils from other SACMEQ countries and then discussed in this section.

As explained in Section 6.2.1, several items were selected to indicate the pupils' socio-economic status. Table 6.20 shows the pupils' characteristics in Grade 6 in SACMEQ countries in 2000.

Table 6.20

Means, percentages, and sampling errors for the pupils' age, sex, and home-related background (SACMEQ II)

Country	Age (months)		Sex (female)		Books at home (number)		Possessions at home (index)		Meals (index)		Parent education (index)	
	Mean	SE	%	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Botswana	157.8	0.41	51.0	0.64	24.7	1.99	5.5	0.13	10.7	0.06	6.5	0.12
Kenya	168.4	0.76	50.3	1.19	27.6	3.25	4.3	0.14	11.2	0.06	7.4	0.13
Lesotho	169.6	0.70	55.6	0.93	16.3	1.38	4.2	0.11	10.7	0.09	6.1	0.08
Malawi	174.0	1.19	47.8	1.34	10.1	1.07	4.0	0.15	11.3	0.06	5.9	0.14
Mauritius	135.8	0.12	48.1	0.60	37.6	2.11	9.7	0.09	11.6	0.04	7.7	0.08
Mozambique	176.7	0.63	40.3	1.16	24.9	2.13	4.0	0.08	10.6	0.06	5.9	0.07
Namibia	166.4	0.57	51.9	0.61	22.0	1.16	5.4	0.10	10.7	0.06	6.9	0.08
Seychelles	138.8	0.12	50.1	1.30	44.6	1.58	8.9	0.05	10.3	0.05	8.7	0.05
South Africa	156.9	0.69	52.5	1.00	32.9	2.36	6.6	0.20	10.5	0.08	7.7	0.14
Swaziland	166.4	0.60	51.6	0.86	19.1	1.62	5.7	0.14	11.0	0.07	7.2	0.12
Tanzania	180.4	0.83	52.2	0.95	31.6	2.83	3.4	0.18	10.6	0.09	6.2	0.13
Uganda	171.4	0.93	44.5	1.63	31.6	2.62	3.4	0.11	9.9	0.11	6.4	0.11
Zambia	166.7	1.43	48.4	1.19	19.1	1.32	4.0	0.18	10.7	0.07	7.5	0.11
Zanzibar	179.1	0.42	51.7	1.23	10.8	0.97	4.6	0.06	11.2	0.04	6.0	0.06
SACMEQ	**164.8**		**49.7**		**25.2**		**5.26**		**10.7**		**6.86**	

Source: Data from SACMEQ II database, 2004

Age

The mean age of pupils in Grade 6 in SACMEQ countries in 2000 was 164.8 months (13.7 years). The variation between countries ranged from 180.4 months (15.0 years) in Tanzania to 135.8 months (11.3 years) in Mauritius. The age of pupils in Grade 6 in SACMEQ countries (ranging from 11.3 to 15 years) may make a difference in terms of pupil performance, taking into consideration the level of maturation of the pupils. In addition, if one considers the normal school entry age (6-7 years) in some countries, pupils were around 2 or 3 years older than expected in Tanzania, for example. The high numbers of over-age pupils in Mozambique may be the result of a combination of factors such as the high levels of grade repetition and late entry into the first grade.

Botswana, Mauritius, Seychelles and South Africa showed percentages that were below the average.

The information summarized in Table 6.20 indicates also that in 2000, the percentage of girls in Grade 6 was 49.7%. There was some variation among countries, ranging from 40% in Mozambique to 56% in Lesotho.

Books in the home

The information summarized in the Table 6.20 shows that the average Grade 6 pupil had 25 books at home. There were huge variations among countries, ranging from a low of 10 books for Malawi to a high of 45 books for Seychelles. In order to improve the reading skills in Mozambique it is essential for pupils to be able to read at home. It is concerning to learn that most pupils had few books at home and at school. To overcome this deficit, the Ministry of Education needs to provide libraries at schools and should advise the parents to buy books for their children and encourage them to visit public libraries in order foster a love of reading.

Index of possessions

Several items were selected in SACMEQ II to indicate the socio-economic status (SES) of pupils in SACMEQ countries. A question was asked in the pupil questionnaire about thirteen possessions they might possess in the home. These items included a daily newspaper, a weekly or monthly magazine, a radio, a TV set, a video cassette recorder (VCR), a cassette player, a telephone, a car, a motorcycle, a bicycle, piped water, electricity (mains, generator, solar), and a table to write on.

The various items were grouped under categories and a certain score was provided under each category. The lowest score possible was zero, if a pupil did not have any item in the list, and the highest was 13. The average number of possessions for pupils was 5.26. The highest was in Mauritius with 9.7 possessions, and the lowest was in Tanzania and Uganda with 3.4 possessions. The countries of Botswana, Mauritius, Namibia, Seychelles, South Africa and Swaziland scored above the average, whereas the rest of the countries scored below the average.

Nutrition

The questions concerning the number of meals the pupils had in a day were included in the questionnaire and the results are summarized in Table 6.20. The table shows that the average index score was 10.7, which indicates that pupils had enough meals per week in SACMEQ countries. The index score in Uganda was the lowest in the region (9.9) while Mauritius had the highest score (11.6).

Parental Education

The pupils were asked about the mother's and father's education levels and the results are summarized in Table 6.20. In Grade 6 the average score was 6.86. There was some variation among the countries, with the highest beings 8.7 in Seychelles and the lowest 5.9 in Malawi and Mozambique. Table 6.21 summarises the general quality of pupils' homes.

Table 6.21

Means and sampling errors for the general quality of pupils' homes

Country	General quality of pupils' homes (index)	
	Mean	SE
Botswana	10.5	0.13
Kenya	8.9	0.13
Lesotho	9.5	0.11
Malawi	8.8	0.16
Mauritius	14.5	0.04
Mozambique	9.4	0.12
Namibia	8.4	0.10
Seychelles	13.5	0.03
South Africa	11.9	0.19
Swaziland	10.7	0.11
Tanzania	9.1	0.16
Uganda	7.9	0.13
Zambia	9.3	0.16
Zanzibar	9.0	0.05
SACMEQ	**10.0**	

Source: Data from SACMEQ II database, 2004

Pupils' homes

From Table 6.21 it can be seen that the general score for the quality of pupils' home in Grade 6 in SACMEQ countries was 10. There was some variation, ranging from 14.5 in Mauritius to 7.9 in Uganda. In Botswana (10.5), Mauritius (14.5), Seychelles (13.5), South Africa (11.9) and Swaziland (10.7) the quality of pupils' homes was higher than the average. The quality of pupils' homes affects their performance, as stressed by Dustmann, Rajah and Soest (1998, p.12):

Not only parental input affects the child's performance, but also the studying conditions. We include a variable which measures whether the child has a separated room in which to study. In families with more than one child, children are likely to compete for resources.

Competing for resources in a family with more than one child can have a negative impact on pupil performance. On the other hand, a child can learn how to share the same resources, and this sharing can be positive from an educational point of view.

Language spoken at home

Proficiency in the language of instruction may have a positive impact on pupil performance. Table 6.22 summarises the pupils' language, days absent and repetition:

Table 6.22

Percentages, mean, and sampling errors for the language, days absent, and repetition

Country	Speak the Language of Instruction		Days absent		Repetition	
	%	SE	Mean	SE	%	SE
Botswana	74.0	1.34	0.4	0.03	31.4	1.02
Kenya	86.4	1.21	2.0	0.10	64.1	1.67
Lesotho	70.7	2.31	1.3	0.09	60.8	1.60
Malawi	40.8	2.87	2.0	0.15	66.1	1.95
Mauritius	64.5	2.28	1.8	0.09	18.7	0.83
Mozambique	94.5	0.50	2.7	0.10	78.2	0.98
Namibia	78.0	1.25	1.5	0.08	54.1	1.15
Seychelles	83.5	0.94	0.9	0.04	10.3	0.77
South Africa	76.5	1.77	1.6	0.13	42.3	1.93
Swaziland	63.8	2.14	0.8	0.05	59.3	1.39
Tanzania	89.9	1.19	2.1	0.17	23.3	1.80
Uganda	82.4	1.97	1.9	0.08	52.9	1.86
Zambia	73.4	2.22	2.5	0.12	51.5	1.56
Zanzibar	96.2	0.46	2.0	0.07	27.6	1.05
SACMEQ	**76.7**		**1.6**		**45.7**	

Source: Data from SACMEQ database, 2004

It can be observed in Table 6.22 that 76.7% of pupils spoke the language of instruction at home at least sometimes, but 23.3% of pupils never spoke the language of instruction. There were huge

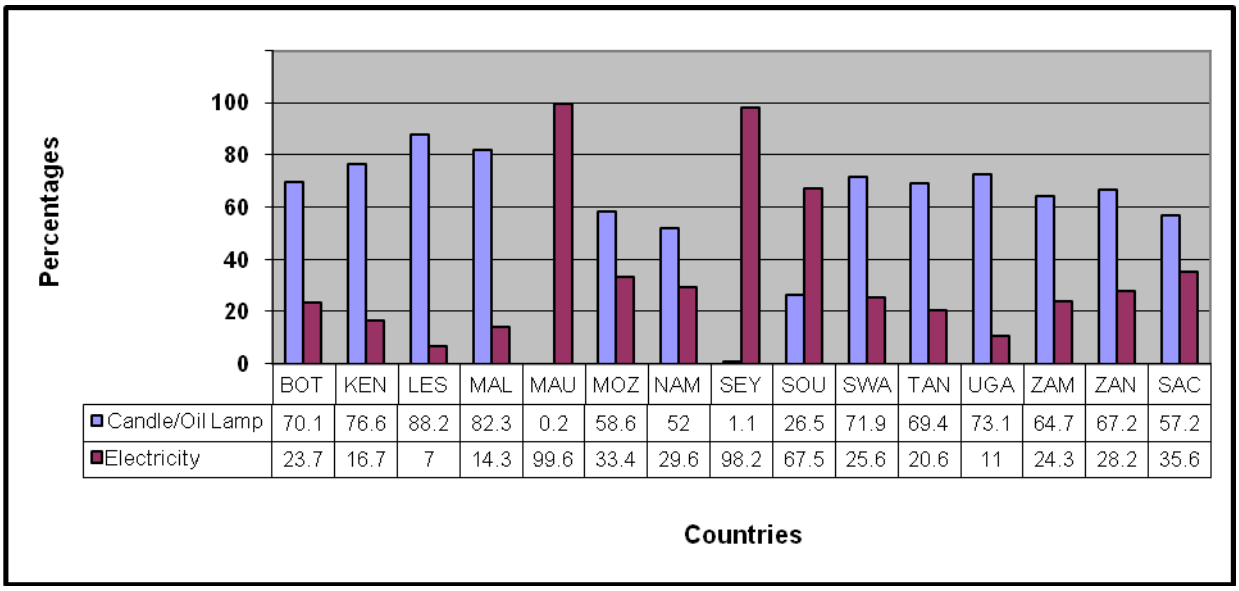
variations among countries, from 41% in Malawi to 96% in Zanzibar. Countries such as Kenya, Mozambique, Seychelles, Tanzania and Zanzibar were the countries where the percentage of pupils that spoke the language of instruction was higher than the average.

Absenteeism and repetition

On average, Grade 6 pupils were absent for 1.6 days during the month preceding the testing. Pupils in Mozambique had the highest number of days absent from school (2.7) and Botswana the lowest (0.4 days). Almost half (46%) of pupils had repeated a grade at least once. Mozambique had the highest percentage of repetition and Seychelles the lowest.

Lighting at home

A further indicator of socio-economic status is the type of lighting that the pupils use at home. Figure 6.6 shows the percentage of pupils that had candles/oil lamps or electricity in their homes (see Appendix 13 for more information).



	BOT	KEN	LES	MAL	MAU	MOZ	NAM	SEY	SOU	SWA	TAN	UGA	ZAM	ZAN	SAC
Candle/Oil Lamp	70.1	76.6	88.2	82.3	0.2	58.6	52	1.1	26.5	71.9	69.4	73.1	64.7	67.2	57.2
Electricity	23.7	16.7	7	14.3	99.6	33.4	29.6	98.2	67.5	25.6	20.6	11	24.3	28.2	35.6

Source: Data from SACMEQ II database, 2004

Figure 6. 6 Percentage of pupils that had candles/lamps or electricity at home

Figure 6.6 shows that more than half (57 %) of the Grade 6 pupils in SACMEQ countries had candles or oil lamps in their homes. On average, only just over a third (36%) of pupils had electricity for lighting in their homes. There was a large difference between countries in terms of the source of lighting ranging, from very few who had candles or oil lamps in their homes in Mauritius to 88% in Lesotho, while only 7% in Lesotho as against almost all pupils in Mauritius used electricity as a source of lighting in their homes.

School location

The distance from home to school is an important factor to consider, and Table 6.23 shows the location of schools in SACMEQ countries.

Table 6.23

School location

Region	Urban		Distance (Km)	
	%	SE	Mean	SE
Botswana	50.9	3.79	21.3	2.49
Kenya	32.7	3.82	14.5	1.32
Lesotho	35.1	4.05	27.8	3.54
Malawi	33.0	4.35	16.6	1.39
Mauritius	51.7	2.29	2.4	0.14
Mozambique	74.5	3.27	13.2	1.59
Namibia	36.5	2.57	30.8	2.02
Seychelles	83.9	0.00	3.9	0.00
South Africa	56.2	3.56	12.7	0.98
Swaziland	29.5	3.86	19.0	1.80
Tanzania	28.6	4.04	15.9	1.49
Uganda	20.3	3.38	21.0	1.66
Zambia	52.1	4.46	35.6	3.64
Zanzibar	41.1	0.00	7.8	0.00
SACMEQ	**44.7**		**17.3**	

Source: Data from SACMEQ II database, 2004

It can be seen in Table 6.23 that most schools catering to Grade 6 pupils in SACMEQ countries were located in rural areas. For instance, almost 45% of the Grade 6 pupils were in urban schools in 2000. The variation between countries ranged from 84% in Seychelles to 20% in Uganda. Mozambique is one the countries where most pupils were being educated in urban schools. This may be a result of having separate schools for lower primary (from Grades 1 to 5) and upper primary (from Grades 6 to 7). As can be seen in the table there is a balanced distribution of schools in Grade 6 in some countries, namely Botswana, Mauritius and Zambia.

Table 6.23 also shows the distance that pupils must travel from home to school. Grade 6 pupils had to walk on average 17.3 km to get to school in SACMEQ countries. There was a large variation among the countries. The Grade 6 pupils travel an average of 2.4 kilometres in Mauritius, while in Zambia they need to travel 35.6 km. Examining the range of distances one notes a huge imbalance

among countries in terms of school distribution. The distance from home to school is one of the factors to take into consideration, because it may make have an effect on pupils' performance.

6.3 SUMMARY

The aim of this chapter was to describe the characteristics displayed by teachers and pupils at the Grade 6 level in primary schools in Mozambique and SACMEQ countries, in terms of gender, age, social status, academic education, professional training and professional experience.

There were some differences in terms of teacher training courses in SACMEQ countries. The entrance level for teacher training college in all SACMEQ countries is Grade 12, except in Mozambique, where the entrance level is Grade 10. The level is low and the duration of the courses, two years, is shorter if than in other countries. In two countries, namely Seychelles and South Africa, the duration of the courses is four years and the level of entrance is Grade 11 and 12 respectively, which means that their teachers have higher qualifications than those in other countries (see Table 6.3).

On average, pupils in SACMEQ countries were being taught reading and mathematics by teachers who were 36.5 and 34.6 years old respectively. Mozambique tended to have the youngest teachers in the region (around 32 years), which could be related to the level of possessions that teachers have at home (about 4), which forces them to aim for better conditions of service, such as a higher salary. Mauritius had the oldest teachers at 44.9 years old on average, and a score of 10.9 in terms of possessions at home. The age of a teacher is also related to the teacher's experience, which is an important variable to take into consideration for teacher performance. Usually teachers with more experience tend to perform better than others with less experience (Boehme et al., 1991).

In terms of gender, only 53% of the pupils in Grade 6 in SACMEQ countries were taught reading by teachers who were female. There were large variations among SACMEQ countries, ranging from 99% female reading teachers in Seychelles to 17% in Uganda. Only 40% of the pupils in SACMEQ countries were taught by mathematics teachers who were female. There were large variations among countries, from 8% of female teacher in Uganda to 81% in Seychelles. It is crucial to consider some policies relating to teacher recruitment in countries like Uganda and Seychelles in order to reduce the gender imbalance. Taking the gender issue into account, 30% of the pupils in Mozambique were taught by female reading teachers while 26% were taught by mathematics teachers who were female.

In spite of the fact that the problem of the low level of economic development exists in each of the SACMEQ countries, Mauritian teachers were the oldest and had more years of experience, and Mozambican teachers were the youngest. It is thought that the teachers' possessions as well as their living condition are perhaps related to their level of salary, and that this may be the reason for Mozambicans leaving the teaching profession in search of a better source of income.

An indicator of living conditions was the use of electricity as a source of lighting. Mauritius and Seychelles had the highest percentage (100%) of electricity usage at home for teachers of mathematics and reading, while Uganda had the lowest percentage (6%) of pupils had mathematics teachers with electricity in their homes, as well as the lowest percentage (17%)of pupils who had reading teachers with electricity in their homes. In Mozambique 38% of pupils had reading teachers and 37% of pupils had mathematics teachers that had electricity in their homes as a source of lighting.

For the majority of Grade 6 reading and mathematics teachers in some SACMEQ countries, the main source of job satisfaction was seeing pupils learn, with the level of salary being the second. In Mozambique the level of salary appears to be the most important issue for reading and mathematics teachers, while the availability of teachers' housing is the second most important for reading teachers, and seeing pupils learn appears as the second for mathematics teachers.

In the SACMEQ countries, on average, the percentage of Grade 6 pupils were taught by reading teachers whose academic education ranged from 22% with A-levels, 45% with senior secondary education, 17% with junior secondary education, and 11% with primary education. Only 6% had undertaken tertiary education. Lesotho and South Africa had the highest percentage of reading teachers that had only primary education, 51% and 27% respectively, and Mauritius had the lowest at 0.3%.

In terms of professional training and experience, reading teachers in the SACMEQ countries had 2.2 years of training and 12.9 years of experience on average, while mathematics teachers had 2.3 years of teacher training and 10.8 years of experience. Years of training varied from 1.5 in reading and 1.4 in mathematics in Malawi, to 3.2 in reading in South Africa and 3.3 in mathematics in Seychelles. Years of teaching experience varied from 7.7 in reading in Malawi to 21.7 in Mauritius, and from 6.4 in mathematics Uganda to 13.8 in Kenya. Teachers of reading had 1.8 years of teacher training and 9.9 years of experience in Mozambique, while mathematics teachers had 1.9 years of teacher training and 9.1 years of experience.

The mean age of pupils in Grade 6 in SACMEQ countries in 2000 was 164.8 months (13.7 years). The variation between countries ranged from 180.4 months (15.0 years) in Tanzania to 135.8 months (11.3 years) in Mauritius. The average age of pupils in Grade 6 in SACMEQ countries ranged from 11.3 to 15 years. This age variation may make a difference in terms of pupils' performance, if the level of maturation of the pupils is taken into consideration. However, a further aspect is the normal school entry age of 6 to7 years. In some countries pupils were around 2 or 3 years older than expected, as was the case in Tanzania. In Mozambique, where the average age is 176.7 months (14.7 years) the high number of over-age pupils may be the result of a combination of factors such as the high levels of grade repetition and late entry into the first grade.

On average, Grade 6 pupils in SACMEQ countries had 25.2 books at home, while in Mozambique the pupils had 24.9 books at home. There were huge variations among countries, ranging from a low of 10.1 books for Malawi to a high of 44.6 books for Seychelles.

The pupils in Grade 6 were asked about their mother and father's levels of education. The average score of parents' education in SACMEQ countries was 6.86, and in Mozambique, it was 5.9. There was some variation, with a high of 8.7 in Seychelles and a low of 5.9 in Malawi and Mozambique.

About 78% of pupils in SACMEQ countries spoke the language of instruction at home at least sometimes, and 22% of pupils never spoke the language of instruction out of school. Variations among countries were seen, from 41% in Malawi to 96% in Zanzibar. Higher than average scores of pupils speaking the language of instruction at home were found in Kenya, Mozambique, Seychelles, Tanzania and Zanzibar.

On average, Grade 6 pupils in SACMEQ countries were absent for 1.6 days during the month preceding the testing. Pupils in Mozambique had the highest number of days absent from school (2.7) and Botswana had the lowest (0.4 days). Almost 46% of pupils had repeated Grade 6 at least once, with Mozambique having the highest percentage of repetition (78.2) and Seychelles the lowest (10.3).

This chapter has outlined and described the teacher characteristics, pupil background and problems encountered by pupils in Mozambique and the other SACMEQ countries. The following chapter describes the teaching contexts in Mozambique and the other SACMEQ countries, focusing on the internal and external teaching contexts.