# CHAPTER 9

# PREDICTORS OF MOZAMBICAN AND SACMEQ PUPIL PERFORMANCE IN READING AND MATHEMATICS IN RELATION TO TEACHER COMPETENCE

## INTRODUCTION

The purpose of this chapter is to provide information about the main factors, which explain the pupil performance variation in Mozambique and other SACMEQ countries and their relationship to teacher competence. The Multivariate Regression Model (MRM) was used to analyse to what extent the pupil performance variation is explained by various domains described in the conceptual framework, as described in detail in Chapter 5, Section 5.3. The results are presented, starting with exploratory statistics such as bivariate correlations between pupil performance and each domain and construct of the conceptual framework, as elaborated on in Chapter 5, Section 5.1.

In this section, the overview of the correlation between pupil performance and each domain and construct of the conceptual framework, first in Mozambique and then in SACMEQ countries, is presented and discussed in Section 9.1. Specifically the overview of the correlations between pupil performance in reading and in mathematics in Mozambique and in SACMEQ countries as a whole is presented and discussed in Section 9.1.1. The overview of the relationship between pupil performance in reading and mathematics and each domain and construct of the conceptual framework in Mozambique and in SACMEQ countries are presented and discussed in Section 9.1.2, while Section 9.1.3 of this chapter presents and discusses the correlations between pupil performance in reading and mathematics and the domain and constructs of the conceptual framework in Mozambique and in SACMEQ countries. This is followed by multiple regressions in Section 9.2. The overview of the results of multiple regression in reading and in mathematics in Mozambique and in SACMEQ countries as a whole is presented and discussed in Section 9.2 1. Predicting pupil performance in reading by teacher competence factor in Mozambique and in SACMEQ countries as a whole as well as in each SACMEQ country is presented Section 9.2.2, while predicting pupil performance in mathematics by teacher competence factor in Mozambique and in SACMEQ countries as a whole as well as in each SACMEQ country is presented and discussed in Section 9.2.3. Finally, the chapter concludes with a summary in Section 9.3.

The analysis was guided by the conceptual framework (see Chapter 5, Figure 5.1), which is organised into three domains, namely the cognitive, affective and behavioural, on three levels, the provincial, national and regional. The conceptual framework also includes the following constructs: teacher training, teacher characteristics, external teacher context, internal teaching context, pupils' characteristics, and parent and community school involvement. The variables that make up each of the domains and constructs of the conceptual framework can be seen in Appendix 47. These were used as explanatory variables and the pupil performance is regarded as the dependent or response variable. However, some of the domains are composed of several items and principal components analysis (PCA) was used in order to group the items in indicator.

As referred to in Chapter 5, Section 5.2 (see also Appendix 54), variables representing domains such as the cognitive, affective and behavioural, and constructs such as the external teaching context, the internal teaching context, teacher characteristics, pupils' characteristics, and parents and community school involvement, were developed using principal components analysis (PCA). This technique was used to identify common components (or factors) underlying a set of items in the survey data. Using this approach, it was possible to condense the information contained in the original variables into a smaller set (Smith, 2002). A set of indicators was therefore grouped and a score calculated, using PCA, for each one of the above domains and constructs (see Appendices 3 and 4).

Constructs such as the internal teaching context proxy variables from the SACMEQ data were used. For instance, the proxy variable used for pupil characteristics was socio-economic status (parent education. possessions at home, the source of lighting, and the composition of the walls, roof and floor). For the teachers' characteristics, it was the teachers' possessions at home (a daily newspaper, a weekly or month magazine, a radio, a TV set, a video cassette recorder (VCR), a cassette player, a car, a telephone, a refrigerator/freezer, a motorcycle, a bicycle, piped water, electricity, a generator, solar panels, a table to write on – to a maximum of 13 items). For the internal teaching context it was class resources (a writing board, chalk, a cupboard, a chart, bookshelves, a classroom library, a teacher table and a teacher chair, to a maximum of 8 items) and teacher class furniture (a map, English/Portuguese/Swahili Dictionary, a subject teacher guide in English/Portuguese/Swahili, a teacher guide for mathematics, and geometrical instruments, to a maximum of 5 items), while the external teaching context included school resources (a library, a hall, a staff room, a school head's office, a store room, first aid facilities and equipment, a sports ground, water, electricity, a telephone, a fax machine, a garden, a typewriter, a duplicator, a radio, a tape recorder, an overhead projector, a television set, a video-cassette recorder, a photocopier, a computer, a fence, and a cafeteria, to a maximum of 22 items).

In summary, the data analysis was performed in two phases. In the first phase the database were already weighted by SACMEQ and aggregated by school, and then PCA was used to develop proxy variables for the domains in which there are no indices on the database. In the second phase, the analysis started with correlation statistics between pupil performance and their background variables. Finally, in the third stage the regression model was developed using the multivariate regression equation to determine to what extent the empirical evidence supports the conceptual framework. In both phases, findings are presented with the Mozambican results first, followed by comparisons between Mozambique and the other SACMEQ countries.

## 9.1 EXPLORING RELATIONSHIPS BETWEEN TEACHER COMPETENCE AND PUPIL PERFORMANCE IN MOZAMBIQUE AND IN OTHER SACMEQ COUNTRIES

The next sections will present and discuss an overview of the relationship between teacher competence and pupil performance in Mozambique and in other SACMEQ countries.

### 9.1.1 An Overview of Mozambique and SACMEQ Countries as a whole

The analysis followed the structure of the conceptual framework, which is composed of three domains and six constructs. The Multivariate Regression Model was used to understand to what extent the pupil performance variation is explained by various domains and constructs described in the conceptual framework. Correlations were analysed as a preliminary step before the regression was undertaken. However, in order to give an overview of the relationship between pupil performance and each of the domains and constructs of the conceptual framework in Mozambique and in other SACMEQ countries, specific criteria were used to group the correlations as having strong, weak or no relationship. Whilst Tables 9.1, 9.2 and 9.3 give a broad overview of the relationships per domain, the details for individual constructs or variables are provided in Section 9.1.2, where the specific criteria for analysing the particular relationships are given, using correlational analysis.

For each of the domains there are a particular number of indicators or variables. A correlation between pupil performance and each one of the indicators was computed:

- Where half or more than half of the variables in the domains or constructs have a correlation of .15 or better, it was classified as *strong* (S);
- Where fewer than half of the variables in the domains or constructs a achieve correlation of .15 or better, it was classified as weak (W); and

- Where no variables in the domains or constructs achieved a correlation of .15 or better, the domain or construct was classified as no correlation (NC).

Bivariate correlation was used to explore to what extent it could be considered in relation to the conceptual framework. Bivariate correlation between pupil performance and the various indicators of each domain were computed for Mozambique and across the SACMEQ countries.

Tables 9.1, 9.2 and 9.3 give the first sense of how strong the correlation of each domain and pupil performance in Mozambique and across SACMEQ countries is in reading and mathematics in different domains and constructs of the conceptual framework at provincial, national and regional level.

Table 9.1

*Overview of the findings from the correlations between variables in the domain and constructs of the teacher competence model and pupil performance in reading and mathematics, at national and regional level*

| | **Cognitive** | | **Affective** | | **Behaviour** | | **Teacher training** | | **Teacher Characteristics** | | **Ext. Teaching Context** | | **Int. Teaching Context** | | **Pre-existing Pupils Char.** | | **Parent Involvement** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** |
| **MOZ** | S | W | NC | W | W | W | W | W | S | S | S | W | W | W | S | S | W | W |
| **SAC** | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S |

**Legend**: **S** = strong (Number of variables with strength correlation .15 were equal or above .0.5 percent)
**W** = weak (Number of variables with strength correlation .15 were below .0.5 percent)
**NC** = no correlation (Strength correlation above 0.5 percent)

Table 9 2

*Overview of the findings from the correlations between variables in the domain and constructs of the teacher competence model within Mozambique and pupil performance in reading and mathematics*

| | **Cognitive** | | **Affective** | | **Behaviour** | | **Teacher training** | | **Teacher Characteristics** | | **Ext. Teaching Context** | | **Int. Teaching Context** | | **Pre-existing Pupils Char.** | | **Parent Involvement** | | **Total Strong** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** |
| **CAB** | S | S | S | S | S | S | S | S | W | W | S | S | W | S | S | S | S | S | **7** | **8** |
| **GAZ** | S | S | S | S | S | S | W | W | S | S | S | S | S | S | S | S | S | W | **8** | **7** |
| **INH** | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | **9** | **9** |
| **MAC** | S | S | W | S | W | S | S | S | S | W | S | S | S | S | S | W | S | W | **7** | **6** |
| **MAN** | S | W | S | S | S | S | S | S | NC | W | S | W | S | W | S | S | W | S | **7** | **5** |
| **MAP** | S | S | S | S | S | S | W | S | S | W | S | S | W | S | S | S | S | W | **7** | **7** |
| **NAM** | W | S | S | W | S | S | S | S | S | W | S | W | W | W | S | W | W | W | **6** | **3** |
| **NIA** | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | **9** | **9** |
| **SOF** | W | S | W | W | S | S | S | W | W | S | S | S | S | S | S | S | S | S | **6** | **7** |
| **TET** | W | W | S | S | S | S | S | W | W | S | S | S | S | S | S | S | S | W | **7** | **6** |
| **ZAM** | W | W | S | W | S | S | S | W | S | W | S | S | W | W | S | S | S | S | **7** | **4** |
| **TT (S)** | **7** | **8** | **9** | **8** | **10** | **11** | **9** | **7** | **7** | **5** | **11** | **9** | **7** | **8** | **11** | **9** | **9** | **6** | **80** | **71** |

**Legend**: **S** = strong (Where half or more than half of the variables in the domains or constructs have a correlation of .15)
**W** = weak (Where fewer than half of the variables in the domains or constructs have a correlation of .15)
**NC** = no correlation (Where no variables in the domains or constructs have a correlation of .15)

As stated in Chapter 5, Section 5.4, the main research question in this study is: *"What is the effect of relationship between teacher competence on and pupil performance in upper primary school in Mozambique and in the SACMEQ countries?"*

Table 9.1 presents an overview of the findings from the grouped correlations between pupil performance in reading and mathematics and each domain of teacher competence model at national and regional level. In Table 9.1, it can be observed that teacher training in Mozambique had a weak relationship with pupil performance in reading and in mathematics. Comparing Mozambique with SACMEQ as whole, it can be observed that in the SACMEQ countries, all of the domains had strong correlations with pupil performance, while in Mozambique only *teachers' characteristics* and *pre-existing pupils' characteristics* had a strong correlation with pupil performance in both subjects, while in the *cognitive domain* the *external teaching context* had a strong correlation with pupil performance in reading. There was no correlation between pupil performance in reading and variables that comprise the *affective domain* in Mozambique.

In Table 9.2, it can be observed, across provinces in Mozambique, that more relationships were found between pupil performance in reading (80) than in mathematics (71) and the various variables in domains and constructs of the conceptual framework. Examining each domain and construct, it can be observed that the *behavioural domain* seems to be the one domain where most correlations were found across all provinces (10 in reading and 11 in mathematics), followed by the *external teaching context construct* (11 in reading and nine in mathematics) and *pre-existing pupils' characteristics* (11 in reading and nine in mathematics). This finding shows that the teachers' attitudes as well as the pupils' attitudes had an effect on pupil performance in reading and in mathematics.

Another construct to take into consideration in pupil performance in Mozambique is the *external teaching context*, which includes variables such as schools' location, schools' conditions, schools' resources, and *pre-existing pupils' characteristics* that include variables such as pupils' SES, home condition, and the provision of meals, as these have an effect on pupil performance. *Teacher characteristics* (seven in reading and five in mathematics) and the *cognitive domain* (seven in reading and eight in mathematics) seem to be the constructs and domain where fewer correlations were found across all provinces. Inhambane and Niassa are the provinces in Mozambique where most correlations were found (in all domains and constructs in reading and in mathematics), followed by Cabo Delgado (seven in reading and eight in mathematics) and Gaza (eight in reading and seven in mathematics). Nampula is the province that presents a weak relationship (six in reading and three in mathematics) between pupil performance and variables in each domain within the construct of the conceptual framework. Appendix 55 shows the overview of the correlations in

Mozambique and the weak relationship between pupil performance in reading and in mathematics and the variables at different domains and constructs.

Table 9.3 presents the correlations between pupil performance in reading and mathematics and background variables or factors within different domains of the conceptual framework across SACMEQ countries. Drawing on this table, it can be seen that in SACMEQ countries there were more relationships between single variables in the domains and constructs and pupil performance in reading (52) than in mathematics (34). The data seems to be consistent with the conceptual framework in SACMEQ countries as a whole. Most variables in the domains and constructs had weak relationships with pupil performance except within the affective domain, which showed evidence of a stronger relationship in mathematics. Examining each domain and construct across the countries, it seems that the variables in *affective and behavioural domains* had the weakest correlation with pupil performance in reading and in mathematics. The strongest construct is *pre-existing pupils' characteristics* in both subjects (12 in reading and 11 in mathematics out of 14 systems of education), followed by the *external teaching context,* with eight in each subject out of 14 systems of education.

However, in Table 9.3 it can also be seen that country by country the picture changes. In countries such as Lesotho, Malawi and Zanzibar, it seems that the data are not consistent with the conceptual framework, with only one or two out of nine domains and constructs having strong relationships with pupil performance. In other countries, such as South Africa (six in reading and five in mathematic out of the nine) and Namibia (seven in reading and four in mathematic out of the nine), it seems that the data are consistent with the conceptual framework.

Table 9.3

*Overview of the findings from the correlations between variables in domain and construct and pupil performance in reading and mathematics in SACMEQ countries*

| | Cognitive | | Affective | | Behaviour | | Teacher training | | Teacher Characteristics | | Ext. Teaching Context | | Int. Teaching Context | | Pre-existing Pupils Char. | | Parent Involvement | | Total Strong | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** |
| **BOT** | S | S | W | W | W | W | W | S | S | S | W | W | W | W | S | S | S | S | **4** | **5** |
| **KEN** | W | W | NC | W | W | W | W | W | S | W | S | S | S | S | S | S | S | S | **5** | **4** |
| **LES** | W | W | NC | NC | W | W | W | W | W | W | W | W | W | W | W | W | W | NC | **-** | **-** |
| **MAL** | W | W | W | W | W | W | W | W | W | W | S | S | W | W | W | W | W | W | **1** | **1** |
| **MAU** | W | W | W | W | W | W | W | W | NC | W | S | S | W | W | S | S | W | S | **2** | **3** |
| **MOZ** | S | W | NC | W | W | W | W | W | S | S | S | W | W | W | S | S | W | W | **4** | **2** |
| **NAM** | S | S | W | W | W | W | S | S | S | W | S | S | S | W | S | S | S | W | **7** | **4** |
| **SEY** | S | W | W | S | S | S | W | W | S | W | W | W | S | W | S | S | S | W | **6** | **3** |
| **SOU** | S | S | W | W | W | W | S | S | S | W | W | S | S | S | S | S | S | W | **6** | **5** |
| **SWA** | W | W | W | NC | W | W | W | W | S | W | S | S | W | W | S | S | W | W | **3** | **2** |
| **TAN** | W | W | NC | NC | W | W | W | W | S | W | S | S | S | W | S | S | W | W | **4** | **2** |
| **UGA** | W | NC | NC | W | W | W | W | W | S | W | W | W | W | W | S | S | W | W | **2** | **1** |
| **ZAM** | S | W | NC | NC | W | W | W | W | S | W | S | S | S | W | S | S | S | W | **6** | **2** |
| **ZAN** | W | W | W | W | W | W | W | W | S | W | W | W | W | W | S | W | W | W | **2** | **-** |
| **TT(S)** | **6** | **3** | **-** | **1** | **1** | **1** | **2** | **3** | **11** | **2** | **8** | **8** | **6** | **2** | **12** | **11** | **6** | **3** | **52** | **34** |

**Legend**: **S** = strong (Where half or more than half of the variables in the domains or constructs have a correlation of .15 or greater)
**W** = weak (Where fewer than half of the variables in the domains or constructs have a correlation of .15 or greater)
**NC** = No correlation (Where no variables in the domains or constructs have a correlation of .15)

### 9.1.2 An Overview of the Correlations between Pupil Performance in Reading and Mathematics in Mozambique and in other SACMEQ Countries

This section presents an overview of the correlations between pupil performance in reading and mathematics and the domain and constructs of the teacher competence model within Mozambique and in SACMEQ countries, and it also summarises the correlations at provincial, national and regional level.

Cohen and Manion's framework (in Creswell, 2002, p.372) was used for interpreting the strength of association between two variables, given the following size of coefficients:

**.20-35:** When the correlations range from .20 to 35, there is only a slight relationship. This relationship may be slightly statistically significant for 100 or more participants. The size of a coefficient may be valuable to explore the interconnection of the variables, but of little value in prediction studies.
**.35-65:** When the correlations are above .35, they are useful for limited prediction. They are the typical values used to identify variable membership in statistical procedure of factor analysis (the inter-correlation of variables with a scale), and many correlation coefficients for bivariate relationships fall into this area.
**.66-85**: When the correlations fall into this range, good prediction can result from one variable to the other. Coefficients in this range would be considered very good.
**.86 and above:** Correlations in this range are typically achieved for the studies of construct validity or test-retest reliability.

As this is regarded as an exploratory study, all relationships above .15 (see Howie, 2002) are included, but only those above .20 (see above) are discussed in this section. Appendices 55 and 56 present the overview of the correlations between pupil performance and all of the variables at different domains of the conceptual framework in Mozambique and SACMEQ countries respectively.

**Cognitive, affective and behavioural domains in Mozambique**

Table 9.4 presents the correlations between variables in the cognitive, affective and behavioural domains and pupil performance in reading and in mathematics. As can be observed, there was a slight but noticeable relationship between pupil performance in reading and in mathematics and the three domains. However, pupil performance in reading was a good predictor of pupil performance in mathematics (r = .778) in the **cognitive domain**, while in the **behavioural domain** there was an association between pupil performance in reading and speaking Portuguese at home (r = .428),

which is useful for a limited prediction. Examining teacher performance in the reading test *(ratott)* in the **cognitive domain**, it can be seen that having a teacher with *secondary* and *tertiary education* and a s*chool head with an academic qualification* had a slight correlation with pupil performance in reading. In the **affective domain**, only *teacher satisfaction-school building quality* had a relationship with pupil performance in mathematics. In the **behavioural domain**, more variables were related to pupil performance than other domains. However, only eight out of the 23 variables had a relationship with pupil performance in reading and in mathematics. The variables in the behavioural domain that had a relationship were more related to teachers' attitudes than to a teachers' approach in the classroom.

Table 9.4

*Correlations between variables in cognitive, affective and behavioural domains and pupil performance in reading and in mathematics in Mozambique*

| Domains | Variables | Pupils' reading test | | | Pupils' math test | | |
|---|---|---|---|---|---|---|---|
| | | Pearson C. | Sig. | n | Pearson C. | Sig. | N |
| **Cognitive** | Pupil maths-all total raw score | .778 | .000 | 176 | - | - | - |
| | Teacher reading-all total raw score * | .201 | .008 | 172 | - | - | - |
| | Teachers with secondary education | .168 | .029 | 168 | - | - | - |
| | Ratio/T having tertiary academic education | -.171 | .027 | 168 | -.229 | .003 | 168 |
| | School head qualification-academic | .175 | .023 | 168 | - | - | - |
| **Affective** | Math teacher satisfact.-school building quality | - | - | - | -.218 | .004 | 171 |
| **Behavioural** | R/M T. reporting comments in reading/math | -.153 | .045 | 173 | -.158 | .039 | 171 |
| | Pupils absent – work | -.326 | .000 | 175 | -.292 | .000 | 175 |
| | Pupils speaking Portuguese at home | .428 | .000 | 176 | - | - | - |
| | S. head activities importance-contact with local com. | .219 | .004 | 168 | .225 | .001 | 168 |
| | Reading T. reporting comments on Portuguese | -.153 | .045 | 173 | | | |
| | School head years of teaching | .154 | .046 | 168 | .153 | .048 | 168 |
| | Math teacher frequency meeting parents | - | - | - | .197 | .010 | 171 |
| | Math T. frequency giving written math test | - | - | - | -.160 | .037 | 171 |

*Pupils speaking Portuguese at home* was the strongest variable in reading, while in mathematics the strongest variable was pupils' absent-work. (For more information see Appendix 55 see also Chapter 6 Tables 6.2; 6.6 and 6.7).

**Cognitive, affective and behavioural domains in SACMEQ countries**

Table 9.5 illustrates that the variables in all three domains had a positive correlation with pupil performance in reading and in mathematics, except for *pupils' days absent*, *pupils' absent to work*, and *school head experience in this school*. *Teachers with primary education only, teachers' satisfaction-teacher house availability* and *teachers' satisfaction-teacher house quality* had a negative relationship with pupil performance in mathematics.

Table 9.5

*Correlations between variables in cognitive, affective and behavioural domains and pupil performance in reading and in mathematics in SACMEQ countries*

| Domains | Variables | Pupils reading test | | | Pupils math test | | |
|---|---|---|---|---|---|---|---|
| | | Pearson C. | Sig. | N | Pearson C. | Sig. | N |
| **Cognitive** | Pupil math-all total raw score | .874 | .000 | 2294 | - | - | - |
| | Teacher reading/ math-all total raw score | .232 | .000 | 1928 | .421 | .000 | 1869 |
| | Teachers qualification-academic | .155 | .000 | 2255 | .217 | .000 | 2218 |
| | Reading/mathematics goals | .175 | .000 | 2255 | .092 | .000 | 2142 |
| | Teachers with tertiary education | .167 | .000 | 2279 | .101 | .000 | 2279 |
| | School head qualification | .191 | .000 | 2279 | .179 | .000 | 2279 |
| **Affective** | Reading/math t. sat.- teacher house availability | - | - | - | -.164 | .000 | 2218 |
| **Behavioural** | Teachers' read/math approach (factor) | .171 | .000 | 2255 | - | - | - |
| | Pupils speaking language of instruction at home | .351 | .000 | 2294 | .274 | .000 | 2294 |
| | School head experience in this school | -.167 | .000 | 2279 | -.217 | .000 | 2279 |
| | Teachers pupils' parents meet year | .252 | .000 | 2255 | - | - | - |
| | Pupils' days absent | -.196 | .000 | 2294 | - | - | - |
| | Pupils' absent - work | -.264 | .000 | 2236 | - | - | - |
| | Pupils' absent – fee not paid | - | - | - | -.251 | .000 | 2236 |

In the **cognitive domain** there was a strong or high correlation (r = .874; p = .000) between *pupil performance in reading* and *pupil performance in mathematics*. The **affective domain** presents the weakest correlation among the three domains. Only *teacher satisfaction regarding housing availability* had a very slight relationship with *pupil performance in mathematics*. *Pupils speaking the language of instruction at home* had a stronger relationship with *pupil performance in reading* (r = .351) than *in mathematics* (r = .274) and was the strongest variable in the **behavioural domain**. It can be observed that *pupils speaking the language of instruction at home* tended to do better in reading and slightly better in mathematics than those who did not. However, school head experience had a negative relationship with pupil performance in mathematics particularly. The importance of the teacher's meeting the pupils' parents was evident in reading, as there was a positive relationship with pupil achievement.

Table 9.6 below shows the correlation between pupil performance in reading and in mathematics as responses and *teacher training* and *teachers' characteristics* as exploratory variables. (For more information see Appendix 56, see also Chapter 6 Tables 6.5; 6.8 and 6.9).

Table 9.6

*Correlations between variables for teacher training and teachers' characteristics and pupil performance in reading and in mathematics in Mozambique*

| Constructs | Variables | Pupils reading test | | | Pupils mathematics test | | |
|---|---|---|---|---|---|---|---|
| | | Pearson C. | Sig. | N | Pearson C. | Sig. | N |
| **Teacher training** | Read/Mathematics teacher training | - | - | - | .182 | .017 | 171 |
| | Teachers (no teacher training) | -.194 | .011 | 168 | -.183 | .018 | 168 |
| | Teacher training (short training) | .220 | .004 | 168 | - | - | - |
| | Teacher training (1 year) | - | - | - | .175 | .024 | 168 |
| | Teacher training (2 years) | .237 | .002 | 168 | - | - | - |
| | Teacher training (more than 3 years) | .183 | .017 | 168 | - | - | - |
| | School head qualification-special training | .170 | .028 | 167 | .167 | .031 | 167 |
| **Teachers' characteristics** | Math teacher sex | - | - | - | 163 | .034 | 170 |
| | Read/math T. total possessions at home | .181 | .017 | 173 | .176 | .021 | 171 |
| | Reading/math teacher source of lighting | .322 | .000 | 173 | .239 | .002 | 171 |
| | School head sex | .168 | .031 | 166 | .184 | .017 | 166 |
| | School head age level | - | - | - | .202 | .009 | 167 |

In the *teacher training construct*, five and four variables respectively out of the 11 had a slight association with pupil performance in reading and mathematics. *No teacher training* had a negative relationship with pupil performance in both subjects, while *school head qualification-special training* had a positive relationship with pupil performance in reading and mathematics. *Teacher training* and *teacher training one year* had a slight relationship with pupil performance in mathematics, while *short training, two years* and *more than three years* of teacher training had a positive effect on pupil performance in reading.

Examining the *teacher characteristics construct*, *the gender of the school head*, *teachers' possessions*, and *the source of light* were associated with pupil performance in reading and in mathematics. Taking into consideration that most of the schools (74.5%) were located in urban areas, it seems that in Mozambique perhaps the *source of light* was more related to the teachers' socio-economic status than the school location. For instance, for the remaining 25.5% of teachers in rural or remote areas, there is the difficulty of access to electricity (see Chapter 6, Figures 6.2)

for mathematics teachers as there was a slight relationship. Pupils that had female teachers tend to achieve better results than their peers that had male teachers. In addition, schools that had female school heads tend also to achieve better results than those with male school heads. (For more information see Appendix 55 see also Chapter 6, Tables 6.1; 6.7; 6.10 and 6.13; Figures 6.1 and 6.3).

The correlations between teacher training, teachers' characteristics and pupil performance in reading and in mathematics are shown below.

Table 9.7

*Correlations between variables for teacher training, teachers' characteristics and pupils' performance in reading and in mathematics in SACMEQ countries*

| Constructs | Variables | Pupils reading test | | | Pupils mathematics test | | |
|---|---|---|---|---|---|---|---|
| | | Pearson C. | Sig. | n | Pearson C. | Sig. | N |
| **Teacher Training** | Teachers (2 years of teacher training) | .215 | .000 | 2279 | .180 | .000 | 2279 |
| | Teachers (more than 3 years) | .179 | .000 | 2279 | .173 | .000 | 2279 |
| **Teachers' characteristics** | Reading teacher sex | .164 | .000 | 2239 | - | - | - |
| | Reading/math teacher total possessions at home | .250 | .000 | 2255 | .237 | .000 | 2218 |
| | Reading/math teacher source of lighting | .267 | .000 | 2255 | .226 | .000 | 2218 |
| | Reading/math teacher home condition | .179 | .000 | 2255 | .196 | .000 | 2218 |

Several variables related to *teachers' characteristics constructs* were related to *pupil performance in reading (*see Table 9.3). *Two years of teacher training, a teacher's total possessions at home,* and *a teacher's source of lighting* were the variables that had a slight association with pupil performance in reading and in mathematics. Apart from the level of significance, (see Table 55 in appendices) the rest of variables have very weak relationships with reading and mathematics performances with most correlations below 0.20. (See also Appendix 56, Chapter 6, Tables 6.4, 6.9, 6.11; 6.12, 6.14 and 6.15 6.Figures 6.3 and 6.4)

Correlations between pupil performance in reading and in mathematics, and the external and internal teaching contexts, are shown in the Table 9.8.

Table 9.8

*Correlations between variables for internal and external teaching context and pupil performance in reading and in mathematics in Mozambique*

| Domains | Variables | Pupils reading test | | | Pupils mathematics test | | |
|---|---|---|---|---|---|---|---|
| | | Pearson C. | Sig. | n | Pearson C. | Sig. | N |
| **External Teaching Context** | The max. number of pup. among shifts | .273 | .000 | 168 | .151 | .051 | 168 |
| | Number of classes | .307 | .000 | 168 | .196 | .011 | 168 |
| | Number of Grade 6 classes | .239 | .002 | 168 | - | - | - |
| | Ratio girls | .233 | .002 | 168 | - | - | - |
| | Pupils having extra tuition-subject | -.321 | .000 | 176 | - | - | - |
| | Pup. having extra tuition- other subject | -.213 | .005 | 176 | -.158 | .037 | 176 |
| | P/extra tuition-payment | -.158 | .037 | 174 | -.216 | .004 | 176 |
| | School location | .279 | .000 | 168 | .161 | .037 | 168 |
| | Total school resources [max=22] | .185 | .017 | 168 | - | - | - |
| **Internal Teaching Context** | Borrow books | -.166 | .033 | 166 | -.150 | .053 | 166 |
| | Pupils' school material | -.241 | .001 | 176 | .193 | .010 | 176 |
| | Pupils' school material | - | - | - | -.292 | .000 | 176 |
| | Writing place | .157 | .038 | 176 | - | - | - |
| | P. sharing/owning reading textbooks | .154 | .041 | 176 | - | - | - |
| | School head/minutes | -.266 | .001 | 167 | -.215 | .005 | 167 |
| | School head periods | -.253 | .001 | 168 | -.235 | .002 | 168 |

The variables in *external and internal teaching context constructs* in Mozambique more often had a relationship with pupil performance in reading than in mathematics. In the *external teaching context construct*, nine and five out of 14 variables had a noticeable though slight relationship with pupil performance in reading and in mathematics respectively. In the internal teaching context, six and five out of 16 variables had correlations with pupil performance in reading and in mathematics respectively. In the *external teaching context construct*, the *number of classes, extra tuition, extra-tuition payment,* and *school location* (isolated/rural. small town and large city) had a negative association with pupil performance in reading and in mathematics, as did the *pupils' school material* and *school head periods and minutes* in the *internal teaching construct.*

In the *internal teaching context*, the shortage of *pupils' material* like pencils, exercise books, pens, and other stationery, had a negative effect on pupil performance in reading and in mathematics.

*Pupils' borrowing books* had little effect on pupil performance in reading. In the Mozambican context, pupils are not accustomed to borrowing books as few schools have libraries. As a result, borrowing books does not play an important role in their reading performance. In all cases, the level of correlation is lower because the explained variation is less than 4% (see Appendix 55, Chapter 7, Tables 7.1 and 7.2; Figures 7.1, 7.2 and 7.3).

Table 9.9

*Correlations between variables in external and internal teaching context in SACMEQ countries and pupil performance in reading and in mathematics*

| Domains | Variables | Pupils reading test | | | Pupils math test | | |
|---|---|---|---|---|---|---|---|
| | | Pearson C. | Sig. | n | Pearson C. | Sig. | N |
| **External teaching context** | Number of classes | .190 | .000 | 2279 | - | - | - |
| | Number of classes – Grade 6 | .178 | .000 | 2279 | .160 | .000 | 2279 |
| | School location | .371 | .000 | 2279 | .286 | .000 | 2279 |
| | Pupils-teacher ratio | -.248 | .000 | 2279 | -.218 | .000 | 2279 |
| | School building condition | -.227 | .000 | 2279 | -.231 | .000 | 2279 |
| | The number of toilets | .277 | .000 | 2279 | .243 | .000 | 2279 |
| | Total school resources [max=22] | .425 | .000 | 2279 | .390 | .000 | 2279 |
| | Pupils can borrow books | - | - | - | .158 | .000 | 2279 |
| | Pupils extra tuition-other subject | .2.28 | .000 | 2294 | .330 | .000 | 2294 |
| | Paying for extra tuitions | -..316 | .000 | 2057 | -.382 | .000 | 2057 |
| **Internal teaching context** | School head minutes | -.127 | .000 | 2277 | -.138 | .000 | 2277 |
| | School head periods | -.259 | .000 | 2279 | -.252 | .000 | 2279 |
| | Pupils school material (exercise books. pen. pencil etc) | -.299 | .000 | 2294 | -.288 | .000 | 2294 |
| | Being given reading/math homework | .192 | .000 | 2294 | .310 | .000 | 2294 |
| | Sitting place | .156 | .000 | 2294 | - | - | - |
| | Writing place | .173 | .000 | 2294 | - | - | - |
| | Sharing/owning reading textbooks | - | - | - | .172 | .000 | 2294 |
| | Reading/math teacher total class furniture [max=5] | .154 | .000 | 2242 | - | - | - |
| | Teacher total class resources (max=8) | .154 | .000 | 2242 | - | - | - |

In Table 9.9, all of the variables in the *external teaching context construct* and the *internal teaching context construct* had an association with pupil performance in reading and in mathematics, with most having a slight or fairly strong relationship. Of these, the *pupil-teacher ratio, the condition of the school building, the number of classroom books, payment for extra tuition, school head periods* and *school head load* had a negative association with pupil performance in reading and in mathematics. The shortage of *pupils' school material* such as pens, pencils, exercise books, and

other stationery, also had a negative relationship with pupil performance. Of all the related variables, *school resources* in the *external teaching context construct* was the strongest for both performance in reading and mathematics, whilst the next strongest was s*chool location for reading*, and *paying for extra tuition for mathematics*. (For more information see also Appendix 56; Chapter 7, Tables 7.3-7.5 and Appendix 22; Figures 7.4-7.7).

Table 9.10

*Correlations between variables in pre-existing pupils' characteristics and pupil performance in reading and in mathematics in Mozambique*

| Construct | Variables | Pupils reading test | | | Pupils math test | | |
|---|---|---|---|---|---|---|---|
| | | Pearson C. | Sig. | N | Pearson C. | Sig. | N |
| **Pre-Existing pupils' characteristics** | Pupils' age in months | -.270 | .000 | 176 | -.155 | .040 | 176 |
| | Pupil sex | .200 | .008 | 176 | - | - | - |
| | Place to stay | -.247 | .001 | 176 | -.175 | .020 | 176 |
| | Evening meal | - | - | - | .225 | .003 | 176 |
| | Pupils' SES | .368 | .000 | 176 | .216 | .004 | 176 |
| | Grade repetition | .259 | .001 | 176 | .179 | .017 | 176 |
| **Parent and C. school Involv.** | Being asked to read or calculate | -.186 | .014 | 176 | -.158 | .036 | 176 |
| | Being asked questions about read/math | -.264 | .000 | 176 | -.185 | .014 | 176 |

*Pupils' characteristics*, as shown in Table 9.10, had the greatest number of relationships with pupil performance. For instance, five in reading and in mathematics out of the 10 variables had an association with pupil performance, namely: *age, sex, place to stay, pupils' socio-economic status (SES),* and *grade repetition.* SES was the strongest variable, which could be useful for limited prediction of pupil performance in reading, while in mathematics the strongest variable was whether or not they had an evening meal.

In Mozambique, parent and community involvement had a noticeable association with pupil performance in reading and in mathematics, with only two out nine variables having a correlation with pupil performance in reading and in mathematics, namely *being asked to read* or *to calculate* and *asking questions about reading and mathematics.* (For more information, see correlations in Appendix 55, see also Chapter 6, Tables 6.16, 6.17 and 6.18; Figure 6.5).

Table 9.11

*Correlations between variables in pre-existing pupils' characteristics and parent involvement in SACMEQ countries and pupil performance in reading and in mathematics*

| Domains | Variables | Pupils reading test | | | Pupils math test | | |
|---|---|---|---|---|---|---|---|
| | | Pearson C. | Sig. | n | Pearson C. | Sig. | N |
| **Pre-Existing Pupils' Characteristics** | Pupil's age in months | -.292 | .000 | 2294 | -.318 | .000 | 2294 |
| | The number of books at home | .333 | .000 | 2294 | .331 | .000 | 2294 |
| | Pupils' morning meal | .175 | .000 | 2294 | .189 | .000 | 2294 |
| | Pupils' lunch meal | 150 | .000 | 2294 | .169 | .000 | 2294 |
| | Pupils' evening meal | .177 | .000 | 2294 | .198 | .000 | 2294 |
| | Pupils' socio-economic status | .497 | .000 | 2294 | .450 | .000 | 2294 |
| | Grade repetition | -..328 | .000 | 2294 | -.303 | .000 | 2294 |
| | Pupils repeating G6 | -.206 | .000 | 2294 | - | - | - |
| **Parent and community school Involvement** | Community Involvement (factor) - build facility | .302 | .000 | 2279 | .255 | .000 | 2279 |
| | Homework-make sure | .299 | .000 | 2289 | .251 | .000 | 2289 |
| | Pupils' Homework-Help | .226 | .000 | 2294 | - | - | - |
| | Being looked at the school work | .244 | .000 | 2294 | .187 | .000 | 2294 |

Within the *pre-existing pupils' characteristics construct*, more than half of the variables had a relationship above r = .20 with pupil performance in reading and in mathematics. The strongest correlation found was pupils' SES for both subjects. *Pupils' age, grade repetition, pupils repeating Grade 6, community involvement* and *the maintenance of facilities* had a negative relationship with pupil performance in reading and in mathematics. Kanu (1996) stated that excellent curricula, materials, infrastructure and administration will not improve the quality of education if the quality of teaching is poor. Conversely, good results can be achieved with quality teaching even with poor curricula, materials or infrastructure. The variable, *books in the home*, had a fairly strong positive relationship with pupil performance in reading and in mathematics.

As previously explained, from the results reported above it seems that the data is consistent with the conceptual framework in SACMEQ countries as a whole. (For more details see Appendix 56; Chapter 6, Tables 20-22 and Figure 6.6).

The correlations are presented and discussed to understand to what extent the same pattern is observable in the provinces and in the SACMEQ countries. The next section shows the correlation

results in Mozambique by provinces and in individual SACMEQ countries in each component of the conceptual framework.

### 9.1.3 The Relationship between Teacher Competence and Pupil Performance in Reading and Mathematics and the Domain and Constructs of Teacher Competence Model within Mozambique and in SACMEQ Countries

The next section presents and discusses the correlation between pupil performance in reading and in mathematics and each of the domains and constructs of the conceptual framework in Mozambique and in SACMEQ countries in greater depth.

**The cognitive, affective and behavioural domains in Mozambique**

After the above presentation of an overview, the results are now presented in detail for each of the domains and constructs for Mozambique. Table 9.12 presents the correlations between pupil performance and variables that comprises the cognitive and affective domains in Mozambique.

Table 9.12

*Correlations between variables in cognitive and affective domains and pupil performance in reading and in mathematics across Mozambican provinces*

| Provinces | CAB | | GAZ | | INH | | MAC | | MAN | | MAP | | NAM | | NIA | | SOF | | TET | | ZAM | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Variables** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** |
| **Cognitive Domain** | | | | | | | | | | | | | | | | | | | | | | |
| P read-all total raw score | | .874 | | .832 | | .712 | | .584 | | .784 | | .667 | | .608 | | .572 | | .783 | | .597 | | .764 |
| T read/math all total score | - | - | .214 | .237 | .164 | .588 | - | .248 | - | - | .297 | .274 | - | - | .232 | - | - | - | .616 | - | - | .218 |
| T qualification-academic | .170 | .478 | - | .204 | .370 | .350 | .233 | .251 | - | .692 | - | - | - | .227 | .337 | - | - | .567 | - | - | .167 | .341 |
| Reading/mathematics goals | .189 | .502 | - | .194 | .271 | - | - | .230 | .342 | .516 | - | .553 | - | .235 | .242 | .248 | - | .186 | .266 | - | - | - |
| T with primary education | - | .264 | .437 | .396 | .408 | .595 | .223 | - | .377 | .199 | .285 | .399 | .306 | .598 | - | .438 | - | - | .171 | .183 | - | - |
| T with secondary education | .416 | .337 | .160 | .150 | - | .187 | - | .265 | .273 | - | .337 | - | .232 | .467 | .433 | .166 | - | - | - | .223 | - | - |
| T with tertiary education | .204 | .250 | .204 | .305 | - | .159 | - | - | .380 | - | .150 | - | - | - | .384 | .453 | - | .319 | - | .406 | .335 | - |
| R/T having tertiary educat | .280 | - | .230 | - | - | .414 | .355 | .271 | .233 | - | - | .239 | - | - | .185 | .717 | - | .278 | - | - | - | .208 |
| SH qualification | - | .311 | - | .193 | .314 | .167 | .470 | .442 | .201 | - | .381 | .259 | .184 | .255 | - | .424 | - | .233 | - | .158 | .274 | - |
| **Affective Domain** | | | | | | | | | | | | | | | | | | | | | | |
| T satisfy-school distance | .619 | - | .375 | .167 | .156 | .172 | .428 | .414 | .283 | .606 | .593 | .369 | .243 | .207 | .299 | - | .153 | .370 | .506 | .329 | .361 | .184 |
| T satisf S. building quality | - | .350 | .464 | .375 | .368 | - | - | .150 | .156 | .228 | - | .175 | .289 | - | - | .227 | - | - | .307 | .173 | - | .285 |
| T satisf T house availability | - | .350 | .349 | - | - | - | .277 | .224 | .419 | - | .337 | .471 | .251 | .156 | .155 | .276 | .334 | - | - | .267 | .341 | .232 |
| T satisf T. house quality | .524 | .414 | .557 | - | - | .416 | - | .151 | .377 | .466 | - | - | .215 | - | .220 | .176 | - | - | - | .506 | .342 | .379 |
| T satisf Cl-furniture qual. | .258 | .277 | .410 | .355 | .287 | .548 | - | - | .163 | .312 | .284 | .145 | - | - | .439 | - | - | .242 | - | .305 | - | - |
| T satisf Level of salary | .467 | .455 | .154 | - | .247 | .256 | - | .334 | .391 | .320 | - | .248 | .245 | .153 | .216 | .369 | - | - | .389 | .248 | .288 | - |
| T satisfy Pupil learn | - | .610 | .227 | .169 | .393 | - | - | .158 | - | - | - | - | .189 | - | .219 | - | - | .424 | - | .172 | - | - |
| T satisf Sch. Manag. Qualit | .389 | .372 | - | .250 | .383 | .627 | .375 | .307 | .212 | .268 | - | .334 | .387 | - | .255 | .321 | .230 | - | .403 | .263 | .328 | .481 |
| T satisf Staff relationship | .217 | .610 | .452 | .353 | .188 | .154 | .212 | - | .381 | 332 | .253 | - | .335 | - | .190 | .176 | - | - | .243 | - | - | - |
| T satisf Comm .relationship | .191 | .382 | .234 | - | .338 | .409 | .291 | - | .381 | - | .291 | - | - | - | - | .279 | .217 | - | .476 | - | .188 | - |
| T satisf Promotion opport | - | .430 | - | - | - | .308 | - | - | .361 | .361 | .593 | .151 | 429 | .163 | .261 | - | - | - | .427 | .395 | .261 | - |
| T satisf Further study | - | .434 | - | - | .295 | .437 | - | .231 | - | 379 | - | .389 | .264 | - | - | .397 | - | - | .228 | .231 | .216 | - |

Legend: P=pupil; T=teachers; SH=school head; R = reading; M = mathematics
= p ≤ .05
= p ≤ .01
= Not significant; = r ≤ 0.15

Generally speaking, Table 9.12 shows that there was a noticeable relationship between pupil performance in reading and in mathematics and the two domains across provinces. However, pupil performance in reading was a good predictor of pupil performance in mathematics and the correlation varies from r = .572 in Niassa to r = .832 in Gaza in the cognitive domain. Cabo Delgado had the highest correlation coefficient between pupil performance in reading and pupil performance in mathematics (r = .874) which, according to Cohen and Manion (in Creswell, 2002), achieves the highest level of correlation. In the **cognitive domain,** it can also be seen that teacher performance in the reading test, having a *teacher with secondary and tertiary education* and a *school head with an academic qualification* had slight correlation with pupil performance in reading and in mathematics. In Niassa, having a *teachers with tertiary education* was a good predictor of mathematics (r = .717). There was no correlation in Sofala province at level of r = .15 between pupil performance in reading and the variable that comprised the cognitive domain.

Only five variables had statistical significance at $p \leq .001$ in the **cognitive domain**, namely the relationship between pupil performance in reading and pupil performance in mathematics in Cabo Delgado, Gaza, Manica, Sofala and Zambézia.

In this study, it was expected that teachers' academic qualifications and teacher performance in reading and mathematics tests would have a relationship that is statistically significant and stronger than reported in Table 9.12. Nevertheless, it should be noted that in Inhambane, teachers with only primary education had a positive correlation with pupil performance in mathematics. Of significance, six and three out of 10 mathematics teachers with primary education had, respectively, two and three years of teacher training in Mozambique (for more detail see Appendix 57 and Chapter 6, Tables 6.10 and 6.13).

Some variables had a noticeable relationship with pupil performance in reading and in mathematics in the **affective domain**, and others were useful for limited prediction for pupil performance in reading and in mathematics. Only six variables reached statistical significance ($p \leq .005$), namely *teachers' satisfaction-school distance* and pupil performance in reading in Cabo Delgado (r = .619), Maputo Província (r = .593) and in Manica (r = .606) in mathematics; *teachers' satisfaction-teachers' house quality* and pupil performance in reading in Gaza (r = .557); *teachers' satisfaction-pupil performance* in Cabo Delgado (r = .610); *teachers' satisfaction-school management quality* and pupil performance in mathematics in Inhambane (r = .627) and Zambézia (r = .481); *teachers' satisfaction-staff relationship* and pupil performance in mathematics in Cabo Delgado; and finally *teachers' satisfaction-promotion opportunity* and pupil performance in reading in Maputo (r = .593). As in the **cognitive domain,** Sofala is the province that had few variables that evidenced a

relationship with pupil performance in reading and in mathematics with r ≥ .15. (For more details see Appendix 58, and see also Chapter 6, Table 6.2).

Table 9.13 presents correlations between pupil performance in reading and in mathematics and the variables that comprised the **behavioural domain** across Mozambican provinces. As indicated in Table 9.13, in Mozambique the majority of variables in the behavioural domain had a slight relationship with pupil performance in reading and in mathematics, or were useful for limited prediction. Only a few variables were good predictors of pupil performance in reading and in mathematics in two provinces, namely in Tete, *pupils' absent-ill* (r = .694) in mathematics; and in Gaza *pupils' absent-work (*r = .788) and *school activities* (r = .740) in mathematics, and *school head experience in this school* (r = .672) in reading. As in the cognitive and affective domains, the **behavioural domain** presents few correlations with pupil performance in reading and in mathematics at level of r ≥.15. As can see from Table 9.13, only 38 variables had statistical significance at the level p ≤ .05, and only in Gaza *pupils' absent-work* in mathematics was p ≤ .01. *Teachers meet pupils' parents/year* is the variable that presents little correlations with pupil performance in reading and in mathematics. In the **behavioural domain**, it was expected that variables in *teachers' approaches* and *years of teaching* would have stronger relationships with pupil performance than that presented in Appendix 59. For more details see Tables of Correlations in Appendices 57, 58 and 59. See also Chapter 6, Tables 6.2; 6.6 and 6.7).

Table 9.13

*Correlations between the variables in behavioural domain and pupil performance in reading and in mathematics across Mozambican provinces*

| Provinces | CAB | | GAZ | | INH | | MAC | | MAN | | MAP | | NAM | | NIA | | SOF | | TET | | ZAM | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Variables** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** |
| **Behavioural Domain** | | | | | | | | | | | | | | | | | | | | | | |
| P days' absent | - | - | .377 | .377 | .644 | .489 | .192 | .269 | .587 | .624 | .155 | - | - | .203 | .331 | - | .266 | .357 | - | .251 | - | - |
| P absent –ill | - | .161 | .379 | .239 | - | .239 | - | .264 | - | .452 | .318 | 212 | - | .212 | .379 | .497 | .367 | .573 | .461 | .694 | .350 | .171 |
| P absent –family | .390 | - | .220 | - | - | - | .290 | - | - | .228 | .293 | -120 | 187 | .199 | .285 | - | .238 | .290 | .270 | .274 | - | - |
| P absent –work | .359 | .236 | .610 | .788 | .235 | 198 | - | - | .283 | .259 | - | - | .441 | .413 | - | - | .547 | .473 | .383 | .273 | - | - |
| P abs fee not paid | .230 | .401 | .199 | - | .268 | - | 174 | 145 | .361 | .345 | 646 | 263 | - | .291 | 157 | - | - | .233 | .556 | .245 | .315 | .188 |
| P speaking Port. home | .125 | .183 | .186 | .236 | .611 | .455 | .218 | .151 | .387 | .363 | - | .233 | .403 | .447 | .505 | .516 | .539 | .523 | .294 | .323 | - | .242 |
| Teachers' approach | .384 | .530 | - | .240 | - | .490 | .228 | .271 | .250 | .261 | .404 | .393 | .504 | .280 | .152 | - | .239 | .613 | .202 | .268 | .271 | .169 |
| Teachers' approach | .361 | .285 | .222 | - | - | .407 | - | - | .652 | .294 | - | .314 | - | - | - | - | .159 | .263 | - | - | .152 | .191 |
| T years of teaching | .173 | .153 | .185 | .249 | .447 | .244 | - | - | .171 | .263 | .183 | | - | .285 | .368 | .530 | - | - | - | .374 | | .162 |
| T hours outside | - | .398 | .273 | .155 | .367 | .297 | .546 | .386 | .553 | | .310 | .281 | .202 | - | - | .258 | .406 | .311 | - | - | .268 | - |
| T R/M activities | .366 | .192 | - | .519 | .381 | - | .354 | .151 | .437 | .362 | - | .308 | .192 | .153 | - | .494 | - | .538 | .231 | .208 | .273 | .288 |
| T R/M activities | .166 | - | .282 | - | .166 | - | .458 | - | - | .437 | - | - | - | .314 | - | - | - | - | .358 | .352 | .235 | .350 |
| T act most import | - | .259 | .248 | .215 | .193 | - | - | - | .235 | .459 | - | .335 | .201 | - | .216 | .488 | - | - | .179 | .321 | - | .177 |
| T par. meet year | .568 | - | .396 | - | .192 | - | - | - | .173 | - | - | .305 | .238 | - | .243 | - | - | - | .211 | - | - | - |
| T fr meeting parent | .301 | .283 | .547 | .169 | .199 | .315 | - | - | .355 | - | .392 | - | .200 | - | - | - | .230 | .157 | .391 | .327 | - | - |
| School activities 1 | .159 | .210 | - | .521 | .385 | .162 | - | .305 | .387 | .332 | .445 | .259 | .162 | - | .166 | .453 | .251 | .232 | .372 | .188 | .538 | .360 |
| School activities 2 | .192 | .217 | - | .740 | .313 | - | - | - | .347 | .178 | - | .313 | .207 | - | .286 | - | - | .191 | .269 | .402 | - | - |
| T fr giving writing test | - | - | .589 | .377 | .267 | - | - | - | .178 | .520 | .613 | - | .305 | .366 | - | .290 | .213 | .154 | .573 | .349 | .181 | .210 |
| T reporting comments | - | - | .179 | .418 | .180 | .291 | - | .352 | .418 | .364 | .368 | .351 | .448 | .418 | .297 | - | - | .345 | .147 | .446 | .405 | .255 |
| SH activities | .438 | .157 | .465 | - | - | .275 | .275 | .330 | .240 | - | .374 | .418 | .164 | .363 | .482 | .319 | .495 | .298 | .594 | .272 | .613 | .425 |
| SH activities | .206 | - | .541 | - | - | .210 | .394 | | - | - | .392 | .408 | .246 | .433 | - | - | .257 | .203 | - | .209 | .288 | .254 |
| SH exp. Altogether | .218 | .316 | - | .324 | .449 | - | - | .195 | .596 | .624 | - | .175 | - | .199 | .170 | - | .518 | .439 | - | - | .294 | .422 |
| SH years teaching | .281 | - | - | .181 | | .214 | - | .246 | - | .187 | .519 | .508 | - | .190 | .324 | - | - | .322 | - | - | - | .218 |
| SH exp. this school | .250 | - | .672 | .541 | .247 | .166 | - | .265 | .418 | .418 | - | .243 | - | - | - | .324 | .403 | .411 | - | - | .410 | .446 |
| SH lost days | - | .405 | .340 | .349 | - | .214 | - | .354 | .645 | .385 | - | .302 | - | - | .520 | .582 | - | - | - | .189 | - | .178 |
| Most import R/M goal | .203 | - | .589 | .338 | .446 | - | .362 | - | - | .459 | .202 | .435 | | - | .187 | .253 | - | .366 | - | .425 | - | .308 |

a) The underlined results had a negative correlation with pupil performance Legend: R=reading; M= mathematics; P= Pupils; T =Teachers; SH=school head; fr or f=frequency; rep=report; act=activities; par/parents; exp=experience; sp lan inst home=speaking the language of instruction at home; abs=absent

= $p \leq .05$
= $p \leq .01$; = $r \leq 0.15$
= Not significant

**The cognitive, affective and behavioural domains in SACMEQ countries**

Table 9.14 shows the correlations in the **cognitive** and **affective domains** in each SACMEQ countries. As in Mozambique, a number of relationships were found between pupil performance in reading and in mathematics and variables that comprised the cognitive domain. The correlation between pupil performance in reading and pupil performance in mathematics indicated that 6 out of the 14 systems of education had correlations above r = .86 which, according to Cohen and Manion (1994) (in Creswell, 2002) achieves the highest level. Namibia had the highest correlation between pupil performance in reading and pupil performance in mathematics (r = .906), while Malawi had the lowest (r = .626) which was still a strong association. This pattern means that across countries, if pupils obtained good marks in reading they tended to obtain good marks in mathematics, because reading is a pre-requisite for mathematics, particularly in problem solving (see Chapter 8, Figures 8.4 and 8.20).

Table 9.17 shows correlations for nine variables in the **cognitive domain**. Within the 14 systems of education in SACMEQ countries, Botswana had the greatest number of variables that had a statistically significant correlation with pupil performance (7 out of 9 in reading and 8 out of 9 in mathematics) followed by Namibia (6 in reading and also in mathematics), and South Africa and Zambia (5 in reading and 6 in mathematics). Uganda was found to have the lowest number of associated variables in the cognitive domain and thus the relationship with pupil performance presents the lowest correlations at the level of r = .15. Perhaps this low correlation arises because little variation exists as most teachers went through the same teacher education training process and have a similar level of knowledge. Just as in the case of Mozambique, it was expected that teachers' academic level and teachers' performance in the test would have a stronger relationship with pupil performance than presented in Table 9.14.

Only seven (in reading) and six (in mathematics) out of 14 education systems had an association above r = 0.15 between teacher performance in tests and pupil performance in reading and mathematics. Examining the academic qualifications of the teachers, there were five and four out of 14 that had a significant relationship with pupil performance in reading and in mathematics respectively, while teachers with tertiary education (8 and six out 14 systems of education) had a significant relationship with pupil performance in reading and in mathematics respectively. Just of note, Mauritius and South Africa did not administer the teachers' reading and mathematics test. (For more details, see Appendix 60 and Chapter 6, Tables 6.8, 6.14. to 6.15.)

Table 9.14 also presents the correlations between pupil performance in reading and mathematics and the **affective domain**. As indicated in Table 9.14, 11 out of 14 education systems (the

exceptions being Lesotho. Tanzania and Zambia) present some correlation ($r \geq .15$) with pupil performance in reading and in mathematics for variables in the affective domain. Generally speaking, there was a noticeable and useful but limited association between the variables comprising the affective domain and pupil performance in reading and in mathematics.

Table 9.14

*Correlations between variables in cognitive and affective domains and pupil performance in reading and in mathematics in SACMEQ II tests*

Obs: a) The underlined results had a negative correlation with pupil performance in reading or in mathematics

| Countries | BOT | | KEN | | LES | | MAL | | MAU | | MOZ | | NAM | | SEY | | SOU | | SWA | | TAN | | UGA | | ZAM | | ZAN | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Variables** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** |
| **Cognitive Domain** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **P reading-score** | - | .880 | - | .895 | - | .745 | - | .629 | - | .906 | - | .778 | - | .940 | - | 890 | - | .900 | - | .744 | - | .819 | - | .788 | - | .830 | - | .673 |
| **T read/math score** | .342 | .336 | - | - | .236 | .278 | - | - | - | - | .201 | - | .482 | .505 | 358 | - | - | - | - | .322 | .235 | .230 | - | - | - | - | .174 | .214 |
| **T Qualif-Acad.** | .192 | .167 | - | - | - | - | - | - | - | - | - | - | .346 | .369 | 379 | - | .300 | 379 | - | - | - | | .155 | - | - | - | - | .206 |
| **Read/math goals** | - | - | - | - | - | .201 | .186 | - | - | - | - | - | .151 | - | .176 | - | - | - | - | - | - | | - | - | .173 | .248 | - | - |
| **T (Prim. Only)** | .153 | .189 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 373 | .280 | - | - | .337 | .261 | - | .174 |
| **T (Sec.)** | .199 | .181 | .210 | - | .182 | - | .388 | .324 | .461 | .476 | .168 | - | - | - | .206 | 271 | .203 | .232 | - | - | .444 | .334 | - | - | .323 | .188 | 200 | - |
| **T (Tertiary)** | .291 | .267 | 207 | .178 | 162 | - | - | - | - | - | - | - | .323 | .278 | .269 | 285 | .436 | 385 | .162 | - | - | - | - | - | .221 | .174 | - | - |
| **Sch.qual-acad** | .319 | .331 | .225 | .182 | - | - | - | - | - | - | .175 | - | .394 | 367 | .198 | - | .383 | .354 | - | - | .171 | - | - | - | .288 | .183 | - | - |
| **Ratio T tertiary** | .207 | .186 | - | - | - | - | - | - | - | - | .171 | .229 | .233 | .231 | .407 | .488 | .330 | .310 | - | - | - | - | - | - | - | - | - | - |
| **Affective Domain (Read/math Teacher Satisfaction)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **School distance** | - | - | - | - | - | - | - | - | - | - | - | - | - | .183 | .469 | .303 | - | - | .172 | - | - | - | - | - | - | - | - | - |
| **S building quality** | - | - | - | - | - | - | - | - | - | - | - | .218 | - | - | - | 289 | - | - | - | - | - | - | - | - | - | - | - | - |
| **T house availabil.** | - | - | - | - | - | - | .168 | - | - | - | - | - | .164 | - | .564 | .483 | .180 | .189 | - | - | - | - | - | - | - | - | - | .202 |
| **T house quality** | - | - | - | - | - | - | - | - | - | .170 | - | - | - | - | .419 | - | 163 | 185 | - | - | - | - | - | - | - | - | .171 | - |
| **Cl-furniture qual.** | - | - | - | .228 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 165 | - |
| **Level of salary** | - | - | - | .161 | - | - | - | .187 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **Pupil learn** | - | - | - | - | - | - | .197 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **Sch. manag. qual.** | - | - | - | - | - | - | - | - | .196 | .197 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | .179 | - |
| **Staff relationship** | - | - | - | - | - | - | .174 | - | - | - | - | - | - | - | - | 255 | - | - | - | - | - | - | - | - | - | - | - | - |
| **Comm.relationship** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | .575 | - | - | - | - | - | - | - | 172 | - | - | - | - |
| **Promotion opport** | .153 | .167 | - | - | - | - | - | - | .187 | .196 | - | - | - | - | .438 | - | 168 | 191 | - | - | - | - | - | 186 | - | - | - | - |
| **Further study** | - | - | - | - | - | - | - | - | - | - | - | - | - | .192 | 224 | - | - | - | - | - | - | - | - | - | - | - | - | - |

Legend: P=pupils; T=teachers; Qualif=qualification; Acad= academic; math=mathematics; Prim=primary; Sec=secondary Cl= classroom; qual=quality; Sch=school, manag=management; R=reading; M=mathematics

= $p \leq .05$
= $p \leq .01$
= $r \leq 0.15$
= Not significant;

Of the 14 education systems included in the SACMEQ study, Seychelles presented the most positive correlations between pupil performance and some variables in the **affective domain** that had a statistically significant correlation in both subjects. For instance, in Seychelles there was a relationship between pupil performance in reading and the following variables: *teachers' satisfaction-school distance*; *teachers' satisfaction-house availability; teachers' satisfaction-house quality; and teachers' satisfaction-promotion opportunity*. In mathematics, Mauritius and South Africa had more relationships (3) that were statistically significant from the rest of the countries. (For more information see Appendix 61 and see also Chapter 6, Table 6.5.)

Table 9.15 shows the correlation between pupil performance and the variables that composed the **behavioural domain** in individual SACMEQ countries. There were two categories of correlations in the behavioural domain: noticeable relationship and useful for limited prediction. Seychelles was the country that presents the most associations between the variables that made up the behavioural domain and pupil performance in reading and in mathematics, while Malawi had the fewest relationships.

It can be observed in Table 9.15 that in all education systems (except in Zanzibar in mathematics) pupil performance had a statistically significant association with the *pupils' speaking the language of instruction at home*. The strongest correlation was found in Seychelles in reading and in mathematics, while the weakest was found in Namibia in reading and in Lesotho in mathematics. This pattern may mean that speaking the language of instruction has a positive impact on pupil performance not only in reading but also in mathematics. As the more regularly pupils speak the language, the better they perform, possibly because the more confident they become the more they can improve the level of their language skills, such as speaking, comprehension, vocabulary, reading and interpretation.

There were relationships between *pupils' days of absenteeism* and pupil performance in reading and in mathematics in 10 out of the 14 systems of education, namely Kenya, Lesotho (in mathematics), Mauritius, Namibia, Seychelles, and South Africa. Swaziland (in mathematics), Tanzania, Uganda and Zambia. There was also a negative relationship between pupils' performance in reading and in mathematics and *pupils' absent-work* in seven of the 14 education systems: Kenya, Mozambique, Namibia, Seychelles, South Africa, Swaziland (in reading), and Tanzania. The *teachers' approach* (six out of 14 education systems) and years of teaching (four out of 14 education systems) correlated with pupil performance in reading and mathematics.

Examining the results of the **behavioural domain**, it seems that the level of language proficiency is a determinant for pupil performance in both subjects in all SACMEQ countries. A stronger

relationship than that presented in Table 9.15 was expected between pupil performance and variables in the behavioural domain, such as *years of teaching* and *teachers' approach in the classroom*. (See Appendix 62 and see also Chapter 6, Table 6.9.)

Table 9.15

*Correlations between variables in behavioural domains and pupil performance in reading and in mathematics in SACMEQ II tests*

| Countries | BOT | | KEN | | LES | | MAL | | MAU | | MOZ | | NAM | | SEY | | SOU | | SWA | | TAN | | UGA | | ZAM | | ZAN | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Variables** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** |
| **Behavioural domain** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| P. days' absent | - | - | .328 | 278 | - | .173 | - | - | .253 | .214 | - | - | .381 | .339 | .635 | .640 | .169 | .169 | - | 171 | .241 | .245 | .226 | .247 | .298 | .313 | - | - |
| P. absent -ill | - | - | - | - | - | - | - | - | - | - | - | - | .256 | .231 | 148 | - | .173 | - | - | - | - | - | - | - | - | - | - | - |
| P. absent -family | .154 | - | - | - | - | - | - | - | .138 | - | - | - | .199 | .201 | .291 | 242 | - | - | - | - | - | - | - | - | - | - | - | - |
| P. absent -work | - | - | .312 | .284 | - | - | - | - | - | - | .326 | .292 | .347 | .314 | .278 | .246 | .353 | .306 | .172 | - | .328 | .334 | - | - | - | - | - | - |
| P. abs fee not paid | - | - | - | - | - | - | - | - | - | - | - | - | .174 | | .257 | .260 | .277 | .263 | - | - | - | - | .192 | - | - | - | - | - |
| P sp lan inst home | .497 | .441 | .252 | .174 | .315 | .246 | .392 | .363 | .378 | .377 | .428 | 419 | .225 | .176 | .589 | .493 | .552 | .471 | .373 | .204 | .441 | .388 | .274 | .162 | .518 | .406 | .246 | .157 |
| Teachers'approach | - | . | - | - | - | - | - | - | - | - | .156 | 158 | .208 | .264 | - | .416 | - | .222 | - | - | .190 | - | - | .276 | - | - | - | - |
| Teachers'approach | | | | | | | | | | | | | | - | .288 | | - | - | - | - | - | - | - | - | - | - | - | - |
| T.years of teaching | .291 | .190 | - | - | - | - | - | - | 149 | .172 | - | - | .257 | .189 | 204 | .413 | - | - | - | - | - | - | - | - | - | - | - | - |
| T. hours outside | .194 | .170 | - | - | - | - | - | - | .185 | .198 | - | - | - | - | .341 | .466 | - | - | - | - | - | - | - | - | - | - | - | - |
| T. R/M activities | | | | | | | | | | | | | - | - | .202 | | | | | | | | | .160 | | | | .155 |
| T. R/M activities | .225 | - | - | - | - | - | - | - | .213 | - | - | - | .181 | .170 | .321 | .544 | - | - | - | - | - | - | - | .279 | .204 | - | - | - |
| T. R/M activities | .165 | - | - | - | - | - | - | - | - | - | - | - | .192 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| T act most import | - | - | - | - | - | - | - | - | - | .154 | - | - | - | - | 218 | .191 | - | - | - | - | .265 | - | - | - | - | - | - | - |
| T most import goal | | | | | | | | | | | | | - | - | .380 | | | | | | | | | | | | | |
| T par. meet year | .414 | - | .287 | - | - | - | - | - | .399 | - | - | .197 | .208 | - | .308 | .188 | .317 | - | .304 | - | - | - | - | - | - | - | - | - |
| Tfr meeting parent | | | - | | - | - | .168 | - | - | - | - | - | - | - | - | - | .313 | .191 | | .177 | - | - | .155 | - | .236 | - | | - |
| School activities | .206 | .226 | - | | - | - | - | - | - | - | - | - | .164 | .192 | .243 | .169 | .332 | .349 | .244 | .192 | - | - | .197 | - | .196 | 155 | .214 | .237 |
| School activities | | | | | | | | | | | | | - | - | .193 | | | | | | | | | | | | | |
| Tf giving writt test | - | - | - | | - | - | .150 | - | .169 | - | - | .160 | - | - | .154 | - | .186 | - | - | - | - | - | - | - | - | - | - | - |
| T.rep. comments | - | - | - | | - | - | - | - | - | - | .153 | - | - | - | - | - | - | - | - | - | - | - | - | - | .248 | .183 | - | - |
| S. head activities | - | - | - | .151 | - | - | - | - | - | - | .184 | .181 | - | - | - | .334 | - | - | .206 | - | - | - | - | - | .170 | .171 | .214 | - |
| S. head activities | | | | | | | | | | | | | | | | .217 | | | | | | | | | | | | |
| S H exp.altogether | - | - | - | | - | - | - | - | .196 | .205 | - | - | .187 | - | - | - | .194 | .181 | - | - | - | - | - | - | - | - | .180 | - |
| S H.years teaching | - | - | - | | - | - | - | - | - | - | .154 | .153 | - | - | .374 | 292 | - | - | .232 | .235 | - | - | - | - | - | - | .179 | - |
| S head exp.this sch | - | - | - | .152 | - | - | - | - | - | - | - | - | 245 | .193 | .291 | 186 | .206 | .197 | - | - | - | - | - | - | - | - | - | - |
| Sch head lost days | - | - | - | | - | - | | - | - | - | - | - | - | - | - | - | 202 | .219 | - | - | - | - | - | - | - | - | .221 | - |

a)The underlined results had a negative correlation with pupil performance Legend: R=reading; M= mathematics; P= Pupils; T =Teachers; SH=school head; fr or f=frequency; rep=report; act=activities; par/parents; exp=experience; sp lan inst home=speaking the language of instruction at home; abs=absent

= p ≤ .05; = r ≤ 0.15

= p ≤ .01 = Not significant

**Teacher training and teacher characteristics in Mozambique**

Table 9.16 shows the correlations between pupil performance and *teacher training* and *teachers' characteristics constructs* in Mozambique. As shown in this table, for the majority of the variables that composed the teacher training construct in Mozambique, there was a noticeable relationship with pupil performance in reading and in mathematics, which could be used for limited prediction. In five out of the11 provinces, teacher training was a good predictor of pupil performance in reading and in mathematics, varying from r = .739 in Maputo Cidade to r =.877 in Manica, both correlations relating to *teacher in-service training effectiveness* in reading and in mathematics respectively. *School head weeks' special training* was also a good predictor of pupil performance in mathematics in four provinces, namely Inhambane, Manica, Maputo Província and Niassa. Only one out of 12 variables was statistically significant, that being the *school head's weeks of special training*, and in Maputo Província this was $p \leq .001$. Gaza is the province that had little correlation between pupil performance and the teacher training construct. (For more details see Appendix 63 and Chapter 6, Tables 6.7 to 6.10 and 6.13.)

Table 9.16 also shows the *teachers' characteristics construct* and its correlation with pupil performance in reading and in mathematics. There is a noticeable relationship which is useful for a limited prediction of pupil performance in reading and in mathematics in Mozambique in the *teachers' characteristics construct*. Out of 11 provinces, Inhambane was the only one that obtained two out of seven variables that had statistically significant correlations with pupil performance, namely the teacher's *source of light* for pupils' reading performance, and the *age level of the school head* for pupils' performance in mathematics. In Maputo Cidade, the *source of light*, and the *teacher's age* in Gaza had a statistically significant association with pupil performance in reading. There was a negative relationship with pupil performance in mathematics and *school head age level* in Niassa, but in Maputo Província the relationship was positive. (For more information, see Appendix 64 and Chapter 6, Table 6.1 and Figures.6.1 and 6.2.)

Table 9.16

*Correlations between variables for teacher training and teachers' characteristics and pupil performance in reading and in mathematics across Mozambican provinces*

| Provinces | CAB | | GAZ | | INH | | MAC | | MAN | | MAP | | NAM | | NIA | | SOF | | TET | | ZAM | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Variables** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** |
| **Teacher Training** | | | | | | | | | | | | | | | | | | | | | | |
| R/M Teacher Training | .284 | .209 | - | - | .465 | - | - | .467 | .525 | - | .182 | .195 | .360 | - | .273 | .256 | .650 | - | .373 | - | - | .487 |
| R/M in-service Trg. Effect | .636 | - | .334 | .484 | .231 | - | .739 | .522 | - | .877 | - | .334 | .195 | - | - | .209 | .328 | - | .420 | - | - | - |
| T. Trg. (1 Year) | - | - | - | - | .449 | .539 | - | - | .431 | .312 | - | .170 | .199 | .292 | .388 | - | .190 | .215 | .169 | - | .202 | - |
| T. Trg. (2 Years) | .229 | .180 | - | .314 | - | .251 | - | .216 | .474 | - | .166 | - | - | .199 | .161 | .165 | .285 | - | - | .227 | .176 | - |
| T. Training. (3 Years) | .411 | .329 | - | - | .409 | - | - | .183 | .442 | - | .223 | - | .153 | .322 | .402 | .205 | - | .413 | - | .455 | .274 | - |
| T. Trg. (More 3 Years) | - | .189 | .454 | .581 | - | - | .215 | .567 | - | .369 | .343 | - | .248 | .386 | .221 | | .282 | | .176 | .290 | .345 | .176 |
| T. (Short Training) | .373 | .388 | - | - | .303 | .311 | - | - | .279 | - | - | .294 | - | - | .186 | .369 | .543 | .530 | - | .500 | .396 | .241 |
| T. (No Training.) | .189 | .237 | - | - | .426 | .540 | .355 | .422 | .297 | - | - | - | .181 | - | .601 | - | .185 | - | .321 | - | - | - |
| Sch. H. T. Training | - | - | - | .196 | .388 | - | .203 | .174 | .427 | .291 | - | .151 | - | - | .451 | .617 | .289 | .325 | .321 | .189 | .251 | .406 |
| S. Head Special Training | .428 | .159 | .411 | .644 | .442 | .328 | .284 | - | .392 | .244 | - | .210 | - | .338 | - | | .219 | .240 | - | - | .249 | - |
| S.H. Weeks Special Trg | - | - | .285 | - | - | .748 | .178 | - | .658 | .814 | .470 | .783 | .653 | .326 | .416 | .835 | .419 | - | - | - | - | - |
| **Teachers' Characteristics** | | | | | | | | | | | | | | | | | | | | | | |
| R/M Teachers' sex | - | - | .335 | - | - | - | - | - | - | - | .230 | .165 | - | - | - | - | .258 | .340 | - | .330 | .394 | - |
| R/M Teachers' age | .257 | - | .536 | - | .414 | .331 | - | - | - | .231 | .191 | - | - | .268 | .293 | .597 | - | - | .273 | .427 | - | .151 |
| R/M T. total possession | - | .269 | - | .284 | .580 | 362 | .361 | - | - | - | - | - | .160 | - | .378 | .179 | - | - | - | .247 | .163 | - |
| R/M T. source of lighting | - | .282 | .182 | .186 | .543 | .515 | .477 | .165 | - | .253 | 205 | - | - | .233 | .352 | .446 | - | .224 | .136 | .373 | .339 | - |
| R/M T. home condition | - | .221 | - | .159 | - | - | - | .351 | - | - | .196 | - | .280 | .285 | .163 | .171 | - | - | .275 | .214 | .372 | .273 |
| School head sex | - | - | .314 | - | .394 | .479 | .286 | - | - | - | .165 | .154 | .200 | - | - | - | .386 | .451 | - | - | - | - |
| School head age | .299 | - | - | .250 | .402 | .568 | .152 | 237 | - | .204 | .191 | .533 | - | .262 | .254 | .230 | .251 | .316 | - | - | - | 322 |

□ = $p \leq .05$ R = reading

a)The underlined results had a negative correlation with pupil performance Legend: R= reading; M= mathematics; P= Pupils; T=Teachers; Trg= training; eff=effective; poss= possessions; SH=school head; Qualif=qualification; Sp=special; TH cond=teachers' house condition

□ = $p \leq .05$; □ = $r \leq 0.15$ □ = $p \leq .01$ □ = Not significant

**Teacher training and teachers' characteristics in SACMEQ countries**

Table 9.17 presents the correlations between pupil performance and *teacher training* in the SACMEQ countries, and shows a noticeable and useful for limited prediction correlation for pupil performance in reading and in mathematics. Across SACMEQ countries at level .15 of correlation, Namibia and South Africa (six out of 11variables in reading and in mathematics) and Botswana (five out of 11 in reading and six in mathematics) were the countries that had the most relationships between teacher training and pupil performance in reading and in mathematics. Only five systems of education in the SACMEQ countries present a noticeable relationship between professional training and pupil performance, namely Mozambique (in mathematics), Namibia, Seychelles (in reading), South Africa and Tanzania (in mathematics).

There was a positive relationship between *teachers without training* and pupil performance in reading and mathematics in Kenya and Mauritius. However, these teachers had senior secondary or A-levels in Kenya, and in Mauritius they had tertiary education (see Chapter 6, Table 6.12 and 6.15). Five school systems, namely Botswana, Namibia, South Africa, Swaziland (in mathematics), and Zambia had positive correlations between pupil performance and school head teacher training. Botswana was the country that presented the most variables that had relationships between pupil performance in reading and mathematics and the three variables related to a school head, such as *school head qualification- teacher training*, s*chool head qualification-special training*, and *number of weeks-special training.* As in Mozambique, it was expected that teacher training would have impacted more on pupil performance in reading and mathematics than presented in Table 9.17. (See Appendix 65; see also Chapter 6 Tables 6.9, 6.11; 6.12; 6.14 and 6.15).

Table 9.17 also presents the correlations between pupil performance in reading and in mathematics and the *teachers' characteristics construct* in SACMEQ countries. As indicated in Table 9.17, the *teachers' characteristics construct* in SACMEQ countries had a noticeable and useful but limited predictive capability for pupil performance in reading and in mathematics. Of the 14 education systems, Zambia was the country with most variables exhibiting significant relationships with pupil performance in reading (six out of the seven variables), followed by Mozambique (five out of seven). Zambia was followed by Namibia (5 in reading and 4 in mathematics) and Botswana (four in reading and also in mathematics). The countries with the fewest significant relationships were Lesotho (two out of the seven) and Zanzibar with none.

The *source of light* in a teacher's home appears as an important variable in all SACMEQ countries except in Mauritius and Seychelles, and generally had either a noticeably significant relationship or a less strong relationship (useful for limited prediction of pupil performance in reading and in mathematics). *Teachers' source of light* as a variable was closely associated with pupil

performance in both subjects in all countries, except Kenya, Uganda and Zanzibar, where the relationship was in mathematics only. All teachers had electricity as a source of lighting in Mauritius and Seychelles. (See Chapter 6, Figure 6.4.) In seven of the 14 systems of education, namely Kenya, Malawi, Tanzania, Zambia, Mozambique (in mathematics) Namibia and South Africa (in reading), having a female teacher correlated with pupil performance in reading and in mathematics.

In 12 and eight of the 14 systems of education respectively, teachers' possessions and teachers' home conditions correlated with pupil performance in reading and in mathematics. Among the variables that composed teachers' characteristics constructs, the *age of the school head* had the weakest relationship with pupil performance, with only Mozambique in mathematics and Zanzibar in reading presenting some correlation in one subject only. (For more information see Appendix 66 and Chapter 6, Tables 6.4, Figures 6.3 and 6.4).

Taking into consideration the level of teacher training in some countries (see Chapter 6, Table 6.9), it was expected that teacher training would have stronger correlation with pupil performance than presented in this section. The problem is that most teachers in some SACMEQ countries received the same level of teacher training, and it was therefore not possible to calculate a correlation.

The results emerging from pupil performance in the SACMEQ tests (See Chapter 8, Figures 8.2 and 8.18) give some indication of the quality of teaching in SACMEQ countries and consequently, the quality of teacher training, and may therefore be of value in informing future revision of the curricula for teaching training programmes.

Table 9.17

*Correlations between variables for teacher training and teachers' characteristics constructs and pupil performance in reading and in mathematics in SACMEQ II tests*

| Countries | BOT | | KEN | | LES | | MAL | | MAU | | MOZ | | NAM | | SEY | | SOU | | SWA | | TAN | | UGA | | ZAM | | ZAN | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Variables** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** |
| **Teacher Training** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| R/M Teacher Trg | - | - | - | - | - | - | - | - | - | - | - | .182 | .329 | .322 | .308 | - | .388 | .407 | - | - | - | 227 | - | - | - | - | - | - |
| R/M ins Trg. effe | - | - | - | - | - | - | .212 | - | - | - | - | - | - | - | .232 | - | .198 | 234 | .226 | - | .296 | .305 | - | - | .257 | 234 | - | - |
| Teach. (NoT.Trg) | .194 | .157 | .153 | .170 | - | - | - | - | .185 | .195 | .194 | .183 | .260 | .215 | .291 | .212 | - | - | .260 | - | - | - | - | - | - | - | - | - |
| Teachers (Short) | - | - | - | - | - | - | .182 | .177 | - | - | .220 | - | - | - | - | - | - | - | - | - | | - | .179 | - | - | - | - | - |
| Teachers (1 Year) | - | .208 | - | - | - | - | .206 | - | - | - | - | .175 | - | - | - | - | - | - | - | - | - | - | - | - | .239 | - | - | - |
| Teach. (2 Years) | - | - | .378 | .274 | - | - | .398 | .343 | .208 | .164 | .237 | - | .182 | .247 | - | .196 | 267 | 298 | - | - | .459 | .330 | .299 | .198 | .543 | .429 | .311 | - |
| Teach. (3 Years) | - | - | .151 | - | .201 | - | .152 | - | .183 | .214 | - | - | .244 | .166 | - | - | .158 | .221 | - | - | - | - | - | - | - | - | - | - |
| T.(More 3 Years) | .574 | .608 | - | - | - | - | - | - | - | - | .183 | - | .624 | .644 | - | - | .596 | .629 | .359 | .196 | - | - | - | - | .246 | .217 | - | .251 |
| Sch. H.Qua.T.Trg | .335 | .327 | - | - | - | - | - | - | - | - | - | - | .430 | .391 | - | - | .375 | .343 | - | .163 | - | 217 | - | - | .245 | .160 | - | - |
| S. Head Spec.Trg | .217 | .193 | - | - | - | - | - | - | - | - | .170 | .167 | - | - | - | - | - | - | - | - | - | - | .153 | - | - | - | - | .915 |
| S.H.WeeksSp.Trg | .336 | .350 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | .231 | .186 | - | - | - | - | - | - | - | .277 |
| **Teachers Characteristics** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Read/math T sex | - | - | .314 | .183 | - | - | .378 | .301 | - | - | - | 163 | .233 | - | 289 | - | .210 | - | - | - | .345 | .241 | - | - | .498 | .306 | 167 | - |
| Read/math T age | .316 | .164 | - | - | - | - | - | - | - | .185 | - | - | .246 | .180 | 160 | .356 | - | - | - | - | - | - | - | - | 154 | - | - | - |
| R/M T poss home | .293 | .186 | .214 | - | .202 | - | - | - | - | .179 | .181 | .176 | .532 | .587 | 157 | .279 | .275 | .269 | .306 | | .291 | - | .232 | .171 | .550 | .429 | - | - |
| R/M T. lighting | .387 | .276 | .325 | - | .274 | .210 | .317 | .317 | - | - | .322 | .239 | .449 | .469 | - | - | .242 | .164 | .361 | .154 | .401 | .302 | .272 | - | .569 | .376 | .217 | - |
| R/M T H conditio | .282 | .222 | - | 170 | - | - | - | - | - | - | - | - | .374 | .449 | - | - | .303 | .303 | .173 | - | .187 | - | .159 | - | .154 | - | - | - |
| School head sex | - | - | 240 | .177 | - | - | - | - | - | - | .168 | .184 | - | - | - | - | - | - | - | - | .191 | .166 | .183 | - | .369 | .337 | .271 | - |
| School head age | - | - | - | - | - | - | - | - | - | - | - | .202 | - | - | 207 | - | - | - | 150 | - | - | - | - | - | - | - | .210 | - |

a)The underlined results had a negative correlation with pupil performance Legend: R= reading; M= mathematics; P= Pupils; T=Teachers; Trg= training; eff=effective; poss= possessions; SH=school head; Qualif=qualification; Sp=special; TH cond=teachers' house condition

= p ≤ .05; = r ≤ 0.15 = p ≤ .01 = Not significant

**The external and internal teaching contexts in Mozambique**

The correlations between pupil performance and variables that compose the *external* and *internal teaching constructs* in Mozambique are presented in this section. Table 9.18 shows the correlations between pupil performance and the *external and internal teaching context constructs* in Mozambique.

Across the external and internal contexts, only one variable was highly correlated and statistically significant in more than two provinces: *school heads periods* in Cabo Delgado (reading), Gaza (reading and mathematics) and Niassa (mathematics). The highest number of strongly correlated and statistically significant variables was found in Zambézia: *paying extra tuition* and *school location* (reading and mathematics).

As referred to earlier in this chapter, *total school resources* were made up of 22 items in the *external teaching context construct*. There are usually shortages of school resources in Mozambican governmental schools (see Chapter 7, Tables 7.5 and 7.6). The slight and useful correlations might be a reflection of the lower variation within and between schools in terms of school resources. Nevertheless, *total school resources* ($r = 0.779$) has a very strong relationship to pupil performance in reading in the Tete province.

In the *external teaching context*, some variables had statistical significance at the level of $p \leq .05$ in six provinces, namely Cabo Delgado with *pupils' extra tuition* in reading; *pupils' extra tuition-other subjects* in Inhambane in reading and in mathematics; *paying extra-tuition* in Zambézia in reading and in mathematics; and in the same province, pupil performance in reading and in mathematics was associated with *school location*. *Pupils can borrow books* in Gaza, and the *number of shifts* in Niassa had a negative relationship that was statistically significant with pupil performance in mathematics and in reading. *Total school resources* and the *ability to borrow books* had relationships that were statistically significant with pupil performance in mathematics in Maputo Província. (For more information, see Appendix 67.)

Table 9.18 also presents correlations between pupil performance in reading and mathematics and the *internal teaching context* in Mozambique. As can be seen, the *internal teaching context construct* is comprised of variables related to the classroom environment. The internal teaching context construct produces the same problems as the external teaching context construct in Mozambique where it is common for there to be a shortage of books and basic materials from Grade 1 to 7 (see Chapter 7, Tables 7.1 and 7.2; Figures 7.1, 7.2 and 7.3)**.** Like the external teaching context construct, the internal teaching context construct is a challenge for the MEC, as it needs to provide classroom furniture, textbooks for all pupils, and teacher classroom resources. As

explained in Chapter 2, in order to improve the quality of education, the MEC introduced changes in the production of textbooks through the development of the National Book Policy – a change that involved the private sector in the process (Strategic Plan for Education, 1998) but this seems to be an ongoing problem not only for Mozambique but for many other cash-strapped SACMEQ countries.

Table 9.18

*Correlations between variables in the external and internal teaching context and pupil performance in reading and in mathematics across Mozambican provinces*

| Provinces | CAB | | GAZ | | INH | | MAC | | MAN | | MAP | | NAM | | NIA | | SOF | | TET | | ZAM | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Variables** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** |
| **External teaching context - construct** | | | | | | | | | | | | | | | | | | | | | | |
| P extra tuition-R/M | .545 | .186 | - | .245 | .523 | .529 | - | - | .222 | .431 | .268 | - | .152 | - | .229 | .450 | - | .442 | .370 | .253 | .238 | - |
| P ext tuit-other sub | .277 | - | .150 | - | .554 | .543 | - | 224 | .513 | .170 | .457 | - | .170 | - | - | - | - | - | .210 | - | .371 | .415 |
| Paying extra tuition | .328 | .183 | .153 | 334 | .332 | .241 | - | .245 | - | .375 | 293 | .212 | - | .385 | .320 | 350 | .193 | 370 | - | - | .588 | .500 |
| School location | - | - | .316 | .307 | - | - | - | .314 | .178 | - | 384 | - | .355 | .243 | .219 | - | .163 | .424 | - | .407 | .624 | .471 |
| Pupil-teacher ratio | .334 | .295 | - | .191 | .515 | .445 | .305 | - | .397 | - | - | - | - | - | - | .171 | .201 | .271 | .207 | - | .311 | .385 |
| Max No pup/shifts | .489 | .370 | - | - | - | .180 | .175 | .201 | .280 | - | .413 | - | .216 | - | .523 | .172 | - | .337 | - | .353 | .320 | - |
| Number of shifts | - | - | .246 | .301 | .323 | .311 | - | .256 | - | - | .409 | .478 | .263 | 254 | .599 | .183 | - | - | - | .163 | .160 | - |
| Ratio girls | - | - | - | - | .314 | - | .278 | - | .334 | - | .258 | - | .157 | | .316 | - | .195 | - | - | | .278 | - |
| No Class & pupils | .436 | .314 | .154 | .228 | - | .241 | - | .407 | .271 | - | .381 | - | .291 | .211 | .498 | - | - | .236 | - | .236 | .223 | - |
| No of cl Gr 6 | .343 | .217 | - | - | - | - | 301 | - | - | .268 | .357 | .323 | .175 | - | .346 | .495 | .327 | | .561 | .331 | .312 | - |
| Sch building cond | .177 | .269 | - | - | .390 | .155 | .255 | .168 | .208 | .258 | .353 | .474 | - | - | .312 | .211 | - | | - | - | .233 | .307 |
| No of toilets | .357 | .370 | .246 | - | - | - | - | .239 | .498 | - | - | .259 | .200 | - | - | - | .196 | | .160 | - | .151 | - |
| Total Sch resources | - | .179 | - | - | .415 | .179 | .455 | .340 | .257 | - | .311 | .570 | - | - | - | 241 | - | .406 | .779 | .474 | - | - |
| P borrow books | .196 | | .364 | .566 | .189 | .164 | .230 | - | .422 | - | - | .613 | - | .274 | - | .254 | .295 | .324 | .219 | .419 | .372 | .210 |
| **Internal teaching context – construct** | | | | | | | | | | | | | | | | | | | | | | |
| Borrow books | - | - | .275 | .329 | - | - | .338 | .452 | .522 | .395 | .293 | .172 | - | .202 | - | - | - | .187 | .277 | - | - | - |
| P school material | - | - | - | 323 | .393 | .536 | - | .238 | - | - | - | - | - | - | .157 | .175 | - | .265 | - | .347 | .550 | .332 |
| P school material | .321 | .581 | - | .240 | .507 | .204 | .252 | - | - | - | - | .379 | - | .162 | .230 | - | .151 | - | .353 | .217 | - | - |
| Sitting place | .529 | .346 | - | - | - | .220 | .270 | .160 | .355 | .394 | .197 | .296 | - | - | - | .223 | .465 | .425 | .588 | .299 | - | - |
| Writing place | .613 | .441 | - | - | - | .186 | .254 | .203 | .181 | - | .153 | - | - | - | .215 | .297 | .439 | .393 | .573 | .297 | - | - |
| Given R/M HW | - | - | - | - | .258 | .228 | .352 | .340 | - | .277 | - | .322 | - | - | .194 | .358 | - | .185 | .272 | .321 | - | .160 |
| Correct R /M HW | - | .213 | - | .514 | - | .298 | - | - | .675 | .542 | - | .550 | - | - | .178 | - | - | - | - | .366 | .179 | - |
| P R/M textbooks | .497 | .439 | 417 | - | - | .548 | .314 | - | 171 | - | .317 | .333 | - | - | - | - | - | - | - | .190 | .198 | - |
| R/M Cl Size | .417 | .475 | .153 | - | .511 | .280 | .300 | .408 | .176 | - | - | .158 | - | .214 | .354 | .455 | .485 | .342 | .272 | .355 | - | - |
| No of cl books | - | .333 | .220 | .304 | .335 | .187 | .254 | .304 | .362 | - | - | .349 | .259 | - | .184 | .307 | .338 | .194 | .391 | .378 | .179 | - |
| TT cl furniture | - | .303 | .602 | .342 | .219 | - | - | .447 | .717 | .162 | .612 | .701 | .278 | .259 | .425 | .354 | - | .461 | .389 | .314 | .184 | .338 |
| TT cl resources | - | .205 | .222 | - | - | - | - | .354 | .520 | .210 | .253 | .440 | - | .177 | .382 | .238 | - | - | 339 | - | - | .238 |
| Teacher periods | - | .390 | .345 | 580 | .427 | .247 | .319 | - | .355 | .538 | - | .174 | .211 | - | - | - | .361 | .439 | - | - | - | .164 |
| Teacher minutes | - | - | - | - | - | - | - | - | - | - | 747 | .551 | - | - | - | - | .250 | - | - | - | - | .352 |
| SH periods | .523 | .566 | .639 | .603 | .246 | .418 | .298 | - | .400 | - | - | .362 | .216 | - | .238 | .537 | - | 223 | .410 | .366 | .354 | .227 |
| SH minutes | - | - | - | - | - | .356 | .286 | - | .422 | - | - | .292 | - | - | .272 | .440 | .322 | - | .423 | .343 | - | - |

a)The underlined results had a negative correlation with pupil performance Legend: R= reading; M= mathematics; P= Pupils; T=Teachers; No=number; Cl=class; Max=maximum; Sch=school; SH=school head; TT=total; HW=homework. = p ≤ .05; = r ≤ 0.15 = p ≤ .01 = Not significant

The slight and useful correlation in Mozambique might be a reflection of the shortage of internal teaching context variables and the lower variation within and between schools. Nevertheless, two out of 11 provinces had strong relationships with pupil performance, namely Manica: *correcting reading homework* (r = .675*)* and *total class furniture* (r = .717*)*; and Maputo Província: *teacher minutes* (r = .747*)* and *total class furniture* (r = .701*)*. *Teacher minutes* and *total class furniture* are the two variables for which the relationship was statistically significant at $p \leq .01$, while the rest of the variables were significant at $p \leq .05$. However, there was also a negative correlation between pupil performance and some variables that constituted the internal teaching context, such as *teachers' periods and school head periods.* Usually the overload of number of periods that teachers and school head tend to have, had negative effects on pupil performance. (For more information, see Appendix 68.)

**External and internal teaching context in SACMEQ countries**

Table 9.19 shows the correlation between *external teaching context construct* variables and pupil performance in reading and mathematics in SACMEQ countries. There was a noticeable relationship useful for limited predictions in all SACMEQ countries, between pupil performance and variables in the external teaching context, except in Namibia (two in reading and one in mathematics) and South Africa (two in reading), where *school location* and *school resources* were good predictors of pupil performance in reading and in mathematics. Namibia had more variables (10 out of 12) that related to pupil performance, while Uganda had fewer variables that had an association with pupil performance in reading and in mathematics and the external teaching construct.

Namibia was the country that presented the most variables that associated with pupil performance (11 out of 13 variables in reading and mathematics) and external teaching constructs. Namibia was followed by Zambia (10 out of 13 variables in reading and in mathematics), Tanzania (10 out of 13 variables in both subjects) and South Africa (nine out of eight variables in reading and in mathematics respectively).

*School resources* were related to pupil performance except in Mauritius and Mozambique in mathematics. *School location* was also associated with pupil performance in all countries except in Mauritius, and in Uganda and Zanzibar in mathematics. The *condition of school buildings* and the *pupils/teacher ratio* had a negative relationship with pupil performance in reading and in mathematics. The variables that comprise the *external teaching context construct* were statistically significant in all of the school systems except for some variables in Seychelles (4), Mozambique (1) and Swaziland (1). Examining SACMEQ countries, Seychelles had the best conditions in terms

Table 9.19

*Correlations between variables for external and internal teaching constructs and pupil performance in reading and in mathematics in SACMEQ II tests*

| Countries | BOT | | KEN | | LES | | MAL | | MAU | | MOZ | | NAM | | SEY | | SOU | | SWA | | TAN | | UGA | | ZAM | | ZAN | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Variables** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** |
| **External teaching context - construct** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Number of shifts | - | - | - | - | - | - | - | .232 | - | - | - | 151 | - | - | - | - | | - | - | - | 180 | - | - | - | .291 | - | - | - |
| Max. No pup/shifts | - | - | - | - | .189 | - | .310 | .295 | .465 | .480 | .273 | - | .242 | .169 | - | - | - | - | - | - | .386 | .284 | - | - | .477 | .343 | - | - |
| No. Class & pupils | - | - | - | - | - | - | .256 | .210 | .415 | .433 | .307 | .196 | .380 | .329 | - | - | .300 | .262 | - | - | .318 | 212 | - | - | .500 | .292 | 173 | - |
| No of classes –Gr 6 | - | - | 239 | .174 | .161 | - | .321 | .267 | 291 | .274 | .239 | - | .263 | .190 | | - | .200 | - | - | - | .313 | .245 | | - | .541 | .335 | - | - |
| School location | .435 | .305 | .400 | .306 | .381 | .421 | .370 | .292 | - | - | .279 | .161 | .685 | .614 | .283 | .245 | .681 | .582 | .394 | .203 | .480 | .362 | .232 | - | .603 | .419 | .348 | - |
| Pupil-teacher ratio | .236 | .337 | .348 | .328 | - | - | .169 | - | - | - | - | - | .294 | .309 | .182 | .222 | - | - | - | - | .261 | .236 | - | - | .346 | .317 | - | - |
| Sch. building cond | - | .170 | .272 | .289 | - | .224 | - | - | - | - | - | - | .347 | .335 | - | .160 | .450 | .411 | .188 | .211 | .179 | .173 | .211 | - | - | - | - | - |
| Number of toilets | .421 | .368 | .382 | 337 | .156 | - | .308 | .205 | .303 | .313 | - | - | .600 | .570 | - | - | 369 | .342 | .369 | .258 | - | - | - | - | .476 | .373 | - | - |
| Total Sch resources | .555 | .574 | .504 | .444 | .462 | .360 | .348 | .256 | - | - | .185 | - | .730 | .688 | .381 | .408 | .727 | .659 | .462 | .322 | .233 | .190 | .425 | .230 | .644 | .478 | .243 | 157 |
| Pup. borrow books | .322 | .353 | .212 | .214 | - | - | - | - | - | - | - | - | .233 | .230 | - | - | .647 | .622 | .254 | .181 | - | - | - | - | - | - | - | - |
| P extra tuition-R/M | - | - | - | - | - | - | - | - | .226 | .285 | .321 | - | .253 | .200 | - | - | .378 | .279 | .266 | .201 | - | .358 | - | - | - | .188 | - | .209 |
| P ext tuit-other sub | .167 | - | - | - | - | - | - | - | .467 | .503 | .213 | .158 | - | - | - | - | - | - | - | .209 | .155 | .237 | - | - | .254 | .169 | .191 | .154 |
| Paying extra tuition | - | - | - | - | - | - | - | - | .203 | .285 | .158 | - | .208 | .187 | .622 | .660 | .288 | 324 | - | .163 | .284 | .254 | - | - | .391 | .282 | .258 | - |
| **Internal teaching context – construct** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Borrow books | - | - | .244 | - | - | - | - | - | .167 | - | .166 | - | - | - | .413 | 330 | .260 | .320 | .157 | - | - | - | - | - | .183 | .198 | - | .153 |
| No of class books | - | - | | - | - | - | | - | .160 | 187 | - | 150 | - | - | 194 | .318 | - | - | - | - | - | - | - | - | - | - | - | .206 |
| P. school material | - | .177 | .175 | .171 | .173 | - | .335 | .251 | - | - | .240 | .268 | .194 | .223 | 299 | 362 | .348 | .322 | .198 | .200 | - | | .319 | .289 | - | - | .345 | .183 |
| Sitting place | - | - | .247 | .196 | - | - | - | - | - | - | - | - | - | - | - | - | .265 | - | - | - | .489 | .406 | .266 | .177 | - | - | - | - |
| Writing place | - | - | .251 | .172 | - | - | - | - | - | - | .157 | - | - | | - | - | 249 | .156 | - | - | .443 | .364 | .196 | .207 | .202 | .196 | - | - |
| Read/math Cl Size | - | - | - | - | - | - | .233 | .193 | .426 | 480 | - | - | .250 | .282 | - | - | .227 | .214 | - | - | .219 | .182 | - | - | .292 | .248 | .176 | - |
| P. R/M textbooks | - | - | .266 | .354 | - | - | - | - | - | - | .154 | - | .310 | .384 | .453 | - | .182 | .284 | - | - | | | - | - | .191 | .154 | - | - |
| Given R/M HW | - | .211 | .226 | .287 | - | - | - | - | - | .320 | - | - | .234 | .303 | - | - | .196 | .372 | - | - | .381 | .318 | - | .171 | 332 | .221 | - | - |
| Correcte R /M HW | .252 | - | 255 | .230 | - | - | - | - | - | - | - | - | .164 | - | .169 | - | - | - | .183 | - | .253 | | .288 | .265 | .181 | - | - | .162 |
| T access material | - | .195 | - | - | .172 | - | - | - | - | - | - | - | | .182 | .276 | - | .246 | .235 | - | - | - | .161 | .209 | - | | - | - | .155 |
| Total clas furniture | - | - | .412 | .329 | - | - | - | - | - | - | - | - | .409 | .419 | - | - | .418 | .418 | .258 | - | - | - | - | - | .239 | .151 | - | - |
| Total cl. resources | - | - | .387 | .272 | - | - | - | - | - | - | - | - | .416 | .402 | - | 209 | .421 | .415 | .322 | .230 | - | - | - | - | .166 | - | - | - |
| Teacher periods | - | - | | - | | - | .230 | 167 | - | - | - | - | - | - | .313 | - | .245 | .170 | - | - | .326 | .386 | .177 | - | .162 | - | - | - |
| Sch. Head periods | - | - | .452 | .368 | - | - | .167 | .199 | - | - | .253 | .235 | .237 | .177 | - | 249 | .253 | .187 | - | - | - | .418 | - | - | .449 | .320 | .226 | - |
| Sch. Head minutes | - | - | - | - | .176 | .195 | .254 | - | - | - | .266 | .215 | | - | .232 | 278 | - | - | - | - | .459 | - | - | - | .218 | .243 | - | - |

a) The underlined results had a negative correlation with pupil performance. **Legend:** R= reading; M= mathematics P= pupils; T =teachers; H/W =homework; SH=school head; Max=maximum; No.=number; cl=classroom; Sch=school; ext tuit-other sub=extra tuition-other subjects

= p ≤ .05; = r ≤ 0.15

= p ≤ .01 = Not significant

of resources allocated to schools. (For more details see Chapter 7, Figure 7.7 and also Appendices 22 and 69.)

Table 9.19 presents the correlations between pupil performance and the *internal teaching context*. There was a statistically significant relationship with limited predictive potential for pupil performance in reading and in mathematics in all school systems in SACMEQ countries except in Seychelles (nine variables), Kenya (one variable), Mozambique (one variable), Swaziland (two variables), and Zanzibar (one variable). South Africa (12 out of 15 in reading and 11 out of 15 in mathematics), Botswana (10 out of 15 in reading and 9 out 15 in mathematics), and Zambia (11 out of 15 in reading and eight out of 15 in mathematics) were the countries that were found to have the most relationships between the variables that comprised the internal teaching context construct and pupil performance in reading and mathematics.

*Pupils' school material* had an association with pupil performance in reading in 10 of the 14 SACMEQ systems of education and in mathematics in nine of the systems. The shortage of pupils' *school material* such as exercise books, pens, pencils and other stationery had negative correlations with pupil performance in reading and in mathematics in all education systems except in Lesotho in reading and in Zanzibar in mathematics. Botswana and Lesotho had lower levels of correlation between pupil performance and variables in the internal teaching context construct, a fact which may be related to the low variation among schools. (See Appendix 70 and Chapter 7, Tables 7.3 and 7.4; and Figures 7.4 to 7.6.)

The next section presents the correlations between pupil performance and pre-existing pupils' characteristics, as well as parent and community school involvement.

**Pre-existing pupils' characteristics and parents and community involvement in Mozambique**

Table 9.20 shows the correlations between pupil performance and variables for pre-existing pupils' characteristics as well as parents and community school involvement in Mozambique. As in other domains and constructs in Mozambique, there was a noticeable and but useful if limited association between pupil performance in reading and in mathematics. A number of variables found under *pre-existing pupils' characteristics construct* had fairly strong or strong relationships with performance. *Pupils' age* (r = 0.816) in mathematics, and *morning meal* (r = 0.658) with reading in Niassa; *pupils' sex* (r = 0.752) in mathematics in Tete; the *evening meal* (r = 0.707) and *socio-economic status* in Inhambane (r = 0.662) and also in Zambézia (r = 0.729) in reading. In some provinces, some variables had a relationship with pupil performance that was statistically significant, such as the *evening meal* in Gaza in reading, and in both subjects in Inhambane. *Grade repetition* had a positive relationship with pupil performance in mathematics in Gaza, but was negative in Sofala.

*Pupils' age* had negative correlations with their performance in Inhambane in mathematics and in Zambézia in reading. In Tete, there were associations between pupils' performance in mathematics and *gender*, namely that boys tended to achieve better results than girls in mathematics (see Chapter 8, Figure 8.8), but in Niassa, *pupils' age* had a positive impact on reading and on mathematics, as did *pupils' SES* in Inhambane and Zambézia in reading. *Meals* appear as an important variable in terms of their strong correlation with pupil performance in four provinces. (For more information see Appendix 71. See also Chapter 6, Tables 6.16, 6.17 and 6.18.)

Table 9.20 also shows the correlation between pupil performance in reading and in mathematics and variables for *parents and community school involvement* in Mozambique.

Table 9.20

*Correlations between variables for pre-existing pupil characteristics and parents and community involvement and pupil performance in reading and in mathematics across Mozambican provinces*

| Provinces | CAB | | GAZ | | INH | | MAC | | MAN | | MAP | | NAM | | NIA | | SOF | | TET | | ZAM | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Variables** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** |
| **Pre-Existing Pupils' Characteristics** | | | | | | | | | | | | | | | | | | | | | | |
| Pupil's age | .330 | .408 | - | - | .515 | .580 | .232 | .186 | .246 | .206 | .275 | .336 | .308 | - | .526 | .816 | .226 | .427 | .436 | - | .472 | .217 |
| Pupil sex | .155 | .211 | .344 | .249 | .617 | .256 | .180 | .307 | 438 | - | .206 | .216 | .170 | .402 | .182 | - | .212 | .394 | .268 | .752 | .432 | - |
| P place to stay | - | - | .371 | .456 | .173 | .204 | .235 | - | - | .330 | .507 | .416 | - | - | .464 | .369 | - | - | - | .423 | - | - |
| No books at home | .127 | .452 | .190 | - | .266 | - | .290 | - | - | .185 | - | - | - | - | - | .206 | - | 225 | - | .379 | .586 | .383 |
| P. morning meal | .166 | - | 413 | - | .466 | .436 | - | - | .633 | .647 | .267 | .176 | .269 | - | .658 | .389 | - | .202 | .278 | .250 | .446 | .241 |
| Pupils' Lunch | .265 | .216 | .341 | .303 | .427 | .166 | .371 | .283 | .370 | - | - | - | - | - | .398 | - | .425 | 383 | - | .154 | - | - |
| P. evening meal | .375 | .426 | .518 | .412 | .707 | .542 | .205 | - | .507 | .399 | .417 | .430 | .257 | - | .312 | - | .357 | .406 | .186 | - | - | .169 |
| Pupil's' SES | .359 | .226 | .174 | .224 | .662 | .474 | - | - | - | .403 | .273 | .153 | - | - | .242 | .348 | .230 | .442 | 274 | .399 | 729 | .434 |
| Grade repetition | .210 | - | .389 | .601 | .127 | .197 | .366 | - | .373 | .314 | - | - | .376 | .168 | .268 | - | .348 | .518 | .317 | .361 | .234 | .184 |
| P repeating G6 | .155 | - | - | .159 | - | - | - | .160 | - | - | .317 | .238 | .407 | - | .207 | - | .282 | .306 | - | .179 | - | .209 |
| **Parents and community School involvement** | | | | | | | | | | | | | | | | | | | | | | |
| HW-make sure | - | - | .151 | - | .332 | .282 | .481 | .402 | .272 | .366 | - | .161 | - | .396 | .166 | .395 | .293 | .207 | .243 | .448 | .360 | .576 |
| P' HW-help | .316 | .427 | - | - | 224 | .200 | - | - | - | - | .174 | - | - | .189 | .441 | .179 | - | - | - | - | .217 | .344 |
| Asked to R/Calc | .172 | .376 | .315 | - | - | .265 | .241 | - | - | - | .162 | .658 | - | - | - | .413 | - | .495 | - | - | - | - |
| Asked Q R/M | .189 | 556 | .675 | .356 | 253 | .216 | - | - | .458 | .171 | .166 | - | - | - | .237 | .397 | .161 | 379 | .404 | .218 | .159 | .203 |
| Looked SW | - | 240 | 153 | - | - | .259 | - | .229 | - | - | - | 249 | .181 | - | .332 | .614 | .218 | .183 | .289 | - | .439 | .325 |
| T ask par to sign | - | - | 612 | .320 | - | .273 | .177 | - | .208 | .430 | .503 | .559 | - | .242 | .431 | - | - | .335 | .417 | - | .260 | .148 |
| Community contr | - | - | - | - | .245 | .333 | - | - | - | .150 | .162 | - | .247 | .370 | .536 | .247 | .230 | - | .491 | .318 | - | - |
| Community contr | .368 | .472 | 276 | - | .209 | - | .328 | - | .341 | .200 | - | - | - | - | .412 | .346 | - | .154 | .437 | .168 | .318 | .319 |
| Comm. problems | .280 | - | - | - | - | .255 | .375 | .508 | - | - | .333 | - | .349 | - | 212 | - | .477 | .403 | .240 | - | - | - |

a)The underlined results had a negative correlation with pupil performance. **Legend:** R= reading; M= mathematics P= pupils; T =teachers; HW =homework; No=number; Q=question; Calc=calculate; SW=school work; par=parents contr=contribution; comm.=community = p ≤ .05; = r ≤ 0.15 = p ≤ .01 = Not significant

Variables that comprised the *parents' and community involvement construct*, such as being *asked questions about reading*, had a fairly strong relationship with pupil performance in reading except in Gaza, where the correlation coefficient was r = .675. There were statistically significant associations between *homework makes sure* and pupil performance in Maputo Cidade in reading and Zambézia in mathematics; between being *asked to calculate* in Maputo Província in mathematics; between *looked at school work* in Niassa in mathematics, in Gaza in reading, and in Maputo Província in mathematics; *teacher asking parents to sign* and finally *community contribution and community problems.* (For more information, see Appendix 72 and also Chapter 7, Table 7.9.)

**Pre-existing pupils' characteristics and parents and community involvement in SACMEQ countries**

Table 9.21 shows the correlation between pupil performance in reading and mathematics and variables for *pre-existing pupils' characteristics* and *parent and community school involvement* in SACMEQ countries. Pre-existing pupils' characteristics had more relationships with pupil performance in reading and in mathematics than any other domain or construct. This pattern may mean that pupils' performance was more closely related to the individual pupils' characteristics rather than to school variables like the condition of the school, the availability of learning resources, teachers' performance, and the like.

It can be seen in Table 9.21 that there was a noticeable but slight relationship in all SACMEQ countries between pupil performance and variables in the pre-existing pupils' characteristics construct. The exceptions were found in Botswana with number *of books at home* in reading and in mathematics, and *SES* in reading and in mathematics in the school systems of Botswana and Kenya (in reading), Namibia, Seychelles, South Africa and Zambia (in reading) and finally, *grade repetition* in South Africa (in reading) were good predictions of pupil performance in reading and in mathematics.

Among the factors making up the *pre-existing pupils' characteristics* variables, *pupils' socio-economic status (SES)* had relationships with pupil performance in all school systems, ranging from r = .216 in mathematics in Mozambique to r = .798 in reading in Namibia. SES was followed by *grade repetition*, where the correlation was significant in 12 of the 14 systems in reading and 11 of the 14 in mathematics, and then by the *number of books at home*, where the correlation was significant in 12 of the 14 systems in reading and nine of the 14 in mathematics. In the school systems of all SACMEQ countries, grade repetition had negative correlation with pupil performance in reading and in mathematics, except in Mozambique, where grade repetition had a positive relationship with pupil performance in reading and mathematics.

In South Africa, all the variables in the pre-existing pupil characteristics construct (10 out of 10) had relationships with pupil performance in reading and in mathematics and were statistically significant. South Africa was followed by Namibia, which had strong correlations in eight out of 10 variables in reading and nine out of 10 in mathematics.

*Pupils' age* had a negative relationship with pupil performance in reading and in mathematics in all education systems except in Seychelles, where the negative relationship applied only in mathematics. Meals were one of the variables that had a relationship with pupil performance in reading and mathematics in some countries. (For more information, see Appendix 73 and Chapter 6, Tables 6.20 to 6.22 and Figure 6.6.)

Table 9.21 also shows the correlations between the *parents' and community school involvement construct* and pupil performance in reading and in mathematics in SACMEQ countries. As can be seen in Table 9.21, there was a noticeable relationship which is useful for limited prediction between pupil performance and the variables that comprised the parents' and community school involvement construct. Zambia (nine out of nine in reading and seven out of nine in mathematics), South Africa (10 out of 11 in reading and five out 11 in mathematics), Botswana (six out of 11 in reading and seven out 11 in mathematics) and Kenya (six out of 11 in reading and seven out 11 in mathematics) were the school systems that presented a greater relationship between pupil performance in reading and in mathematics and parents' and community school involvement. Across the SACMEQ countries, some variables appear to be more related to pupils' performance than others, being statistically significant in the majority of the countries: *homework-make sure* (seven out of 14 in reading and eight out of 14 in mathematics); *community contribution-material* (seven out of 14 in reading and eight out 14 in mathematics); *school community problems* (eight out of 14 in reading and six out of 11 in mathematics). (For more information, see Appendix 74.)

Table 9.21

*Correlations between variables for pre-existing pupils' characteristics and parent school involvement constructs and pupil performance in reading and in mathematics in SACMEQ II tests*

| Countries | BOT | | KEN | | LES | | MAL | | MAU | | MOZ | | NAM | | SEY | | SOU | | SWA | | TAN | | UGA | | ZAM | | ZAN | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Variables** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** | **R** | **M** |
| **Pre-Existing Pupils' Characteristics** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pupil's age | .436 | 357 | .578 | .492 | .291 | .266 | .206 | - | .494 | .521 | .270 | .155 | .504 | .487 | 183 | .315 | .523 | .442 | .501 | .354 | .323 | .264 | .445 | .323 | .549 | .415 | .152 | - |
| Pupil sex | - | - | - | - | - | - | - | .202 | .154 | - | .200 | - | - | .132 | - | - | .217 | .187 | - | - | - | - | - | - | .166 | - | - | .231 |
| Pupil place to stay | .317 | 267 | - | - | - | - | - | - | - | 165 | .247 | .175 | - | - | - | .270 | .347 | .296 | - | .211 | - | - | - | - | - | - | .303 | .224 |
| No books at home | .671 | .677 | .317 | .347 | .168 | - | .286 | .358 | .444 | .461 | - | - | .394 | .393 | .631 | .586 | .423 | .491 | .292 | .370 | - | - | .203 | - | .410 | .301 | .208 | - |
| P. morning meal | - | - | .211 | .176 | - | - | - | - | .218 | .233 | - | - | .222 | .208 | .277 | .318 | .215 | .250 | - | .200 | .295 | .321 | .351 | .329 | .407 | .310 | .267 | .246 |
| Pupils' Lunch | .255 | .218 | .241 | .207 | - | - | - | - | - | - | - | - | .269 | .258 | .278 | 245 | .312 | .323 | - | .160 | .343 | .305 | .268 | .229 | - | - | - | - |
| P. evening meal | .252 | .191 | .242 | .186 | - | - | - | - | - | - | - | .225 | .150 | .133 | .375 | 229 | .376 | .375 | - | 211 | - | - | .344 | .327 | - | - | .211 | .179 |
| Pupil's' SES | .685 | .560 | .691 | .564 | .366 | .283 | .428 | .292 | .558 | .590 | .368 | .216 | .798 | .747 | .701 | .731 | .776 | .699 | .609 | .469 | .629 | .553 | .567 | .409 | .670 | .501 | .424 | - |
| Grade repetition | .241 | .245 | .190 | - | .279 | .188 | .217 | .356 | .539 | .556 | .259 | .179 | .523 | .530 | - | - | .675 | .646 | .401 | .335 | .235 | .177 | .196 | .259 | .328 | .282 | - | - |
| P. repeating G6 | - | - | .379 | .311 | - | - | - | - | .521 | .520 | - | - | .322 | .312 | - | .169 | .467 | .384 | - | .161 | - | - | .275 | .305 | - | - | - | - |
| **Parents and community School involvement** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Homework-make | .409 | .394 | .426 | .408 | - | - | - | - | - | - | - | - | .293 | .284 | .172 | 252 | .329 | .279 | .267 | .232 | - | .170 | - | - | .314 | .306 | - | - |
| P' homework- | .361 | .242 | .312 | .267 | - | - | - | .167 | - | - | - | - | - | - | - | - | .152 | - | .264 | - | .292 | .353 | - | - | .308 | .242 | - | - |
| Looked SW | .348 | .338 | .377 | | .214 | - | - | - | .184 | .166 | - | - | - | - | .275 | - | .239 | - | .159 | - | .347 | .396 | 175 | - | .380 | .285 | - | - |
| Asked to R/Calc | - | .194 | - | .236 | - | - | - | - | - | .182 | .186 | .158 | .239 | - | - | - | .254 | - | - | - | - | .386 | - | - | .166 | .218 | - | - |
| Asked Q R/M | - | - | - | .332 | - | - | - | - | - | - | 264 | .185 | .262 | - | - | .256 | .198 | - | - | - | .328 | .405 | - | .161 | .374 | 297 | - | - |
| T asking parents | .340 | - | .261 | | - | - | - | - | - | - | - | - | - | - | .270 | .204 | .215 | - | .275 | - | - | - | - | - | .273 | - | - | - |
| Community contr | .283 | .325 | - | - | - | - | .236 | .261 | - | | - | .180 | .507 | .478 | - | - | .281 | .276 | - | - | .258 | .163 | .244 | .154 | .355 | .160 | - | .177 |
| Community contr | - | - | 235 | .168 | - | - | 300 | .219 | .151 | .172 | - | - | .210 | .180 | .247 | - | | - | - | - | - | - | - | - | .153 | - | - | - |
| Community contr | - | - | - | - | - | - | - | - | - | | - | - | .192 | .234 | - | | .462 | .495 | - | - | - | - | .174 | | .299 | .260 | - | - |
| Community contri | | 184 | | - | | | .254 | - | .203 | .231 | - | - | - | - | .170 | | .281 | .292 | - | - | - | - | - | | - | - | - | - |
| Comm. Problems | .218 | .282 | 196 | .259 | - | - | - | - | .309 | .333 | - | - | - | - | .410 | .439 | .201 | .244 | - | - | - | - | .227 | .158 | .200 | - | .231 | - |

a)The underlined results had a negative correlation with pupil performance. **Legend:** R= reading; M= mathematics P= pupils; T =teachers; HW =homework; No=number; Q=question; SW=school work; par=parents contr=contribution; comm.=community

= p ≤ .05;
= r ≤ 0.15
= p ≤ .01
= Not significant

In the case of Mozambique, the low correlation for the variables may be related to the level of parents' education and the high rate of illiteracy (34.3%), especially among the female population (66.7% - INE. 2008).

From the results above it can be seen that in Mozambique as in most other SACMEQ countries pupil performance is associated more by individual pupil-level differences than with teacher training, teachers' characteristics, the internal and external teaching contexts, parents' involvement, or other variables in the conceptual framework.

For a more detailed analysis, regression analysis is used in the next section to identify the main predictors of pupil performance and the degree of variance that can be explained by the predictors.

## 9.2 PREDICTING PUPIL PERFORMANCE BY TEACHER COMPETENCE FACTORS IN MOZAMBIQUE AND IN SACMEQ COUNTRIES

This section presents the main predictors of pupil performance in reading and in mathematics in Mozambique and in other SACMEQ countries. As in correlations, the analysis followed the structure of the conceptual framework, which is composed of three domains and six constructs. The Multivariate Regression Model was used to understand to what extent the pupil performance variation is explained by various domains and constructs described in the conceptual framework.

### 9.2.1 An Overview of Mozambique and SACMEQ Countries as a whole

From correlations in the previous section and taking into consideration all of the variables in the study, it can be observed that there was more noticeable correlation between pupil performance in reading (80) than in mathematics (71). The issue now is to analyse to what extent all of the variables together explain the pupils' performance. As was presented in Chapter 5, Section 5.4.7, the variables which have a correlation coefficient (with an absolute value) equal to or higher than 0.15 with achievement (in reading and mathematics), are included in the Multiple Regression Model (MRM) (stepwise). However, due to the problem of multi-collinearity (see Chapter 5), only a few of them are significant.

Tables 9.22 and 9.23 present an overview of findings of the main predictors of pupil performance in reading and mathematics in Mozambique and in other SACMEQ countries as a whole. In the two tables, the dependent variable is the pupils' reading and mathematics scores and the predictors are variables in the **cognitive, affective, and behavioural domains**, and *the constructs in teacher training, teachers' characteristics, external teaching context and internal teaching context, pre-*

*existing pupils' characteristics* and *parents and community involvement*. A number of variables were included in separate models firstly for Mozambique and secondly for SACMEQ data. Ultimately, after the application of stepwise, the results revealed that there were seven predictors in reading and eight in mathematics for Mozambique, while SACMEQ had 30 predictors in each subject.

It can be observed in Table 9.22 that the main predictors of pupil performance in Mozambique as a whole were found in the **behavioural domain**, with two predictors in reading and four in mathematics, while in the SACMEQ countries the main predictors of pupil performance were found in the *pre-existing pupils' characteristics* with five predictors in each subject. In Mozambique, the behavioural domain is followed by the *internal teaching context and pre-existing pupils' characteristics*, with two predictors in reading; while in the SACMEQ countries, the pre-existing pupils' characteristics are followed by the **behavioural domain** (nine in total with six in reading and three in mathematics) and *the external teaching context* with eight predictors (three in reading and five in mathematics). The **cognitive domain** in Mozambique and the **affective domain** in SACMEQ countries were not found to be predictors of pupil performance in reading or in mathematics.

Table 9.22

*Results of stepwise regression showing main predictors of pupil performance in reading and mathematics in Mozambique and in SACMEQ countries per domain and construct*

| | Cognitive | | Affective | | Behaviour | | Teacher training | | Teacher Characteristics | | Ext. Teaching Context | | Int. Teaching Context | | Pre-existing Pupils Char. | | Parent Involvement | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** |
| **MOZ** | - | - | - | 1P | 2P | 4P | 1P | - | - | 1P | 1P | - | 1 P | 1P | 2P | - | - | 1 P |
| **SAC** | 1P | 3P | - | - | 6P | 3P | 2P | 1P | 2P | 1P | 3P | 5P | 2P | 4P | 5P | 5P | 1P | 1P |

P=Predictor

Table 9.23

*Results of stepwise regression showing main predictor of pupil performance in reading and mathematics across all SACMEQ countries per domain and construct*

| | Cognitive | | Affective | | Behaviour | | Teacher training | | Teacher Characteristics | | Ext. Teaching Context | | Int. Teaching Context | | Pre-existing Pupils Char. | | Parent Involvement | | Adjusted R Square | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** | **Read** | **Math** |
| **BOT** | - | - | - | - | 1P | 2P | - | 2P | - | 1P | - | 1P | - | - | 3P | 3P | - | 1P | **.785** | **.920** |
| **KEN** | - | - | - | 1P | 2P | 1P | - | - | - | - | 1P | 2P | 1P | 1P | 2P | 1P | 1P | - | **.609** | **.418** |
| **LES** | - | - | - | - | - | 1P | - | 1P | - | - | 1P | 1P | 1P | - | 1P | - | 1P | - | **.348** | **.341** |
| **MAL** | - | | 1P | - | - | - | - | 1P | - | 1P | - | - | - | - | 1P | 3P | - | 1P | **.472** | **.303** |
| **MAU** | 1P | 1P | 1P | 1P | 2P | 3P | - | 1P | - | - | - | - | 1P | - | 2P | 2P | - | - | **.567** | **.571** |
| **MOZ** | **-** | **-** | **-** | **1P** | **2P** | **4P** | **1P** | **-** | **-** | **1P** | **1P** | **-** | **1 P** | **1P** | **2P** | **-** | **-** | **1P** | **.434** | **.320** |
| **NAM** | 1P | 1P | - | 1P | 1P | 1P | 5P | 5P | 1P | - | 1P | 2P | 1P | - | 6P | 5P | 1P | 1P | **.811** | **.778** |
| **SEY** | - | - | 1P | 1P | - | 1P | - | - | - | - | - | - | - | - | 1P | 1P | - | - | **.559** | **.840** |
| **SOU** | 1P | 1P | - | - | 2P | - | - | 1P | - | - | 2P | - | 1P | 1P | 2P | 3P | - | - | **.752** | **.850** |
| **SWA** | - | - | - | - | - | 1P | 2P | - | - | - | - | - | - | - | 3P | 3P | - | - | **.701** | **.593** |
| **TAN** | - | - | - | - | 1P | 1P | 1P | 1P | - | - | - | - | - | 1P | 1P | 2P | - | 1P | **.417** | **.803** |
| **UGA** | 1P | 1P | - | - | 1P | 1P | 1P | 1P | - | - | 1P | - | - | 1P | 5P | 3P | - | 1P | **.545** | **.502** |
| **ZAM** | - | - | - | 1P | - | 1P | - | - | 1P | - | - | - | 2P | 1P | 2P | 1P | 1P | - | **.889** | **.479** |
| **ZAN** | - | - | 1P | - | 2P | - | - | - | - | - | | - | 1P | - | 3P | 2P | - | - | **.408** | **.235** |
| **SAC** | **4** | **4** | **4** | **6** | **14** | **17** | **10** | **13** | **2** | **3** | **7** | **6** | **9** | **6** | **34** | **29** | **4** | **6** | **.529** | **.489** |

P=Predictor and number indicates number of predictors found per cell
n = reading and math in each country

Table 9.23 presents the results of stepwise regression showing the main predictors of pupil performance in reading and mathematics across all SACMEQ countries per domain and construct.

Table 9.23 shows that for seven of the 14 SACMEQ systems in reading and 10 of the 14 in mathematics, the largest number of predictors was found in the pre-existing pupils' characteristics (34 predictors in reading and 29 in mathematics), followed by the behavioural domain (14 predictors in reading and 17 in mathematics) and teacher training (10 in reading and 13 in mathematics). The smallest number and least commonly found predictor is teacher characteristics (two predictors in reading and three in mathematics).

Examining each domain, it can be observed that the predictors of pupil performance in reading and in mathematics in SACMEQ countries are more strongly related to the pre-existing pupils' characteristics, in the behavioural domain, and the teacher training construct than any other.

The variance that could be explained across SACMEQ countries by the regression models (stepwise) ranged from 34.8% (adjusted $R^2$) in Lesotho to 88.9% in Zambia in reading, and ranged from 23.5% (adjusted $R^2$) in Zanzibar to 92% in Botswana in mathematics. A higher percentage of variance was evident for reading (52.9%) than for mathematics (48.9%) in SACMEQ countries generally.

### 9.2.2 Predicting Pupil Performance in Reading by Teacher Competence Factors in Mozambique and in SACMEQ Countries

The next sections will present and discuss an overview of the main predictors of pupil performance in Mozambique and in other SACMEQ countries.

**Predicting pupil performance in reading by teacher competence factors in Mozambique**

The following section concentrates on the results of the stepwise regression model[17]. Table 9.24 presents the results of the regression model (stepwise) where the dependent variable was pupil performance in reading tests. When correlated individually, variables with pupil performance are significant, but when the variables are combined in a model, only a few are significant.

In general, most results are consistent with the conceptual framework and are consistent with other cross-national studies. When all of the eight predictors are included (see Table 9.24) 43.4% of variance in reading achievement is explained. The indicators with the significant effect on pupil

[17] The regression model seems not to have multi-collinearity problems because VIP was less than 10.

performance belong to the following domain and constructs: behavioural, teacher training, the external and internal teaching context constructs, and the pre-existing pupils' characteristics construct. As can be seen in Table 9.24, the results suggest that the strongest indicator is *speaking Portuguese at home* (β = .34; p = .000), which belongs to the behavioural domain. The magnitude of the estimated effects is 34% of the standard deviation of (SD)[18]. Taking into consideration that speaking Portuguese at home is a proxy of parent education and therefore of SES in Mozambique, the results reflect the effect of pupils' characteristics on pupil performance. It was surprising to find that in the internal teaching context, the *number of periods of school* had a negative effect on pupil performance (19%), meaning that in one SD in *school head-number of periods*, the pupil performance decreased to almost a fifth of an SD. One can speculate that the amount of time spent by a school head on teaching implies a reduction of time in school management, which may have a negative effect on pupil performance. However, there may also be other contributory factors. Other indicators with strong effects were related to the *short training* and *grade repetition* with a positive association of magnitude of 13% and 17%. This suggests that short-term training had a positive effect on pupil performance as well as *pupils' grade repetition*. *Pupils' absenteeism to work* (19%), *having a teacher without a professional qualification* (19%), *pupils' extra tuition in Portuguese* (15%) and a *pupils' age* (12%) tend to have a negative effect on pupils' performance.

[18] 1 SD increase on frequency of speaking Portuguese at home implies an increased 0,34 on pupils' achievement at school keeping other variables constant.

Table 9.24

*Stepwise regression model for reading in Mozambique*

| Domain | Learning Factors | Unstandardized Coefficients | | Standard Coeff. | | | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|---|
| | | B | Std Error | Beta | t | Sig. | Tolerance | VIF |
| | (Constant) | 32.024 | 8.032 | | 3.987 | .000 | | |
| **Behavioural** | Speaking Portuguese at home | 27.291 | 4.871 | **.346** | 5.603 | .000 | .931 | 1.074 |
| | Pupils' absent - work | -15.118 | 4.895 | -.193 | -3.088 | .002 | .914 | 1.094 |
| **Teacher Training** | No teacher training | -.234 | .072 | -.197 | -3.263 | .001 | .976 | 1.025 |
| | Short training | .183 | .085 | .131 | 2.155 | .033 | .962 | 1.040 |
| **Ext. T. Context** | Extra tuition in Portuguese | -4.932 | 2.087 | -.151 | -2.363 | .019 | .870 | 1.150 |
| **Int. Teaching Context** | School head number of periods | -.143 | .047 | -.191 | -3.013 | .003 | .887 | 1.127 |
| **P.E.P. Characterist.** | Grade repetition | 7.585 | 2.714 | .173 | 2.795 | .006 | .925 | 1.081 |
| | Pupils' age | -.062 | .031 | -.128 | -2.032 | .044 | .895 | 1.117 |

a Dependent Variable: ratotp

**R Square = 0.462 D.W = 1.647 Adjusted R Square = 0.434 F =16.241 Sig = 0.000 VIF 1.025 – 1.150**

Examining the domain and constructs where variables belong, it can be said that the data support the conceptual framework of this study, and that for Mozambique the behavioural domain, the teacher training construct, the external teaching construct, the internal teaching construct and the pre-existing pupils' characteristics construct were the predictors of pupil performance in Mozambique. Educationally these results have to be taken into account by the various Ministries of Education and this aspect is further discussed in the conclusions in Chapter 10. Comparing this with the adapted Cheng and Tsui model, it is evident that the cognitive and affective domains, the teachers' characteristics construct and parent and community involvement construct were not predictors of pupil performance in Mozambique (See Appendix 75).

**Predicting pupil performance in reading by teacher competence factors in SACMEQ countries**

Table 9.25 shows the results of the regression model (stepwise) in the reading test in SACMEQ countries and explains the variance adj $R^2 = 0.529$ in reading. This variance means that the pupil performance in reading in SACMEQ countries was explained by those factors shown in Table 9.25, which belong to all of the domains and constructs of the adapted Cheng and Tsui model except the affective domain. Of note, is that the indicators with the largest magnitude affect belong to the behavioural domain: pupils' characteristics and the external teaching context construct such as pupils' socio-economic status (27.9%), *pupils' speaking the language of instruction home* (19.4%),

total school resources (15.9%), *pupils' repeating a grade* (13.9%), the number of books at home (11.8%), teachers meeting pupils' parents (11.9%), pupils' absent to work (10.6%), and pupils paying for extra tuition (10.3%). Interestingly, and of importance to ministries of education, both the Mozambican and the SACMEQ results highlight the relevance of the *language spoken at home* as a predictor of pupil performance in reading.

Table 9.25

*Stepwise regression model in reading in SACMEQ countries*

| Domain and Constructs | Factors | Unstandardized Coefficients | | Std Coeff. | t | Sig. | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|---|
| | | B | Std Error | Beta | | | Tolerance | VIF |
| **Domain** | (Constant) | 19.889 | 5.743 | | 3.463 | .001 | | |
| **Cognitive** | T. with primary education only | -.087 | .031 | -.058 | -2.825 | .005 | .943 | 1.061 |
| **Behavioural** | P. speak lang. of instruction home | 8.977 | 1.027 | .194 | 8.744 | .000 | .816 | 1.226 |
| | Pupils' absent - work | -9.125 | 1.892 | -.106 | -4.823 | .000 | .830 | 1.205 |
| | Pupils' absent | -.409 | .178 | -.051 | -2.305 | .021 | .814 | 1.228 |
| | T/pupils' parents meet/year | .049 | .009 | .120 | 5.743 | .000 | .915 | 1.093 |
| | Teacher reading approach (factor) | .549 | .227 | .050 | 2.420 | .016 | .952 | 1.050 |
| | S. head experience this school | -.185 | .040 | -.098 | -4.608 | .000 | .890 | 1.124 |
| **Teacher** | In-service training | -1.046 | .496 | -.044 | -2.111 | .035 | .939 | 1.064 |
| **Training** | No teacher training | -.142 | .072 | -.042 | -1.965 | .050 | .877 | 1.140 |
| **T.** | Teachers' source of lighting | -.862 | .367 | -.076 | -2.349 | .019 | .379 | 2.640 |
| **Characterist.** | Teachers' possessions | -.242 | .120 | -.072 | -2.009 | .045 | .316 | 3.168 |
| **I. T. Context** | S. head number of periods | -.065 | .020 | -.076 | -3.226 | .001 | .719 | 1.390 |
| | Teach. access to material (factor) | -1.595 | .352 | -.104 | -4.535 | .000 | .764 | 1.309 |
| **E. T. Context** | School location | .947 | .324 | .074 | 2.925 | .004 | .634 | 1.579 |
| | Total school resources [max=22] | .306 | .069 | .139 | 4.411 | .000 | .405 | 2.469 |
| | Paying for extra tuitions | -1.984 | .458 | -.103 | -4.329 | .000 | .714 | 1.401 |
| **Pre-existing** | Pupils' socio-economic status | 1.114 | .179 | .279 | 6.212 | .000 | .199 | 5.021 |
| **Pupils** | The number of books at home | .048 | .009 | .118 | 5.121 | .000 | .749 | 1.334 |
| **Characteristi** | Pupils' evening meal | 2.943 | .730 | .087 | 4.034 | .000 | .866 | 1.155 |
| **cs** | Age in months | .068 | .024 | .099 | 2.778 | .006 | .313 | 3.192 |
| | Pupils repeating G6 | -10.195 | 1.602 | -.139 | -6.364 | .000 | .841 | 1.189 |
| **P.C. Sch Involv.** | S. contributed by com.-textbooks | .857 | .241 | .080 | 3.557 | .000 | .784 | 1.275 |

a Dependent Variable: ratotp

**R Square = 0.538 D.W = 1.442 Adjusted R Square = 0.529 F = 60.977 Sig = 0.000 VIF 1.050 – 5.021**

Although the pupils' characteristics play an important role in overall results in SACMEQ countries, it can be said that the results are consistent with a hypothesis that pupils, teachers and parents' attitudes make a difference to pupil performance.

One important remark to be made is that the results are consistent with the adapted Cheng and Tsui model, with some variation in terms of the magnitude of effects of the various domains. For instance, in SACMEQ countries as well as in Mozambique, the pre-existing pupils' characteristics and behaviour are most important predictors of pupil performance. Other variables to take into

consideration in terms of predicting pupil performance in reading in SACMEQ countries were *teachers' possessions* ($\beta$ = -.072; $p \leq .01$), and *pupils' lack of school material* had a negative impact on pupil performance ($\beta$ = -.104; $p \leq .001$).

To sum up, all the factors that predict pupil performance related to the teacher training construct, such as *in-service training* ($\beta$ = -.044; $p \leq .01$) and *no teacher training* ($\beta$ = -042; $p \leq .05$), in particular, tend to have negative effects on pupils' performance. This finding is another that could inform Ministries of Education in the future revision of pre- and in-service teacher training programmes.

**Predicting pupil performance in reading by teacher competence factors in each SACMEQ country**

Table 9.26 shows the results of the use of the regression model (stepwise) in the reading test in each SACMEQ country. The regression models (stepwise) explain more than 50% (adj $R^2$) of variance in reading in all SACMEQ countries, except in Lesotho (34.8%), Malawi (47.2%), Mozambique (43.4%), Tanzania (41.7%), and Zanzibar (40.8%). The explained variation in Zambia is the highest at 88.9%, followed by Namibia with 81.1%, Botswana with 78.5% and South Africa with 75.2%. *Pre-existing pupils' characteristics* seems to be the most important predictor of pupil performance in reading in all 14 of the SACMEQ countries. This construct is followed by the behavioural domain, for which there are firm relationships in nine of the 14 systems of education. *Socio-economic status (SES)*, one of the variables in pre-existing pupils' characteristics, appears as a predictor of pupil performance in reading in 12 of the 14 systems of education, the exceptions being Lesotho and Mozambique.

Table 9.26

*Stepwise regression model in reading in each SACMEQ country*

| Domain | Factors | Unstandardized Coefficients | | Standard Coeffic | | | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|---|
| | | B | Std Error | Beta | t | Sig. | Tolerance | VIF |
| **BOT** | (Constant) | 12.245 | 8.664 | | 1.413 | .165 | | |
| **Pre-existing P.** | Pupils' SES | 1.284 | .359 | .408 | 3.577 | .001 | .375 | 2.668 |
| **Character.** | Number of books at home | .110 | .025 | .487 | 4.435 | .000 | .406 | 2.463 |
| | Pupils' lunch meal | 6.072 | 2.524 | .179 | 2.405 | .021 | .880 | 1.137 |
| **R Square = 0.800 D.W = 1.668 Adjusted R Square =0.785 F = 54.546 Sig = 0.000 VIF 1.137 – 2.668** | | | | | | | | |
| **KEN** | **(Constant)** | 48.776 | 5.136 | | 9.498 | .000 | | |
| **Behavioural** | Pupils' absent | -1.634 | .786 | -.203 | -2.077 | .043 | .769 | 1.300 |
| | P absent-work | -39.506 | 14.420 | -.263 | -2.740 | .009 | .802 | 1.246 |
| **I. T. Context** | P' borrow books | 5.348 | 2.141 | .231 | 2.498 | .016 | .866 | 1.155 |
| **E. T. Context** | P-teacher ratio | -.249 | .084 | -.269 | -2.949 | .005 | .889 | 1.125 |
| **P.E.P.Charact.** | P SES | 1.113 | .437 | .263 | 2.545 | .014 | .692 | 1.446 |
| **P.C.Sch.Involv** | T asked par to sign | 5.153 | 1.871 | .255 | 2.754 | .008 | .862 | 1.160 |
| **R Square = 0.653 D.W = 1.987 Adjusted R Square =0.609 F = 14.772 Sig = 0.000 VIF 1.125 – 1.446** | | | | | | | | |
| **LES** | **(Constant)** | 26.447 | 2.016 | | 13.120 | .000 | | |
| **Behavioural** | Speak lang. of instruction at home | 3.061 | 1.327 | .149 | 2.306 | .022 | .889 | 1.125 |
| | Pupils' school material (factor) | 1.789 | .764 | .144 | 2.342 | .020 | .979 | 1.022 |
| **E. T. Context** | School location | 1.697 | .639 | .181 | 2.656 | .009 | .796 | 1.256 |
| | Total school resources | .892 | .194 | .312 | 4.584 | .000 | .799 | 1.252 |
| **P.E.P.Charact.** | Pupils' Grade repetition | -6.688 | 1.987 | -.209 | -3.365 | .001 | .960 | 1.042 |
| **Parent C Inv** | Looked at the school work | 4.285 | 1.974 | .136 | 2.171 | .031 | .941 | 1.063 |
| **R Square = 0.370 D.W = 1.888 Adjusted R Square =0.0.348 F = 16.649 Sig = 0.000 VIF 1.022 – 1.256** | | | | | | | | |
| **MAL** | (Constant) | 28.839 | 2.675 | | 10.782 | .000 | | |
| **Affective** | T. satisf-T. house availability | -6.059 | 2.148 | -.333 | -2.821 | .007 | .879 | 1.138 |
| **P. E. P. Cha.** | Pupils´SES | .981 | .225 | .516 | 4.367 | .000 | .879 | 1.138 |
| **R Square = 0.497 D.W = 1.737 Adjusted R Square =0.472 F = 20.248 Sig = 0.000 VIF 1.138 – 1.138** | | | | | | | | |

Table 9.26 (Continued)

| Domain | Factors | Unstandardized Coefficients | | Standard Coeffic | | | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|---|
| | | | | Beta | | | Tole | |
| | | B | Std Error | | t | Sig. | rance | VIF |
| **MAU** | (Constant) | -7.579 | 8.658 | | -.875 | .383 | | |
| **Cognitive** | Teachers (sec) | .181 | .057 | .215 | 3.141 | .002 | .681 | 1.468 |
| **Affective** | T sat.-sch. Manag quality | 11.024 | 3.600 | .176 | 3.062 | .003 | .963 | 1.039 |
| **Behavioural** | T. pupils' parents meet/year | .111 | .025 | .263 | 4.436 | .000 | .908 | 1.101 |
| | P.' absent | -1.068 | .502 | -.130 | -2.126 | .035 | .854 | 1.171 |
| | Pupils' borrow books | 3.793 | 1.495 | .147 | 2.537 | .012 | .948 | 1.054 |
| **Pre-existing** | Pupils' SES | 2.110 | .604 | .241 | 3.493 | .001 | .667 | 1.498 |
| **P. Character.** | Grade repetition | -16.393 | 5.855 | -.200 | -2.800 | .006 | .625 | 1.600 |
| | Pupils' morning meal | 3.662 | 1.471 | .150 | 2.490 | .014 | .881 | 1.135 |
| **R Square = 0.593 D.W = 1.819** | | **Adjusted R Square = 0.567** | | **F = 23.281 Sig = 0.000** | | | **VIF 1.054 – 1.600** | |
| **MOZ** | (Constant) | 32.024 | 8.032 | | 3.987 | .000 | | |
| **Behavioural** | Speak lang. instruction at home | 27.291 | 4.871 | .346 | 5.603 | .000 | .931 | 1.074 |
| | Reason absent-work | -15.118 | 4.895 | -.193 | -3.088 | .002 | .914 | 1.094 |
| **T. Training** | No teacher training | -.234 | .072 | -.197 | -3.263 | .001 | .976 | 1.025 |
| | Short training | .183 | .085 | .131 | 2.155 | .033 | .962 | 1.040 |
| **E.T. Context** | Extra tuition in Portuguese | -4.932 | 2.087 | -.151 | -2.363 | .019 | .870 | 1.150 |
| **I. T. Context** | S. head number of periods | -.143 | .047 | -.191 | -3.013 | .003 | .887 | 1.127 |
| **P.E.P. Char.** | Grade repetition | 7.585 | 2.714 | .173 | 2.795 | .006 | .925 | 1.081 |
| | Pupils' age | -.062 | .031 | -.128 | -2.032 | .044 | .895 | 1.117 |
| **R Square = 0.462 D.W = 1.647** | | **Adjusted R Square =0.434** | | **F = 16.241 Sig = 0.000** | | | **VIF 1.025 – 1.150** | |

Table 9.26 (Continued

| Domain | Factors | Unstandardized Coefficients | | Standard Coeff | | | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|---|
| | | B | Std Error | Beta | t | Sig. | Tolerance | VIF |
| **NAM** | (Constant) | -13.309 | 9.235 | | -1.441 | .151 | | |
| **Behavioural** | Speak lang. instruction at home | 6.189 | 1.605 | .123 | 3.855 | .000 | .863 | 1.159 |
| **Teacher** | No teacher training | -.850 | .198 | -.142 | -4.303 | .000 | .808 | 1.238 |
| **Training** | Short training | -.761 | .277 | -.084 | -2.746 | .007 | .937 | 1.067 |
| | Teachers training (2 years) | -.215 | .062 | -.112 | -3.472 | .001 | .855 | 1.169 |
| | T. Training more than 3 years | .171 | .055 | .121 | 3.098 | .002 | .583 | 1.714 |
| | Professional qualification | .939 | .346 | .087 | 2.713 | .007 | .859 | 1.164 |
| **T. Charact.** | Source of lighting | -1.233 | .438 | -.113 | -2.818 | .005 | .546 | 1.833 |
| **I.T. Context** | Being given reading homework | -4.043 | 1.427 | -.096 | -2.834 | .005 | .764 | 1.310 |
| **E.T. Context** | Total school resources [max=22] | .671 | .096 | .362 | 6.960 | .000 | .328 | 3.049 |
| **Pre-existing** | Age in months | .178 | .044 | .179 | 4.036 | .000 | .449 | 2.228 |
| **P. Charact** | Pupils' SES | 2.036 | .248 | .512 | 8.201 | .000 | .227 | 4.408 |
| | Grade repetition | -4.778 | 2.246 | -.085 | -2.127 | .035 | .552 | 1.812 |
| | Pupils' repeating Grade 6 | -4.969 | 2.593 | -.066 | -1.916 | .057 | .744 | 1.345 |
| | Evening meal | 3.799 | 1.169 | .122 | 3.249 | .001 | .626 | 1.597 |
| | Pupils' morning meal | -2.251 | .887 | -.100 | -2.537 | .012 | .571 | 1.752 |
| **Par. Involv.** | Asked question about reading | -4.513 | 2.072 | -.073 | -2.178 | .031 | .795 | 1.257 |
| **R Square = 0.825 D.W = 1.646 Adjusted R Square =0.811 F = 58.236 Sig = 0.000 VIF 1.067 – 4.408** | | | | | | | | |
| **SEY** | (Constant) | 27.389 | 10.950 | | 2.501 | .027 | | |
| **Affective** | T. satisfaction.-house availability | -5.424 | 1.283 | -.732 | -4.228 | .001 | .979 | 1.021 |
| **P. Charact.** | Pupils' SES | 2.398 | 1.013 | .410 | 2.368 | .034 | .979 | 1.021 |
| **R Square = 0.618 D.W = 2.549 Adjusted R Square =0.559 F = 10.520 Sig = 0.002 VIF 1.021 – 1.021** | | | | | | | | |
| **SOU** | (Constant) | 19.503 | 5.300 | | 3.680 | .000 | | |
| **Cognitive** | T. with primary education only | -.284 | .065 | -.223 | -4.379 | .000 | .924 | 1.083 |
| **Behavioural** | Speak lang. instruction at home | 10.619 | 3.863 | .158 | 2.749 | .007 | .726 | 1.377 |
| | Reason absent-fee not paid | -16.390 | 6.664 | -.129 | -2.460 | .016 | .872 | 1.147 |
| **E.T.context** | Tot. school resources [max=22] | .504 | .155 | .242 | 3.258 | .002 | .434 | 2.302 |
| | School building condition | -4.122 | 1.562 | -.160 | -2.639 | .010 | .650 | 1.538 |
| **I. T. Context** | Total class furniture [max=5] | 1.955 | .686 | .162 | 2.850 | .005 | .738 | 1.356 |
| **Pre-existing** | Pupils' SES | .987 | .418 | .189 | 2.364 | .020 | .373 | 2.683 |
| **Pup. Char.** | Grade repetition | -15.152 | 3.800 | -.254 | -3.987 | .000 | .590 | 1.694 |
| **R Square = 0.771 D.W = 1.900 Adjusted R Square = 0.752 F = 40.327 Sig = 0.000 VIF 1.083 – 2.683** | | | | | | | | |

Table 9.26 (Continued)

| Domain | Factors | Unstandardized Coefficients | | Standard Coeff | | | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|---|
| | | B | Std Error | Beta | t | Sig. | Tolerance | VIF |
| **SWA** | (Constant) | 60.413 | 13.454 | | 4.490 | .000 | | |
| **T. Training** | 1 year | -1.717 | .448 | -.300 | -3.830 | .000 | .902 | 1.109 |
| | 2 years | -.250 | .118 | -.173 | -2.110 | .040 | .821 | 1.218 |
| **Pre-existing** | Age in months | -.150 | .073 | -.188 | -2.056 | .045 | .661 | 1.513 |
| **P. Charact.** | Number of books at home | .082 | .028 | .269 | 2.873 | .006 | .631 | 1.585 |
| | Pupils' SES | 1.634 | .329 | .514 | 4.969 | .000 | .517 | 1.933 |
| **R Square = 0.729 D.W = 1.895 Adjusted R Square = 0.701 F = 26.318 Sig = 0.000 VIF 1.109 – 1.933** | | | | | | | | |
| **TAN** | (Constant) | 44.029 | 4.358 | | 10.103 | .000 | | |
| **T. Training** | Professional qualification | -4.002 | 1.258 | -.412 | -3.180 | .003 | .995 | 1.005 |
| **P.E.P. Charact** | Pupils' SES | 2.300 | .593 | .502 | 3.877 | .000 | .995 | 1.005 |
| **R Square = 0.450 D.W = 1.986 Adjusted R Square = 0.417 F = 13.497 Sig = 0.000 VIF 1.005 – 1.005** | | | | | | | | |
| **UGA** | (Constant) | 11.129 | 8.637 | | 1.288 | .200 | | |
| **Cognitive** | Teacher with tertiary education | -.179 | .073 | -.148 | -2.441 | .016 | .810 | 1.235 |
| **Behavioural** | Speak lang. instruction at home | 11.477 | 2.991 | .222 | 3.837 | .000 | .887 | 1.127 |
| **T. Training** | Short training | -1.661 | .673 | -.137 | -2.468 | .015 | .965 | 1.036 |
| **E.T.Context** | Total school resources | .684 | .184 | .246 | 3.725 | .000 | .681 | 1.469 |
| **Pre-Existing** | Pupils' SES | 2.347 | .411 | .391 | 5.711 | .000 | .633 | 1.579 |
| **Pupil** | Pupils' evening meal | 5.258 | 1.559 | .197 | 3.372 | .001 | .869 | 1.151 |
| **Characterist.** | Pupils' repeating Grade 6 | -14.174 | 3.740 | -.232 | -3.789 | .000 | .794 | 1.259 |
| **R Square = 0.566 D.W = 1.833 Adjusted R Square = 0.545 F = 27.207 Sig = 0.000 VIF 1.036 – 1.579** | | | | | | | | |
| **ZAM** | (Constant) | 19.696 | 3.401 | | 5.791 | .000 | | |
| **T. Charact.** | Sex | 7.494 | 1.485 | .379 | 5.046 | .000 | .634 | 1.577 |
| **I.T. Context** | Being given reading homework | 7.993 | 2.424 | .242 | 3.298 | .003 | .664 | 1.507 |
| | Total class resources | .704 | .292 | .150 | 2.410 | .024 | .923 | 1.084 |
| **Pre E. P. Char** | Pupils' socio-economic status | 1.158 | .323 | .311 | 3.581 | .001 | .476 | 2.101 |
| | Grade repetition | -9.297 | 3.578 | -.204 | -2.598 | .015 | .583 | 1.715 |
| **P.C.Sch Involv** | Being asked to read | 6.974 | 2.413 | .188 | 2.890 | .008 | .844 | 1.185 |
| **R Square = 0.910 D.W = 1.866 Adjusted R Square =0.889 F =42.337 Sig = 0.000 VIF 1.185 – 2.101** | | | | | | | | |
| **ZAN** | (Constant) | 39.963 | 3.952 | | 10.113 | .000 | | |
| **Affective** | T. Satisf.-house availability | 2.426 | 1.212 | .147 | 2.001 | .048 | .901 | 1.110 |
| **Behavioural** | S. head experience all together | .230 | .088 | .186 | 2.602 | .010 | .953 | 1.050 |
| | School head lost days | -.141 | .067 | -.157 | -2.091 | .039 | .864 | 1.158 |
| **I.T. Context** | Pupils' school material | -2.362 | .930 | -.192 | -2.540 | .012 | .846 | 1.182 |
| **Pre-existing P.** | Pupils' socio-economic status | 1.151 | .236 | .358 | 4.886 | .000 | .905 | 1.105 |
| **Charact.** | Pupils' place to stay | -11.854 | 3.337 | -.262 | -3.552 | .001 | .888 | 1.126 |
| | Pupils' evening meal | 1.151 | .465 | .181 | 2.477 | .015 | .906 | 1.104 |
| **R square = 0.442 D.W = 1.791 Adjusted R Square = 0.408 F = 13.025 Sig = 0.000 VIF 1.104 – 1.182** | | | | | | | | |

Other factors to take into consideration as predictors of pupil performance in reading, are *grade repetition* (seven of the 14 systems of education), *pupils' speaking the language of instruction at home* (five of the 14) and *pupils' meals* (five of the 14), especially the *evening meal*, which had a positive effect on pupils' performance in reading. Teachers who had primary education only (South Africa), no teacher training (Mozambique and Namibia), short training (Namibia and Uganda), one year (Swaziland) and two years of training (Namibia and Swaziland) had a negative association with pupil performance in reading.

Examining the model of the conceptual framework, it can be said that the data support the conceptual framework in some ways, but that no single country completely fits the model. However, it can be said that Namibia (seven out of nine), Kenya, Mozambique, South Africa and Uganda (six out of nine) were the countries whose results most closely reflect the model composed of the domains and constructs as represented by Cheng and Tsui. In addition, looking at the SACMEQ countries as a whole, it is evident that the following domains and constructs were not associated with residual pupil performance for the fitted models in reading across SACMEQ countries: the *cognitive domain* in Kenya, Mozambique and Namibia; the *affective domain* in all 5 countries previously mentioned; *teacher training* in Kenya and South Africa; *teachers' characteristics* in Mozambique, South Africa and Uganda; the i*nternal teaching context* in Kenya and Uganda, and *parent and community involvement* in Mozambique, South Africa and Uganda.

In the next section, the regression model (stepwise) identifies the main predictor of pupil performance in mathematics and the amount of variation explained by predictors in Mozambique and in SACMEQ countries as well as in each SACMEQ country. (see Appendix 75)

**Predicting pupil performance in mathematics by teacher competence factors in Mozambique and in SACMEQ countries as well as in each SACMEQ country**

The next sections present and discuss an overview of the main predictor of pupil performance in Mozambique and in other SACMEQ countries.

**Predicting pupil performance in mathematics by teacher competence factors in Mozambique**

Table 9.27 shows the results of the regression model (stepwise) in the SACMEQ mathematics test in Mozambique.

Table 9.27

*Stepwise regression model for mathematics in Mozambique*

| Domain | Learning Factors | Unstandardized Coefficients | | Standard Coeff. | | | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|---|
| | | B | Std Error | Beta | t | Sig. | Tolerance | VIF |
| | (Constant) | 24.193 | 1.446 | | 16.730 | .000 | | |
| **Behavioural** | Pupils' absent - work | -9.505 | 2.428 | -.261 | -3.915 | .000 | .967 | 1.034 |
| | T. frequency giving written math test | -1.234 | .583 | -.141 | -2.115 | .036 | .971 | 1.030 |
| | Teacher frequency meeting parents | 1.899 | .669 | .188 | 2.837 | .005 | .981 | 1.020 |
| | School head activities | .480 | .196 | .164 | 2.442 | .016 | .951 | 1.052 |
| **Affective** | T. satisfaction-school building quality | -1.123 | .475 | -.159 | -2.364 | .019 | .952 | 1.051 |
| **T. Charact.** | School head age level | .087 | .035 | .172 | 2.526 | .013 | .934 | 1.071 |
| **I. T. Context** | Pupil school material (factor) | -1.245 | .408 | -.208 | -3.051 | .003 | .929 | 1.077 |
| **Parent C Inv** | Asked questions about mathematics | -3.995 | 1.436 | -.186 | -2.782 | .006 | .965 | 1.036 |

*Dependent Variable: SCR: / pupil math-all total raw score*

**R Square = 0.354 D.W = 1.738 Adjusted R Square =0.320 F =10.292 Sig = 0.000 VIF =1.020 - 1.077**

In Mozambique, all eight predictor variables were included and these variables explained 32% (adjusted $R^2$) of the total variance of pupil performance in mathematics. In some ways, the constructs, which explain the pupil performance, were the same as in reading. That would be explained by the correlation between reading and mathematics achievement. For instance, the indicators with a significant effect on pupil performance belong to the following domains and constructs: behavioural, affective domains, teachers' characteristics, internal teaching context, and parents' involvement. It is important to note also that the indicators are slightly different. While in reading the indicators in the behavioural domain were more related to the pupils' attitudes (pupils speaking Portuguese at home, and pupils' *absent-work),* in mathematics the indicators were more closely related to the teachers' attitudes (teachers' frequency in giving written mathematics tests, teachers' frequency in meeting parents, the school head's activities). However, in the behavioural domain, the common indicator is *pupils' absenteeism* from (work) school.

As shown in Table 9.27, the strongest predictor of pupil performance in mathematics in Mozambique was *pupils' absenteeism to work* ($\beta$ = -.261; $p \leq .001$). The magnitude of the estimated effects was 26% of the standard deviation. This effect means that where pupils were absent from school, they tended to achieve lower results in mathematics. The next strongest predictor of pupils' performance was *pupils' possession of school material* (exercise books, a pen, a pencil, etc), which suggests that pupils' lack of school material ($\beta$ = -.208; $p \leq .01$) had a negative effect on pupil performance. These results highlight the fact that teachers, pupils and parents'

attitudes were the predictor of pupils' performance in both subjects. Another indicator with strong effects on pupil performance in mathematics was t*eacher satisfaction (teachers' satisfaction-school building quality* ($\beta$ = -.159; $p \leq .01$). As a result, pupils with teachers who were satisfied with the environment in which they worked tended to achieve better results in mathematics.

Parental involvement with their children's mathematics needs and the frequency of assessment must be taken into account as predictors of pupil performance. Parents who *never asked* or *asked only sometimes about mathematics* realised a $\beta$ = -.186; $p \leq .01$, while the *frequency with which teachers gave written mathematics tests* realised a $\beta$ = -.141; $p \leq .01$ and had a negative effect on pupil performance. Other predictors to take into consideration in terms of predicting pupil performance in mathematics in Mozambique were the *frequency with which teachers met parents* ($\beta$ = .188; $p \leq .01$), the *age of the school head* ($\beta$ = .172; $p \leq .01$) and the *activities of the school head (*$\beta$ = .164; $p \leq .01$*)*, which had a positive effect on pupil performance. Comparing the adapted Cheng and Tsui model with the results, it is evident that the cognitive domain, teacher training, the external teaching context and pre-existing pupil characteristics were not associated with pupil performance in Mozambique.

**Predicting pupil performance in mathematics by teacher competence factors in SACMEQ countries**

Table 9.28 shows the results of the regression model (stepwise) in the mathematics test in SACMEQ countries.

Table 9.28

*Stepwise regression model in mathematics in SACMEQ countries*

| Domain | Learning Factors | Unstandardized Coefficients | | Std Coeff. | | | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|---|
| | | B | Std Error | Beta | t | Sig. | Tolerance | VIF |
| | (Constant) | 4.493 | 2.976 | | 1.510 | .131 | | |
| **Cognitive** | T. with primary education only | -.047 | .018 | -.046 | -2.642 | .008 | .877 | 1.141 |
| | T. with secondary education | -.019 | .010 | -.036 | -1.970 | .049 | .801 | 1.249 |
| | Teachers' qualification-academic | .441 | .130 | .060 | 3.394 | .001 | .859 | 1.164 |
| **Behavioural** | P. speak lang. of instruction home | 4.481 | .519 | .159 | 8.639 | .000 | .795 | 1.258 |
| | Reason absent-work | -5.600 | 1.014 | -.098 | -5.526 | .000 | .861 | 1.162 |
| | S/ shead experience this school | -.165 | .021 | -.136 | -7.842 | .000 | .898 | 1.113 |
| **T. Training** | More than 3 years of training | .054 | .025 | .039 | 2.124 | .034 | .801 | 1.248 |
| **T. Character.** | Teachers' source of lighting | -.966 | .174 | -.132 | -5.553 | .000 | .478 | 2.094 |
| **Internal** | Pupils' school material (factor) | -1.113 | .190 | -.107 | -5.845 | .000 | .800 | 1.250 |
| **Teaching** | Sharing/owning math textbooks | 1.199 | .348 | .068 | 3.450 | .001 | .704 | 1.420 |
| **Context** | Homework given | 2.472 | .399 | .113 | 6.190 | .000 | .806 | 1.241 |
| | S. head number of periods | -.039 | .010 | -.073 | -3.787 | .000 | .726 | 1.378 |
| **External** | Paying for extra tuitions | -1.841 | .247 | -.145 | -7.449 | .000 | .716 | 1.397 |
| **Teaching** | Extra tuition- others subjects | 2.634 | .463 | .108 | 5.689 | .000 | .747 | 1.339 |
| **Context** | School location | .415 | .180 | .049 | 2.305 | .021 | .604 | 1.655 |
| | School building condition | -1.063 | .245 | -.077 | -4.345 | .000 | .870 | 1.150 |
| | Total school resources | .087 | .039 | .060 | 2.233 | .026 | .375 | 2.666 |
| **Pre-existing** | Pupils' socio-economic status | .398 | .094 | .150 | 4.220 | .000 | .215 | 4.660 |
| **Pupils'** | Age in months | .036 | .013 | .080 | 2.781 | .005 | .327 | 3.062 |
| **Characteristics** | Pupils' Grade repetition | -3.021 | .510 | -.111 | -5.922 | .000 | .766 | 1.306 |
| | The number of books at home | .032 | .005 | .118 | 6.377 | .000 | .785 | 1.274 |
| | Pupils' evening meal | 2.402 | .393 | .107 | 6.114 | .000 | .882 | 1.134 |
| **P Com Sch Inv.** | S. cont. com-furnit. equip.(factor) | .428 | .127 | .061 | 3.382 | .001 | .821 | 1.217 |

*Dependent Variable: SCR:/ pupil mathematics-all total raw score*

**R Square = 0.495 D.W = 1.400 Adjusted R Square = 0.489 F = 79.831 Sig = 0.000 VIF 1.113 – 4.660**

Table 9.28 indicates that the regression model (stepwise) explains that there was more than 48.9% (adj $R^2$) of the variation in pupil performance in mathematics in SACMEQ countries. This means that a proportion of pupil performance in mathematics in SACMEQ countries is explained by those factors presented in Table 9.28. All of the domains and constructs present in the adapted Cheng and Tsui model are present here except for the affective domain, which is not a predictor association of pupil performance in mathematics.

As in reading, most of the indicators with the greatest magnitude effect belong to the pre-existing pupils' characteristics construct. Variables with a negative association include *pupils' socio-economic status* (15%), grade repetition (11.1%), the *number of books at home* (11.8%) - and to behavioural domain, with *pupils' speaking the language of instruction at home* (15.9%), and the *school head's experience* in the particular school (13.6%). Other predictors to take into consideration in SACMEQ countries were related to the *external teaching context construct, paying for extra tuition* (14.5%) and *extra tuition in other subjects* (10.8%) - and in the internal teaching context construct, *the homework given* (11.3%) and pupils' *school material* (10.7%).

One factor which predicted pupil performance strongly was *pupils' speaking the language of instruction at home* ($\beta = .159$; $p \leq .001$). Pupils who frequently speak the language of instruction at home tended to achieve better performance in mathematics. This result confirms what was observed in the correlation at the beginning of this chapter, in which pupil performance in reading correlated strongly with pupil performance in mathematics, a finding from the TIMSS study (see Chapter 3). However, there are other factors to take into consideration in terms of predicting pupil performance in mathematics in SACMEQ countries, and these are *teacher training* (more than 3 years) ($\beta = .039$; $p \leq .01$), *a teacher's academic qualification* ($\beta = 0.060$; $p \leq 01$), *a pupil's evening meal* ($\beta = .107$; $p \leq .001$), and the *community contribution* ($\beta = .061$; $p \leq .01$), all of which correlate positively.

Comparing the results with the adapted Cheng and Tsui model, it can be seen that the affective domain was not a predictor of pupil performance in mathematics in SACMEQ countries. Appendix 71 in the Appendices presents the regression model (enter) in the mathematics test in SACMEQ countries. The next section describes the use of the regression model (stepwise) to identify the main predictor of pupil performance in reading and the amount of variation explained by predictors in each SACMEQ country.

**Predicting pupil performance in mathematics by teacher competence factors in each SACMEQ country**

Table 9.29 below shows the main predictor of pupil performance in mathematics and the amount of variation explained by predictors in each SACMEQ country. It indicates that in the majority of the school systems (eight out of 14), the regression model (stepwise) explains more than 50% (adjusted $R^2$) of the variance in mathematics in SACMEQ countries, but not in Kenya (41.8%), Lesotho (34.1%), Malawi (30.3%), Mozambique (32%), Zambia (47.9%) and Zanzibar (23.5%). The largest variance explained was in Botswana (92%), followed by South Africa (85%). The percentage of the variance is lower in mathematics than in reading in eight of the 14 systems of education. Botswana, Mauritius, Seychelles, South Africa and Tanzania were the countries where the variance explained

was lower in reading than in mathematics. As in reading, *pre-existing pupils' characteristics* was the strongest predictor of pupil performance in mathematics in all SACMEQ countries except in Mozambique and Zanzibar. Pre-existing pupils' characteristics was followed by the behavioural domain in 11 out of 14, and then by the teachers' training construct in eight out of the 14 systems of education. In pre-existing pupils' characteristics, *SES* appears as a predictor of pupil performance in seven of the 14 systems of education.

Table 9.29

*Stepwise regression model in mathematics in each SACMEQ country*

| Domain | Factors | Unstandardized Coefficients | | Standard Coeffic | | | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|---|
| | | B | Std Error | Beta | t | Sig. | Tolerance | VIF |
| **BOT** | (Constant) | 22.857 | 4.573 | | 4.998 | .000 | | |
| **Behavioural** | Speak lang. instruct. at home | 5.728 | 2.035 | .162 | 2.815 | .008 | .469 | 2.131 |
| | Teacher math activities | -.819 | .289 | -.128 | -2.836 | .007 | .771 | 1.297 |
| **T. training** | No teacher training | -.586 | .190 | -.146 | -3.079 | .004 | .699 | 1.431 |
| | School head special training | 2.604 | .571 | .219 | 4.563 | .000 | .678 | 1.476 |
| **T. Characterist.** | Teacher age | -.146 | .044 | -.145 | -3.280 | .002 | .797 | 1.255 |
| **Ext. T. Context** | School building condition | -2.173 | .539 | -.185 | -4.034 | .000 | .745 | 1.342 |
| **Pre E. Pupils** | Pupils' evening meal | 2.145 | .943 | .110 | 2.274 | .028 | .672 | 1.488 |
| **Character.** | Pupils' place to stay | -4.745 | 1.271 | -.192 | -3.733 | .001 | .590 | 1.696 |
| | Number of books at home | .115 | .008 | .789 | 13.680 | .000 | .470 | 2.130 |
| **P.C. Sch Inv** | Homework make sure | -9.677 | 1.609 | -.400 | -6.015 | .000 | .353 | 2.833 |
| **R Square = 0.938 D.W = 1.994 Adjusted R Square =0.920 F =54.594 Sig = 0.000 VIF 1.166 – 2.833** | | | | | | | | |
| **KEN** | (Constant) | 24.573 | 2.120 | | 11.589 | .000 | | |
| **Affective** | T. sat.-class furniture quality | 1.978 | .788 | .150 | 2.511 | .013 | .966 | 1.036 |
| **Int. T. Context** | Pupils' teacher ratio | -.126 | .036 | -.212 | -3.464 | .001 | .927 | 1.078 |
| | Homework given | 3.472 | 1.196 | .176 | 2.904 | .004 | .942 | 1.062 |
| **Ext. T. Context** | School building condition | -1.940 | .754 | -.161 | -2.574 | .011 | .884 | 1.131 |
| **P. E.P. Char** | Socio-economic status | 1.098 | .177 | .407 | 6.186 | .000 | .800 | 1.249 |
| **R Square = 0.435 D.W = 1.957 Adjusted R Square =0.418 F =25.104 Sig = 0.000 VIF 1.036 – 1.249** | | | | | | | | |
| **LES** | (Constant) | 15.870 | .986 | | 16.098 | .000 | | |
| **Behavioural** | Factor teacher approach | .969 | .295 | .282 | 3.288 | .001 | .997 | 1.003 |
| | Speak lang. instruct. at home | 3.259 | 1.014 | .285 | 3.214 | .002 | .934 | 1.071 |
| **T. Training** | In-service training | -1.538 | .613 | -.215 | -2.510 | .014 | .999 | 1.001 |
| **Ext. T. Cont.** | School location | 1.397 | .378 | .327 | 3.696 | .000 | .933 | 1.072 |
| **R Square = 0.370 D.W = 1.978 Adjusted R Square =0.341 F =12.627 Sig = 0.000 VIF 1.003 – 1.072** | | | | | | | | |
| **MAL** | (Constant) | 18.294 | .834 | | 21.938 | .000 | | |
| **T. Training** | 1 years | .035 | .018 | .165 | 1.956 | .053 | .774 | 1.292 |
| **T. Charact.** | Teachers' source of lighting | .566 | .266 | .175 | 2.130 | .035 | .819 | 1.221 |
| **Pre-existing** | Pupils' sex | -2.894 | 1.047 | -.215 | -2.765 | .007 | .917 | 1.091 |
| **Pupils'** | Number of books at home | .051 | .014 | .278 | 3.539 | .001 | .898 | 1.114 |
| **Character.** | Grade repetition | -1.691 | .696 | -.189 | -2.428 | .017 | .917 | 1.090 |
| **Parent C. Inv.** | Community contrib. (factor) | .475 | .168 | .216 | 2.838 | .005 | .958 | 1.043 |
| **R Square = 0.336 D.W = 1.910 Adjusted R Square =0.303 F =10.114 Sig = 0.000 VIF 1.043 – 1.292** | | | | | | | | |

Table 9.29 (Continued)

| Domain | Factors | Unstandardized Coefficients | | Standard Coeffic | | | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|---|
| | | B | Std Error | Beta | t | Sig. | Tolerance | VIF |
| **MAU** | (Constant) | 1.991 | 4.963 | | .401 | .689 | | |
| **Cognitive** | Teacher with secondary educ. | .111 | .040 | .188 | 2.807 | .006 | .706 | 1.416 |
| **Affective** | T. sat .sch. managem. quality | 9.380 | 2.566 | .212 | 3.656 | .000 | .938 | 1.066 |
| **Behavioural** | Teacher hours outside | .201 | .057 | .202 | 3.543 | .001 | .970 | 1.031 |
| | Speak lang. instruct. at home | 2.659 | 1.279 | .126 | 2.079 | .040 | .855 | 1.169 |
| **T. Training** | More than 3 years of training | .124 | .055 | .128 | 2.229 | .028 | .959 | 1.042 |
| **Pre-existing** | Pupils' socio-economic status | 1.671 | .418 | .270 | 4.001 | .000 | .691 | 1.447 |
| **P. Charact.** | Grade repetition | -19.133 | 3.784 | -.330 | -5.057 | .000 | .741 | 1.350 |
| **R Square = 0.593 D.W = 1.852 Adjusted R Square =0.571 F =26.868 Sig = 0.000 VIF 1.042 – 1.447** | | | | | | | | |
| **MOZ** | (Constant) | 24.193 | 1.446 | | 16.730 | .000 | | |
| **Affective** | T. satisf-sch building quality | -1.123 | .475 | -.159 | -2.364 | .019 | .952 | 1.051 |
| **Behavioural** | Reason absent-work | -9.505 | 2.428 | -.261 | -3.915 | .000 | .967 | 1.034 |
| | T. frequency meeting parents | 1.899 | .669 | .188 | 2.837 | .005 | .981 | 1.020 |
| | School head activities | .480 | .196 | .164 | 2.442 | .016 | .951 | 1.052 |
| | T. freq.giving written test | -1.234 | .583 | -.141 | -2.115 | .036 | .971 | 1.030 |
| **Int. T. Context** | Pupil sch. material (factor) | -1.245 | .408 | -.208 | -3.051 | .003 | .929 | 1.077 |
| **T. Character.** | School head age level | .087 | .035 | .172 | 2.526 | .013 | .934 | 1.071 |
| **Parent C. Inv.** | Asked questions about math. | -3.995 | 1.436 | -.186 | -2.782 | .006 | .965 | 1.036 |
| **R Square = 0.354 D.W = 1.738 Adjusted R Square =0.320 F =10.292 Sig = 0.000 VIF =1.020 - 1.077** | | | | | | | | |
| **NAM** | (Constant) | 1.533 | 5.241 | | .293 | .770 | | |
| **Cognitive** | T. academic qualification | .488 | .192 | .089 | 2.547 | .012 | .833 | 1.201 |
| **Behavioral** | T mact | -.796 | .230 | -.126 | -3.465 | .001 | .771 | 1.298 |
| **Teacher Training** | Teacher training (no training) | -.350 | .125 | -.098 | -2.804 | .006 | .835 | 1.198 |
| | Short training | -.507 | .177 | -.094 | -2.859 | .005 | .948 | 1.055 |
| | T. Training 2 years | -.161 | .045 | -.140 | -3.594 | .000 | .678 | 1.475 |
| | More than 3 years of training | .199 | .037 | .235 | 5.426 | .000 | .548 | 1.826 |
| **E. T. Context** | Total school resources | .346 | .061 | .312 | 5.639 | .000 | .334 | 2.990 |
| **I. T. Context** | Number of classes – grade 6 | -.550 | .208 | -.110 | -2.640 | .009 | .595 | 1.680 |
| **Pre-existing Pupils' Charact.** | Pupils' age in months | .083 | .027 | .143 | 3.059 | .003 | .472 | 2.120 |
| | Pupils' socio-economic status | .712 | .148 | .300 | 4.801 | .000 | .263 | 3.806 |
| | Number of books at home | .045 | .012 | .142 | 3.865 | .000 | .762 | 1.313 |
| | Pupils' repeating Grade 6 | -3.640 | 1.653 | -.081 | -2.202 | .029 | .754 | 1.326 |
| | Grade repetition | -2.946 | 1.404 | -.090 | -2.099 | .037 | .564 | 1.772 |
| **R Square = 0.792 D.W = 1.681 Adjusted R Square =0.778 F =59.308 Sig = 0.000 VIF 1.055 – 3.806** | | | | | | | | |

Table 9.29 (Continued)

| Domain | Factors | Unstandardized Coefficients | | Standard Coeffic | | | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|---|
| | | B | Std Error | Beta | t | Sig. | Tolerance | VIF |
| **SEY** | (Constant) | -15.380 | 5.435 | | -2.830 | .011 | | |
| **Affective** | T. satisf-sch building quality | 3.651 | .986 | .330 | 3.704 | .002 | .879 | 1.137 |
| **Behavioural** | Pupils' absent | 3.273 | .867 | .354 | 3.776 | .001 | .792 | 1.262 |
| **Int.T. Context** | School head periods | .165 | .058 | .243 | 2.843 | .010 | .952 | 1.050 |
| **P.E.P.Char** | Socio-economic status | 3.487 | .496 | .664 | 7.030 | .000 | .780 | 1.281 |
| **R Square = 0.868 D.W = 1.930 Adjusted R Square =0.840 F =31.136 Sig = 0.000 VIF 1.050 – 1.281** | | | | | | | | |
| **SOU** | (Constant) | 24.696 | 6.666 | | 3.705 | .001 | | |
| **Cognitive** | T. academic qualification | 2.350 | .596 | .341 | 3.945 | .000 | .588 | 1.701 |
| **T. Training** | Professional qualification | -3.447 | 1.337 | -.265 | -2.579 | .015 | .417 | 2.396 |
| **I.T.Context** | Number of books at home | .062 | .022 | .212 | 2.865 | .008 | .801 | 1.248 |
| | Class size | -.277 | .074 | -.259 | -3.760 | .001 | .931 | 1.074 |
| | Socio-economic status | 1.853 | .406 | .492 | 4.561 | .000 | .378 | 2.647 |
| | Grade repetition | -12.762 | 4.551 | -.291 | -2.804 | .009 | .408 | 2.454 |
| **R Square = 0.877 D.W = 2.132 Adjusted R Square =0.850 F =33.184 Sig = 0.000 VIF 1.074 – 2.647** | | | | | | | | |
| **SWA** | (Constant) | -1.670 | 8.200 | | -.204 | .839 | | |
| **Behavioural** | Pupils' absent | -2.020 | .704 | -.242 | -2.868 | .006 | .988 | 1.012 |
| **P.E. Pupils' Characterist.** | Pupils' socio-economic status | .948 | .177 | .486 | 5.354 | .000 | .853 | 1.172 |
| | Pupils' evening meal | 5.399 | 2.153 | .216 | 2.507 | .015 | .942 | 1.062 |
| | Number of books at home | .069 | .018 | .339 | 3.730 | .000 | .851 | 1.175 |
| **R Square = 0.621 D.W = 1.797 Adjusted R Square =0.593 F =22.116 Sig = 0.000 VIF 1.012 – 1.175** | | | | | | | | |
| **TAN** | (Constant) | 6.572 | 3.143 | | 2.091 | .043 | | |
| **Behavioral** | Pupils' absent | -.954 | .182 | -.367 | -5.240 | .000 | .856 | 1.168 |
| | Teachers' experience | .103 | .049 | .149 | 2.093 | .043 | .831 | 1.204 |
| **T.Training** | 1 year | -.152 | .068 | -.152 | -2.250 | .030 | .916 | 1.092 |
| **I.T. Context** | Pupils' sitting place | 10.483 | 4.737 | .236 | 2.213 | .033 | .370 | 2.704 |
| **Pre-existing P. Characteristics** | Pupils' lunch meal | 2.314 | 1.106 | .223 | 2.092 | .043 | .370 | 2.702 |
| | Grade repetition | -5.584 | 1.374 | -.291 | -4.065 | .000 | .819 | 1.221 |
| **Parent/comm. I.** | Asked quest about mathematics | 7.695 | 1.405 | .386 | 5.477 | .000 | .844 | 1.185 |
| **R Square = 0.832 D.W = 1.839 Adjusted R Square =0.803 F =28.374 Sig = 0.000 VIF 1.092 – 2.704** | | | | | | | | |

Table 9.29 (Continued)

| Domain | Factors | Unstandardized Coefficients | | Standard Coeffic | | | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|---|
| | | B | Std Error | Beta | t | Sig. | Tolerance | VIF |
| **UGA** | (Constant) | 11.217 | 6.773 | | 1.656 | .101 | | |
| **Behavioural** | T. math. activities (factor) | -3.603 | .638 | -.420 | -5.647 | .000 | .857 | 1.167 |
| **T. Training** | Short training | -2.898 | .985 | -.212 | -2.943 | .004 | .916 | 1.092 |
| **I.T. Context** | Math homework given | 6.890 | 2.373 | .223 | 2.903 | .005 | .803 | 1.245 |
| **P.E. Pupils' Characterist.** | Pupils' socio-economic status | 1.209 | .382 | .245 | 3.168 | .002 | .791 | 1.265 |
| | Grade repetition | -12.890 | 3.274 | -.294 | -3.937 | .000 | .854 | 1.171 |
| | Pupils' evening meal | 3.727 | 1.640 | .164 | 2.273 | .025 | .915 | 1.093 |
| **Parent C Inv.** | Asked quest about mathematics | -7.366 | 3.413 | -.164 | -2.158 | .033 | .817 | 1.224 |
| **R Square = 0.535 D.W = 1.718** | | **Adjusted R Square =0.502** | | **F =16.105** | | **Sig = 0.000** | **VIF 1.092 – 1.265** | |
| **ZAM** | (Constant) | -15.380 | 5.435 | | -2.830 | .011 | | |
| **Affective** | T. satisf-sch building quality | 3.651 | .986 | .330 | 3.704 | .002 | .879 | 1.137 |
| **Behavioural** | Pupils' days absent | 3.273 | .867 | .354 | 3.776 | .001 | .792 | 1.262 |
| **T. Character** | School head periods | .165 | .058 | .243 | 2.843 | .010 | .952 | 1.050 |
| **P.E. P. Char.** | Pupils' socio-economic status | 3.487 | .496 | .664 | 7.030 | .000 | .780 | 1.281 |
| **R Square = 0.512 D.W = 2.151** | | **Adjusted R Square =0.479** | | **F =15.317** | | **Sig = 0.000** | **VIF 1.050 – 1.281** | |
| **ZAN** | (Constant) | 12.458 | 4.085 | | 3.050 | .003 | | |
| **Cognitive** | Teacher with primary educ. Only | .136 | .043 | .281 | 3.178 | .002 | .962 | 1.040 |
| | Teacher academic qualification | 1.846 | .821 | .202 | 2.250 | .027 | .932 | 1.073 |
| **E. T. Context** | Total school resources | .238 | .115 | .188 | 2.069 | .041 | .913 | 1.095 |
| **Pre E. Pupils' Characterist** | Pupils' sex | -7.276 | 3.405 | -.190 | -2.137 | .035 | .952 | 1.050 |
| | Pupils' morning meal | 1.599 | .664 | .211 | 2.409 | .018 | .977 | 1.023 |
| **R Square = 0.273 D.W = 1.568** | | **Adjusted R Square =0.235** | | **F =7.276** | | **Sig = 0.000** | **VIF 1.023 – 1.095** | |

Other factors to take into consideration as predictors of pupil performance in mathematics are *pupils' meals* (with a positive effect in five of the 14 systems of education), and *pupils' absences* (five out of 14) and *grade repetition* (six out of 14) with a negative effect association on pupils' performance in mathematics. *Professional training* had a positive effect on pupils' performance in mathematics in four countries, including Malawi (for teachers with more than three years of professional training) and Namibia (two years), and where a teacher had no professional training this absence had a negative impact on pupil performance in mathematics. *Teachers' academic qualification* was a predictor particular association with pupil performance in mathematics in Namibia.

Using the adapted Cheng and Tsui model, it can be said that Botswana and Namibia (six out of 9) and Mauritius, Mozambique, Tanzania and Uganda (five out of nine) were the countries that

presented the most domains and constructs with MRM analysis. It is evident that some domains and constructs were not further associated with of pupil performance in the first two countries where the MRM was specified: the cognitive domain, the affective domain and the internal teaching context construct were not predictors in Botswana, while in Namibia, the affective domain, teachers' characteristics and the internal teaching context were not predictors of pupil performance in mathematics (see Appendix 75).

## 9.3 SUMMARY

In Mozambique, there is a weak correlation between pupil performance and the variables at different domains and constructs with only a few variables having strong associations with pupil performance in reading and in mathematics. Mozambican pupils' characteristics presented as the best predictor of pupil performance.

Examining the results across the provinces, the behavioural domain seems to be the one domain with some correlation in reading and mathematics, although it was weak. The behavioural domain is followed by pre-existing pupils' characteristics. This finding suggest that the teachers', parents' and pupils' attitudes and pupils' characteristics such as SES, home condition, meals, etc. have a positive association with pupil performance. In Mozambique, another construct to take into consideration in pupil performance is the external teaching context, which includes factors such as school buildings and school resources.

The purpose of this chapter was to present the results regarding pupil performance in Mozambique and other SACMEQ countries. The Multivariate Regression Model (MRM) was used to understand to what extent the pupil performance variation is explained by various domains described in the conceptual framework. The analysis therefore started with exploratory statistics such as bivariate correlation between pupil performance and each variable in domain and constructs of the conceptual framework.

The analysis followed the structure of the conceptual framework (see Chapter 5, Figure 5.1) which is organized into three domains, namely the cognitive, affective and behavioural; and on three levels: provincial, national and regional. The conceptual framework is also composed of constructs: teacher training, teacher characteristics, external teacher context, internal teaching context, pupils' characteristics, and parent and community involvement.

For the analysis in the first stage, the data was weighted and aggregated by school, and then PCA was used to develop proxy variables (see Appendices 3 and 4) for the domains in which there are

not indices on the database. In the second stage, the analysis starts with basic statistics (correlations) for pupil performance and the background variables. Finally, in the third stage, the regression model was developed using the multivariate regression equation to determine to what extent the empirical evidence supports the conceptual framework. In all three stages, the analysis starts with the Mozambican results and is followed by comparisons between Mozambique and other SACMEQ countries.

The MRM confirms what was found in the correlations. The main predictor of pupil performance in reading and in mathematics in Mozambique is the behavioural domain, while in the SACMEQ countries as a whole, the main predictor is pre-existing pupils' characteristics, which is followed by the behavioural domain and the external teaching context. The correlations show that teacher training has a weak association with pupil performance in Mozambique as well as in the other SACMEQ countries. Various reasons can be given, but the first reason, which may be applicable to some SACMEQ countries, is the absence of variation in teacher training among primary school teachers as most teachers received the same level of teacher training. Of note, is that in Mozambique as a whole, the cognitive domain and professional training are not predictors of pupil performance.

In the case of Mozambique, the second reason, which can be identified as leading to unsatisfactory pupil performance, is the low quality of teacher training. Primary school teaching has been not an attractive profession in Mozambique since 1975, for which reason academically excellent pupils are not recruited into the profession when they leave secondary school. The third reason is the fact that in the last 30 years teacher training has always been an emergency topic, and to date there is no a clear policy for teacher training could be a reason for poor performance and teacher competency.

The data are consistent with the model for SACMEQ countries as a whole. However, when one examining them country by country the picture changes. In countries such as Lesotho, Malawi and Zanzibar, the data are not consistent with the model, only one or two of the nine domains having correlations with pupil performance at the level of .15. In the other countries, the data are consistent with the model in at least seven of the nine domains and constructs, which had correlations with pupil performance.

Using the adapted Cheng and Tsui model it can be said that Namibia (7 out 9), Kenya, Mozambique, South Africa and Uganda (6 out of 9) were the countries that presented more domains and constructs in reading. In mathematics, it can be said that Botswana and Namibia (6 out of 9 and 5 out of 9), Mauritius. Mozambique, Tanzania and Uganda were the countries that

presented the most domains and constructs. It must, therefore, be stated that the data support the conceptual framework in some ways, but that no single country completely fits the model.

# CHAPTER 10

# CONCLUSIONS AND RECOMMENDATIONS

This chapter presents and discusses the conclusions of the study related to teacher competence and its effect on pupil performance in upper primary schools in Mozambique and other SACMEQ countries. Firstly, Section 10.1 gives an overview of the context of the study, which is followed by a summary of the research questions and the findings, while in Section 10.2 reflections on the methodology and substance of the study are presented. Section 10.3 presents the conclusions and recommendations relating to the main factors influencing pupil performance in Mozambique and in other SACMEQ countries in upper primary schools, with recommendations for further research appearing in Section 10.4.

## 10.1 CONTEXT, SUMMARY OF RESEARCH QUESTIONS AND FINDINGS

This section provides a summary of the context in which SACMEQ II was implemented in Mozambique as well as the main research questions that guided the study. The section reflects the main findings of the effects of teacher competence on pupil performance in reading and in mathematics in Mozambique and in the other SACMEQ countries.

The Southern and Eastern Africa Consortium for Monitoring Educational Quality (SACMEQ) conducts cross-national studies whose purpose is to monitor educational quality in the SACMEQ countries, 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.

SACMEQ II is one of the few known research projects that has 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 a truly representative national sample in their design (Passos, Nahara, Magaia and Lauchande, 2005). Consequently, SACMEQ II provided not only the opportunity for local team members to participate in a large-scale research project, but also provided valid and reliable data on which important decisions could be based. Specifically, SACMEQ II provided relevant, high-quality data about the academic profile of

teachers, the level of performance in the areas assessed, school management and other factors that are relevant for policy making for the Ministry of Education and Culture.

Many benefits arising from the SACMEQ study are apparent for Mozambique as well as within the educational context of the region more generally. As a Portuguese-speaking country, Mozambique has a unique history, tradition and system of education that differs from those of the other participating countries. The data collected through SACMEQ II can be considered to be of extreme importance for Mozambique's education system, since it provides the country with important data to motivate reflection on its primary education sector, identify the position of the education system within the region, and consequently, work towards its improvement.

The Republic of Mozambique is located in the south-eastern part of Africa, is divided into 11 provinces and has an overall population of 20 530 714 inhabitants (INE, 2008)**.** The gross illiteracy rate is 34.3%, with the overall illiteracy rate amongst the female population being 66.7% (INE, 2006).

Mozambique was a Portuguese colony from the fifteenth century until political independence from Portuguese rule was attained in 1975. Mozambique is a multilingual country with 18 main Bantu languages (Sitoe and Ngunga, 2000) but Portuguese is the official language and language of instruction from Grade 1. In 2004 the Ministry of Education and Culture (MEC) introduced the mother tongue as the medium of instruction, but this mother-tongue instruction was initially introduced only in Grades 1 and 2 in some schools located in linguistically homogeneous zones.

The National System of Education (SNE) was introduced in 1983. The three main objectives of the education system proposed by the Strategic Plan for Education (1998) are: to increase access and educational opportunities for all Mozambicans at all levels of the education system, to maintain and improve the quality of education, and to develop an institutional and financial framework that would sustain Mozambican schools and pupils in future.

The MEC recognises that the quality of education and teacher training provided in institutions is often poor: "Teachers at all levels are often under qualified for the posts they hold. Nearly a quarter of all teachers in EP1 are entirely untrained, and the majority has received only six years of schooling and one year of professional training" (1998, p.9). For these reasons the MEC defined expanding access to education, improving educational quality and sustaining expansion and improvement as priority activities, and has attempted including teacher training in particular, as part of the programme to ensure on-going improvement of teacher quality. However, in the last 30

years, teacher training has always been considered an emergency topic, but to date there is no clear policy for teacher training (see Chapter 2, Table 2.4).

This then is the context of this study where, for the first time, national and regional samples are used to analyse the relationship between teacher competence and pupil performance in Mozambique and in other SACMEQ countries. The next section presents a summary of the main research questions and results.

### 10.1.1 Summary of Research Questions and Results

The purpose of this study has been to investigate the effect of teacher competence on pupil performance in upper primary schools in Mozambique and in other SACMEQ countries.

The variables that comprise teacher competence in this study are academic education, professional training and teacher performance in reading and mathematics, as evaluated in the SACMEQ II tests. Those variables can be found in the cognitive and behavioural domains as seen in the teacher training construct in the conceptual framework (see Figure 10.1). As Medley and Shannon say (1994), "Competence to teach is defined in terms of possession of two kinds of knowledge, knowledge of subject matter and professional knowledge." Shulman (1986) reinforces this idea by stating that all three types of knowledge: content knowledge, pedagogical content knowledge, and curricular knowledge, are vital in the training of teachers.

The analysis of the data is dived into two phases. Phase 1 is the descriptive component of the research and was addressed in Chapters 6 and 7, while Phase 2 is an exploratory analysis, which was addressed in Chapter 8. The purpose of Phase 1 is to describe the results of SACMEQ and the characteristics of the sample in Mozambique and other countries in terms of context of the study. Secondly, Phase 1 assisted in identifying variables to include in the analysis of performance for the main questions in the second phase. The purpose of Phase 2 is to establish the relationship between teacher competence and its relationship with pupil performance in reading and in mathematics in Mozambique and in other SACMEQ countries.

The next section presents a summary of the main results of the first phase, providing a descriptive analysis of the characteristics of the teachers, pupils and school conditions in Mozambique and in the other SACMEQ countries.

a) What were the characteristics of the schools that took part in the SACMEQ study? (This aspect is related to pupils' characteristics and the external teaching context).

In Mozambique in 2000, 74.5% of the Grade 6 pupils were found in urban schools. Cabo Delgado was the only province where most of the pupils were found in rural schools (see Chapter 6, Table 6.19). In the SACMEQ countries as a whole, most Grade 6 pupils were found in schools located in rural areas (55%). In some countries, there is a balanced distribution of the location of schools offering Grade 6 in rural and urban areas (see Chapter 6, Table 6.23).

The school resources mean in Mozambique was 6.9 (out of 22). Maputo Cidade had the highest mean (10.7) of school resources (see Chapter 7, Table 7.6). Mozambique mean is compared with 8.2 in the SACMEQ countries on the whole, with Seychelles having the highest mean at 16.7 (see Chapter 7, Figure 7.7).

Mozambican school heads considered all of the activities in the list given to them as very important, but discussing educational objectives with the *teaching staff* was the most important for them (94.2%). About two thirds (69.2%) of principals considered their own *professional development* to be vitally important in running their schools - see Chapter 7, Table 7.9). In the SACMEQ countries as a whole, all of the listed activities (see Chapter 7, Table 7.12) were considered important, but the *professional development* of school directors (95.3%) was thought to be the most important, and contact with the community (83.8%) was ranked as being relatively of the least importance. It seems that in some countries the school directors were more interested in their own professional development than in monitoring pupil progress or their teachers' professional development.

b) What were the characteristics of the classroom? (This question is related to the internal teaching context.)

In Mozambique, almost a third (30%) of Grade 6 pupils were without seats, and about 35% were without writing places. In five of the 11 provinces, the mean number of seats and writing places was lower than the country average (see Chapter 7, Table 7.1). This result contrasts with the situation in the SACMEQ countries as a whole, where 89.6% and 86.8% of Grade 6 pupils were equipped with seats and writing places respectively, with only four out of 14 school systems recording a lower than average mean for seats and writing places (see Chapter 7, Table 7.3).

Just over half of Mozambican Grade 6 pupils (53.2% in reading and 58.3% in mathematics) had their own textbooks, and in 6 of the 11 provinces the mean of pupils' having their own reading and mathematics textbooks was lower than the country average. With reference to the supply of books in SACMEQ countries on the whole, 43.8% and 45.4% of Grade 6 pupils had their own reading

and mathematics textbook respectively, and in five and six out of the14 systems of education the mean of pupils' having their own reading and mathematics textbooks was lower than the SACMEQ average in both reading and mathematics respectively (see Chapter 7, Table 7.2).

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

The mean age of the pupils in Grade 6 in 2000 in Mozambique was 176.7 months (14 years old). The average age of the pupils in the study was four years older than expected. The high number of over-age pupils was due to a combination of factors such as the high levels of grade repetition and late entry into the first grade. The percentage of girls in Grade 6 in Mozambique was 40.3%. The northern provinces had the lowest percentage of girls in Grade 6, and in those provinces the MEC introduced a specific programme to promote the participation of girls in school. Other factors which helped describe the characteristics of pupils were the supply of meals and the number of books found in the home. In Mozambique, pupils in Grade 6 had an adequate number of meals per week, and on average, only 24.9% of Grade 6 pupils had books in their homes (see Chapter 6, Table 6.16).

In terms of pupils' backgrounds, in 2000 the mean age of pupils in Grade 6 in the SACMEQ countries as a whole was 164.8 months (13.7 years old). Taking into consideration the normal school entry age (6-7 years) in some countries, pupils were around two or three years older than expected. In Tanzania, as in Mozambique, this age issue could have been caused by late entrance into school and then by grade repetition. On average, 25.2% of Grade 6 pupils had books at home, which is slightly higher than the number in Mozambique. The percentage of girls in Grade 6 in the SACMEQ countries as a whole was 49.7%.

The pupils were asked about their mothers and fathers' level of education. The mean for parents having education in Mozambique was 5.9 in contrast with that in the SACMEQ countries as a whole, where the mean was 6.8. Pupils were living with their families or guardians in all countries. A second option was to live with relatives, and the school hostel was the third (see Chapter 6, Tables 6.16 and 6.20).

On average, 94.5% of the pupils in Mozambique and 77.6% of the pupils in the SACMEQ countries as a whole spoke the language of instruction at least sometimes at home. In only four of the 11 provinces in Mozambique, and in only six of the 14 systems of education in the SACMEQ countries, the percentage of pupils that spoke the language of instruction is higher than the average.

About three quarters of the pupils (78%), had repeated at least one grade in Mozambique. On average, Grade 6 pupils were absent for 2.7 days during the month preceding the testing (see Chapter 6, Table 6.18). These findings are compared with fewer than half of the pupils repeating grades across SACMEQ countries, and with their being absent for 1.7 days during the month preceding the testing (see Chapter 6, Tables 6.18 and 6.22).

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

Grade 6 Mozambican reading teachers were, on average, 32.7 years old, and mathematics teachers were 31.1 years old. In the SACMEQ countries, the Grade 6 teachers were slightly older at 36.9 years (reading) and 34.6 years (mathematics).

Less than a third (29.9%) of Grade 6 pupils in Mozambique were taught reading by teachers who were female, compared with more than half in the SACMEQ countries. Only 40.2% of pupils were taught mathematics by teachers who were female in SACMEQ countries.

Teachers in Mozambique are poorer than their SACMEQ counterparts. The average number of possessions[19] for reading teachers was 3.9, and 3.8 for mathematics teachers, compared with 6.1 for reading teachers and 5.5 for mathematics teachers in the SACMEQ countries as a whole (see Chapter 6, Tables 6.1 and 6.4).

Most reading and mathematics teachers in upper primary school in Mozambique do not have electricity at home, with an average of only 33.9% of reading teachers and 32.9% of mathematics teachers having electricity, as compared with half of the mathematics (58.3%) and reading (53%) teachers in the SACMEQ countries. Only 41.7% of mathematics teachers and 47% of reading teachers had electricity in their homes. The rest had to rely on candles or oil lamps in their homes for lighting for lighting their homes (see Chapter 6, Figures 6.2 and 6.7).

The *level of teachers' salaries* in Mozambique, for both reading and mathematics teachers, is the primary indicator of their job satisfaction. Only 39.4% of reading teachers and 45.4% of mathematics teachers indicate that they are satisfied in this respect. The main source of job satisfaction for the majority of Grade 6 reading and mathematics teachers in some SACMEQ countries was *seeing pupils learn*. The second most important source of job satisfaction for these teachers was the *salary level* (see Chapter 6, Tables 6.2 and 6.5).

[19] The minimum score that defines the social economic status is 0, and indicates that a teacher does not have any item in the list, with the maximum of 13, indicating that a teacher possesses all of the items in the list.

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

It can be seen that there were some differences in some SACMEQ countries with reference to teachers' training courses. The entrance level into teacher training colleges in all SACMEQ countries is Grade 12, except in Mozambique and Uganda where the entrance level is Grade 10. In 14 systems of education, six had a three-year duration and an admission requirement of level of Grade 12 (see Chapter 6, Tables 6.7 and 6.9).

A very small percentage of teachers who taught reading (4%) and mathematics (2.7%) in Mozambique did not have the required basic level of education (junior secondary schooling). It follows that 96% of the reading teachers and 97.3% of the mathematics teachers meet the government policy requirements (see Chapter 6, Tables 6.6, 6.10 and 6.13).

On average, the Grade 6 pupils in the SACMEQ countries were taught by reading teachers who had the following academic qualifications: 21.7% had A-level, 44, 9 % had senior secondary education, 16.5% had junior education, and 11.2% had only primary education. However, a mere 5.6% had tertiary education in SACMEQ countries (see Chapter 6, Tables 6.11; 6.12; 6.14 and 6.15).

**How do teachers and pupils perform in reading and mathematics in Mozambique and in other SACMEQ countries?**

In order to measure cognitive outcomes in the SACMEQ study, all countries tested teachers and pupils' reading and mathematics knowledge with the exception of South African and Mauritian teachers.

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

Taking into consideration that the teachers' test was similar to the pupils' test, it was expected that the teachers in Mozambique as well as in SACMEQ countries would perform well in relation to their pupils. Teachers achieved higher results on average than their pupils (see Chapter 7, Tables 7.1 and 7.3) with the teachers' averaging 716.2 in reading in Mozambique and 733.8 in the SACMEQ countries. Pupils in only 5 of the 14 systems of education had reading teachers who performed above the SACMEQ II mean.

With reference to the levels of competency reached by reading teachers in Mozambique and the other SACMEQ countries, the findings show that the lowest percentages can be observed at Levels

1, 2, 3, 4 and 5 and the highest percentages at Levels 7 (analytical reading) and 8 (critical reading) (see Chapter 8, Figures 8.1 and 8.2).

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

As in reading, it was expected that teachers in Mozambique and in the other SACMEQ countries would perform well in relation to their pupils. The Mozambican national average for the mathematics teachers was 782.8 points, as against the SACMEQ II mean of 792 points.

With reference to the levels reached by the Mozambican mathematics teachers, the findings show that the lowest percentages can be observed at Levels 1, 2, 3, 4 and 5 and the highest percentages at Levels 7 (problem solving) and 8 (abstract problem solving). With reference to the levels reached by mathematics teachers in the other SACMEQ countries, 8.9% of pupils had teachers that performed between Level 3 (basic numeracy) and Level 5 (competent numeracy), while 38.6% of the teachers reached the highest level, Level 8 (abstract problem solving) (see Chapter 8, Figures 8.17 and 8.18). It is expected that as teacher training programmes equip teachers more adequately, that their level of numeracy and/or literacy will improve and that the majority of them will be operating at the highest levels.

c) How did pupils perform in reading tests in Mozambique and in other SACMEQ countries?

In all SACMEQ countries, a mean score of 500 was set with a standard deviation of 100. On average, the pupil performance in reading in Mozambique was 516.7, In terms of levels of competency reached by Mozambican pupils in reading, the findings show that the lowest pupil percentages can be observed at Levels 1, 2, 7 and 8 and the highest percentages at Levels 4 and 5.

Despite the fact that the pupils in Grade 6 have had 6 years of schooling, 40% of the pupils in the SACMEQ countries performed between Levels 1 and 3 (basic reading). The majority (56%) performed between Level 4 (reading for meaning) and Level 7 (analytical reading) and only 3.7% performed at Level 8 (critical reading) (see Chapter 8, Figures 8.3 and 8.4).

**Pupils' reading performance by gender, socio-economic status and school location**

There was little difference in Mozambique between the sub-groups in terms of the mean and the levels achieved by pupils. On average, boys achieved 518.4 and girls 514.1 in reading. Furthermore, as expected, pupils from higher SES levels performed slightly better than pupils from

lower SES levels (523; 510.5), while pupils from large towns performed better than pupils from small towns and isolated or rural areas (533.3; 510.5 and 502.3 respectively), having easier access to resources. Taking into account the three aspects of *gender, socio-economic status and school location*, in terms of mean, 17.6% of Mozambican pupils performed at Category 1 (pre/emergent/basic reading), while 20.9% at Category 3 (inferential/analytical reading) and 61.4% reached Category 2 (meaning/interpretative reading). (For further details, see Chapter 8, Figure 8.9.)

On average, girls performed slightly better in reading (505.1) than boys (494.6) in reading in the SACMEQ countries, except in Lesotho, Malawi, Mozambique, Tanzania and Zanzibar, where boys performed better in reading than girls. With reference to the levels reached by pupils in reading, on average 42.3% of the boys and 37.7% of the girls in the SACMEQ countries performed at Category 1, and 36.6% of the boys and 37.7% of the girls reached Category 2, while 18.1% of the boys and 19.6% of the girls reached Category 3. Finally, 3.5% of the boys and 4.8% of the girls performed in Category 4. (For further details, see Chapter 8, Figure 8.10 and 8.11.)

On average, pupils from a low SES in the SACMEQ countries had 482.4 points in reading, while pupils from a high SES had 519.9 points. In all of the SACMEQ countries, pupils from a higher SES reached higher categories in reading than pupils from a lower SES. (For further details, see Chapter 8, Figure 8.12 and 8.13). Pupils from isolated/rural areas in the SACMEQ countries had a reading mean of 482 points, as against those from large towns, who had 540.7 points, a difference of 58.7 points. (For further details, see Chapter 8, Figure 8.14 and 8.15.)

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

Pupils achieved 530 points in mathematics in Mozambique. In the other SACMEQ countries, 70.1% of pupils in Grade 6 performed between Levels 1 (pre-numeracy) and 3 (basic numeracy). Taking into consideration that at Level 4 pupils are at a stage only of "beginning numeracy," the conclusion is that 70.1% of SACMEQ pupils performing under this level will not have mastered the initial numeracy skills. Only 1.5% of Grade 6 pupils reached Level 8 (abstract problem solving). (For further details, see Chapter 8, Figures 8.19 and 8.20.)

**Pupils' mathematics performance by gender, socio-economic status and school location**

Boys in Mozambique performed better than girls in mathematics (537 and 519.5 respectively) and pupils from a higher SES performed better than pupils from a lower SES (532.6 and 527.5 respectively) while pupils from large towns performed better than pupils from isolated or rural areas and small towns (536.7, 527.5 and 524 respectively). On average, within the three aspects (gender, SES and school location), 54.7% of pupils reached Category 1, while 43% reached Category 2 and 1.8% reached Category 3 (Chapter 8, Figure 8.25).

On average, as expected, boys performed better in mathematics (501.7) than girls (498.1) in the SACMEQ countries. However, in Botswana, Lesotho, Mauritius, Seychelles and South Africa, girls performed better in mathematics than boys. On average, in terms of the levels of performance reached by pupils in mathematics, 69.6% of boys and 71% of girls in the SACMEQ countries performed at Category 1 (for more details see Chapter 8, Tables 8.26 and 8.27).

On average, pupils from a low SES in SACMEQ countries had 486 points in mathematics, in comparison with pupils from a high SES, who had 515.2 points. In all SACMEQ countries, pupils from a higher SES reached higher categories in mathematics than pupils from a lower SES. 64.7% of pupils from a higher SES and a 75.1% from a lower SES respectively performed at Category 1. (For further details, details see Chapter 8, Figures 8.28 and 8.29.)

Following a trend, pupils from isolated/rural areas achieved 487.4 points in mathematics, as compared with those from large towns, who had a mean of 526.7. In all SACMEQ countries, pupils living in large towns achieved higher categories of performance than pupils living in isolated or rural areas.

Using the SACMEQ II data archive, Zhang's (2006) analysis revealed that in some SACMEQ countries rural pupils not only lagged behind their counterparts in reading ability but were also learning in unfavourable school conditions, an important factor for academic success in general. Pupils from rural areas generally belong to lower SES families and they tend to have less home support for their academic work. In addition, rural students tend to be older than their urban counterparts as a result of their late entry into the school system, a higher incidence of grade repetition, or a combination of both. In addition to poor conditions, schools in rural areas have fewer instructional resources, fewer facilities, and their teachers have lower reading scores (see Chapter 8, Figures 8.30 and 8.31).

Taking the SACMEQ results into consideration it seems that in some countries, despite significant efforts from the Ministries of Education, many children do not have access to proper school

facilities such as buildings, books, basic equipment, running water and electricity, as well as good teaching resulting from their teachers having academic qualifications as well as being professionally trained. However, it would require a massive integrated programme to address all of these interrelated issues in an attempt to improve teacher competence and pupil performance.

The following section presents and discusses the main predictors of pupil performance in reading and mathematics in Mozambique and in other SACMEQ countries.

**Phase 2 – Exploratory analysis**:

This section presents a summary of the main predictors of pupil performance in reading and in mathematics in Mozambique and in the other SACMEQ countries in relation to the findings. Firstly, the presentation focuses on the main findings in reading, followed by the main findings in mathematics.

The maximum number of predictors in Mozambique was seven in reading and eight in mathematics, while in the SACMEQ countries as a whole there were 29 predictors in reading and 30 in mathematics. All variables included in the Multiple Regression Model (stepwise) were statistically significant (for more information see Chapter 9 Tables 9.24 - 9.29).

The main predictors of pupil performance in reading in Mozambique were pupils' speaking Portuguese at home, pupils' absent-work, untrained teachers, inadequately trained teachers, taking extra tuition in Portuguese, the number of periods taught by the school head, grade repetition and pupils age, while in mathematics the main predictors of pupil performance were: pupils absent-work, the frequency with which teachers' give written mathematics tests, the frequency with the teacher meets the parents, the activities of a school head, teachers' satisfaction with the quality of the school building , the age of the school head, pupils' possession of school materials (factor), and whether or not pupils were asked questions about mathematics (see Chapter 9, Tables 9.24 and 9.27).

The ten main predictors of pupil performance in reading in the SACMEQ countries were pupils' socio-economic status, pupils' speaking the language of instruction at home, total school resources, pupils' repeating grade 6, teacher/parent contact, the number of books at home, pupils' being absent, classroom resources, pupils' paying for extra tuition and pupils' age; while the ten main predictors of pupil performance in mathematics were pupils' speaking the language of instruction at home, pupils' socio- economic status, pupils' paying for extra tuition, the experience of the school head in this school, the teachers' source of lighting at home, the number of books in pupils'

homes, the homework given, pupils' grade repetition, extra tuitions in other subjects, and the pupils' classroom material (see Chapter 9, Tables 9.25 and 9.28).

The conceptual framework for this study, adopted and adapted from Cheng and Tsui's model (1998) "total teacher effectiveness" (see Chapter 5, Section 5.3 Figure 5.1), is used for the analysis of the conclusions of this study. As previously said, the second phase is the exploratory part of the study conducted to address the central research question, namely: What is the effect of teacher competence on pupils´ performance in upper primary school in Mozambique and in the other SACMEQ countries?

This section presents and discusses the main predictors of pupil performance in reading within each domain and construct of the conceptual framework to address the research question. The preparatory steps of the correlational analyses that preceded the regression analyses are not summarised here and can be found in Chapter 8.

**The Cognitive Domain**

None of the variables in the cognitive domain appear as a predictor of pupil performance in reading in Mozambique (see Chapter 9, Tables 9.4 and 9.24). Examining the SACMEQ countries as a whole, only one factor, *teachers with primary education only* (β = -0.058; p =0.005), appeared as a predictor of pupil performance, although it was not one of the 10 main predictors. For instance, for each teacher unit increase in the variable t*eachers with primary education only*, pupils' scores decreased by only 0.087 units (See Chapter 9, Tables 9.5 and 9.25).

Similarly, in mathematics in Mozambique none of the variables in the cognitive domain appear as a predictor of pupil performance. (See Chapter 9, Tables 9.4 and 9.27). In SACMEQ countries as a whole, three variables (*teachers with primary education only*, *teachers with secondary education, and teachers' academic qualification)* appear as predictors of pupil performance in mathematics. For instance, for each unit *increase of teachers' academic qualification* (β = .060; p =.001) the pupils' score increased by 0.44 units, meaning that if teachers had high academic qualifications, pupils tended to perform better. Conversely, pupils whose teachers had low academic qualifications tended to achieve low scores as well, indicating a similar performance pattern between teacher and pupils. The first two factors listed above had negative effects, namely teachers with primary and secondary education (see Chapter 9, Tables 9.5 and 9.28).

**The Affective Domain**

The level of *teachers' satisfaction with the quality of school buildings* ($\beta$ = -.159; $p \leq .01$) appears as a predictor of pupil performance in mathematics in Mozambique but not in SACMEQ (see Chapter 9, Tables 9.4, 9.5, 9.25 and 9.28).

**The Behavioural Domain**

The results indicate two factors within the behavioural domain. *Pupils' speaking Portuguese at home* ($\beta$ = .346; $p \leq .000$) appears as the strongest predictor of pupil performance in reading in Mozambique among eight factors, meaning that for each unit increase in *pupils' speaking Portuguese at home*, pupil performance increased by 27 units. Pupil absenteeism (*pupils' absent-work*) was another factor in the behavioural domain that was a predictor of pupil performance in reading, and was the third most important predictor. In Mozambique for each unit increase in pupils' absenteeism, pupils' scores decreased by 15 units, meaning that pupils who were more frequently absent from school tended to perform poorly (see Chapter 9, Tables 9.4 and 9.24).

In SACMEQ countries, *speaking the language of instruction at home* ($\beta$ = .194; $p \leq .000$) was the second strongest predictor of pupil performance in reading, meaning that pupils who spoke the language of instruction at home tended to perform better in reading. In the behavioural domain, *the frequency with which teachers met pupils' parents* ($\beta$ = .120; $p \leq .000$) was another predictor of pupil performance in reading, and was ranked 5$^{th}$, meaning that a teacher who meets the parents at least once a year has pupils who tend to achieve better scores. Pupil absent-work ($\beta$ = -.106; $p \leq .000$) was a negative predictor of pupil performance in reading, and was ranked seventh.

In the behavioural domain, other predictors of pupil performance in reading were *pupils' absenteeism, the teachers' reading approach, and the school head's experience in this school*, but they were not among the 10 main predictors of pupil performance in reading in the SACMEQ countries (see Chapter 9, Tables 9.5 and 9.25).

In the behavioural domain, the results indicated that in mathematics *pupil absent-work* ($\beta$ = -.261; $p \leq .000$) appears to be the strongest predictor of pupil performance in Mozambique and is the first of eight factors. Thus, for each unit increase in *pupils' absenteeism*, pupil performance decreased by 9.50 units. In the behavioural domain, the *frequency with which teachers meet parents* ($\beta$ = .188; $p \leq .005$) also appears as a predictor of pupil performance in mathematics, and was ranked 3$^{rd}$ in position. For each unit increase in *teachers' meeting parents*, pupils' scores increased by 1.90 units, meaning that pupils who had teachers that met their parents more frequently tended to achieve a better performance. The *activities of the school head* was another predictor belonging to the behavioural domain, and was ranked in position 7, ($\beta$ = .164; $p \leq .016$) while the f*requency with*

*which teachers give written mathematics test* (β = -.141; p ≤ .005) was ranked in 8th position (see Chapter 9, Tables 9.4 and 9.27).

In the SACMEQ countries, *speaking the language of instruction at home* (β = .159; p ≤ .000) appears as the 2nd predictor in pupil performance in mathematics, meaning that pupils that spoke the language of instruction at home tended to perform better in mathematics. For each unit increase in *pupils' speaking the language of instruction at home*, pupil performance increased by 4.48 units. Another predictor in the behavioural domain was the *experience of the school head* in this school (β = 0.136; p ≤ .000), with a negative effect on pupil performance. This means that pupils tended to achieve lower with a school head who had more years of experience in that same school. Another factor in the behavioural domain, but not one of the 10 main predictors, *was pupils' absent-work* (β = .098; p ≤ .000). (See Chapter 9, Tables 9.5 and 9.28.)

*Pupils' absent-work* had a negative effect on pupil performance in reading and in mathematics in Mozambique and in the other SACMEQ countries, which means that the more days pupils are absent, the more likely it is that their performance in reading and in the mathematics test would be lower. Mathematics in particular follows a constructive step-by-step approach. Particular concepts and skills are prerequisites for the next level of understanding. Therefore, pupils who are absent will manifest gaps in their learning and as a result will tend to fall behind.

**The Teacher Training Construct**

In Mozambique only, being taught by a *teacher with no training at all* (β -0.197; p ≤ .001) had a negative effect, whereas short training (β = .131; p ≤ .033) was a positive predictor of pupil performance in reading. This result means that pupils who had teachers without training tended to have lower scores, with each unit of increase in *no teacher training* resulting in the pupils' scores decreasing by 0.23 units (see Chapter 9, Tables 9.6 and 9.24).

Only two variables showed a noticeable relationship between teacher training and pupil performance in reading and in mathematics in the SACMEQ countries: in-service teacher training (β = -.044; p = .035) and *no teacher training* (β = -.042; p ≤ .050). However, neither of them was one of the10 main predictors of pupil performance. Pupils who had teachers that had had in-service training only or no teacher training at all tended to achieve low scores in reading (see Chapter 9, Tables 9.7 and 9.25). In the SACMEQ countries, 7 out of 14 systems of education and about 50% of the reading teachers had two years of professional training (see Chapter 6, Table 6.12).

In Mozambique, none of the factors that comprise the teacher training construct were predictors of pupil performance in mathematics (see Chapter 9, Tables 9.6 and 9.27).

In the SACMEQ countries, as in reading, only two variables had a relationship with pupil performance in mathematics. However, only being taught by a teacher with more than 3 years of training ($\beta = .039$; $p \leq .034$) was a predictor of pupil performance in mathematics. Pupils who had teachers with more than three years of training tended to perform better than those who had teachers with fewer than three years. For each unit increase of teacher training, pupil scores increased by 0.054 units (see Chapter 9, Tables 9.7 and 9.28).

**The Teacher Characteristics Construct**

The *teachers' total possessions at home, the teachers' source of lighting at home, and the gender of the school head* were not predictors of pupil performance in reading In Mozambique (see Chapter 9, Tables 9.6 and 9.24). This finding was in contrast to the position in the SACMEQ countries, where the predictors of pupil performance in the teacher characteristics construct included the *source of lighting* as a predictor of pupil performance in reading. The *source of lighting* is also related to the school location, teachers' SES and the level of salary. Teachers who have electricity in their homes perhaps have access to more information via the radio or television, and they would also have better conditions within which to work, particularly at night, while correcting their pupils' work or for lesson preparation and administration. Teachers' possessions were a negative predictor of pupil performance in reading. Teachers' possessions are also reflected in other ways, such as through the teachers' SES, which is of course related to the level of the teachers' salaries (see Chapter 9, Tables 9.7 and 9.25).

In Mozambique, the *age of the school head* ($\beta = -.172$; $p \leq .013$) was a predictor of pupil performance in mathematics, meaning that the age of the school head had association with pupil performance in mathematics. In the SACMEQ countries, as in reading, the *teachers' source of lighting at home* ($\beta = -.132$; $p \leq .000$) had a negative effect of pupil performance in mathematics and was the fifth strongest predictor (see Chapter 9, Tables 9.6, 9.7, 9.27 and 9.28).

**The External Teaching Context Construct**

In Mozambique in the external teaching context construct only one variable, *extra tuition in Portuguese*, ($\beta = -.151$; $p \leq .019$) seems to have a negative effect of pupil performance in reading, but did not appear as a predictor of pupil performance in mathematics (see Chapter 9, Tables 9.8 and 9.24).

In the external teaching context, the *total school resources* ($\beta = -.139$; $p \leq .000$) was a predictor (the third strongest) and had a positive effect on pupil performance in reading in SACMEQ countries. This result meant that pupils attending schools with more resources were more likely to

achieve higher test scores than those pupils in which schools were poorly resourced. For instance, for each unit increase of school resources, pupils' scores increased by 0.306 units. Often poorly performing pupils attend extra lessons, but in this case *Pupils paying for extra tuition* ($\beta$ = -0.103; $p \leq .000$) had a negative effect with very little improvement in performance being observed. Another predictor of pupil performance in reading was *school location*. Pupils in large towns tended to perform better than their counterparts in small towns and rural or remote areas (see Chapter 9, Tables 9.9 and 9.25).

None of the variables in the external teaching context construct was a predictor of pupil performance in mathematics in Mozambique (see Chapter 9, Tables 9.8 and 9.27).

*Pupils' paying for extra tuitions* ($\beta$ = -.145; $p \leq .000$) was the 3rd strongest predictor of pupil performance in mathematics in the SACMEQ countries. *Pupils' extra tuitions - other subjects* ($\beta$ = -.108; $p \leq .000$) was rated in position nine and had a negative effect on pupil performance. Another variable that was a predictor of pupil performance in mathematics was the *condition of school building* (see Chapter 9, Tables 9.9 and 9.28).

**The Internal Teaching Context Construct**

In Mozambique only the *number of periods taught by a school head* ($\beta$ = -.191; $p \leq .003$) was a predictor (the 4th strongest - negative) of pupil performance in reading. For each unit increase of the *number of periods taught by the school head*, a pupil's score would decrease by 143 units, meaning that more periods for school head resulted in lower pupil performance in Mozambique (see Chapter 9, Tables 9.8 and 9.24).

In the SACMEQ countries, teachers' total classroom resources ($\beta$ = -.104; $p \leq .000$) was the 8th strongest predictor. For each unit increase in the shortage of teachers' classroom resources, pupil performance decreased by 1.59 units. The *number of periods taught by a school head* appears as a negative predictor of pupil performance in mathematics (see Chapter 9, Tables 9.9 and 9.25).

In Mozambique, *pupils' school material* ($\beta$ = -.208; $p \leq .003$) was the second strongest predictor of pupil performance in mathematics. For each unit increase in the shortage of school material, pupil performance decreased by 1.2 units meaning that more *pupils' school material* resulted in better pupil performance (see Chapter 9, Tables 9.8 and 9.25).

Four factors appear as predictors of pupils' performance in mathematics in the SACMEQ countries. One of these was the *homework given* ($\beta$ = -.113; $p \leq .000$) (the 7th strongest). For each unit increase in the homework given, pupil performance increased by 2.47 units. The lack of *pupils'*

*school material* (β = -.107; p ≤ .000) (the 10th strongest) was a negative predictor of pupil performance in mathematics. For each unit of increase in the shortage of school material, pupils' performance decreased by 1.11 units.

Two factors appear as a predictor of pupil performance in mathematics in the SACMEQ countries, namely *owning mathematics textbooks*, a positive predictor. Pupils with textbooks tended to achieve better results than those without or sharing textbooks - and the *number of periods taught by a school head*, which was a negative predictor (see Chapter 9, Tables 9.9 and 9.28).

**The Pre-Existing Pupils' Characteristics Construct**

In Mozambique *pupils' grade repetition* (β = -.173; p ≤ .006) (fifth strongest) and *pupils' age* (β = -.128; p ≤ .032) (8th strongest) were predictors of pupil performance in reading. Mozambique has high numbers of over-age pupils and a high percentage of grade repetition, particularly in rural areas. The two variables, *grade repetition* and *age*, are perhaps related to the fact that the more repetition pupils undergo, the older they become, which means they are over age for their grade (see Chapter 6, Tables 6.16 and 6.18, and Chapter 9, Tables 9.10 and 9.24).

It is important to refer to the fact that of the 10 main predictors of pupil performance in reading, four belong to pre-existing pupils' characteristics. In the SACMEQ countries *pupils' socio-economic status* (SES) (β = -.279; p ≤ .000) is the strongest (1st position) predictor of pupil performance in reading. For every increased unit for pupils' SES, pupils' scores increased by 1.114 units. The variable, *pupil repeating grade 6* (β = -.139; p ≤ .000) is in the 4th position as a predictor of pupil performance in reading. For every increased unit for pupils repeating Grade 6, pupils' scores decreased by 10.19 units. The *number of books at home* (β = .118; p ≤ .000) is the 6th predictor, meaning that pupils that had books at home tended to perform better than those that did not. *Pupils' age* (β = .099; p ≤ .006) is also a predictor of pupil performance in reading and is rated in tenth position, meaning that the pupils' age had an apparently positive effect on pupil performance in reading. Another positive predictor of pupil performance was pupils' evening meals. Pupils that had an evening meal tended to perform better than those that did not (see Chapter 9, Tables 9.11 and 9.25).

Pre-existing pupils characteristics do not appear as a predictor of pupil performance in mathematics in Mozambique (see Chapter 9, Tables 9.10 and 9.25). This outcome is not surprising because in Mozambican school system there is some equity even though there is disparity in terms of SES between pupils in rural areas and pupils in large towns and cities.

As with reading in the SACMEQ countries, four of the 10 main predictors of pupil performance in mathematics belong to the pre-existing pupils' characteristics category, meaning that pupil performance variation is explained more by pre-existing pupils' characteristics than by other variables in the study such as school and teacher variables. The same factors as in reading appeared as predictors of pupil performance in mathematics: SES ($\beta$ = .150; p = .000) was ranked in the second position; the *number of books at home* ($\beta$ = -.118; p $\leq$ .000) in the 6$^{th}$ position; *grade repetition* ($\beta$ = -.0,111; p $\leq$ .000) in the 8$^{th}$ position and *pupils' evening meals* ($\beta$ = .107; p $\leq$ .000) in the tenth position. *Pupils' age* is another predictor in the SACMEQ countries, but was not one of the 10 main predictors of pupil performance in mathematics (see Chapter 9, Tables 9.11 and 9.26).

**The Parent and Community Contribution Construct**

The community's contribution is a composite of school facilities such as classrooms and teachers' houses; the maintenance of school facilities (such as classrooms, teachers' houses, etc.); the construction or maintenance and repair of furniture and equipment; the purchase of textbooks; the purchase of other school supplies, materials and/or equipment; the purchase of stationery; the purchase of other school supplies, materials and/or equipment; the payment of examination fees; the payment of an additional amount on top of the normal salary of teachers; the payment of the salaries of non-teaching staff; the payment of an additional amount on top of the normal salary of non-teaching staff; extra-curricular activities, including school trips; assisting teachers in teaching and/or teaching or supervising pupils themselves without pay; and the provision of school meals.

There were no predictors of pupil performance in reading arising from the parents' and community's school involvement in Mozambique (see Chapter 9, Tables 9.10 and 9.24).

In reading in the SACMEQ countries, only the community's *contribution of textbooks* to the school appeared as a predictor of pupil performance in reading.

In Mozambique, only the variable having to do with *asking questions about mathematics* was a predictor of pupil performance in mathematics (see Chapter 9, Tables 9.11 and 9.27). In the SACMEQ countries, the *community's contributions of furniture and equipment* to the school appeared as a predictor of pupil performance in mathematics (see Chapter 9, Tables 9.11and 9.28).

## 10.2 DISCUSSION AND REFLECTION

The purpose of this section is to discuss and reflect on the results of the study. The reflection will start with a critical review of the methodology and how the approach has influenced the results.

The second part is a more substantive discussion and reflection in which the main results arising from the analysis are compared with the results of other research projects on the same topic.

### 10.2.1 Reflection on the Methodology

Firstly, all fourteen systems of education involved in the SACMEQ project, applied the same instruments and followed the same methodology. In this secondary study, one of the limitations is the fact that data collected in 2000 is used for analysis in 2007. A number of things could have changed in the seven years, although systemic change takes time. A further limitation is that this study was constrained by to what was available in the SACMEQ II database, which is not the same as collecting data for a specific study.

For example, class observation is crucial to assessing teacher performance in teaching reading and in mathematics in Grade 6. As explained by Medley and Shannon (in Dunkin, 1997), the main tools for assessing teacher performance are observational schedules. However, as this study is a secondary analysis, the results of teachers' completing the SACMEQ II reading and mathematics tests were used to assess teacher competence, rather than observation. Classroom observation may have enhanced the assessment of teacher competence within the classroom context.

The set of variables in the SACMEQ database was organised according to the conceptual framework presented in the study, and some of the variables that composed each domain and construct were grouped using Principal Component Analysis (PCA), which, according to Smith (2002), has the advantage of reducing the number of dimensions without much loss of information. All SACMEQ variables were included in the correlation matrix except those related to *inspection, teacher adviser and resources centre* in the external teaching construct, because they did not measure what they were supposed to measure and were excluded from SACMEQ III. The teachers and pupils who were included the SACMEQ II study represents a school sample, meaning that the 20 pupils selected belong to a school and not to a specific class. Hence, pupils were aggregated to school to calculate the correlations and regression.

Authors have previously used the regression model to study the determinants of pupil achievement. Carr (2006), for instance, applied the regression model to find the main determinants of pupil achievement. Factors such as student attendances, the proportion of teachers rated as highly qualified, and student mobility show statistical significance in the partial regression coefficient in Carr's study. Haegeland, Raaum and Salvanes (2005) separated the effect of school resources from the effect of family background in the study of pupil achievement determinants, since resources may be allocated to schools in a compensatory manner. The family background has a positive

effect on pupil performance, but the quantity of resources and the teacher hours per pupil had only a moderate effect. Teacher qualifications do not appear to have a significant effect on school results and, in addition, the quality of resources, as measured by teacher characteristics, does not appear to have a significant impact on pupils' marks. The regression model was also used in this study to identify the variables that had an effect on pupil performance. However, the emerging factors may differ from studies conducted in European and Western countries. Thus, the context of the study - that of Africa - needs to be taken into account.

It is within the framework of this literature review that the regression model was used in this study to understand the determinants or predictors of pupil performance in Mozambique and in other SACMEQ countries. Applying the regression model gives the effects of each explanatory variable in each domain and construct in the conceptual framework, while controlling the impact, and the predictor can be ranked accordingly. The results could therefore be used in policy formulation and decision making to improve the quality of education by allocating the resources in alignment with the most important predictors.

The next section presents and discusses the main predictor of pupil performance in reading in each domain or construct of the conceptual framework.

### 10.2.2 Reflection on Conceptual Framework and the Results

The original Cheng and Tsui model of teacher effectiveness was further developed in their 1998 model of teacher effectiveness. The Cheng and Tsui model has been modified and adapted to relate to the African education systems and social context under study, and rather aligned with to the data available for this study. Figure 10.1 reflects the changes that have been made to the model, which were discussed in Chapter 5 (see Section 5.3).

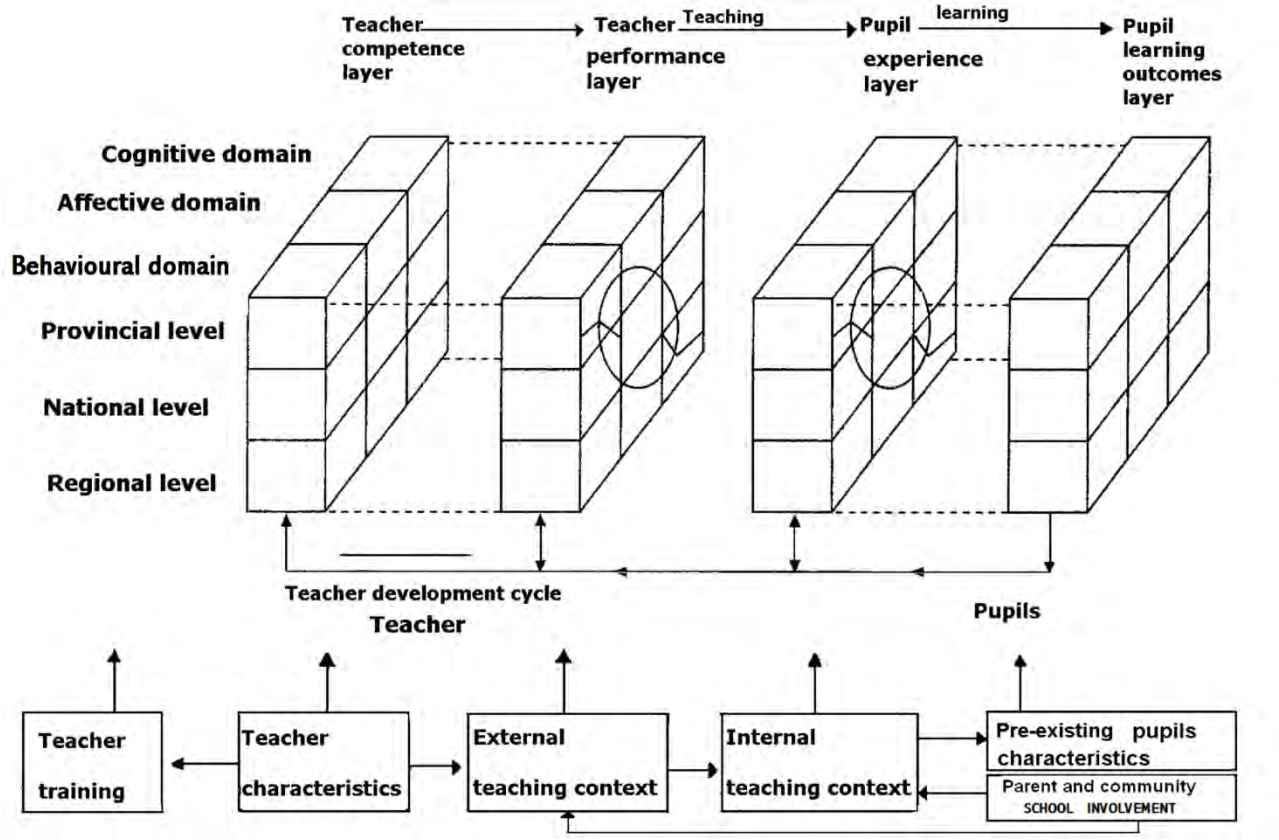


*Figure 10.1* Levels of teacher effectiveness (adapted from Cheng and Tsui, 1998, p.41)

**The Cognitive Domain**

In Mozambique, the variables that comprised the cognitive domain did not appear as a predictor of pupil performance in reading and in mathematics. In the SACMEQ countries as a whole, and in three of the 14 systems, a number of variables that comprise the cognitive domain appear as predictors for pupil performance (see Chapter 9, Tables 9.24 to 9.29). The variables that comprise the cognitive domain and teacher training are referred to in the literature as the requisites for a competent teacher, namely subject knowledge, curriculum knowledge and professional training, as confirmed by Medley and Shannon (1994), Shulman (1986), and Grossman (1995).

Analysing the school systems, country by country, in which pupils performed below the SACMEQ mean, one should take note that the greater part (in fact, nearly half) of the teachers in Lesotho had only primary education (49.6%) and within this group 31.1% had 3 years of teacher training (see Chapter 6, Table 6.12). The academic level of teachers may explain the low level of pupil performance in reading (see Chapter 8, Figure 8.4). Mothibeli and Maema reveal that "some teachers' highest academic qualifications were the primary education that the pupils themselves were just about to attain" (2005, p.179). But in the final analysis "teacher performance was much higher than pupils', although a small percentage of them – probably those with primary school

education as their highest academic qualification – were performing at the same level as a small percentage of the pupils they taught" (2005, p.185).

South Africa was one of the countries where a significant percentage of teachers had only primary education (27.1% - see Chapter 6, Table 6.12) and pupil performance in reading was below the SACMEQ mean (492 - see Chapter 8, Figure 8.3). Moloi and Strauss (2005) state that the possible cause of these results could be systematic gaps in the manner in which reading and general literacy development takes place in the schools. These systematic gaps could be in educator training levels, the availability and use of reading materials in schools, or a combination of these and other factors. Where pupils performed below the SACMEQ mean in the other countries, the teacher had acceptable levels of academic qualifications, but the level of pupil performance is low in the case of Malawi, Namibia, Uganda, Zambia and Zanzibar.

Other factors such as the teachers' knowledge of the contents of primary education or lack of professional training may be able to explain low pupil performance. Those results confirm what was felt by authors such as Grossman (1995), Medley and Shannon (1994) and Westera (2001), who pointed out the importance of teacher subject knowledge and professional training as part of teacher competence, and their link with pupil performance. In this regard, Shulman (1986) argued that "the person who presumes to teach subject matter to children must demonstrate knowledge of that subject matter as a prerequisite to teaching. Although knowledge of the theories and methods of teaching is important, it plays a decidedly secondary role in the qualification of a teacher." Sedel (in Verspoor, 2003) confirms this position and emphasizes that the two indicators most frequently used to measure the overall quality of teaching personnel in primary schools where teachers teach according to established standards are the required academic qualifications and primary school teacher training.

The content knowledge as well as the aims or objectives of each subject are vital, as stressed by Postlethwaite and Ross (1992), who affirm that schools which produce good results have teachers that have a good knowledge of the aims of the education system, the syllabi and materials, and which teaching strategies are most likely to address those aims. Thorough knowledge of the aims and goals of the subject is the first step towards achieving excellent performance.

In the SACMEQ countries as a whole and in 3 of the 14 education systems, teachers' academic qualifications appear as a predictor of pupils' performance. In the literature, authors such as Shulman (1986), Hargreaves and Fullan (1992), Eraut (1994) and Westera (2001) stress the importance of teacher subject knowledge as part of teacher competence. As Postlethwaite and Ross explain (1992), schools which achieve well have teachers with sound knowledge of their subject

matter, sound pedagogical knowledge and skills, and good classroom management skills. Table 10.1 present the main predictors of pupil performance in reading and in mathematics in Mozambique and in SACMEQ countries.

Table 10.1

*Main predictors of pupil performance in reading and in mathematics in Mozambique and in SACMEQ countries*

| Domains and Constructs | Reading | | Mathematics | |
|---|---|---|---|---|
| | **MOZ** | **SACMEQ** | **MOZ** | **SACMEQ** |
| **Cognitive** | - | Teacher with primary education only | - | Teacher with primary education only<br>Teacher with secondary education<br>Teacher qualification-academic |
| **Affective** | - | - | Teacher. satisfaction-school building quality | - |
| **Behavioural** | Speaking Portuguese at home<br>Pupils' absent - work | Pupils speak lang. of instruction home<br>Pupils' absent – work<br>Pupils' absent<br>Teacher/pupils' parents meet/year<br>Teacher reading approach (factor)<br>S. head experience this school | Pupils' absent – work<br>Teacher. frequency giving written math test<br>Teacher frequency meeting parents<br>School head activities | Pupils speak lang. of instruction home<br>Pupils' absent-work<br>S/ head experience this school |
| **Teacher Training** | No teacher training<br>Short training | In-service training<br>No teacher training | - | More than 3 years of training |
| **Teachers' characteristics** | - | Teachers' source of lighting<br>Teacher. possessions | School head age level | Teachers' source of lighting |
| **External teaching context** | Extra tuition in Portuguese | School location<br>Total school resources [max=22]<br>Paying for extra tuitions | - | Paying for extra tuitions<br>Extra tuition- others subjects<br>School location<br>School building condition<br>Total school resources |
| **Internal teaching context** | School head number of periods | S. head number of periods<br>Teacher. access to material (factor) | Pupils' school material (factor) | Pupils' school material (factor)<br>Sharing/owning math textbooks<br>Homework given<br>School head number of periods |
| **Pre-existing pupils' characteristics** | Grade repetition<br>Pupils' age | Pupils' socio-economic status<br>The number of books at home<br>Pupils' evening meal<br>Age in months<br>Pupils repeating G6 | - | Pupils' socio-economic status<br>Age in months<br>Pupils Grade repetition<br>The number of books at home<br>Pupils' evening meal |
| **Parents and community school involvement** | - | School contributions by community-textbooks | Asked questions about mathematics | School contribution. community furniture. equipment.(factor) |

**The Affective Domain**

In Mozambique in reading, and in the SACMEQ countries as a whole in both reading and mathematics, the affective domain is not a predictor of pupil performance. However, the affective domain is a predictor of pupil performance in reading within individual SACMEQ countries and their systems of education. Only 8 (3 in reading and 5 in mathematics) out of the 14 had a significant relationship, with 6 having a positive effect on pupil performance and 2 a negative effect. Gronlund (2000) explain that responding to and valuing the environment shows that teachers' behaviour then becomes consistent with the internalised values. For instance, the level of teachers' satisfaction with the quality of school buildings, classroom furniture, the quality of the management of the school, and the availability of teachers' houses appear as predictors of pupil performance in reading and in mathematics. In the same way, the level of teachers' satisfaction with the quality of school buildings appears to be a predictor of pupil performance in mathematics in Mozambique, This confirms what was found in previous studies, 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" (Rodgers-Jenkinson and Chapman, as cited in Fraser, Draper and Taylor, 1998, p.68). Authors such as MacDonald (1999), Evans (1997), and Cockburn (2000) stress the effects of teacher satisfaction on pupil performance and demonstrate the relationship between teaching experience and student achievement (Lundberg and Linnakyla, 1993) (see Chapter 9, Tables 9.26 and 9.29).

Teachers' living conditions might be related to the level of salary. Lack of recognition of teaching experience and of their progress in terms of professional knowledge and skills through their career is a demotivating factor, particularly when teachers with many years of teaching indefinitely hold the same position and salary as those at beginning of their careers. It is thus important to recognise that financial incentives may have to play a major role in recruitment. Teachers require sufficient money to look after their everyday needs (Cockburn, 2000). The level of teacher salaries is therefore highlighted in the literature as one of the causes of teacher dissatisfaction, as also of difficulties in teacher recruitment and retention (MacDonald, 1999). MacDonald stresses that one of the reasons for teacher attrition is the stagnation of the profession, the lack of recognition and development of skills throughout a career. In addition, MacDonald refers to the importance of the quality of school conditions as one of the causes of teachers' dissatisfaction. Thus there is the need for applied effort to improve schooling by enhancing teachers' working lives (Evans, 1997).

**The Behavioural Domain**

*Speaking the language of instruction at home* appears as the strongest predictor of pupil performance in reading in Mozambique, confirming what emerged from other cross-national studies such as TIMSS and PIRLS. "The extent to which the test language was spoken at home, and whether one or both parents spoke the language of the test at all**,** were combined to form the composite language background variable. This factor showed a positive correlation, indicating that the stronger the test-speaking language background, the higher the achievement (Australia, in TIMSS study)" (Papanastasiou, 2000, p.5). In the PIRLS study Greaney and Kellaghan (2008) claim that "students who spoke the language used in assessment at home tended to have higher scores than students who spoke other languages" (p.117). They found the same result in Programme d'Analyse des Systèms Éducatifs de la CONFEMEN (Programme on the Analysis of Education System, or PASEC) in which the use of French in a child's home was related to pupil performance.

In Mozambique (only in reading) as well as in SACMEQ countries, *speaking the language of instruction at home* is one of the strongest predictors of pupil performance in reading and mathematics. Across the SACMEQ countries 5 out of 14 systems of education in reading and 3 out of 14 in mathematics show speaking the language of instruction at home as a predictor, confirming what was found in other cross-national studies such as in TIMSS (Papanastasiou, 2000) and in PASEC studies (Greaney and Kellaghan, 2008). Howie (2002) confirms the same finding in TIMSS 1999: "The language spoken at home was also found to be a relatively strong predictor (p=0.18) as supporting evidence and pupils that spoke the language of the test (English or Afrikaans) were more likely to achieve higher test scores than those not doing so" (2002, p.169).

*Pupils' days absent*

Pupils' absenteeism had a negative effect on pupil performance in reading and mathematics in Mozambique and the other SACMEQ countries. Across the SACMEQ countries, pupils' absenteeism was a significant variable in 3 of the 14 systems in reading and in 5 of the 14 in mathematics. In the past, many authors such as Smith (1979) and Summers and Wolfe (1977) have referred to the relationship between pupil performance and the number of days of absent. Differences will exist between the academic performance of students in classes where absences are concentrated on a small number of days and the academic performance of students in classes where absences are more evenly spread over all possible days. Monk and Ibrahim (1984) stress that during the school year, early absences and late absences are related in different ways to pupil performance depending on when and how frequent the absences are. Students who are present in a class beset with absenteeism are adversely affected academically by the absences of their peers (Monk and Ibrahim, 1984).

In contrast, the PASEC study conducted by Greaney and Kellaghan (2008) revealed that the number of days that teachers were absent from school also had a negative effect on pupil performance.

*The frequency of teachers' meeting pupils' parents*

In Mozambique and in the SACMEQ countries as a whole, the frequency with which teachers meet pupils' parents is a predictor of pupil performance in mathematics and in reading. Across the SACMEQ countries, *the frequency of teachers' meeting pupils' parents* is a predictor of pupil performance in reading in Mauritius. Christensen et al. (1992) stresses the importance of the connection between the home and the school. Across all of the SACMEQ countries, home factors associated with acquiring reading literacy, and parental or caregivers' involvement in children's schooling may be key to the development of literacy (Mullis et al., 2004, p.30): "Parents' or caregivers' involvement can reinforce the value of learning to read, monitor children's completion of reading assignments for school, and encourage children through praise and support."

**The Teacher Training Construct**

Having an untrained teacher or a teacher with little training appears as a predictor of pupil performance in reading in Mozambique. In the SACMEQ countries as whole, having a teacher with no training or with only in-service training, and having a teacher with more than three years of teacher training appears as a predictor of pupil performance in reading and in mathematics. There is no relationship between teacher training and pupil performance in Mozambique or the other SACMEQ countries, and this finding confirms what was found in previous studies of the same issues.

To illustrate the above finding, four factors have emerged from the Mozambican context each of which may relate to or contribute to poor teacher training. The first factor could be that most teachers undergo the same level of teacher training, or the training curriculum is subject to similar problems as seen in the difficulty of setting a teacher training policy. The second factor is the type of candidate who elects teaching as a profession. For instance, primary school teaching has not been seen as an attractive profession in Mozambique since 1975, and the smart or excellent pupils are therefore not recruited when they leave secondary school. The third factor is the fact that during the last 30 years in Mozambique, teacher training has undergone many changes and there is still to date no clear policy for teacher training (see Chapter 2, Table 2.4). The number of courses introduced is indicative of the nature of the current policy in the teacher training field in Mozambique. The fourth factor is related to the selection of trainers in the teacher training college. The Ministry of Education and Culture selects the trainers from Pedagogical University (UP),

where teachers for secondary education are trained. However these trainers, who then work in the teacher training colleges, do not know the methodologies for primary school education, and they do not have experience in primary school teaching. Teachers with degrees in Portuguese or Mathematics teach in secondary schools but do not necessarily have the subject knowledge to teach the specific subjects or the relevant didactical knowledge for primary education. In this case, the quality of teacher training is poor as is indicated in Chapter 2. The MEC does in fact recognise that the quality of the education and training provided in the institution is often inadequate. "Teachers at all levels are often under qualified for the posts they hold" (MINED, 1998, p.9). As a result of these factors, the MEC defined expanding access to education, improving educational quality and sustaining expansion and improvement as priority activities, and teacher training is part of this programme (Strategic Plan for Education, 1998).

As can be seen in Table 8.1, professional training, pre-service and in-service training does not have a relationship with pupil performance in any provinces. This lack of relationship means that pupil performance in Mozambique is determined by other variables, such as the pupils' background, rather than by professional teacher training. This conclusion confirms what was found in previous studies in which professional training did not make a significant difference because of the trainer profile and the structure of the teacher training curriculum (Passos and Cabral, 1989; and Passos, Navesse and Chiau, 2000).

Authors such as Hargreaves and Fullan (1992), Chapman and Mählck (1997), and Kanu (1996) stress the quality of teaching as a key issue for education quality. As stated by Abagi and Odipo (1997) of the Kenyan situation, "Another pertinent issue about the efficiency of teachers is their qualifications. Traditionally, education researchers and planners have believed that professionally trained teachers are more efficient and effective than untrained ones. That is why the government [spent] 2.2% of its 1996/97 financial year educational expenditure on teacher education" (p.19).

In two countries, namely Tanzania and South Africa, professional training is a predictor of pupil performance in reading and mathematics, but a negative predictor. More than 3 years of training had positive effects on pupils' performance in the SACMEQ countries as a whole in mathematics, but was not one of the 10 main predictors. Confirming what was stressed by many researchers (Hargreaves and Fullan, 1992; Sander and Horn, 1998; Raudenbush, Eamsukkawat, Di-Ibor; Kamali andTaoklam, 1993 in Kanu, 1996) teachers should clearly become "the vanguard of the effort" to improve pupil performance. In the PASEC study conducted in West Africa (Greaney and Kellaghan, 2008), teachers' initial and in-service training appears important in determining pupil performance. However, "voluntary" teachers (employed by parents) were more effective than teachers who were civil servants.

**The Teacher Characteristics Construct**

In the SACMEQ countries as a whole, teachers' source of lighting as well as teachers' *possessions* are predictors of pupil performance in reading. They reflect the condition in which teachers live and their socio-economic status. Teachers' living conditions are linked, as previously stated, to teacher satisfaction, which has an effect on pupil performance, as confirmed by MacDonald (1999), Evans (1997) and Cockburn (2000).

Teachers' possessions and teachers' source of lighting (electricity) reflect the teachers' SES in SACMEQ countries, which in turn could be related to the level of teachers' salaries. MacDonald (1999) asserts that socio-economic factors that have been attributed to increasing attrition include living conditions, attitudes towards family responsibilities, health and ethnicity. The author also stresses that teachers tend to leave positions where living conditions are extremely poor, harsh or overly expensive. Cockburn (2000) confirms MacDonald's findings.

The age and the years of experience of the school head would have an influence on motivating the teaching staff and thus on pupils' performance. In this study, the age of the school head had a negative effect on pupil performance in mathematics in Mozambique. A study carried out in Nigeria about the performance of school heads shows that the performance in the age bracket of 40-49 years is substantially better than those in age groups 30-39 and 50 and above (Ehiametalor, 1985). In addition, the same study shows that unless school heads are exposed to further training and development in school administration and thus undergo professional development, there tends to be no significant difference in performance between a school head with four to 11 years of experience and one with 20 years of experience (Ehiametalor, 1985).

**The Internal Teaching Context Construct**

The availability of pupils' school material is a predictor of pupil performance in mathematics in Mozambique and in reading in the SACMEQ countries. The shortage of pupils' school material had a negative effect on pupil performance both two cases. Anderson suggests that "When equipment and materials are needed, this equipment and these materials should be readily available to the students" (1991, p.38). If there is a shortage of basic material such as exercise books, pens, and pencils, pupils became passive learners, because it is not possible to take notes about the lesson or complete exercises to apply what they learn and as a result, teaching and learning becomes ineffective.

The number of periods taught by a school head is a predictor of pupil performance in Mozambique in reading, and in the SACMEQ countries in both subjects (although not one of the top 10), with a

negative effect. As noted in Chapter 8, it seems that the amount of time spent by the school head on teaching implies a reduction of the time the school head spends on school management, which may have a negative effect on pupil performance. However, there may also be other possible interpretations: Wylie (1997), in a New Zealand study, found that teaching school head workloads are greater than those of non-teaching school heads while Grift and Houtveen's (1999) findings which emerged from the study carried out in 1993 in The Netherlands, showed that there is a significant relationship between educational leadership and pupil performance.

**The External Teaching Context Construct**

*Total school resources* is a predictor of pupil performance in reading and in mathematics in SACMEQ countries as a whole. In three of the 14 systems of education, school resources appeared as a predictor of pupil performance in reading and in mathematics. As stated by Chowdhury (1995), the quality of the infrastructure in developing countries is poor, as is the school equipment, particularly in rural areas. Researchers such as Anderson (1991), Abagi and Odipo (1997) and Zhang (2006) confirm the negative effects of the lack of or poor school resources on pupil performance. "When equipment and materials are needed, this equipment and these materials should be readily available to the students" (Anderson, 1991, p.38). Poor quality teaching, curriculum, instructional materials and school infrastructure can have an adverse effect on student learning (Chowdhury, 1995, p.9).

Extra tuition in the SACMEQ countries as a whole (and especially in Portuguese in Mozambique) and paying for extra tuition appear as predictors of pupil performance in reading and in mathematics. Murimba (data) claims that "in several countries, e.g. Seychelles, Zimbabwe and Mauritius, extra tuition has reached levels that are morally not justifiable. Because streaming and extra tuition are associated with good learning outcomes, they tend to find implicit support among educators and parents" (2005, p.95).

**The Pupils' Characteristics Construct**

The pre-existing pupils' characteristics construct is the strongest predictor of pupil performance in reading in Mozambique and in the SACMEQ countries, emerging as a predictor of pupil performance in all 14 systems of education. In mathematics, pupils' characteristics appear as a predictor in 12 out of 14 system of education, the exceptions being Mozambique and Zanzibar (see Chapter 9, Tables 26 to 29). With reference to the PASEC study, Greaney and Kellaghan (2008) confirm that "a variety of individual student and family characteristics (including parents' literacy and the use of French in the student's home) were related to student achievement" (p.138). As confirmed by Garden (1997), the success of individual pupils is strongly related to pupils' characteristics and their home environment, and these are predictors of pupil performance.

A *pupil's age* (determined by entering school later or repeating a grade resulting in more mature pupils) is a predictor of performance in reading in Mozambique, and in the SACMEQ countries in reading and in mathematics (although not one of the top 10). *Grade repetition* and *age* are possibly related (see Chapter 6, Tables 6.7 and 6.18), as pointed out by Zhang (2006), who notes that in rural areas students tend to be older than their urban counterparts as a result of their late entry into the school system and their higher incidence of grade repetition, or a combination of both (p.596).

A *pupil's socio-economic status* is the strongest predictor of pupil performance in reading and the second strongest in mathematics in the SACMEQ countries as a whole. Examining country by country, it can be observed that a *pupil's SES* is a predictor of pupil performance in 10 out of the 14 systems of education in reading, and 8 out of the 14 systems of education in mathematics. This variable emeges in many studies (Becker, 1981; Gold Miles, 1981; Anderson, 1991; Postlethwaite and Ross, 1992; Dustmann, Rajah and Soest, 1998; Epstein, 1998 in Gold and Miles 1981; Howie, 2002; Mulls, Kennedy, Martin and Sainsbury, 2004; Kotte, Lietz and Lopez, 2005; and Lee, Zuze and Ross, 2005) which stress the relationship between pupils' backgrounds and their performance.

*Grade repetition* is a predictor of pupil performance in reading in Mozambique and in reading and in mathematics in the SACMEQ countries. Examining the SACMEQ countries, it can observed that seven out of the 14 systems of education grade repetition as a predictor of pupil performance in reading and six out of the 14 systems of education in mathematics. Grade repetition could be a reflection of the quality of the teaching and of schools conditions, as pointed out by Zhang (2006): "In addition, rural students tended to be older than their urban counterparts, as a result of late entry into the school system, a higher incidence of Grade repetition, or a combination of both. Even though many schools in the SACMEQ countries might benefit from a boost in physical and human resources, this was especially true in rural areas, where more school buildings needed major repairs, where teachers had fewer instructional resources, where schools had fewer facilities, and where teachers had lower reading scores" (p.596). According to Chowdhury (1995), the long distances to and from school in developing countries and the poor school facilities, especially in rural areas, contribute to weaker pupil performance as well as to the pupil dropout and repetition rate. Lee, Zuze and Ross (2005) show that repetition rates are much higher in sub-Saharan Africa than in developed countries. Results from the Kenya study reveal that Kenyan primary education has had internal efficiency problems such as a great deal of wastage stemming from low completion and high repetition rates (Abagi and Odipo, 1997, p.10). Greaney and Kellaghan are of the opinion that "students might appear to benefit from Grade repetition, but the gains [are] only temporary" (2008, p.138).

The *number of books at home* is a predictor of pupil performance in reading and in mathematics in the SACMEQ countries. In two out of the 14 systems of education, it is a predictor of pupil performance in reading, and in four out of the 14 systems of education of mathematics. According to Mulls, Kennedy, Martin and Sainsbury (2004), an important aspect of the home environment is the availability of reading material and educational resources. Greaney and Kellaghan (2008) concur. They report that in the First International Comparative Study of Language and Mathematics in Latin America, carried out by Laboratorio Latinoamericano de Evaluación de la Calidade de la Educación (the Latin American Laboratory for Assessment of the Quality of Education, or LLECE), the results indicate that SES varies considerably among countries. However, the relationship is more pronounced in Argentina and Brazil than in Cuba, which had relatively little variation in the level of parental education. In Cuba, 72% of the pupils in rural areas achieved Level III in mathematics. Elley (1992) and Greaney and Kellaghan (2008) argue that the number of books in the home correlates significantly with pupil performance in mathematics. If pupils can borrow books from the school library, this occurrence minimises the problem raised by Postlethwaite and Ross (1992), that the number of books in the classroom or in a school library, and also at home, have a positive impact on pupil performance. This is a particularly pertinent aspect to consider in an African environment, where books are sorely lacking. Despite their acknowledgment of the importance of school libraries and the role they play in pupil performance, the Ministry of Education and Culture in Mozambique has found it difficult to provide books to schools, and has even found it difficult to provide textbooks on time for all pupils. However, there are some initiatives aimed at providing libraries at schools.

*Pupils' evening meals* appear as a predictor in reading (not in the top 10) and in mathematics in SACMEQ countries. In five of the 14 school systems, the pupils' evening meal emerges as a predictor of pupil performance in reading and in mathematics. The number of pupils' meals per day or week reflects in some ways the level of pupils' SES. Studies such as that conducted by Postlethwaite and Ross (1992) show that pupils' backgrounds (including the number of meals per week) correlate with pupils' reading literacy scores. Etsey (2005) points out that the parents of pupils from the high-achieving schools always provide breakfast before their children go to school.

**The Parent and Community Contribution Construct**

*Community involvement* is a predictor of pupil performance in reading in Mozambique and in SACMEQ countries. Authors such as Fullan (2001), drawing from research, emphasise that community involvement has a positive effect on pupil performance. In Kenya, Abagi and Odipo (1997) identified the factors that contribute to pupils losing interest in school, as evidenced in poor performance and high repetition and drop-out rates, and divided them into three categories: education policies and institutional processes; school-based factors; and household- and

community-based factors. In addition to the factors internal to education systems impinging on pupils' rates of success, Abagi and Odipo (1997) also identified factors in the family and community, namely a household's attitudes, initiation ceremonies and tradition, lack of opportunities, high cost, gender issues, flawed socialization, and debilitating religious principles. In the PIRLS study, for example, higher performance was obtained by the pupils of parents with favourable attitudes to reading (Greaney and Kellaghan, 2008).

*Community involvement* is a predictor of pupil performance in mathematics in the SACMEQ countries. It was found in the PISA study that parental education and support were strongly related to pupil performance in mathematics (Greaney and Kellaghan, 2008) and the finding is reinforced by Fullan (2001) and Abagi and Odipo (1997), who too claim that community involvement has a positive effect on pupil performance.

The next sections present and discuss the main conclusion and recommendations of the study.

## 10.3 CONCLUSIONS AND RECOMMENDATIONS REGARDING POLICY AND PRACTICE

This section presents the main conclusions of the study concerning teacher competence and its effects on pupil performance in reading and in mathematics in Mozambique and other SACMEQ countries, taking into consideration the conceptual framework. This section also highlights the main recommendations of the study for Mozambique and other SACMEQ countries if applicable.

### 1. The hypothesised model of teacher competence (effectiveness) fits the SACMEQ data as a whole consistently better for reading than for mathematics.

For the SACMEQ countries as a whole the data in reading are consistent with the model, although they occupy only 2 domains, namely the cognitive and behavioural, and the following 6 constructs: teacher training, teacher characteristics, the internal and external teaching contexts, pre-existing pupils' characteristics, and parents' and the community's involvement. But if we examine the countries separately, the picture changes. The data are not consistent with the model in Botswana (1), Malawi (2), Seychelles (2), Swaziland (2) and Tanzania (2), where only one or two out of the nine domains or constructs are predictors of pupil performance. No individual country fills the model completely. The maximum number of domains and constructs (7) was found in Namibia, and comparing the reading results with the adapted Cheng and Tsui model it is evident that the cognitive and affective domain are not predictors of pupil performance in reading in Namibia.

As in reading, it can be stated that in some ways the data in mathematics in the SACMEQ countries support the conceptual framework, with eight out of the nine domains and constructs being present in the model, the exception being the affective domain. Again, no individual country completely fits the adapted Cheng and Tsui model. It can be claimed that Swaziland (2) Lesotho (3), Malawi (3) and Zanzibar (3) show that the data are not consistent with the model, as only two or three out of the nine domains or constructs are predictors of pupil performance. But in Botswana and Uganda six out of the nine domains and constructs are statistically significant predictors. The following domain and constructs are not predictors of pupils' performance in the two countries: the affective domain in both, the cognitive domain and the internal teaching context in Botswana, and the external teaching context and teacher characteristics in Uganda.

In Mozambique, the model explains more in reading (*adj $R^2$ = .434*) than in mathematics (*adj $R^2$ = .320*). In SACMEQ countries, the results indicate that the model fits better and explains more in reading ((*adj $R^2$ = .529*) than in mathematics ((*adj $R^2$ = .489*). (See Chapter 9, Tables 9.25 and 9.28.)

***Recommendation:*** *from the results it can be said that the model can be used in SACMEQ countries, but more adaptation is needed in individual SACMEQ countries.*

**2. More predictor variables of pupil performance were found for mathematics in SACMEQ as a whole than at country level**.

In the SACMEQ countries, the Multiple Regression Model confirms what was found in the correlation (see the Tables of Correlation in the Appendices). Out of all of the variables, 22 in reading and 23 in mathematics in the SACMEQ countries had positive or negative effects on pupil performance. In the SACMEQ countries, the Variation Inflation Factor (VIF) varies between 1,050 and 5,021 in reading, and from 1,113 to 4,660 in mathematics. In Mozambique, eight variables in reading and eight in mathematics had positive or negative effects on pupil performance. In Mozambique, VIF varies between 1,025 and 1,150 in reading, and between 1,020 and 1,077 in mathematics. Hence, the results of the regression model were lower than 10 meaning that the variables are not related and the model is satisfactory in Mozambique and in SACMEQ countries (see Chapter 9, Tables 9.24 to 9.28). Nevertheless, not all of the predictors operated in the same way in Mozambique and in the SACMEQ countries. For example, grade repetition had positive effects on pupil performance in Mozambique where some repeaters were doing a little better than others, but in the other SACMEQ countries the effects were negative in that even though pupils repeated, there was little improvement in their performance.

***Recommendation:*** *Generally speaking, there is a need to improve the professional qualifications of teachers, including subject knowledge, especially for reading teachers in Mozambique and in other SACMEQ countries. It is necessary also to increase the level of academic qualification of teachers, taking into consideration the level at which they are teaching. It is not acceptable that a teacher with only a primary school education teaches at the Grade 6 level.*

**3. More predictor variables were found at pupils' level for reading and mathematics than at teachers' and school levels in Mozambique and the other SACMEQ countries.**

In Mozambique eight of the variables had effects on pupil performance in reading, namely one allocated to the school head, five to pupils, and two to teachers; and in mathematics three were allocated to teachers, two to school heads and three to pupils. In the SACMEQ countries 23 variables had positive or negative effects on pupil performance in mathematics, of which two were related to the school head, six to the teachers, 12 to the pupils and three at school level. In reading 22 variables had positive or negative effects on pupil performance, namely two related to the school head, nine to pupils, eight to teachers and two to schools. As explained in Chapter 9, the cognitive domain (teacher academic education) is a predictor of pupils' performance in mathematics in the SACMEQ countries, but is not one of the 10 main predictors. This result means that subject knowledge has more effect on pupil performance in mathematics than in reading. In other words, pupils' results in mathematics depend on teachers' competence: that is, the more effective the teachers, the better the pupils' results in mathematics.

Pre-existing pupils' characteristics, the behavioural domain, and teacher training are the main predictors of pupil performance in reading and in mathematics in Mozambique, with the behavioural domain being the main predictor of pupil performance. In SACMEQ, the behavioural domain is the main predictor of pupil performance in reading, while pre-existing pupils' characteristics is the main predictor of pupil performance in mathematics.

***Recommendation:*** *It seems that mathematics teachers had a greater impact than teachers of reading on pupil performance, but there is a need to improve the professional qualification of mathematics teachers in the SACMEQ countries.*

**4. For teacher competence, more predictor variables were found related to teachers' academic qualifications than directly to teachers' training levels.**

This finding was the case for Mozambique in reading and in mathematics, and overall for SACMEQ countries in reading and in mathematics. Teachers' academic level, teachers' subject knowledge (teachers' performance in the SACMEQ II tests), and teachers' professional training (pre- and in-service) are the most important variables emphasised in the literature as having to be taken into consideration with teacher competence (Westera, 2001, Grossman, 1995, Shulman, 1986, Mendel and Shannon, 1999). Darling-Hammond's (1999) findings indicate a consistent and significant positive relationship between the proportion of well-qualified teachers and student achievement on the National Assessment of Educational Progress (NAEP) reading and mathematics assessment. This result is confirmed by Vlaardingerbroek and Taylor (2003) in the TIMSS study, in which they found evidence to reinforce the view that primary teacher training ideally occurs in a university, and involves a 4-year degree programme.

The relationship between teacher competence and teachers' subject knowledge is emphasized by some studies. In the TIMSS study, Vlaardingerbroek and Taylor (2003) stress that teachers' attainment at high school emerged as a principal correlate with TIMSS rankings. Better rankings were also associated with the existence of mandatory science 'content' studies as part of teacher training. These observations are consistent with the axiom that teachers' competence in primary science arises largely from their own mastery of scientific concepts (pp. 429-438). Grossman et al. (1989) insist that without the essential base of subject matter knowledge, primary teachers are simply unable to provide effective instruction. The level of confidence in subject matter affects teaching and the way the teachers teach (Shulman, 1986).

***Recommendations*:**

*1 - The results of teacher performance in the reading and mathematics tests indicated the need for better selection criteria for teacher training programmes in Mozambique and in the other SACMEQ countries. The examination to select the candidate must include subject knowledge assessment and investigation into the mastery of primary education content, to ensure that the candidate has the knowledge requisite to teaching in primary education. It is acknowledged that the purpose of teacher training courses is to provide professional training for the candidate in the disciplines of Psycho-Pedagogics and Didactics rather than to provide academic knowledge. However, if it is necessary, teacher training colleges should organize extra sessions to improve the students' knowledge of the subjects taught in a primary school and then submit the students to examination. It is important to stress that if teachers do not have the knowledge of each subject, it is not possible for them to teach at primary level. The candidate must be competent in primary*

*education subjects before being able to be an effective teacher. Primary school subject knowledge must therefore be a pre-requisite for entering a teacher training course. The most important factor to stress is that professional training is as important as may be of lesser importance than subject knowledge no nevertheless essential subject knowledge. The combination of the two is pre-requisite to training a competent teacher.*

*2 - As noted in Chapter 2, since Mozambique achieved its independence in 1976 the Ministry of Education and Culture has implemented many teacher training models, but at present it does not have an ideal model for teacher training. One of the problems with teacher training is the frequency with which the Ministry of Education and Culture makes and implements curriculum changes. The changes that take place do not take into consideration the educative process as a whole, and the aims and objectives of the change are not stated. The Ministry's decision makers do not take research findings into account when implementing changes.*

Some additional recommendations and suggestions can be offered for the teacher training process as "curriculum plans, instructional materials, elegant classrooms and even intelligent administrators cannot overcome the negative effects of weak teaching or match the positive effects of positive teaching. The entire formal and informal curriculum of the school is filtered through the hearts and minds of classroom teachers, making the quality of school learning dependent on the quality of teachers" (Holmes Group, 1986, p.2323 in Kanu, 1996, p.174). From a review of the literature, one can conclude that the concept of competence is complex and that there are many factors that contribute to teacher competence. The literature reviewed overlooks two important aspects which one could consider in developing teacher competence in teacher training institutions. The first is the competence of the trainers in the institutions, and the second is the availability and quality of the staff of annexe schools.

In Mozambique, for example, no single factor is sufficient to develop competence in teacher trainees. The MEC should approach all of the processes and the factors involved as a whole. For instance, the fact that the factors illustrated in Figure 10.2 below are balanced is of paramount importance.

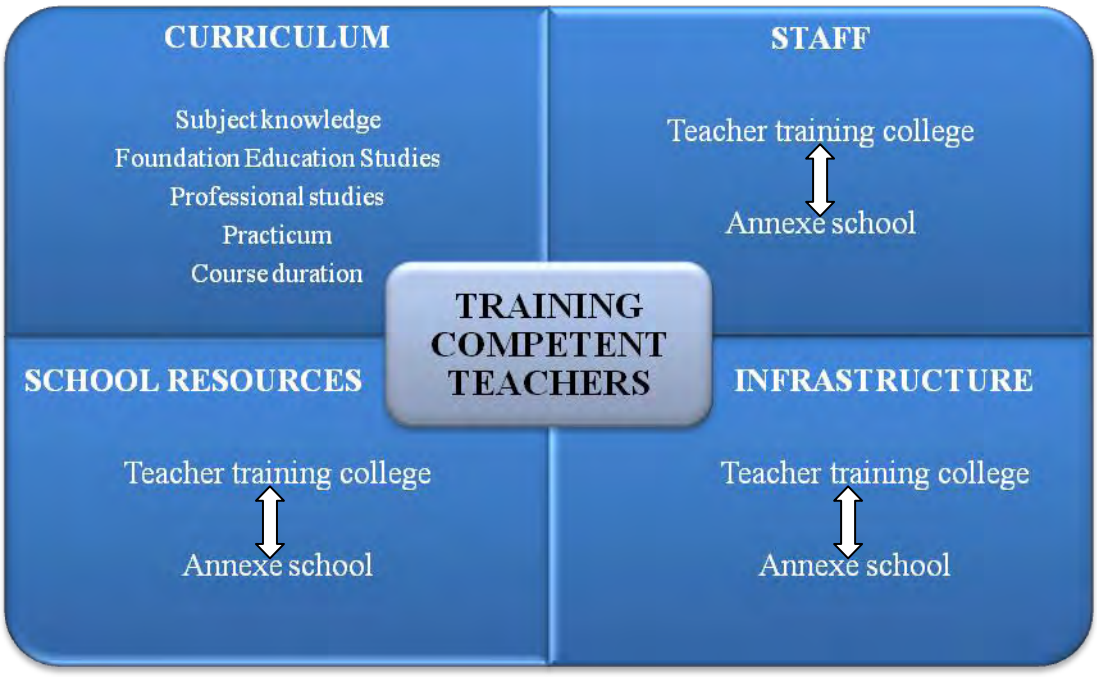


*Figure 10.2* A model for developing teachers training competence in Mozambique (Passos, 2009)

Figure 10.2 seeks to specify the factors that may be involved in the development of teacher training competence, and to establish relationships among them. In training competent teachers it is important to consider not only the curriculum for teacher training but also the other components that play a vital role in the process of teacher training, like the members of staff, the school's resources and teacher training colleges and annexe schools, as shown in the figure. All of these components must be considered as a whole.

Training competent teachers may depend on factors such as the quality of the curriculum, staff competence and expertise in teacher training institutions, the availability of resources and funding and the relationship of teacher training institutions with annexe schools to allow successful practica to be completed.

The quality of the **curriculum**, particularly taking into consideration the four elements referred to by Ben-Peretz (1995, p.543**),** which are: the Subject-matter to be taught, Foundation of Education studies, Professional studies, and Practicum. Subject knowledge is a pre-requisite for entry into the teacher training college, because if subject knowledge is part of the teacher training programme, it would be overloaded at the expense of the foundation and professional studies, as Dzvimbo and Lima's study (1994) revealed. The curriculum should be designed and developed in accordance with the level of education in which the trainees are to be trained to teach - in this case, primary

education - in order to develop the competence of the students to teach. In this way, the curriculum should be aligned with the education needs of the country and take into account good school practices.

The **staff** competence of the teacher training institution should match the curriculum goals and practices. The teacher training curriculum, whether primary or secondary, should be directly linked with the qualifications and experience of the staff in both the teacher training colleges and the annexe school, as staff competence and qualifications play an important role in developing teacher competence. Besides other qualifications (a first degree or postgraduate degree), they must have professional training and experience at the same level in which they are training (primary or secondary education). The teacher is the key to educational quality

**School resources** are determined by the curriculum in terms of material and amount of financial support. Even though quality teaching and good results can be achieved with poor curricula, materials or infrastructure, lack of school resources and financial restraints affect the training of teachers as well as the standard of education in a country. This aspect is particularly important in the Mozambican context where, even if the infrastructure is lacking and resources are scarce, teacher competence could ensure the delivery of quality education (Alberto and Mahumane, 2000). However, the lack of infrastructure, the lack of school resources and the poor conditions that prevail in Mozambican schools have to be taken into consideration, as well as the internal (e.g. books, time in the class, class resources) and external teaching contexts (e.g. the school building, the library, the school's equipment) as these have a huge impact on teaching and learning. But note should to be taken of the specific resource and financial needs, implemented in the teacher training curriculum, which would differ, depending on whether the training is for primary or secondary education.

**Infrastructure** - in order for the practicum to be successfully implemented, teacher training colleges must be aware of the annexe schools with whom they align themselves. Annexe schools are an integral part of teacher training and an essential aspect in the teacher training process, and a relationship must therefore be developed between the two institutions. Aspects to consider are the size of school, the number of pupils, the school year and the timetable, so that they can conveniently accommodate the student teachers and implement the teacher training curriculum, as all of these factors are important in promoting good teacher training. The staff of the annexe schools and the conditions under which they receive student teachers must be organized to achieve the teacher training goals as well as the school's own objectives.

As stressed by Carr (2006), teachers are the front line of the education system, and intuition tells us that improving their quality should improve the quality of the service they provide.

**5. Across the SACMEQ countries, on average one out of five pupils in reading and one out of two pupils in mathematics have not attained the minimum basic requirements in these subjects by the end of Grade 6.**

In the SACMEQ countries, 22% of the Grade 6 pupils performed at Levels 1 (pre-reading) and 2 (emergent reading), and 40% of the pupils performed at Levels 1 (pre-numeracy) and 2 (emergent numeracy) in mathematics. These percentages imply that those pupils cannot read at all. In countries like Zambia (47.7% in reading and 71.2% in mathematics), Malawi (45.5% in reading and 74.3% in mathematics), Namibia (43.4% in reading and 76.6% in mathematics), South Africa (in 31% reading and 52.2% in mathematics) and Lesotho (24.4% in reading and 65.9% in mathematics), where pupils performed at Levels 1 and 2 in reading and mathematics, which is extremely low for Grade 6, special attention from key stakeholders including the Ministry of Education is necessary. The high percentage of pupils at those two levels has far-reaching implications in terms of the internal and external efficiency of the education system. The quality is low, and the pupils who performed at this level cannot proceed to higher levels of schooling. The teaching of reading and writing skills begins at Grade 1 and 2 levels in the case of Mozambique.

***Recommendations:***

1- **Further study**: The Ministries of Education in SACMEQ countries and in particular the countries with a high percentage of pupils who cannot read need to carry out two kinds of research studies. One would be designed

a) To assess the learning of reading and writing skills in primary education, identifying appropriate strategies and ways of addressing challenges

and the other would be designed

b) To assess all teachers training processes with a focus on the methodology of teaching reading and writing skills. (See “Further studies” in Section 9.3.)

2 - **Pre-Primary:** According to Fuentes and Nieto (2005), the early years of education are gaining more and more recognition and are the subject of studies and research all over the world. Taking into consideration that in Mozambique most pupils do not attend pre-primary education and do not speak Portuguese when they enter a school, it is suggested that pre-primary skills be introduced in a

compulsory class. However, in order to maintain the same number of classes (5) in lower primary, Grades 1 and 2 could be combined into one year. This innovation means that pre-primary pupils can learn the foundations of reading and mathematics, such as speaking, reading and writing, and skills related to mathematics like recognising position and size, before progressing into Grade 1, where the pupils would acquire and develop initial reading, writing and numeracy skills.

According to Passos (1995), a study carried out in Mozambique in the first grade shows that pupils who attended preschool or kindergarten were better equipped than others for the acquisition of reading skills. Abadzi (2005) found the same result: that reading achievement was lowest among pupils who had not attended preschool. This outcome is true internationally (the World Bank, 2006).

Mendes, Neves and Guedes (2000) explain that success in further learning depends significantly on the pupils' access to quality preschool education, which constitutes an irreplaceable factor in the learning process, as the first stage in basic education and as a way to achieve the objective of quality education for all, as defined by the UNESCO. Education for All (EFA) stresses that early childhood care and education contribute to good child development outcomes that set the foundation for lifelong learning, and helps in the monitoring of health and nutrition status during this critical period of development (EFA, 2005, p.82). In addition, Fuentes and Nieto (2005) argue that politicians have recognised that quality pre-primary education can constitute the sound foundation of a child's learning for the rest of his/her life. It is known from experience that children at this stage of their education are young investigators with an enormous, creative potential, capable of reasoning and thinking.

The problem militating against including pre-primary in the education system in Mozambique is usually described as being financial, but it is imperative for the Ministry of Education to rethink the costs of grade repetition in terms of the internal and external efficiency of the system, the costs for parents, and the frustration for teachers, pupils and parents. Using PASEC and SACMEQ data, Fehrler, Michaelowa and Wechtler (2006) have stressed that repetition generates high costs, because the system has to cope with an increased overall number of pupils and an increase in early drop-out. Although repetition of under-prepared learners is at times necessary, the effects of repetition on pupils' learning have consistently been shown to be negative rather than positive.

Finally, it is vital to stress that the acquisition and teaching of reading skills is a challenging task for pupils and teachers, but attending preschool lays a foundation for the acquisition of reading and writing skills for both teachers and pupils. According to Sedel (inVerspoor, 2003), "the challenge

of basic education policy is not only a challenge of quality but also one of equality: of equal opportunities to learn and achieve" (p.43).

**6. Reading performance is strongly related to mathematics performance.**

Pupil performance in reading is strongly related to pupil performance in mathematics in Mozambique (r =.778, p = 000) and in the SACMEQ countries as a whole (r = .874; p = 000). Examining individual SACMEQ country levels, the correlation between pupil performance in reading and in mathematics varies from (r = .629; p = 000) in Malawi to (r = .940; p = 000) in Namibia. However, reading performance is related to speaking the language of instruction at home, in Mozambique (r = .428; p = 000) and in the SACMEQ countries as a whole (r = .351; p = 000). In individual SACMEQ countries the correlation ranges from (r = .225; p = 000) in Namibia to (r = .589; p = 002) in Seychelles. For more details, see the tables of correlations in the Appendices. Pupils' speaking the language of instruction at home, is one of the strongest predictors of pupil performance in reading in Mozambique, and in both subjects in the SACMEQ countries. As evidence of this phenomenon, a study carried out in India shows that "There was a positive association between the mean percentage score in language and mathematics, the correlation between the two being 0.73. Thus the districts with a high achievement level in mathematics also depict high achievement level in language" (Aggarwal, 2000, p.9). Researchers found the same results in other cross-national studies such as in TIMSS (Papanastasiou, 2000), TIMSS 1997 (Howie, 2002), and PASEC and PIRLS studies (Greaney and Kellaghan, 2008).

The results draw attention to the need for special attention from key stakeholders, including the Ministry of Education. The higher percentage of pupils performing between Levels 1 and 3 in reading and mathematics has far-reaching implications in terms of the internal and external efficiency of the education systems. The quality is low, and pupils who performed within this level cannot proceed to higher levels of schooling. Basic reading, writing and numeracy skills are learnt at the Grade 1 and 2 levels in Mozambique, which means that when pupils reach Grade 6 their literacy levels should have developed beyond Levels 1 and 3 in SACMEQ tests.

***Recommendation:*** *Due to the important role that the language plays in pupil performance, it is critical to rethink the strategy of teaching the language of instruction. This teaching implies more investment in terms of resources like textbooks and libraries, and improved teacher training programmes. The Ministries of Education need to consider their language policies, taking into account the role of the mother tongue and the acquisition of the language of instruction and then to develop appropriate strategies to teach this language of instruction.*

**7. Pre-existing pupils' characteristics and the behavioural domain were the main predictors of pupil performance in reading in Mozambique, and in reading and in mathematics in SACMEQ countries.**

Four pupil variables affecting pupil performance in reading were found in Mozambique, in comparison with the two teacher variables. Examining the distribution of the variables in reading in the SACMEQ countries, it can be observed that of all the variables, 16 had positive or negative effects on pupil performance, namely 4 for school heads and 6 each for teachers and pupils.

***Recommendations:*** *Pre-existing pupils' characteristics, in particular pupils' SES, are the strongest predictors of pupil performance. One of the possible ways to reduce the negative impact of pupils' disadvantage in Mozambique would be to create a kind of association in which the parents, companies, and the economic and social sectors can play a part by paying tax to help children who are disadvantaged. The money can provide uniforms, textbooks, school materials and breakfast or tea at school during the school year. Another possibility is the payment of tax by parents to provide breakfast or tea at school for all pupils during the school year with sponsoring disadvantaged children. The money could be managed by schools and representatives of the community commission.*

**8. Pupils who speak the language of instruction at home tend to achieve higher results in both reading and mathematics.**

*Speaking the language of instruction at home* is one of the strongest predictors of pupil performance in reading in Mozambique, and in both subjects in the SACMEQ countries. Pupils who speak the language of instruction at home tend to achieve better performance in reading and in mathematics. This variable plays an important role in pupil performance as the more children who speak the language, the better their achievement in reading and in mathematics.

***Recommendation:*** *In certain SACMEQ countries such as Mozambique, Mauritius and Uganda, the language of instruction from Grade 1is not the mother tongue. However, although their performance was not the best, these countries did perform better than some other countries where the pupils learn in the mother tongue. Taking into consideration the SACMEQ results of those countries, it is recommended that the language of instruction to be used in a pupil's school career should be introduced from Grade One either as the oral and written language or as an oral subject in the countries that use bilingual education.*

*However, if the countries that apply bilingual education already teach the language of instruction from Grade 1, those countries need to rethink the language policy and in particular, the methodology used to teach the language.*

**9. Teachers' satisfaction is a predictor of pupil performance in mathematics in Mozambique and in some individual SACMEQ countries.**

The affective domain is a predictor of pupil performance in some individual SACMEQ countries. For instance, the quality of school buildings, classroom furniture, of the school management, and the availability of teachers' houses appears as a predictor of pupil performance in reading and in mathematics. The quality of school buildings appears as a predictor of pupil performance in mathematics in Mozambique.

Teachers' satisfaction is indicated in the literature as one of the factors related to teachers' performance. According to Fullan (1992) teachers teach in the way they do not only because of the skills they have or have not learned. The way they teach is also grounded in their background, their biographies, and in the kinds of teachers they have become. Their careers, their hopes and dreams, their opportunities and aspirations, and the frustration of these things important determinants of teacher commitment and morale. According to Tauber "something must be done to change perceptions that educators lack any special expertise. This perception had a negative affect on how pupils, administrators and the public, and these negative perceptions also influence how educators feel about themselves, about one another, and their profession" (1992, p.98). EFA (2005) argues for the provision of basic sanitation, a sound infrastructure and other facilities to make schools safe and welcoming. The condition of schools was identified by teachers as one of the sources of job satisfaction.

***Recommendation:*** *As there are many sources of teacher dissatisfaction in Mozambique such as the career path of teachers through promotion and their level of salary, it is suggested that the Ministry looks at offering alternative benefits to teachers. Previously, and in other countries, social benefits such as housing, health, education, travel and recreation were offered to teachers in lieu of major salary increases. Such a scheme could work in addressing issues of dissatisfaction identified in the SACMEQ study.*

**10. Gender has a differential effect on reading and mathematics across SACMEQ countries.**

On average, girls performed better in reading (505.1) than boys (494.6 p=.000) and boys performed slightly better in mathematics (501.7) than girls (498.1 p = .044) in SACMEQ countries. In Mozambique boys achieved 518.4 and girls 514.1 in reading, and in mathematics boys performed better (537) than girls (519.5 p = 000). However, exceptions were found in Lesotho, Malawi, Mozambique, Tanzania and Zanzibar, where boys performed better in reading than girls. In the PIRLS studies (2000 and 2006) girls recorded significantly higher mean scores in reading than boys in all systems, a fact which Greaney and Kellaghan (2008, p.117) and Mullis, Martin and Kennedy (2007) confirmed in PIRLS (2001 and 2006). In Botswana, Lesotho, Mauritius, Seychelles and South Africa, girls performed better in mathematics than boys. A similar result was found in the TIMSS study by Greaney and Kellaghan who state that "Overall, gender differences in mathematics achievement were negligible. Girls, however, outperformed boys in some systems, while boys did better in other systems" (2008, p.114).

**11. Pupils with a higher socio-economic status performed better than pupils with a lower socio-economic status across SACMEQ countries.**

Pupils with a higher SES performed better than pupils with a low SES (510.5; 523 p = .000) in reading and in mathematics (532.6; 527.5; p = 012) in the SACMEQ countries. On average, pupils with a low SES had 482.4 points in reading and 486 points in mathematics, while pupils with a high SES had significantly higher scores, with 519.9 points in reading and 515.2 points in mathematics. The exception is Lesotho, where pupils with a low SES performed better in mathematics (448.6) than pupils with a high SES (444.9). In various studies (Dustmann, Rajah andSoest, 1998; Epstein,1988 in Gold and Miles, 1981; Howie, 2002; Kotte, Lietz and Lopez, 2005), researchers emphasise the relationship between pupils' background and their performance. In addition, EFA (2) (2005) stress that pupils' socio-economic status is very influential in determining achievement in all contexts.

***Recommendation:*** *EFA (2) (2005) and other studies show that the impact of pupils' socio-economic status can be partly offset by a better school climate. It is recommended that the training of teachers is improved, that in-service training is continued, that there is provision of stronger support to teachers, and additional school resources, especially textbooks, needs to be considered by the Ministry to address this particular issue. In addition, the community can become more involved in the running and supporting of the school and its pupils.*

**12. Across SACMEQ countries on average, pupils from large towns performed better than pupils from smaller towns and rural or isolated areas.**

On average, pupils from isolated/rural areas in the SACMEQ countries had a mean of 482 points in reading; those from small towns had a 508.9 mean while pupils from large towns had a 540.7 mean (p=.000). In mathematics, pupils from isolated/rural areas had a 487.4 mean, their peers from small towns had a mean of 507.7 and for those from large towns, a mean of 526.7 was achieved (p = 000).

Mozambique pupils showed a similar pattern in both reading and mathematics. Pupils from large towns (533.3) performed better in reading than pupils from small towns (510.5) and isolated or rural areas (502.3; p = .000) and in mathematics pupils from large towns performed better than pupils from small towns 536.7; and 527.5 and isolated or rural areas (524; p = 000).

Using the SACMEQ data archive, Zhang's (2006) analysis found that in some SACMEQ countries rural pupils not only lagged behind their counterparts in reading ability but that their school conditions, which are important to academic success in general, compared unfavourably. Pupils from rural areas generally belong to families with a lower SES and tend to have less home support for their academic work. In addition, rural students tend to be older than their urban counterparts, as a result of late entry into the school system, a higher incidence of Grade repetition, or a combination of both. In addition to the poor condition of their facilities, schools in rural areas have fewer instructional resources, fewer facilities, and the teachers in those schools have lower reading scores.

***Recommendation:*** *To address the gap between education in urban and rural areas the Ministry of Education and Culture needs to implement a holistic plan to improve the quality of teaching and aim for greater equity. In order to develop equity, the lack of school resources, the infrastructure and the quality of teacher training and continued support of in-service teachers should be addressed. Consideration also needs to be given to the SES of both the teachers and the pupils in rural areas, and so it is recommended that in such areas, an upliftment programme involving the community and NGOs be implemented to address this issue*

**13. The availability of school resources is important for pupils' success in reading and mathematics in SACMEQ countries.**

School resources are predictors of pupil performance in reading and mathematics in SACMEQ countries. In less developed countries, there is a relationship between the school's location, the

external teaching context (school resources), and the internal teaching context (textbooks and school material). Chowdhury (1995) identifies three major problems related to the school's location. Firstly, the lack of physical access to the school; secondly, the quality of the infrastructure as well as the school equipment, especially in rural areas; and thirdly, the quality of the schooling, which is also an important determinant of participation and retention. These findings confirm what was found in EFA (2005) that most studies in developing countries suggest that cognitive achievement increases as school expenditure, teacher education and school facilities are enhanced. Fuller (1987) also found that resources were more important determinants of student achievement in developing countries than in industrialized countries. Fuller and Clarke (1994) reinforce this conclusion. In addition, EFA (4) (2005) argues that learning materials strongly affect what teachers can do. Zhang's (2006) study, referred to before, confirms the relationship between SES, school resources, school condition and school location (see Chapter 7, Figures 7.16 and 7.18).

***Recommendation:*** *The Ministry of Education and Culture in Mozambique should focus attention on rural schools and find the mechanisms to reduce the impact of pupils' low socio-economic status, school conditions and the lack of school resources, which could contribute to low pupil performance. One possible way to address these factors is for such rural schools to be attached to or associated with companies and NGOs or schools in large or small towns, which could then contribute to and assist in developing them.*

**14. Parent and community involvement is important for pupil performance in reading across SACMEQ countries.**

Community involvement appears as a predictor in reading and in mathematics in the SACMEQ countries. The role of parents in pupil performance is described in the literature as one of the variables that makes a difference. Students develop personally and academically if their families emphasize schooling, particularly if they let their children know they are interested, and do so continually over the years (Epstein, 1988 in Gold and Miles, 1981). Another important variable that makes a difference to pupil performance is the level of parents' education, especially the education levels of the mother, as no maternal education is an important determinant of pupils' enrolment as well as of pupils' performance, especially for girls, as confirmed by Chowdhury (1995). The reason for low parent involvement might be ascribed to the low literacy rate in rural areas.

***Recommendation*:** *The Ministry of Education and Culture in Mozambique should ensure that the commission/committee of the school community plays an active role in supporting schools, both in urban and in rural areas. The involvement of the community in schools could help solve some of the daily problems that schools face such as maintaining school buildings and monitoring the*

*conditions in schools, implementing a disciplinary policy, a homework policy, and addressing teacher and pupil absenteeism. The implementation of literacy and numeracy programmes for parents has occurred in Mozambique to improve the level of parents' education.*

The aim of the next section is to propose further studies for a deeper understanding of pupil performance.

## 10.4 CONCLUSIONS AND RECOMMENDATIONS REGARDING THE RESEARCH AND FURTHER STUDIES

Taking into consideration the results of this study, the purpose of this section is to propose some themes for further research designed to understand the reasons for low pupil performance in reading and in mathematics in some SACMEQ countries. The two investigations proposed relate to undertaking another secondary study using the SACMEQ data and a different study investigating the methodology used in the teaching of reading and writing skills in primary education.

### 1 – There is a need for further cross-national studies using the SACMEQ database

The use and analysis of the SACMEQ cross-national database provides the Ministries of Education of the SACMEQ countries with sound data to inform the development of teaching and learning in schools. Examples of kinds of such information are:

a) pupil performance in reading in different types of texts:

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

***Expository prose:*** *Continuous text in which the writer aims to describe, explains, or otherwise conveys 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.*

b) pupil performance in mathematics in different types of numeracy:

***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.*

These studies can contribute to identifying the areas where pupils present difficulties. The results of the study can be useful for curriculum planners to improve strategies for teaching, for those who write primary school textbooks, as well as for teaching and learning.

**2 – There is a need for a further study emanating from the results of SACMEQ**

The high percentage of pupils performing only between Levels 1 and 3 in reading and mathematics has far-reaching implications in terms of the internal and external efficiency of the education system. The quality is low, and pupils who performed at these levels cannot proceed to higher levels of schooling. This poor performance has implications for the acquisition and development of initial reading, writing and numeracy skills, which are aimed at Grade 1 and 2 in the case of Mozambique.

Where pupils perform in or under Level 3, the Ministries of Education of those school systems should conduct two kinds of research studies:

a) One study should assess primary education and incorporate an investigation into:

- The level of teachers' knowledge of reading, writing and numeracy skills methodology.
- How teachers implement the methodologies which enable pupils to learn reading, writing and numeracy skills.
- How textbooks implement the methodology to learn reading, writing and numeracy skills.
- How teachers prepare pupils to learn reading, writing and numeracy skills.

The purpose of such a study would be to identify the major difficulties that pupils encounter in learning reading, writing and numeracy skills, and to evaluate the level of teachers' knowledge of the methodology.

b) The other study should assess all teacher training processes with a focus on the methodology of teaching reading, writing and numeracy skills, including:

- The curriculum for teacher training.
- Trainers' profiles.
- Modules in teacher training colleges.
- Teachers' profiles at Annexe schools.
- Pedagogical practices at primary school level.
- Textbooks and subject teacher guides in primary school.

## 10.5 CONCLUSION

Dealing with the role of the teacher in pupil performance, which is emphasized by many researchers, such as Chapman and Mählck (1997), Châu (1996), Darling-Hammond (1999) and Kanu (1996), this study is intended to be a modest contribution made to the Ministries of Education in SACMEQ countries, although it has particular relevance for the Ministry of Education and Culture in Mozambique. This contribution is made in the knowledge that the Ministry has conducted few studies in upper primary school related to the pupils' and teachers' performance, and in the knowledge that Mozambique, as a Portuguese-speaking country, has a unique history, tradition and system of education different from that of any others of the countries that participated in the SACMEQ study.

A comparative analysis using a cross-national study is important for the Ministry of Education and Culture in order to have an overview of the performance of teachers and pupils in other school systems within the SACMEQ countries. By identifying the weaknesses and the strengths in each system, all SACMEQ countries can learn from one another. However, the results of this thesis` should be used with caution, taking into consideration the history, location, economy and culture of each country.

SACMEQ II is one of the few known research projects that 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 data. SACMEQ provided valid and reliable data on which important decisions could be based. Specifically, SACMEQ II provided relevant, high-quality data about the academic profile of teachers, the level of performance in the areas assessed, school management, and other factors that are relevant for policy making.

Many benefits are apparent within the educational context of the region. The data collected through SACMEQ II can be considered to be of extreme importance for Mozambique's education system,

since it provides the country with important data to promote a reflection on its primary education sector, to identify the position of Mozambique's education system within the region, and to work towards its improvement.

The Ministry of Education and Culture in Mozambique focuses very strongly on increasing access and educational opportunities for all Mozambicans at all levels of the education system. At the same time, the quality of education in Mozambique is constantly being improved, and institutional and financial frameworks are developed that will sustain Mozambican schools and pupils in the future (MINED, 1998). Although school conditions and the various resources are essential to the overall results achieved by pupils, the quality of the teachers is of paramount importance to the performance of pupils.

The challenge facing the education system in Mozambique is therefore not only to improve school conditions and to ensure the availability of resources, but to deliver quality teachers, thereby entrenching quality in education.