The Southern and Eastern Africa Consortium for Monitoring Educational Quality

A cross-national assessment of students’ literacy and numeracy in Africa

The Southern and Eastern Africa Consortium for Monitoring Educational Quality (SACMEQ) carries out large-scale cross-national research studies in member countries in the Southern and Eastern Africa region (see Figure 1 for member countries). It aims to assess the conditions of schooling and performance levels of learners and teachers in the areas of literacy and numeracy. SACMEQ has completed three cross-national educational research projects so far at five- to six-year intervals (SACMEQ I, 1995-1999, SACMEQ II, 1998-2004 and SACMEQ III, 2005-2010). It is currently implementing the fourth project (SACMEQ, n.d.-c).

Origins and context

In 1990, the Ministry of Education in Zimbabwe undertook an integrated research and training program provided by UNESCO’s International
The Southern and Eastern Africa Consortium for Monitoring Educational Quality (SACMEQ) has its origins in a project aimed at assessing the quality of education in Zimbabwe’s primary schools. This program involved the staff of the Ministry’s Planning Unit in integrated research and training activities to produce meaningful advice related to policy concerns expressed by senior Ministry decision-makers (SACMEQ, n.d.-b, para. 1). As a result, it produced a research report that reviewed a range of important education policy issues and provided baseline information for comparison with later studies. The report was used as the central theme when educational planners and researchers from Zimbabwe and several surrounding countries took part in a series of IIEP follow-up training workshops (SACMEQ, n.d.-b).

In 1992, the workshop participants discussed with IIEP the training needs for strengthening capacity so that staff members of their education planning units can monitor and evaluate the quality of their education systems. This discussion eventually resulted in the establishment of a consortium of ministries of education known as SACMEQ (SACMEQ, n.d.-b). In 1997, SACMEQ was registered as an international non-governmental organisation by the Government of Zimbabwe (Ross, 1998). Since then, the number of participating ministries of education has grown from seven in the first SACMEQ project to 14 in SACMEQ II and to 15 in SACMEQ III (SACMEQ, n.d.-c).

SACMEQ’s policies and programs are set by the SACMEQ Assembly of Ministers consisting of the 16 Ministers of Education (Ross, 1998). Operational activities to implement these policies and programs are co-ordinated by the SACMEQ Co-ordinating Centre based within the IIEP in Paris. In addition, the SACMEQ Managing Committee and the SACMEQ Scientific Committee work closely in the implementation. The former coordinates the details of SACMEQ’s administration and finance. The latter is responsible for providing the SACMEQ Coordinating Centre with training, technical support and advice. The implementation of SACMEQ projects within a country is overseen by National Research Coordinators (NRCs) who are appointed by their respective Ministers of Education. The SACMEQ Coordinating Centre and the SACMEQ Scientific Committee provide the NRCs with administrative and technical support. Since the formation of the consortium, the Government of the Netherlands has been providing financial support (SACMEQ, n.d.-b).

**Purpose**

The main purposes of SACMEQ are to:

- provide educational officials and researchers with training in the technical skills required to monitor, evaluate, and compare the general conditions of schooling and the quality of basic education
- generate information that can be used by decision-makers to formulate plans for improving the quality of education, and
- widely disseminate and use SACMEQ research results as the basis for policy and practice (SACMEQ, n.d.-a).

**Measurement objectives**

**Cognitive test**

SACMEQ I assessed only reading. Based on extensive analyses of curricula, syllabi, exams and textbooks used in member countries, the project defined three sub-domains to be assessed in the reading test (‘narrative prose’, ‘expository prose’ and ‘documents’). These sub-domains were combined with five reading skill levels (with increasing competence levels from 1 to 5) to form a framework for the construction of suitable test items (Ross et al., 2004). The SACMEQ II assessment framework for student reading test is shown in Table 1.

There were three major changes in the test construction when preparation for the SACMEQ II project took place. First, it was decided to add mathematics to the subjects to be assessed. In a similar way to the SACMEQ reading test, three sub-domains (‘number’, ‘measurement’ and ‘space-data’) and five levels of skills to
be assessed were combined to construct a mathematics framework for SACMEQ II mathematics test (Ross et al., 2004).

Table 2 displays the framework.

Second, it was decided to assess performance levels of teachers as well in reading and mathematics (Ross et al., 2004). This means that the performance levels of both students and teachers were assessed for reading and mathematics in SACMEQ II and III, while only students had been assessed in one subject (reading) in SACMEQ I.

Third, SACMEQ II included linked test items selected from earlier studies such as SACMEQ I, the Zimbabwe Indicators of the Quality of Education Study, IEA’s Trends in International Mathematics and Science Study (TIMSS), and IEA’s Progress in International Reading Literacy Study (PIRLS). Including these linked items made it possible to make comparisons between various groups of respondents such as students and teachers within SACMEQ projects, and students in SACMEQ and students in TIMSS/PIRLS studies (Ross et al., 2004). There were no significant changes in the test items for SACMEQ III (Sauba & Lutchmiah, 2011).

**Contextual information**

Questionnaires were also administered to students, teachers and principals to provide information on the general conditions of schooling and the background of the students and teachers. In addition, information about students’ and teachers’ knowledge about HIV and AIDS was collected in SACMEQ III (Hungi, 2011b; Hungi et al., 2011; Makuwa, 2011).
Target population and sampling methodology

The target population of SACMEQ projects is Grade 6 students. This choice of target grade is partly explained by the timing of transition between the use of local and official languages in classrooms. In general, schools in SACMEQ countries start introducing official languages around third or fourth grade. Given that all SACMEQ countries administer the assessment in one of their official languages (SACMEQ, 2007b), it is important to conduct it when it can be assumed that the official language has been learnt sufficiently for most or all students. Assessing students lower than Grade 6 was considered too close to the transition point (Onsomu, Nzomo & Obiero, 2005; Wagner, 2011).

Two-stage stratified sampling is employed in SACMEQ projects. The target population is stratified by region. In the first sampling stage, schools are selected from each region using probability proportional to size (PPS) sampling. In the second sampling stage, a random sample of a fixed number of students is drawn by trained data collectors from each selected school (Hungi et al., 2010). Data collectors are provided with a manual that explains all the necessary steps to make sure a simple random sample of students is selected in the school they visit (SACMEQ, 2007a). The minimum number of students per selected school was 20 in SACMEQ I and II (Ross et al., 2004; SACMEQ, 1995), and 25 in SACMEQ III (SACMEQ, 2007a).

For the assessment of teachers, those teachers who teach relevant subjects in the three largest Grade 6 classes are selected by the data collectors from each selected school. For example, if classes 6A, 6C and 6D have the largest number of students in Grade 6, all the teachers who teach reading, mathematics and health education in these three classes are selected (SACMEQ, 2007a).

Note. Adapted from Ross et al. (2004) Chapter 2: Methodology for SACMEQ II study, p.51

Table 2. SACMEQ II Assessment Framework for Student Mathematics Test

<table>
<thead>
<tr>
<th>Skill levels</th>
<th>Domains</th>
<th>Number</th>
<th>Measurement</th>
<th>Space-data</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td></td>
<td>Measurement</td>
<td>Space-data</td>
</tr>
<tr>
<td></td>
<td>Recognise numbers. Link patterns to numbers.</td>
<td>1</td>
<td>Recognise units of measurement. Apply basic calculations using simple measurement units.</td>
<td>Link patterns and graphs to single digits. Recognise and name basic shapes.</td>
</tr>
<tr>
<td></td>
<td>Apply single operations to two digit numbers or simple fractions.</td>
<td>2</td>
<td>Convert measurement units when undertaking one-step operations.</td>
<td>Translate shapes and patterns. Identify data in tabular form.</td>
</tr>
<tr>
<td></td>
<td>Extend and complete number patterns.</td>
<td>3</td>
<td>Apply two and three-step arithmetic operations to numbers. Use and convert measurement units.</td>
<td>Combine arithmetic operations in order to link information from tables and charts.</td>
</tr>
<tr>
<td></td>
<td>Combine arithmetic operations in order to link information from tables and charts when performing calculations.</td>
<td>4</td>
<td>Combine operations in order to make calculations involving several steps and a mixture of operations using combinations of fractions, decimals, and whole numbers.</td>
<td>Link data from tables and graphs in order to make calculations involving several steps and a mixture of operations.</td>
</tr>
<tr>
<td></td>
<td>Combine operations in order to make calculations involving several steps and a mixture of operations using combinations of fractions, decimals, and whole numbers.</td>
<td>5</td>
<td>Link data from tables and graphs in order to make calculations involving several steps and a mixture of operations.</td>
<td></td>
</tr>
</tbody>
</table>

Number Measurement Space-data

1 Recognise numbers. Link patterns to numbers.

2 Apply single operations to two digit numbers or simple fractions.

3 Extend and complete number patterns.

4 Combine arithmetic operations in order to link information from tables and charts when performing calculations.

5 Combine operations in order to make calculations involving several steps and a mixture of operations using combinations of fractions, decimals, and whole numbers.

Note. Adapted from Ross et al. (2004) Chapter 2: Methodology for SACMEQ II study, p.51

3 All SACMEQ countries administered the assessments in English except that Mozambique used Portuguese and Tanzania (Mainland and Zanzibar) used Kiswahili.
The approximate sample size of each SACMEQ project was as follows:

- SACMEQ I – 1000 schools, 20 000 students, 3000 teachers
- SACMEQ II – 2000 schools, 40 000 students, 5300 teachers, and
- SACMEQ III – 2800 schools, 61 000 students, 8000 teachers (SACMEQ, n.d.-c).

Assessment administration

In SACMEQ, paper-based instruments are administered by trained data collectors who may be retired teachers or employees of the ministries of education. In most SACMEQ countries, data are collected over a two-week period in September and December. The data collection process is guided by two detailed manuals – one for National Research Co-ordinators who oversee the national implementation of SACMEQ, and the other for data collectors which details every step that has to be taken during assessment administration (SACMEQ, 2007a, 2007b).

For students, assessments of reading, mathematics and health knowledge are administered at school over two days. All of the randomly sampled students sit in one room and complete the assessment. After the assessment on the first day, students are asked to take home a student questionnaire, complete it at home and bring it back to school the following day (SACMEQ, 2007a). This arrangement aims at reducing the number of missing responses to some questions to which students might not know the answers, but family members could help in completing (for example, parents’ education level, estimates of travel distance to school, and home possessions) (Hungi, 2011a).

Teachers are assessed separately from students. All of the selected teachers are asked to sit in one room to complete a teacher booklet. The teacher booklet consists of four parts: background information, health knowledge, reading and mathematics. All selected teachers are required to complete the first two parts, while reading teachers are asked also to complete the reading part, and mathematics teachers also need to fill in the mathematics part (SACMEQ, 2007a). Completed instruments are collected and sent immediately to the SACMEQ National Research Coordinating Centre in each country for data entry, cleaning and analysis. A copy of the cleaned data is also sent to the SACMEQ Coordinating Centre in Paris for cross-country analysis (Monyaku & Mmereki, 2011; Sauba & Lutchmiah, 2011; Wasanga, Ogle & Wambua, 2012).

Reporting and dissemination

A wide range of reports is published for each SACMEQ project. The SACMEQ Coordinating Centre releases a number of international reports with cross-national comparisons and descriptions of technical aspects of SACMEQ projects. Each participating country issues a policy brief and a detailed country report. Within a country report, sections are devoted to describing the background of the education system, the administration of the study, contextual information, the performance of students and teachers, and policy recommendations (SACMEQ, 2013, n.d.-c).

In SACMEQ, the performance of students and teachers is reported in two main ways – as a mean score which is scaled using the Rasch model of Item Response Theory, and as percentages in one of the eight competency levels that have been identified for each subject – reading and mathematics. For the purposes of analysis, these scores and percentages are typically disaggregated by region, sex, school location (rural/urban), and socioeconomic status (low/high) (Hungi et al., 2010).

Table 3 is an example taken from a country report for Botswana (Monyaku & Mmereki, 2011). This table indicates that overall scores of reading improved from SACMEQ II to SACMEQ III. It also shows that in both SACMEQ studies, the mean scores are higher for girls than for boys, that the schools in urban areas scored higher than those in rural areas, and that students with high Socio-Economic Status (SES) performed better than those with low SES. It can also be seen that the performance level of students with low SES declined from SACMEQ II to SACMEQ III.

A wide dissemination of research results is one of the SACMEQ’s main purposes (SACMEQ, n.d.-a). Each SACMEQ country convenes a forum for the dissemination of results that involves different groups of stakeholders, ranging from high-level policy makers and senior management of the education

---

4 The overall student mean score of SACMEQ II is set to be equal to 500, and the standard deviation is equal to 100.
ministry to donor agencies and regional/local level
decision-makers (Nzomo & Makuwa, 2006). In
addition, all types of reports and data files from the
three SACMEQ projects are publicly available on
SACMEQ’s website (http://www.sacmeq.org/).
This enables the results to reach a broader range of
stakeholders, and provides education planners and
researchers with an opportunity to conduct further
analysis to aid in policy formulation for specific
concerns in the education sector.

**Influence**

SACMEQ research results have been playing an
important role in informing dialogue and decisions
related to the education systems of the member
countries (Leste, 2005; Nzomo & Makuwa,
2006; Sayed & Kanjee, 2013). When SACMEQ I
was completed, for example, the project reports
featured in major policy documentation such as:

- presidential and national commissions on
  education in Kenya, Namibia and Zimbabwe
- a prime ministerial and cabinet review of
  educational policy in Zanzibar
- national education sector studies in Malawi and
  Zambia, and
- a review of a national education master plan in
  Mauritius (Murimba, 2002).

Moreover, the influence of SACMEQ research
results can be observed not only in policy
documentation, but also in the actual direction
of policy and practice reforms in some countries.
In Kenya, for example, SACMEQ findings on
lower-than-expected levels of achievement have
prompted the government, in collaboration with
other key stakeholders and development partners,
to implement a school-based teacher development
program. Donors have also begun to support
the provision of textbooks to all public primary schools
when findings showed there was an inadequate
supply of them (Nzomo & Makuwa, 2006).

Another example is Namibia, where findings from
the SACMEQ research revealed that the northern
regions had the most difficulty in providing
adequate educational resources and achieving
minimum levels of student learning outcomes.
With the support of development partners,
multiple levels of the education sectors in these
regions – from teachers to regional education
officers – have now been targeted for assistance.
Schools have been divided into clusters for
administrative and support services. This
arrangement enables a cluster of schools to share
educational resources, good practice, and valuable
expertise, which can benefit struggling schools in
the region (Nzomo & Makuwa, 2006).

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>SE</td>
<td>Mean</td>
<td>SE</td>
</tr>
<tr>
<td>Boys</td>
<td>507.2</td>
<td>519.7</td>
<td>12.5</td>
</tr>
<tr>
<td>Girls</td>
<td>534.4</td>
<td>549.4</td>
<td>15.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>SE</td>
<td>Mean</td>
<td>SE</td>
</tr>
<tr>
<td>Rural</td>
<td>502.4</td>
<td>508.1</td>
<td>5.7</td>
</tr>
<tr>
<td>Urban</td>
<td>539.1</td>
<td>559.5</td>
<td>20.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>SE</td>
<td>Mean</td>
<td>SE</td>
</tr>
<tr>
<td>Low SES (bottom 25%)</td>
<td>490.8</td>
<td>474.4</td>
<td>-16.4</td>
</tr>
<tr>
<td>High SES (Top 25%)</td>
<td>573.1</td>
<td>583.6</td>
<td>10.5</td>
</tr>
</tbody>
</table>

| Botswana         | 521.1                                | 534.6                                | 13.5              |
| SACMEQ           | 500.0                                | 509.7                                | 9.7               |

In reporting these two examples, it is emphasised that active involvement by ministry of education staff in the research implementation is the key for establishing a linkage between research results and action (Nzomo & Makuwa, 2006).

References


The ACER Global Education Monitoring Centre supports the monitoring of educational outcomes worldwide, holding the view that the systematic and strategic collection of data on educational outcomes, and factors related to those outcomes, can inform policy aimed at improving educational progress for all learners.