

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

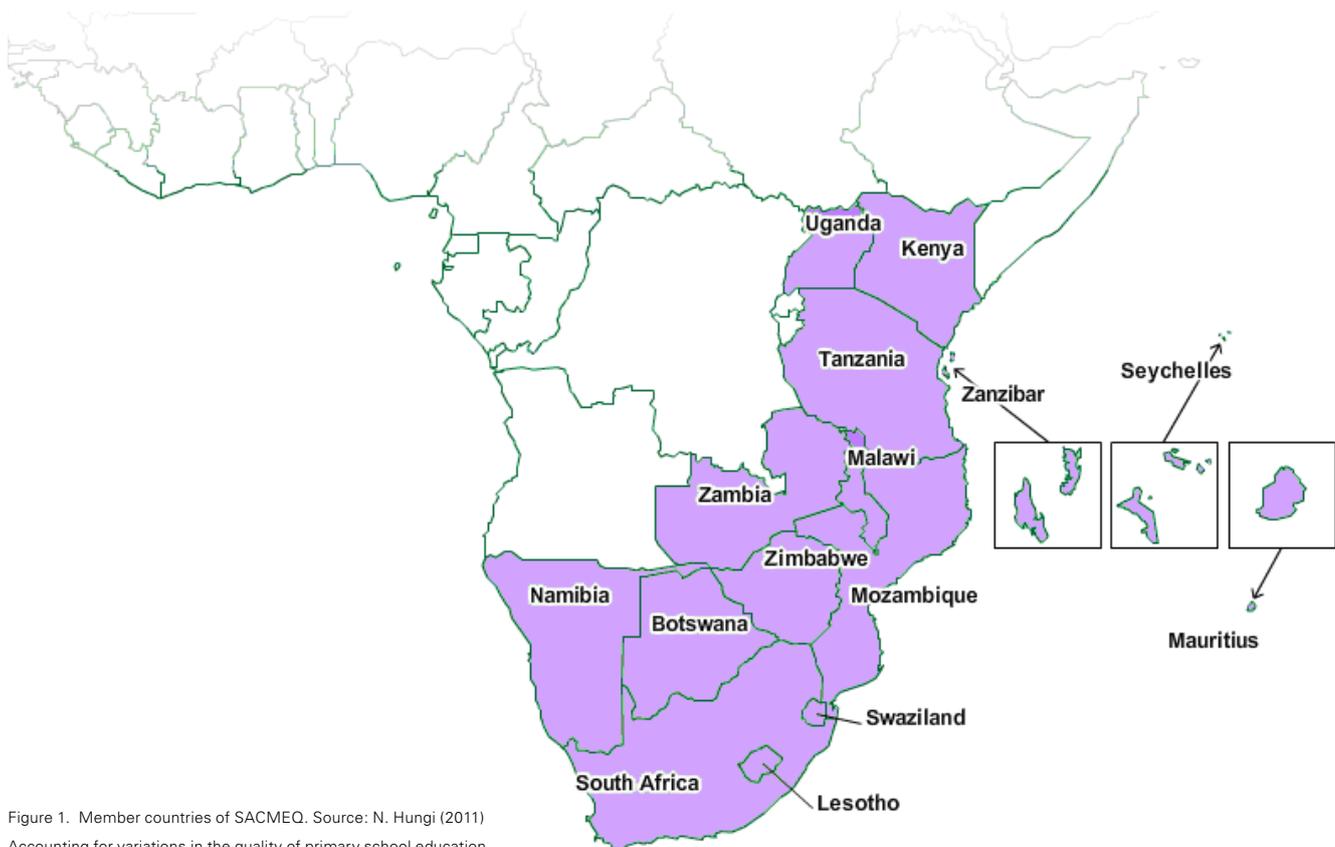


Figure 1. Member countries of SACMEQ. Source: N. Hungi (2011) Accounting for variations in the quality of primary school education

Institute for Educational Planning (IIEP). This program aimed to '(1) assess the quality of education in Zimbabwe's primary schools, (2) involve the staff of the Ministry's Planning Unit in integrated research and training activities, and (3) provide 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 also 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 III¹ (SACMEQ, n.d.-c).

SACMEQ's policies and programs are set by the SACMEQ Assembly of Ministers consisting of the 16 Ministers of Education² (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

1 The seven countries/regions that participated in SACMEQ I include: Kenya, Malawi, Mauritius, Namibia, Zanzibar of Tanzania, Zambia and Zimbabwe. These seven countries and eight more countries/regions (Botswana, Lesotho, Mozambique, Seychelles, South Africa, Swaziland, Mainland of Tanzania and Uganda) took part in SACMEQ II. Zimbabwe did not participate in SACMEQ II. Those 14 countries/regions that participated in SACMEQ II implemented SACMEQ III as well. Zimbabwe joined again in SACMEQ III.

2 Angola is a member of SACMEQ, but has not implemented any survey project yet.

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

Table 1. SACMEQ II Assessment Framework for Student Reading Test

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

Note. Adapted from Ross et al. (2004) Chapter 2: Methodology for SACMEQ II study, p.48

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 (Hungu, 2011b; Hungu et al., 2011; Makuwa, 2011).

Table 2. SACMEQ II Assessment Framework for Student Mathematics Test

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

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

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)³, 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 (Hungu 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).

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) (Hungu, 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 & Lutcmiah, 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 model⁴ 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) (Hungu 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.

Table 3. Botswana: Comparison of Students' Mean Scores of Reading Between SACMEQ II and SACMEQ III Disaggregated by Sub-Groups

	Reading mean scores SACMEQ II (2000)		Reading mean scores SACMEQ III (2007)		Change (2007 –2000)
	Mean	SE	Mean	SE	Mean change
<i>Pupil gender</i>					
Boys	507.2	3.92	519.7	5.06	12.5
Girls	534.4	3.60	549.4	4.53	15.0
<i>School location</i>					
Rural	502.4	3.36	508.1	4.85	5.7
Urban	539.1	5.68	559.5	6.99	20.4
<i>Socioeconomic levels</i>					
Low SES (bottom 25%)	490.8	3.75	474.4	5.30	-16.4
High SES (Top 25%)	573.1	8.30	583.6	5.82	10.5
Botswana	521.1	3.46	534.6	4.57	13.5
SACMEQ	500.0	1.16	509.7	1.23	

Source B. Monyaku, and O. Mmerekhi (2011) The SACMEQ III project in Botswana: A study of the conditions of schooling and the quality of education, p. 62.

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).

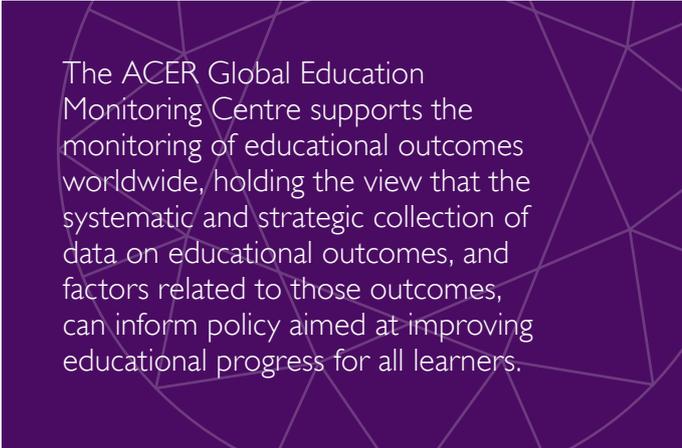
Moreover, the influence of SACMEQ research results can be observed not only in policy documentation, but also in the actual direction of policy and practice reforms in some countries. In Kenya, for example, SACMEQ findings on lower-than-expected levels of achievement have prompted the government, in 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).

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).

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