



## **GENDER EQUALITY IN EDUCATION: LOOKING BEYOND PARITY**

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**TRENDS IN GENDER EQUALITY IN LEARNING  
ACHIEVEMENT IN SOUTHERN AND EASTERN AFRICA:  
EXPLORATION OF CHARACTERISTICS OF EDUCATIONAL  
ENVIRONMENT AND CURRICULUM AREAS**

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## **ABSTRACT**

The purpose of this paper is to study the gender differences in learning achievement by exploring in Southern and Eastern African countries the educational environment and curriculum contents. The study is based on the data archive of a large-scale assessment administered by a consortium known as Southern and Eastern Africa Consortium for Monitoring Educational Quality (SACMEQ) during 2000 and 2007.

The examination of the progress in gender equality in various educational dimensions revealed that many countries have improved the gender balance in school participation while the quality issue tended to remain unchanged between 2000 and 2007.

However, by comparing the characteristics of groups of schools within two countries, it was suggested that gender differences in achievement may not always be related to the availability of school resources and/or the wealth of the pupils.

By examining different domains of reading and mathematics subjects, it seemed that boys tended to do better in the 'documents' domain of reading and the 'measurement' domain of mathematics while girls tended to do better in the 'expository' domain of reading and the 'number' domain of mathematics.

Keywords: gender differences, learning achievement, SACMEQ,

## INTRODUCTION

Trends in gender differences in learning achievement have been analyzed in several large-scale international assessments. For example, analyses from a number of studies (Trends in International Mathematics and Science Study (TIMSS), Progress in International Reading Literacy Study (PIRLS), and Programme for International Student Assessment (PISA)) demonstrate that literacy results have systematically favoured girls, while gender differences in mathematics results have been narrowed, at all age and grade levels (Mullis et al, 2007; 2008; OECD, 2009).

Results from countries that took part in an international study on *Segundo estudio regional comparativo y explicativo*<sup>1</sup> (SERCE) as well as countries participating in the Programme d'analyse des systèmes éducatifs des États et gouvernements membres de la CONFEMEN (PASEC) revealed that gender differences at upper grades were large in favour of boys while the differences at lower grades were marginal (LLECE, 2008; CONFEMEN, 2011).

Using the data from Southern and Eastern Africa Consortium for Monitoring Educational Quality (SACMEQ), Saito (2010) reported that there has been little change in the magnitude or direction of gender differences for learning achievement in reading and mathematics in Southern and Eastern African countries. This has led to a hypothesis that gender-related interventions in these countries might have focused too much on school access and participation, rather than on educational quality.

The purpose of this paper is to explore the educational environment and curriculum content in 15 school systems<sup>2</sup> in Southern and Eastern Africa. This may then provide further explanation for the presence or absence of gender differences in learning achievement in primary education in this region.

Research questions are as follows:

- How has each country progressed on gender equality in various educational dimensions between 2000 and 2007?
- What were the characteristics of the educational environment where there were minimal gender differences in reading and mathematics performance in 2007?
- What were the characteristics of curriculum areas, in reading and mathematics, where there were large gender differences in 2007?

## METHODOLOGY

The current research is based on the data that were collected by a network known as SACMEQ. SACMEQ has undertaken three large-scale, cross-national studies of the quality of education: SACMEQ I with over 20,000 Grade 6 pupils in seven Ministries (1995-1999, reading); SACMEQ II with over 41,000 Grade 6 pupils in 14 Ministries (2000-2004, reading and mathematics); and SACMEQ III with over 61,000 Grade 6 pupils in 15 Ministries (2006-2010, reading, mathematics, and HIV and AIDS knowledge).

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<sup>1</sup> Student Achievement in Latin America and the Caribbean

<sup>2</sup> SACMEQ has 15 member Ministries, but these are 14 countries because Tanzania has two memberships: Tanzania Mainland and Tanzania Zanzibar. These members are referred as 'school systems'.

The target population for all SACMEQ studies has been pupils at the Grade 6 level. A sample of Grade 6 pupils were selected based on a stratified two-stage cluster sample using a probability sampling proportional to the size of schools. It is also based on each country's degree of heterogeneity between schools, and is within the international standard of sampling accuracy equivalent to a 400 simple random sample. Pupil weight, which was the inverse of the probability of selection at pupil level, was applied in order to adjust for any discrepancies. A more detailed explanation of the sampling procedures that were used in SACMEQ studies has been given in Ross and Saito (in press).

Tests for reading and mathematics were based on the curriculum blueprints of the participating SACMEQ countries. Partial test items were shared between studies at different time points as well as between pupils and teachers. Items across these different tests were calibrated using a Rasch approach, and these different tests were equated based on the relative difficulty levels of shared items. All items in all SACMEQ tests were checked for any bias between different time points, across countries, and between boys and girls, using Differential Item Functioning (DIF) analyses. While there was no gender bias in any of the SACMEQ tests (Saito, 2008), a few items that were subject to bias between different SACMEQ studies and among countries were not used for the scoring purpose (Saito et al., in press). The original blueprints were cross-checked by undertaking the "skills audit", and a series of hierarchical competency descriptions were established for each subject (see Appendix A). The pupil mean of 500 and the standard deviation of 100 were established during SACMEQ II, and the partial use of common items during SACMEQ III made possible the direct comparison of mean scores between the studies.

In all SACMEQ data archives, data from pupils, teachers, and school heads have been merged at the pupil level. Therefore all the results must be interpreted in reference to the pupils (Saito & Dolata, in press). Analyses that were carried out in this paper were descriptive, based on the SACMEQ data archives of 2000 and 2007 using SPSS version 19 with the complex sample module for calculating the sampling errors.

## **RESULTS**

### **1. How has each country progressed on gender equality in various educational dimensions between 2000 and 2007?**

In order to answer the question regarding the progress on gender equality in primary education, seven selected dimensions available from SACMEQ II and III data archives were examined (see Table 1).

**Table 1: Selected Dimensions for Gender Equality and the Specific Indicators**

<b>Selected Dimensions</b>	<b>Specific Indicators</b>
a. Gender balance in participation	a. Proportion of girls in Grade 6 participation
b. Gender equality in reading achievement	b. Gender differences in reading mean scores
c. Gender equality in mathematics achievement	c. Gender differences in mathematics mean scores
d. Gender balance in reading teachers	d. Proportion of Grade 6 pupils who were taught by female reading teachers
e. Gender balance in mathematics teachers	e. Proportion of Grade 6 pupils who were taught by female mathematics teachers
f. Gender balance in school heads	f. Proportion of Grade 6 pupils going to schools where School Heads are males
g. Gender equality in toilet provision	g. Differences between ratios for boys/toilet and girls/toilet

Each indicator was converted into a scale with five possible values, depending on the magnitude and the direction of the gender differences as shown in Table 2. This same process was applied to SACMEQ II and SACMEQ III.

**Table 2: Values and Descriptions for Scale of Gender-related Indicators**

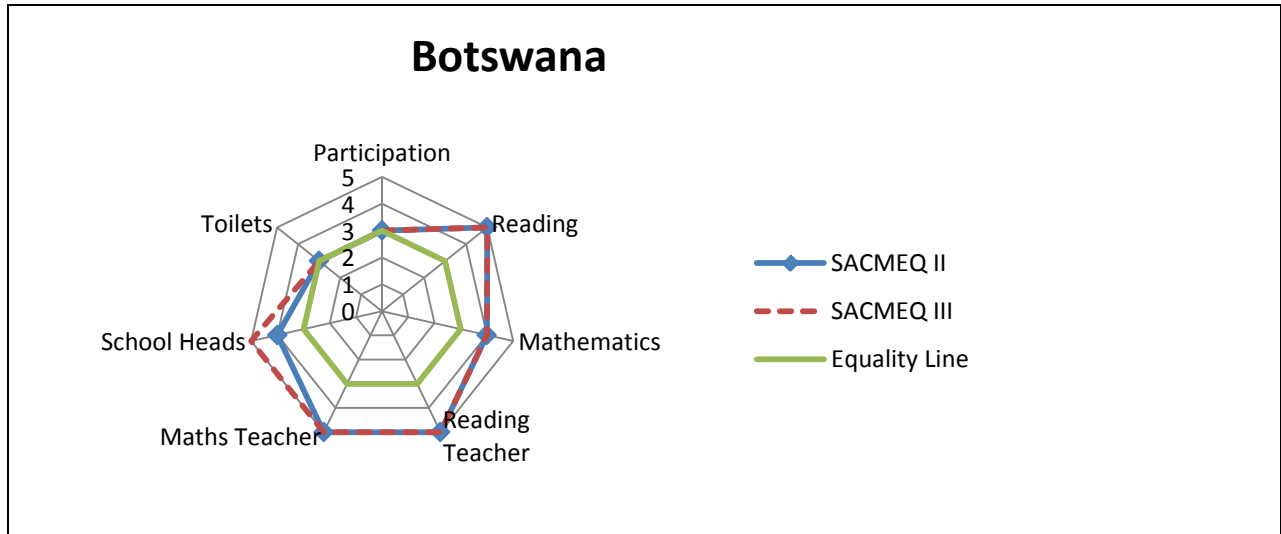
<b>Value</b>	<b>Gender Difference</b>
1	Significant (greater or equal to two Standard Errors) <b>in favour of boys and/or males</b>
2	Reasonable (greater or equal to one Standard Errors but less than two Standard Errors) <b>in favour of boys and/or males</b>
3	None or negligible (within one Standard Error)
4	Reasonable (greater or equal to one Standard Errors but less than two Standard Errors) <b>in favour of girls and/or females</b>
5	Significant (greater or equal to two Standard Errors) <b>in favour of girls and/or females</b>

In Appendix B, a summary of progress towards gender equality has been provided in a spider web diagram for each country. The 'gender equality' line has been illustrated as a green line, which connects the value of 3 in all the indicators. This could be compared with the blue line for SACMEQ II results and the dotted red line for SACMEQ III results. If these lines are outside the green line, this means that situations were more advantageous for girls and/or females. Lines inside the green line illustrate advantageous situations for boys and/or males. The most desirable trend results would be to move closer to the green line between different time points, whichever the direction would be.

For example, in Botswana (see Figure 1), the blue line (SACMEQ II) and the dotted red line (SACMEQ III) were very similar. Neither of these lines was inside the green line (gender equality line). Concretely, gender balance has been achieved in terms of Grade 6 pupils' participation for both SACMEQ studies, and reading and mathematics achievements were always in favour of girls with significant gender differences. In addition, teaching positions (both reading and mathematics) in Botswana have been always dominated by female. When it comes to the leadership position, however, the situation of female domination which was already seen during SACMEQ II was even more

accentuated during SACMEQ III. Lastly, there has been equality in the provision of gender-separate toilets for both SACMEQ studies. A similar pattern was observed in Lesotho and Seychelles, where all the indicators were outside or on the green line, indicating that the situation was either gender equal or in favour of girls and/or females. More importantly, in both Lesotho and Seychelles, there was a perfect match between the blue line and the red dotted line, indicating that the situation was exactly the same between SACMEQ II and SACMEQ III.

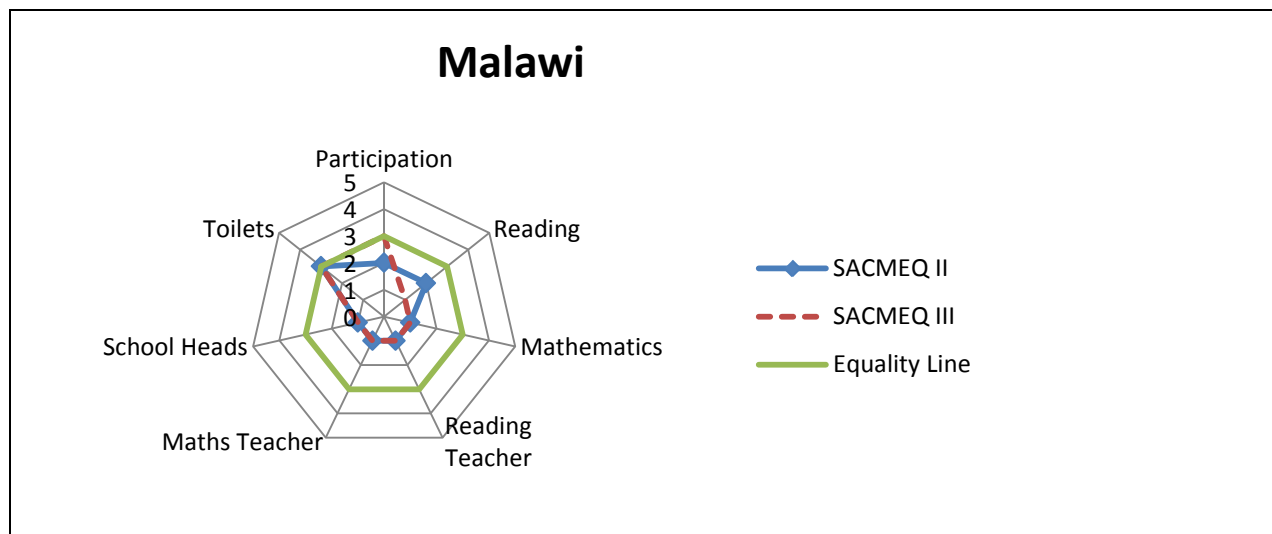
**Figure 1: Progress in Gender Equality in Selected Dimensions (Botswana)**



Source: Generated by the author based on SACMEQ III data (2007)

In contrast, in Malawi (see Figure 2), neither of the lines was outside the green 'gender equality' line. First, a promising change has occurred in the Grade 6 pupil participation, which used to be in favour of boys, but reached the gender balance line. However, the gender difference in reading achievement, which was already in favour of boys in SACMEQ II, has become even worse during SACMEQ III. Mathematics achievement continued to be significantly in favour of boys for both SACMEQ studies. Likewise, teaching and leadership positions were all significantly dominated by male for both studies. While toilet provision has been on a gender equality level for both studies, Milner et al. (2011) reported that the boys/toilet ratio and girls/toilet ratio were equally far beyond the Ministry's benchmark. Mozambique and Zambia also had all the values on or inside the equality line, i.e., in these countries, boys and males were more advantaged.

**Figure 2: Progress in Gender Equality in Selected Dimensions (Malawi)**



Source: Generated by the author based on SACMEQ III data (2007)

When examining the areas where improvement has occurred in each country, the most common improvement was in gender balance in the Grade 6 participation as seen in Table 3. Improvement in gender equality in mathematics achievement occurred in three countries, while that of toilet provision occurred in four countries. SACMEQ countries that are not listed in Table 3 displayed no improvement in any of the gender-related indicators that were examined.

**Table 3: Areas of Gender-related Improvement in SACMEQ Countries**

Countries that saw improvement	Areas in which gender-related improvement was seen between SACMEQ II and SACMEQ III
Malawi	Gender balance in the Grade 6 participation
Mauritius	Gender balance in the Grade 6 participation Gender equality in the toilet provision
Mozambique	Gender equality in the toilet provision
Namibia	Gender equality in the mathematics achievement
South Africa	Gender balance in the Grade 6 participation
Swaziland	Gender balance in the Grade 6 participation
Tanzania Mainland	Gender balance in the Grade 6 participation
Uganda	Gender balance in the Grade 6 participation Gender equality in the mathematics achievement
Zanzibar	Gender equality in the mathematics achievement Gender equality in the toilet provision
Zimbabwe	Gender equality in the toilet provision

Source: Generated by the author based on SACMEQ III data (2007)

However, regarding the toilet issue, it may not be enough to examine the 'equality' in provision since the needs for availability of gender-separate toilets might be different between boys and girls. Analyses of SACMEQ National Briefs related to gender issues have shed light on the fact that few countries had established national benchmarks for the pupil/toilet ratio, which would

include different benchmarks for boys' toilets and girls' toilets. The latter could be considered as an 'equity' (not 'equality') measure.

## **2. What were the characteristics of the educational environment where there were minimal gender differences in reading and mathematics performance in 2007?**

Saito (2010) reported that between SACMEQ II and SACMEQ III studies there had not been much change in terms of the direction and the magnitude of the gender differences in learning achievement. Concretely, this means that in countries where boys performed much better than girls during SACMEQ II, they continued to outperform to the same degree during SACMEQ III. Moreover, in countries where girls performed much better than boys during SACMEQ II, girls systematically outperformed boys during SACMEQ III. Furthermore, in countries where there were no gender differences during SACMEQ II, this was also the case during SACMEQ III.

Instead of comparing across countries, this section of analysis involves a comparison between schools within two SACMEQ countries: Tanzania Mainland, for the reading achievement, and Kenya for the mathematics achievement. Within each country, schools were first ranked by the size of the gender differences in achievement. Out of this list, three groups of schools were chosen for comparison: (i) 10 schools with the largest gender difference in favour of boys; (ii) 10 schools with the smallest gender difference; and (iii) 10 schools with the largest gender difference in favour of girls. For each group of schools, a series of indicators were examined as shown in Tables 4 and 5. These indicators were selected on the basis of the often reported importance for achieving gender equality in schools.

The pupil socio-economic status (SES) score in the tables was constructed using the Rasch measurement approach based on the calibration of home possessions, parents' education levels, and materials used for constructing the homes in which pupils lived (Dolata, 2005). The distance to facilities was the mean distance in kilometres from the school to various facilities, such as a clinic, road, library, book shop, secondary school, market, HIV testing place, and educational resource centre. Two indicators related to sexual harassment were based on the perception of School Heads. The reported percentages in both tables are the combination of two options: 'sometimes occur' and 'often occur'.

**Table 4: Comparison of Selected Indicators between Groups of Schools (Tanzania Mainland, 2007)**

Selected Indicators	Schools where ...					
	Boys better		No gender difference		Girls better	
Overall Pupil Reading Score	528	(11)	548	(19)	573	(13)
Girls in Grade 6 (%)	52	(5)	51	(1)	55	(3)
Pupil SES Score	410	(13)	440	(18)	445	(7)
Female Reading Teachers (%)	25	(2)	74	(15)	61	(17)
Teacher Reading Score	696	(13)	718	(8)	733	(21)
Female School Heads (%)	6	(1)	26	(11)	21	(0)
Distance to Facilities (km)	62	(25)	36	(15)	20	(5)
Availability of School Fence (%)	21	(15)	11	(12)	34	(10)
Pupil/Toilet Ratio	73	(5)	76	(17)	84	(5)
Sexual Harassment (Pupils to Pupils) (%)	77	(15)	79	(16)	55	(17)
Sexual Harassment (Teachers to Pupils) (%)	70	(15)	100	(0)	66	(20)

Sampling errors have been expressed in ( )

Source: Generated by the author based on SACMEQ III data (2007)

Although it is not shown in the table, it is worth mentioning that at the country level, Tanzania Mainland had the highest overall reading mean score during SACMEQ III with the largest overall improvement from SACMEQ II (546 in SACMEQ II to 578 in SACMEQ III) out of all SACMEQ countries. However, the size of gender difference was persistent at about 17 score points in favour of boys in both studies. In this context, Tanzanian policy makers might be interested in learning about the characteristics of schools where boys and girls performed more or less equally.

As one might expect, Table 4 indicates that Tanzanian schools where boys and girls performed equally in reading achievement tended to be placed in the middle position for many of the indicators examined. However, the indicators on proportion of female reading teachers and that of School Heads were two of the exceptions. The group of schools in favour of girls in reading achievement was not the group with the highest percentages on female staff.

The availability of school fences was very low throughout all the groups, and surprisingly, the lowest percentage was recorded in the group of schools where reading achievement was equal by gender. Another surprising result was the pupil/toilet ratio, which was the highest (i.e., more people to share – less comfort) in the schools where girls performed better in reading. Percentage for School Heads' perceptions of the occurrence of sexual harassment of pupils by teachers was the highest among the schools with no gender differences in reading achievement. This may be related to the fact that these sexual harassment indicators were based on the School Heads' perceptions.

**Table 5: Comparison of Selected Indicators between Groups of Schools (Kenya, 2007)**

Selected Indicators	Schools where ...					
	Boys better		No gender difference		Girls better	
<b>Overall Pupil Mathematics Score</b>	<b>549</b>	<b>(6)</b>	<b>546</b>	<b>(9)</b>	<b>593</b>	<b>(19)</b>
<b>Girls in Grade 6 (%)</b>	<b>56</b>	<b>(1)</b>	<b>49</b>	<b>(2)</b>	<b>48</b>	<b>(3)</b>
<b>Pupil SES Score</b>	<b>441</b>	<b>(2)</b>	<b>464</b>	<b>(10)</b>	<b>528</b>	<b>(25)</b>
<b>Female Mathematics Teachers (%)</b>	<b>44</b>	<b>(2)</b>	<b>21</b>	<b>(16)</b>	<b>42</b>	<b>(9)</b>
<b>Teacher Mathematics Score</b>	<b>883</b>	<b>(3)</b>	<b>933</b>	<b>(36)</b>	<b>935</b>	<b>(17)</b>
<b>Female School Heads (%)</b>	<b>3</b>	<b>(3)</b>	<b>7</b>	<b>(7)</b>	<b>29</b>	<b>(10)</b>
<b>Distance to Facilities (km)</b>	<b>29</b>	<b>(2)</b>	<b>10</b>	<b>(2)</b>	<b>10</b>	<b>(2)</b>
<b>Availability of School Fence (%)</b>	<b>84</b>	<b>(3)</b>	<b>100</b>	<b>(0)</b>	<b>75</b>	<b>(10)</b>
<b>Pupil/Toilet Ratio</b>	<b>84</b>	<b>(9)</b>	<b>40</b>	<b>(6)</b>	<b>37</b>	<b>(3)</b>
<b>Sexual Harassment (Pupils to Pupils) (%)</b>	<b>80</b>	<b>(0)</b>	<b>45</b>	<b>(11)</b>	<b>53</b>	<b>(3)</b>
<b>Sexual Harassment (Teachers to Pupils) (%)</b>	<b>91</b>	<b>(0)</b>	<b>100</b>	<b>(0)</b>	<b>74</b>	<b>(2)</b>

Sampling errors have been expressed in ( )

Source: Generated by the author based on SACMEQ III data (2007)

As shown in Table 5, the pattern in Kenya is somewhat different from that of Tanzania Mainland. First of all, schools where girls performed better had the highest overall achievement as well as the highest SES score. Schools where boys performed better had the highest proportion of girls in Grade 6. It should be noted, however, that pupils at Grade 6 level in 2007 came into school before the implementation of the Universal Primary Education (UPE), and in general, those girls who were at Grade 6 could be considered as 'selected elites'. It seems to be worth investigating further how and which grade the newly admitted pupils were integrated.

The percentage for the female mathematics teachers was remarkably lower in the group of schools where gender equality was achieved than in the other two groups, where the percentages were double regardless of the direction of gender difference in pupil mathematics achievement. As far as the female School Heads are concerned, the highest percentage was recorded in the schools where girls performed better in mathematics. In the first two groups, percentages were extremely low.

Compared to Tanzania Mainland, the level of the availability of a school fence in Kenya was very high in all three groups of schools, ranging from 75 percent to 100 percent, and it was highest in the group of schools where boys and girls performed equally in mathematics. However, as was the case in Tanzania Mainland, schools with no gender difference in pupil mathematics achievement had a very high percentage for School Heads' perception of sexual harassment incidents by teachers on pupils.

As can be seen from the examples of the two countries above, schools with gender equality in achievement may not be always related to the availability of school resources and/or the wealth of the pupils, though low SES scores and larger distances to facilities seem to be common in schools where boys performed better than girls. Certain conditions such as the gender of teachers and their

potentially different interactions with pupils in classrooms are areas which have not been explored enough within the SACMEQ studies. This type of qualitative analysis of the general learning environment might give more insight and possible explanations of gender differences.

### 3. What were the characteristics of curriculum areas, in reading and mathematics, where there were large gender differences in 2007?

In this section, curriculum areas were examined in relation to the performance at the domain level and at the item level for the reading and mathematics tests that were used during SACMEQ III. As shown in Table 6, throughout SACMEQ studies, the following domains were used (Ross et al, 2004).

**Table 6: Domains of SACMEQ Reading and Mathematics Test**

Subject	Domain	Description
Reading	Narrative prose	Continuous texts in which the writer aims to tell a story – whether this be fact or fiction.
	Expository prose	Continuous text in which the writer aims to describe, explain, or otherwise convey factual information or opinion to the reader.
	Documents	Structured information organized by the writer in a manner that requires the reader to search, locate, and process selected facts, rather than to read every word of a continuous text.
Mathematics	Number	Operations and number line, square roots, rounding and place value, significant figures, fractions, percentages, and ratios.
	Measurement	Measurements related to distance, length, area, capacity, money, and time.
	Space-Data	Geometric shapes, charts (bar, pie, and line), and tables of data.

Source: Ross et al (2004).

The SACMEQ III reading test had 55 items (13 items in the Narrative domain, 22 items in the Expository domain, and 20 items in the Documents domain). The mathematics test had 48 items<sup>3</sup> (18 items in the Number domain, 11 item in the Measurement domain, and 19 items in the Space/data domain). Percentages correct separately for boys and girls in each domain have been presented in Tables 7 and 8 for reading and mathematics respectively.

For SACMEQ as a whole, girls performed significantly better in all of the reading domains. At the national level, this was the case for Botswana, Mauritius, Namibia, Seychelles, and South Africa. In Lesotho, Swaziland, and Zanzibar, significant gender differences in favour of girls were recorded in two of the domains.

Significant gender differences in favour of boys were recorded in the Document domain for Malawi and in the Expository and Document domains for Tanzania Mainland.

<sup>3</sup> Original SACMEQ III mathematics test had 49 items. However one item was the one which was already deleted during SACMEQ II, but re-inserted in order to verify the fact that this item did not ‘work’ again during SACMEQ III. Scoring was carried out excluding this item.

**Table 7: Percentage Correct for Different Reading Domains by Gender (2007)**

School Systems	Narrative			Expository			Documents		
	Boys	Girls		Boys	Girls		Boys	Girls	
Botswana	53 (1.1)	59 (1.0) **		45 (0.9)	51 (0.8) **		65 (1.0)	71 (0.9) **	
Kenya	59 (1.0)	60 (1.1)		52 (0.9)	53 (0.9)		67 (1.0)	65 (1.3)	
Lesotho	44 (0.8)	47 (0.6) **		37 (0.6)	38 (0.6) **		52 (0.8)	52 (0.7)	
Malawi	38 (0.7)	38 (0.6)		35 (0.6)	34 (0.6)		44 (0.8)	40 (0.7) **	
Mauritius	65 (1.1)	72 (1.0) **		52 (1.0)	57 (0.9) **		68 (1.0)	73 (0.9) **	
Mozambique	49 (0.8)	48 (1.0)		35 (0.5)	34 (0.6)		56 (0.7)	55 (0.9)	
Namibia	48 (0.8)	52 (0.8) **		42 (0.6)	45 (0.6) **		56 (0.8)	59 (0.8) **	
Seychelles	63 (0.9)	74 (0.8) **		47 (0.8)	60 (0.7) **		67 (0.9)	78 (0.7) **	
South Africa	49 (1.0)	53 (1.0) **		40 (0.8)	44 (0.8) **		55 (1.0)	59 (1.1) **	
Swaziland	59 (0.7)	61 (0.7)		51 (0.6)	52 (0.6) **		71 (0.7)	73 (0.6) **	
Tanzania	67 (0.6)	66 (0.6)		57 (0.7)	54 (0.7) **		75 (0.7)	71 (0.7) **	
Uganda	48 (0.8)	48 (0.8)		40 (0.7)	40 (0.6)		54 (0.8)	52 (0.9)	
Zambia	39 (0.8)	40 (1.0)		34 (0.6)	33 (0.7)		44 (0.8)	42 (0.9)	
Zanzibar	63 (0.7)	65 (0.6) **		43 (0.6)	46 (0.6) **		64 (0.8)	66 (0.6)	
Zimbabwe	53 (1.5)	56 (1.3)		43 (1.1)	46 (1.1)		58 (1.5)	59 (1.4)	
SACMEQ III	53 (0.3)	56 (0.3) **		44 (0.2)	46 (0.2) **		60 (0.3)	61 (0.3) **	

Sampling errors have been expressed in ( )

\*\* Gender differences are significant at 95 percent confidence level.

Source: Generated by the author based on SACMEQ III data (2007)

For the mathematics results, the general pattern was opposite from that of reading. In none of the countries were there significant differences in favour of girls in all mathematics domains. In Botswana, Mauritius, and Seychelles, girls outperformed better in general, but the statistical significance was seen only in one or two mathematics domains. In Malawi, Kenya, Tanzania Mainland, and Zambia, boys performed significantly better in all of the mathematics domains.

**Table 8: Percentage Correct for Different Mathematics Domains by Gender (2007)**

School Systems	Number		Measurement		Space/Data	
	Boys	Girls	Boys	Girls	Boys	Girls
Botswana	47 (0.7)	49 (0.7) **	28 (0.8)	26 (0.6)	43 (0.7)	45 (0.6)
Kenya	57 (0.7)	54 (0.7) **	36 (0.8)	32 (0.7) **	48 (0.8)	44 (0.8) **
Lesotho	41 (0.6)	41 (0.5)	24 (0.5)	23 (0.5)	35 (0.6)	35 (0.5)
Malawi	35 (0.6)	33 (0.5) **	23 (0.6)	22 (0.6)	31 (0.5)	29 (0.5) **
Mauritius	60 (1.0)	64 (0.9) **	48 (1.1)	48 (1.0)	56 (1.0)	59 (0.9)
Mozambique	42 (0.5)	40 (0.6) **	25 (0.5)	26 (0.5)	35 (0.5)	34 (0.6)
Namibia	39 (0.5)	39 (0.5)	26 (0.5)	25 (0.4)	34 (0.5)	33 (0.5)
Seychelles	47 (0.7)	52 (0.6) **	35 (0.6)	36 (0.6)	47 (0.6)	53 (0.6) **
South Africa	41 (0.6)	42 (0.6)	29 (0.7)	28 (0.6)	38 (0.7)	39 (0.7)
Swaziland	49 (0.5)	48 (0.5)	31 (0.5)	28 (0.5) **	49 (0.5)	48 (0.5)
Tanzania	59 (0.7)	54 (0.8) **	34 (0.7)	30 (0.6) **	49 (0.7)	44 (0.7) **
Uganda	42 (0.6)	40 (0.6) **	26 (0.5)	24 (0.5) **	36 (0.6)	35 (0.6)
Zambia	35 (0.5)	33 (0.5) **	24 (0.5)	22 (0.4) **	27 (0.5)	25 (0.5) **
Zanzibar	41 (0.5)	40 (0.5)	27 (0.5)	26 (0.4)	37 (0.4)	37 (0.4)
Zimbabwe	46 (1.0)	47 (1.0)	34 (1.0)	32 (0.9)	42 (1.1)	41 (1.0)
SACMEQ III	45 (0.2)	45 (0.2)	30 (0.2)	28 (0.2) **	41 (0.2)	40 (0.2)

Sampling errors have been expressed in ( )

Source: Generated by the author based on SACMEQ III data (2007)

Appendices C1 and C2 have been presented to illustrate the pattern of items in the SACMEQ III reading and mathematics tests respectively, depending on whether girls performed better or boys performed better. The “+” sign has been designated if girls performed better on the item for each country. Both countries and items have been arranged in the order of the number of the “+” signs. For example, in Seychelles, girls performed better on all reading items except one item. In contrast, Tanzania Mainland had only ten reading items where girls performed better. In terms of items, the reading item #53 had the most number of “+” signs (14 “+” signs), indicating that the girls’ performance on this particular item was better than boys in 14 SACMEQ countries, while item #35 had only two “+” signs.

**Table 9: Characteristics of 10 Reading Items with Largest Gender Differences in Favour of Boys**

Item	Domain	About	SACMEQ Competency Level
<b>PR35</b>	Expository	Special birds	7. Analytical Reading
<b>PR39</b>	Documents	Map of an island	6. Inferential Reading
<b>PR17</b>	Documents	School timetable	4. Reading for Meaning
<b>PR23</b>	Documents	Concert programme	5. Interpretive Reading
<b>PR04</b>	Documents	Preposition	1. Pre-Reading
<b>PR14</b>	Narrative	Family in a village	5. Interpretive Reading
<b>PR24</b>	Documents	Concert programme	3. Basic Reading
<b>PR03</b>	Documents	Preposition	1. Pre-Reading
<b>PR05</b>	Documents	Preposition	1. Pre-Reading
<b>PR10</b>	Narrative	Family members	4. Reading for Meaning

Source: Generated by the author based on SACMEQ III data (2007)

**Table 10: Characteristics of 10 Reading Items with Largest Gender Differences in Favour of Girls**

<b>PR44</b>	Expository	Age of trees	6. Inferential Reading
<b>PR51</b>	Documents	Healthy attitude	5. Interpretive Reading
<b>PR55</b>	Expository	Smoking phenomenon	5. Interpretive Reading
<b>PR09</b>	Narrative	Family members	3. Basic Reading
<b>PR19</b>	Expository	Fruits marketing process	5. Interpretive Reading
<b>PR28</b>	Narrative	Animals in conflict	3. Basic Reading
<b>PR49</b>	Documents	Camera usage	6. Inferential Reading
<b>PR52</b>	Expository	Smoking phenomenon	8. Critical Reading
<b>PR11</b>	Narrative	Family members	4. Reading for Meaning
<b>PR53</b>	Expository	Smoking phenomenon	5. Interpretive Reading

Source: Generated by the author based on SACMEQ III data (2007)

Table 9 illustrates characteristics of the first ten items on the sorted list that had less “+” signs. That is, these are the items where boys tended to perform better out of all the reading items administered during SACMEQ III<sup>4</sup>. The most common domain was the Documents domain (seven out of ten items). While the difficulty levels varied, it is worth noting that three of the ten items were from the first SACMEQ competency level: Pre-Reading.

The ten items on the sorted list that had more “+” signs (i.e., items where girls tended to perform better) were presented in Table 10. Expository prose was the most common domain for these items (five out of ten items), unlike the items that were performed better by boys. Furthermore, in this group of ten items, there was no item that belonged to the first two levels of SACMEQ competency, resulting in much higher average difficulty level.

Likewise, first ten mathematics items that were performed better by boys and ten items where girls performed better have been listed in Tables 11 and 12 respectively. For example, mathematics item #15 had only one country where girls performed better than boys, whereas item #03 had 11 countries where girls performed better.

The most common domain that appeared in the ten mathematics items in which boys performed better was Measurement (six out of ten items). The competency levels ranged from level 2 to level 7.

In contrast, the most common domain where girls performed better for the ten mathematics items was the Number domain (see Table 12). The difficulty level was much lower in these items with two items belonging to the first competency level: Pre-Numeracy.

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<sup>4</sup>The absence of a “+” sign could mean that boys performed better or that there was no gender gap. When sorted, the first 10 items with less “+” were the items that boys performed better.

**Table 11: Characteristics of 10 Mathematics Items with Largest Gender Differences in Favour of Boys.**

Item	Domain	Sub-Domain	SACMEQ Competency Level
PM15	Measurement	Time	5. Competent Numeracy
PM08	Measurement	Time	4. Beginning Numeracy
PM42	Measurement	Distance	7. Concrete Problem Solving
PM02	Number	Number	3. Basic Numeracy
PM13	Measurement	Time	5. Competent Numeracy
PM14	Space/Data	Line	2. Emergent Numeracy
PM26	Space/Data	Angle	6. Mathematically Skilled
PM33	Measurement	Time	5. Competent Numeracy
PM39	Space/Data	Data	6. Mathematically Skilled
PM10	Measurement	Time	7. Concrete Problem Solving

Source: Generated by the author based on SACMEQ III data (2007)

**Table 12: Characteristics of 10 Mathematics Items with Largest Gender Differences in Favour of Girls**

Item	Domain	Sub-Domain	SACMEQ Competency Level
PM46	Number	Fraction	3. Basic Numeracy
PM19	Number	Operation	4. Beginning Numeracy
PM21	Measurement	Volume	4. Beginning Numeracy
PM28	Number	Operation	2. Emergent Numeracy
PM29	Number	Operation	2. Emergent Numeracy
PM45	Space/Data	3-D	2. Emergent Numeracy
PM47	Measurement	Volume	6. Mathematically Skilled
PM05	Space/Data	2-D	1. Pre-Numeracy
PM44	Number	Operation	5. Competent Numeracy
PM03	Number	Operation	1. Pre-Numeracy

Source: Generated by the author based on SACMEQ III data (2007)

## **CONCLUSION**

The size and the direction of the gender differences have been stable in SACMEQ countries throughout time. In order to help understand why, an attempt has been made to combine these differences with the indicators of educational conditions as well as curriculum content. It should be noted that these indicators do not suggest any causal link on achievement. Other variables that were not reported in this study may explain the gender differences. However, there are some important messages that emerge from these findings.

First, by examining different gender-related indicators by country, it was apparent from the analyses that much of the improvement was on participation, and not much improvement was seen in the quality dimension. It is possible to identify the areas where more policy interventions are required. Secondly, by investigating the curriculum content and the competency levels, teaching and learning materials could be proposed that are appropriate for different competency levels of boys and girls. Finally, in order to study other areas that have not been investigated with SACMEQ studies, more qualitative research might be useful in order to observe classrooms and interview teachers and pupils. For Ministries of education in the Southern and Eastern Africa sub-region, there is still a long way to go before they reach gender equality.

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### Appendix A1: SACMEQ Competencies on Reading

Level	Description	Skill/Competence
1	Pre-reading	Matches words and pictures involving concrete <u>concepts and everyday objects.</u>
2	Emergent Reading	Matches words and pictures involving prepositions and <u>abstract concepts.</u>
3	Basic Reading	Interprets meaning (by matching words and phrases, <u>completing sentences.</u>
4	Reading for Meaning	Reads to link and interpret information located in <u>various parts of the text.</u>
5	Interpretive Reading	Interprets information from various parts of the text in <u>association with external information.</u>
6	Inferential Reading	Reads to combine information from various parts of the <u>text so as to infer the writer's purpose.</u>
7	Analytical Reading	Locates information in longer texts (narrative, document or expository) in order to combine information from various parts of the text so as to infer the writer's personal beliefs (value systems, <u>prejudices and biases.</u>
8	Critical Reading	Reads from various parts of the text so as to infer and evaluate what the writer has assumed about both the topic and the characteristics of the reader

Source: Ross et al (2004).

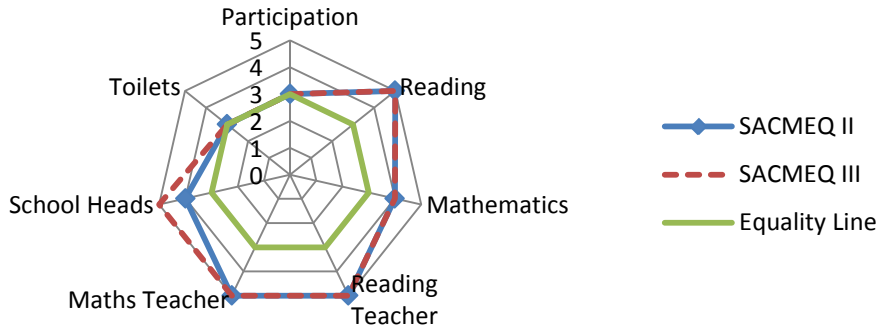
### Appendix A2: SACMEQ Competencies on Mathematics

Level	Description	Skill/Competency
1	Pre- Numeracy	Applies <u>single step addition and subtraction.</u>
2	Emergent Numeracy	Applies a two-step addition and subtraction involving <u>carrying.</u>
3	Basic Numeracy	Translates verbal information into arithmetic <u>operations.</u>
4	Beginning Numeracy	Translates verbal or graphic information into simple <u>arithmetic problems.</u>
5	Competent Numeracy	Translates verbal, graphic, or tabular information into an arithmetic form in order to solve a given problem.
6	Mathematically Skilled	Solves multiple-operation problems (using the correct order) involving fractions, ratios, and <u>decimals.</u>
7	Concrete Problem Solving	Extracts and converts information from tables, charts and other symbolic presentations in order to identify, <u>and then solve multi-step problems</u>
8	Abstract Problem Solving	Identifies the nature of an unstated mathematical problem embedded within verbal or graphic information and then translate this into symbolic, algebraic or equation form in order to solve a problem.

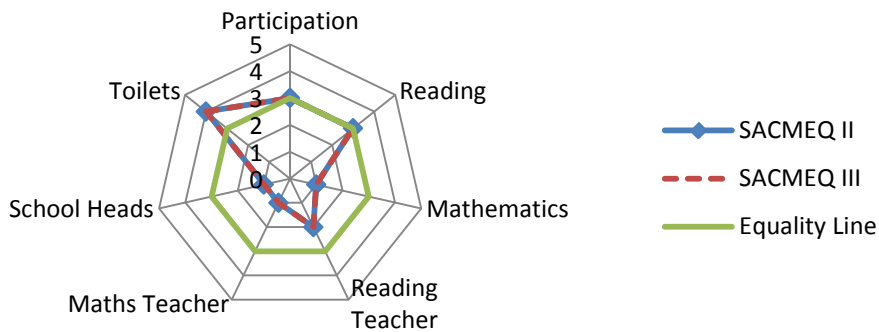
Source: Ross et al (2004).

Appendix B: Progress in Gender Equality in Education for SACMEQ Countries

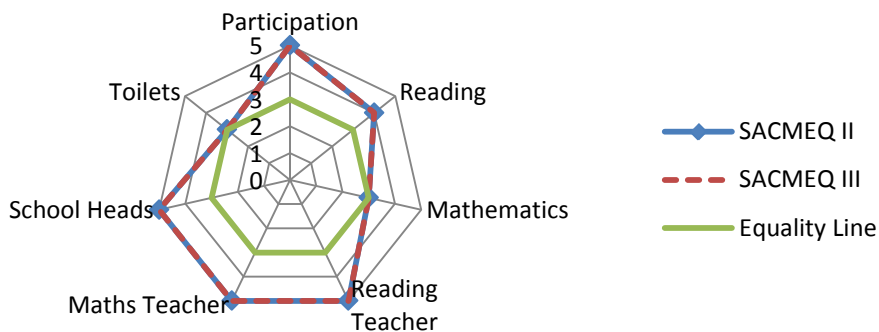
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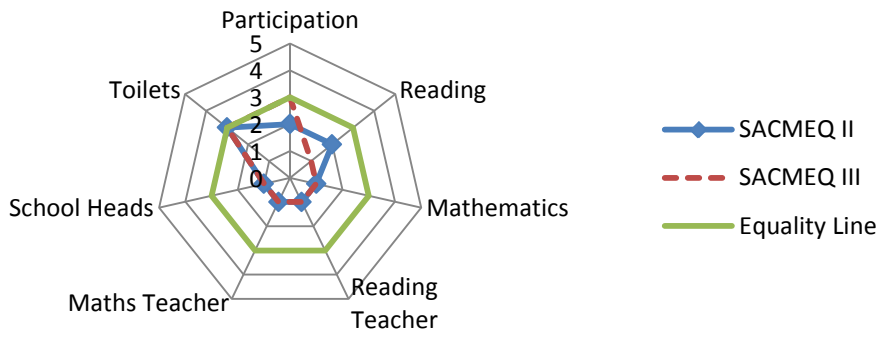
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### Lesotho

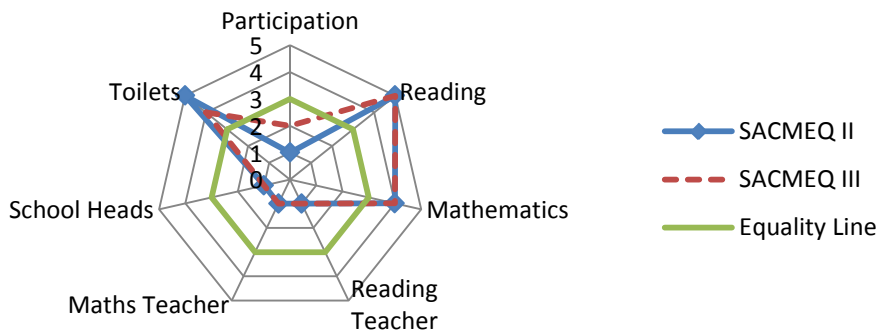


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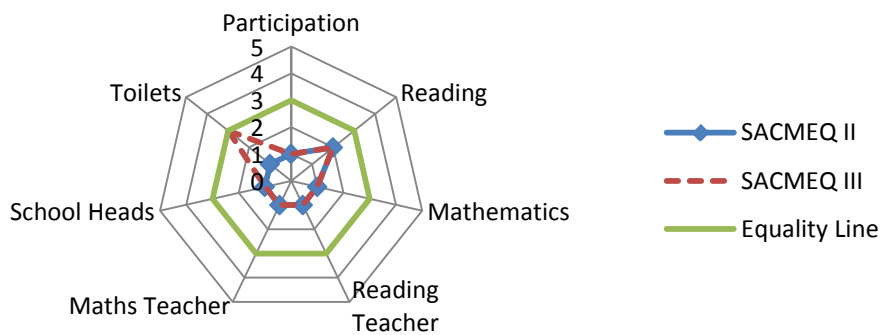
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## Mauritius



6

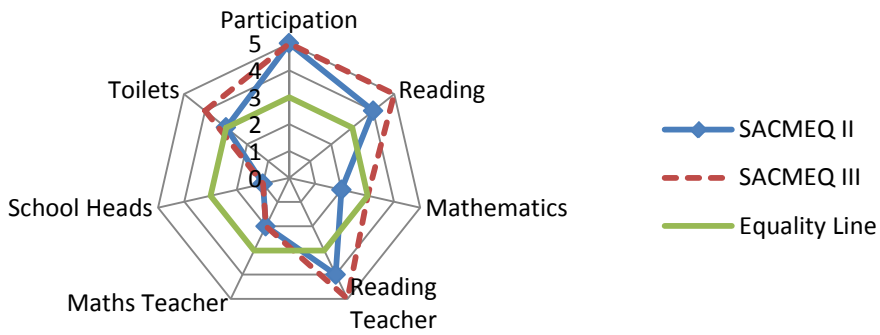
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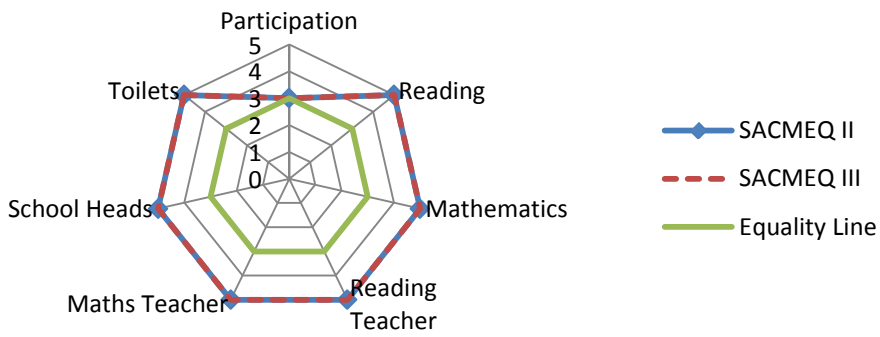
<sup>5</sup> SACMEQ II Data collection in Malawi was in 2002.

<sup>6</sup> SACMEQ II Data collection in Mauritius was in 2001,

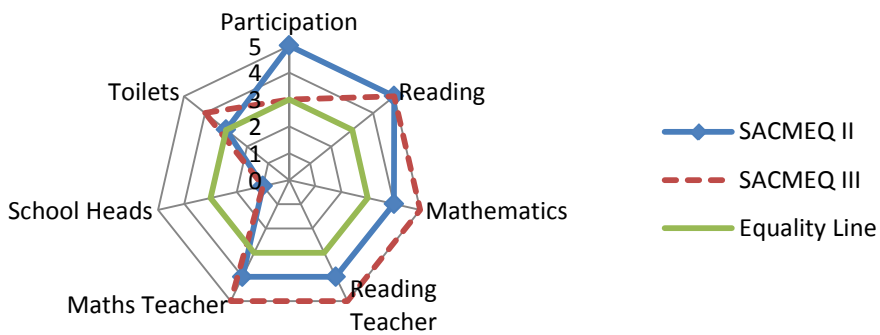
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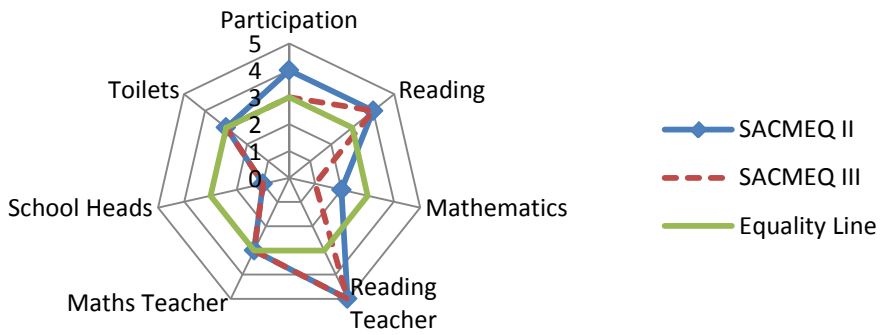
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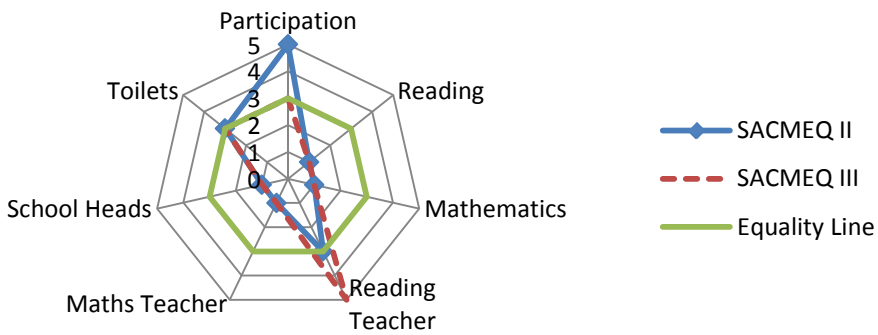
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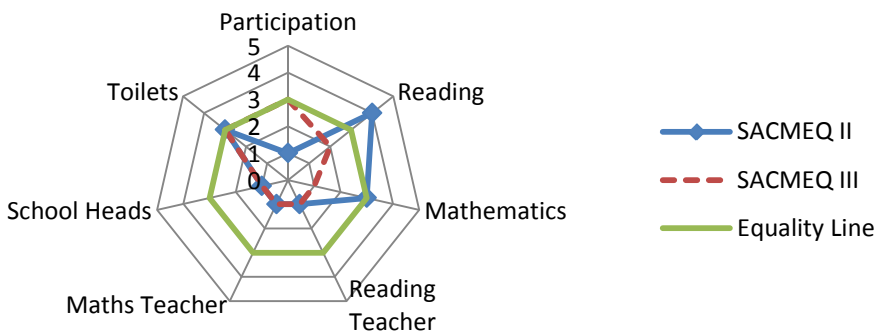
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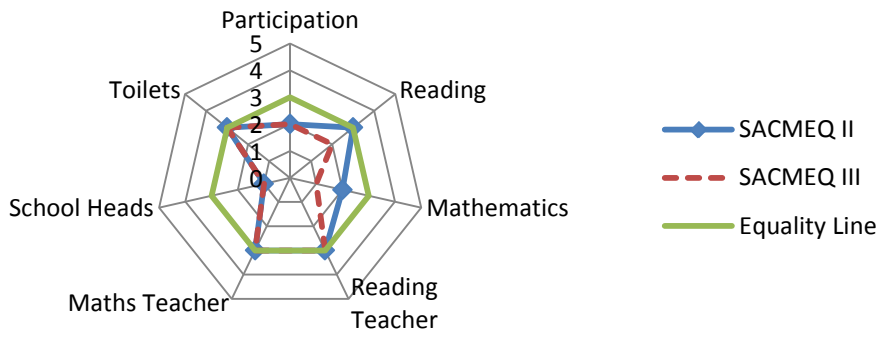
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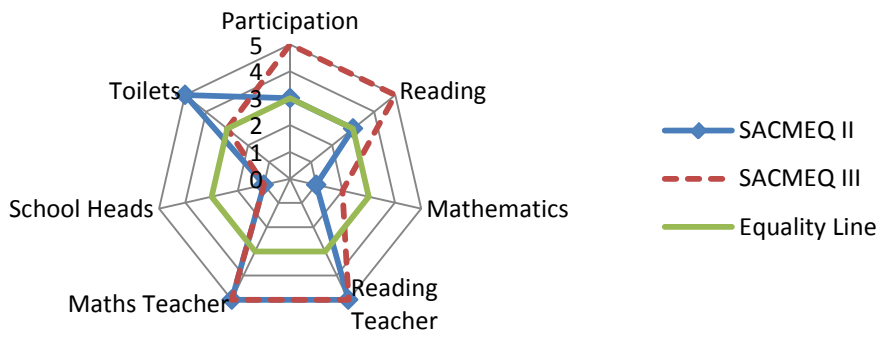
## Uganda



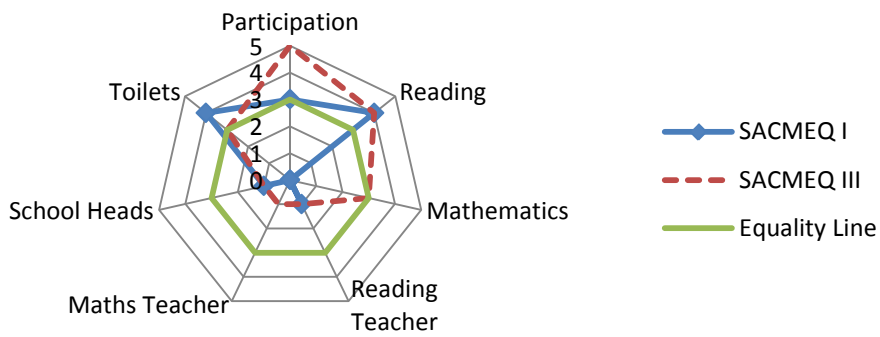
## Zambia



## Zanzibar



## Zimbabwe



7

<sup>7</sup> Zimbabwe did not take part in SACMEQ II.

**Appendix C1: “Gutmann Scale” of Gender Differences in SACMEQ III Reading Test**

	TAN	MAL	UGA	ZAM	MOZ	KEN	LES	SWA	ZAN	ZIM	NAM	SOU	BOT	MAU	SEY
PR35		+												+	
PR39					+								+		+
PR17									+			+	+	+	+
PR23					+							+	+	+	+
PR04									+		+	+	+	+	+
PR14					+				+			+	+	+	+
PR24										+	+	+	+	+	+
PR03							+	+			+	+	+	+	+
PR05			+					+		+		+	+	+	+
PR10		+					+				+	+	+	+	+
PR13		+	+	+						+	+	+			+
PR20			+		+				+		+	+	+	+	+
PR34	+		+	+			+			+			+	+	+
PR38							+	+		+	+	+	+	+	+
PR41					+		+			+	+	+	+	+	+
PR42		+							+	+	+	+	+	+	+
PR46		+		+			+				+	+	+	+	+
PR01			+				+	+	+	+	+	+	+	+	+
PR02	+			+			+	+		+		+	+	+	+
PR06							+	+	+	+	+	+	+	+	+
PR12	+						+		+	+	+	+	+	+	+
PR18							+	+	+	+	+	+	+	+	+
PR26			+				+		+	+	+	+	+	+	+
PR45						+		+	+	+	+	+	+	+	+
PR08						+	+	+	+	+	+	+	+	+	+
PR25						+	+	+	+	+	+	+	+	+	+
PR29						+	+	+	+	+	+	+	+	+	+
PR32		+		+			+	+		+	+	+	+	+	+
PR36					+	+		+	+	+	+	+	+	+	+
PR37		+			+			+	+	+	+	+	+	+	+
PR40						+	+	+	+	+	+	+	+	+	+
PR43				+			+	+	+	+	+	+	+	+	+
PR47						+	+	+	+	+	+	+	+	+	+
PR07	+			+			+	+	+	+	+	+	+	+	+
PR15				+		+	+	+	+	+	+	+	+	+	+
PR22				+		+	+	+	+	+	+	+	+	+	+
PR27					+	+	+	+	+	+	+	+	+	+	+
PR48					+	+	+	+	+	+	+	+	+	+	+
PR50					+	+	+	+	+	+	+	+	+	+	+
PR54		+	+			+		+	+	+	+	+	+	+	+
PR16		+	+	+	+			+	+	+	+	+	+	+	+
PR21	+	+		+	+			+	+	+	+	+	+	+	+
PR30			+	+	+	+		+	+	+	+	+	+	+	+
PR31	+			+	+	+	+	+	+		+	+	+	+	+
PR33		+	+		+		+	+	+	+	+	+	+	+	+
PR44		+	+			+	+	+	+	+	+	+	+	+	+
PR51			+		+	+	+	+	+	+	+	+	+	+	+
PR55	+	+	+			+		+	+	+	+	+	+	+	+
PR09		+	+	+	+	+	+	+		+	+	+	+	+	+
PR19			+	+	+	+	+	+	+	+	+	+	+	+	+
PR28	+		+	+		+	+	+	+	+	+	+	+	+	+
PR49		+	+	+	+	+	+	+		+	+	+	+	+	+
PR52	+	+	+	+	+	+	+	+	+	+	+			+	+
PR11	+		+	+	+	+	+	+	+	+	+	+	+	+	+
PR53		+	+	+	+	+	+	+	+	+	+	+	+	+	+
	TAN	MAL	UGA	ZAM	MOZ	KEN	LES	SWA	ZAN	ZIM	NAM	SOU	BOT	MAU	SEY

Note: + indicates girls performed better than boys on the item.

**Appendix C2: “Gutmann Scale” of Gender Differences in SACMEQ III Mathematics Test**

	TAN	KEN	UGA	MAL	ZAN	NAM	ZAM	SWA	MOZ	ZIM	LES	BOT	SOU	SEY	MAU
PM15															+
PM08													+	+	
PM42									+					+	
PM02									+					+	+
PM13													+	+	+
PM14										+				+	+
PM26				+			+		+						
PM33									+					+	+
PM39							+	+							+
PM10				+			+		+		+				
PM23				+								+		+	+
PM38	+								+					+	+
PM11			+	+		+	+		+						
PM16	+		+				+		+						+
PM24										+	+	+		+	+
PM35			+						+			+		+	+
PM36			+	+			+		+						+
PM01										+	+	+	+	+	+
PM07										+	+	+	+	+	+
PM17										+	+	+	+	+	+
PM18		+	+					+	+		+			+	
PM20						+		+		+		+		+	+
PM04								+		+	+	+	+	+	+
PM09				+			+	+	+		+		+		+
PM12						+			+	+		+	+	+	+
PM22			+		+						+	+	+	+	+
PM25			+	+	+		+		+		+		+		
PM30				+				+		+		+	+	+	+
PM31				+			+			+		+	+	+	+
PM41					+		+	+	+				+	+	+
PM06					+		+			+	+	+	+	+	+
PM34			+				+	+	+			+	+	+	+
PM37					+			+	+	+		+	+	+	+
PM40					+	+	+		+			+	+	+	+
PM43						+		+		+	+	+	+	+	+
PM46		+				+				+	+	+	+	+	+
PM19						+		+	+	+	+	+	+	+	+
PM21				+		+		+		+	+	+	+	+	+
PM28		+			+	+				+	+	+	+	+	+
PM29					+	+		+		+	+	+	+	+	+
PM45					+	+		+	+		+	+	+	+	+
PM47			+	+	+					+	+	+	+	+	+
PM05	+				+	+		+		+	+	+	+	+	+
PM44			+	+	+	+	+		+		+		+	+	+
PM03		+		+	+	+		+		+	+	+	+	+	+
	TAN	KEN	UGA	MAL	ZAN	NAM	ZAM	SWA	MOZ	ZIM	LES	BOT	SOU	SEY	MAU

Note: + indicates girls performed better than boys on the item.