



Southern and Eastern Africa Consortium
for Monitoring Educational Quality

Trends in Achievement Levels of Grade 6 Pupils in Tanzania Mainland

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Introduction

This policy brief provides information about levels and trends in the reading and mathematics achievements of Tanzanian (mainland) Standard 6 pupils. The results are drawn from two large-scale, cross-national research studies of the quality of education conducted by the fifteen school systems involved in the Southern and Eastern Africa Consortium for Monitoring Educational Quality (SACMEQ).

Tanzania mainland did not participate in the first SACMEQ Project during 1995-1998, but joined the other countries that participated in the SACMEQ II Project (2000-2004), and the SACMEQ III Project (2007-2011) in order to benefit from the opportunity provided by the SACMEQ network for educational planners and researchers from participating countries to: (a) apply scientific methods for monitoring and evaluating the quality of education, and (b) generate research-based information that could be used to plan for improvements in the quality of education.

In 2000, primary education in Tanzania mainland was characterized by a number of salient problems such as low enrolment rates, shortage of classrooms, shortage of teaching and learning materials including textbooks, inadequate qualified teachers, lack of quality assurance training programmes, less relevant curriculum, high dropout rates and low performance at Primary School Leaving Examination (MoEVT, 2001).

In 2002, the first phase of the Primary Education Development Program (PEDP I, 2002-2006) was introduced in order to achieve four short-term objectives: (i) expansion of enrolment, (ii)

improving the quality of learning outcomes, (iii) improving teacher competencies, and (iv) strengthening institutional management. These measures were aimed at improving the quality of education and contributing to the realization of the Education for All (EFA) goals.

The introduction of the first phase of PEDP in 2002 was shortly followed by the official release of Tanzania's SACMEQ II results in 2004. The results of the SACMEQ II Project in Tanzania showed that, contrary to expectations, overall Standard 6 pupil achievement results for reading and mathematics were satisfactory. However, the Ministry of Education in Tanzania used these results to devise measures aimed at further improving the quality of education through the Education Sector Analysis, and Annual Reviews (ESA and ESR). The Ministry also used the SACMEQ II results in making adjustments to the first phase of the PEDP (PEDP I), and in designing the second phase of the PEDP which commenced in 2007 (the same year that data collection for SACMEQ III was conducted). The second phase of PEDP is scheduled for completion by December 2011.

The results of the SACMEQ III Project that have been presented in this brief provide a measure of the quality of primary education in Tanzania during the first phase of the PEDP (2001-2006), and provide a baseline for the second phase of the PEDP (2007-2011).

SACMEQ's Literacy and Numeracy Indicators

When the SACMEQ Consortium was launched in 1995, SACMEQ's Governing Board (the SACMEQ Assembly of Ministers) emphasized

that the planning of improvements in the quality of education required better indicators of the “literacy” and “numeracy” skills that were being acquired by pupils as they moved through the basic cycles of primary education. These indicators were considered important because they allowed senior decision-makers to assess the performance of school systems, and to provide information that could be used for strategies aimed at improving the quality of education.

The SACMEQ Ministers interpreted the concept of “literacy” as meaning reading comprehension skills that were transmitted through school language and reading instruction programmes. They interpreted “numeracy” as meaning the numerical and mathematical reasoning skills that formed the core of school mathematics programmes. The SACMEQ Ministers wanted their school systems to be judged by the extent to which pupils acquired the knowledge and skills that they were expected to acquire – as specified in official school curricula, textbooks, and teachers’ guides.

The SACMEQ Ministers decided that the design of tests for the assessment of pupil achievement in reading and mathematics in the SACMEQ research programme should focus on:

- (a) **Standard 6** - because (i) they wanted to monitor the "output" of their primary education systems before large numbers of the pupil cohort left school, and (ii) they considered that assessments held at lower Standards would result in distorted results due to the "turbulence" in learning environments that occurred in some school systems during the changeover (at around Standard 3 to 4) from the delivery of instruction in local to the official or national languages; and
- (b) **The National Language of Instruction** - because they were concerned that the acquisition of reading and mathematics skills in the national language of instruction was necessary for a successful transition to secondary education.

The SACMEQ reading and mathematics tests were developed from a careful analysis of the official school curricula, school syllabi, and textbooks

used in both Tanzania mainland and other SACMEQ school systems. These tests made it possible to employ Modern Item Response Theory methods to undertake item analyses and test-scoring procedures. The test scores were transformed so that pupils from both the SACMEQ II and III Projects were placed on a single scale with the SACMEQ II scores anchored to a mean of 500 and a Standard deviation of 100.

The SACMEQ reading and mathematics tests were scored in two different ways for different reporting purposes:

- (a) **Scaled Scores** – which were useful for reporting the average performance of pupils at national and regional levels for both SACMEQ Projects. These scores were scaled so that meaningful comparisons could be made across countries for each project, and across projects for each country. The average scaled scores for Tanzania and its zones have been reported in **Table 1** for the SACMEQ II Project (2000) and the SACMEQ III Project (2007).
- (b) **Competency (or Skill) Levels** – which were useful for presenting a descriptive account of (i) the skills that pupils had acquired at eight levels of competence measured by the scaled scores, and (ii) the skills that must be acquired for pupils to move from one level of competence to a higher level. The competency levels for reading and mathematics have been described in **Table 2(a)** and **Table 2(b)**, respectively. These tables show the percentages of Tanzania mainland pupils at each competency level for the SACMEQ II Project (2000) and the SACMEQ III Project (2007).

Results for Average Scaled Scores

The average reading and mathematics scores of Standard 6 pupils across the 11 zones of Tanzania mainland were derived from SACMEQ reading and mathematics tests that were administered in Tanzania mainland to 2,854 Standard 6 pupils from 181 schools for the SACMEQ II Project in 2000, and 4,194 Standard 6 pupils in 196 schools for the SACMEQ III Project in 2007.

In order to examine **levels of achievement**, the average scores were colour-coded to show their levels relative to the SACMEQ II Project overall mean of 500. Green figures indicated ten points or more above the SACMEQ average, red figures indicated ten points or more below the SACMEQ average, and black figures indicated within ten points of the SACMEQ average.

In order to show **trends in achievement**, colour-coded arrowheads were used to show changes in average scores between 2000 and 2007. A green arrowhead denoted an increase of ten points or more, a red arrowhead denoted a decrease of ten points or more, and a grey arrowhead denoted change of less than 10 points above or below the SACMEQ mean of 500.

(a) Achievement Levels

It can be seen from **Table 1** that for Tanzania mainland as a whole, the mean score for reading increased by 31 points, from a mean of 546 in 2000 to a mean of 577 in 2007. For mathematics, there was an increase of 31 points in the national mean score, that is, from a mean of 522 in 2000 to a mean of 553 in 2007. In 2000, the mean scores of Standard 6 pupils in Tanzania mainland were above the SACMEQ mean of 500 for reading and mathematics, except for the Southern zone where the mean scores for both reading and mathematics were below the SACMEQ mean. However, the Southern zone improved performance in both reading and mathematics in 2007. The mean reading score of Standard 6 pupils in the Southern zone improved by 72 points – from 495 points in 2000, to 567 points in 2007, while performance in mathematics increased by 41 points, to 528 points in 2007.

For Tanzania as a whole, the mean scores of Standard 6 pupils for reading, and mathematics showed high levels of achievement in 2007 because the scores were substantially above the SACMEQ mean of 500.

There were large variations in the performance of Standard 6 pupils in both

reading and mathematics during 2000 and 2007 among the 11 zones. For example, the mathematics mean score of pupils in the Southern zone (528) was, despite improvement, still substantially below the national mean (553) for Tanzania mainland as a whole.

(b) Achievement Trends

From the green arrowheads in **Table 1**, it can be seen that Standard 6 pupils in all zones (except Kilimanjaro and Northern zones in reading) showed improvements in the levels of reading achievement during 2007. For Tanzania as a whole, it can be seen that the mean scores for both reading and mathematics in 2007 were (a) substantially higher than the Tanzanian reading and mathematics mean scores in 2000, and (b) substantially higher than the SACMEQ mean for both reading and mathematics.

Results for Competence Levels

Another way in which the SACMEQ results can be presented is by calculating the percentages of pupils who had reached each level of competence on a hierarchical scale of competence levels as explained below.

The reading and mathematics test items were first arranged in order of difficulty, and then examined item-by-item to describe the specific skills required in order to provide correct responses. Items were then placed in groups so that the items in each group had similar difficulty values and shared a common theme with respect to the underpinning competencies required to provide correct responses.

This “skills audit” for the reading and mathematics tests resulted in the identification of eight hierarchical levels of competence for each test (Level 1 being the lowest, and Level 8 being the highest).

The results of the skills audit have been presented in **Tables 2(a), and 2(b)**. A description or summary name was linked with each of the levels – in order to summarize the competencies

associated with each group of test items. The first three competence levels in reading and mathematics employed the same prefixes (Pre, Emergent, and Basic) in order to reflect the mechanical nature of the most elementary competencies. From the fourth level upwards, the prefixes of the summary names were different for reading and mathematics, and were designed to reflect deeper levels of understanding of subject specific competencies.

The eight competence levels provided a more concrete analysis of what pupils could actually do. They also suggested instructional strategies relevant to pupils who were learning at each level of competence.

For reading, it can be seen that there were increases in the percentages of pupils who were performing at Levels 6 to 8, as indicated by the plus (+) symbols in front of the figures in the final column of **Table 2(a)**.

There was a corresponding decline in percentages of pupils who performed at lower and middle levels of competences (levels 1-5) as indicated by the minus (-) symbol in front of the figures in the final column of **Table 2(a)**.

For mathematics, **Table 2(b)** showed that the percentage of pupils who were performing at Level 4 to 7 increased, while the percentage of pupils performing at Level 1 to 3 decreased. The results for mathematics were thus positive, because of a shift in percentages of pupils from the lower to higher competence levels in 2007.

Summary of Results

The results discussed in this Policy Brief have shown that there was substantial improvement in the performance of Standard 6 pupils in Tanzania mainland in reading for nearly all zones. For mathematics, all zones showed improvement between 2000 and 2007, except for slight declines in Kilimanjaro and Northern zones. In addition, the results showed that in both 2000 and 2007 there were wide variations in pupil achievement across the 11 zones of Tanzania mainland. For example, for 2007 the difference in mean scores

across the zones ranged from 563 points in North East zone to 605 points in Eastern zone for reading. For mathematics, the mean scores ranged from 528 points in the Southern zone to 578 points in Southern Highland in 2007.

The general improvement in pupil achievement levels in Tanzania between 2000 and 2007 can be attributed to many factors, but some of the efforts made by the Ministry of Education through the PEDP are worth noting. For example:

- Improvements in resource allocation across all the zones - Book Pupil Ratio improved from 1:20 in 2001 to 1:3 in 2006.
- An improvement in the provision of classrooms and increase in number of primary schools from 11,873 in 2001 to 14,700 in 2006.
- Revision of the primary school curriculum to include aspects that are competency based and relevant to learners' needs and global challenges.
- Professional upgrading of a total of 50,813 under qualified primary school teachers who attained the minimum qualification (Grade IIIA).
- Training of School Committees and educational leaders at all levels to enhance their capacities to manage primary education delivery.

Research-Based Conclusions

The following conclusions have been based on the results discussed in this Policy Brief concerning: (a) achievement levels for Standard 6 pupils – as measured by scaled test scores, and (b) achievement trends of Standard 6 pupils – as measured by their location in one of the 8 competency levels.

- 1. Levels of Achievement: In 2007, the average for reading performance of Standard 6 pupils in Tanzania mainland was 578, which was well above the SACMEQ average (512). Similarly, the average for mathematics performance of Standard 6 pupils in Tanzania mainland was 553, which was also above the SACMEQ average (510). This is commendable. Although generally all zones registered improvements in mean scores for**

both reading and mathematics, there were variations across the zones.

The Ministry of Education should redouble its efforts in order to narrow the differences in achievement levels across the zones by paying special attention to the zones that registered lower scores.

The Ministry should investigate the reason(s) for the slight decline in Standard 6 achievement in mathematics for Kilimanjaro and Northern zones.

- 2. Trends in Achievement:** Substantial improvement was registered in the performance of Standard 6 pupils in Tanzania mainland for both reading and mathematics between 2000 and 2007. The zone education authorities, and the “school inspectorate department” in the Ministry of Education in collaboration with the Prime Minister’s Office, Regional Administration and Local Government (PMO-RALG) should explore interventions that will assist teachers and schools to raise the competence levels of Standard 6 pupils even further, especially in reading.

A Concluding Comment

The task of improving the quality of education for a whole system of education must be seen as a long-term challenge. There are very few examples in the world where “quick fix” responses have resulted in system-wide positive improvements in the quality of education delivered across a nation.

For Tanzania mainland as a whole there was an overall improvement in: (a) the achievement levels of Standard 6 pupils in both reading and mathematics, and (b) in the percentages of Standard 6 pupils who were performing at higher levels of competence in reading and mathematics between 2000 and 2007. The Tanzanian government’s investment in primary education through the initial implementation of the Primary Education Development Program (PEDP 2002-2011) seems to be working well.

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A copy of this Policy Brief can be downloaded from the SACMEQ Website: www.sacmeq.org

SACMEQ wishes to acknowledge the financial assistance provided by the Ministry of Foreign Affairs of the Government of the Netherlands in support of SACMEQ’s research and training programmes.

Table 1: Levels and Trends in Pupil Achievement across Regions in Tanzania

| | Pupil reading score | | | Pupil mathematics score | | |
|-------------------|---------------------|------------|---|-------------------------|------------|---|
| | 2000 | 2007 | | 2000 | 2007 | |
| Central | 538 | 588 | ▲ | 512 | 549 | ▲ |
| Eastern | 569 | 605 | ▲ | 530 | 565 | ▲ |
| Kagera | 539 | 593 | ▲ | 514 | 562 | ▲ |
| Kilimanjaro | 556 | 564 | ► | 543 | 534 | ► |
| Mwanza | 532 | 570 | ▲ | 505 | 551 | ▲ |
| North East | 551 | 563 | ▲ | 516 | 551 | ▲ |
| Northern | 557 | 565 | ► | 549 | 538 | ▼ |
| Southern Highland | 565 | 595 | ▲ | 531 | 578 | ▲ |
| Southern | 495 | 567 | ▲ | 487 | 528 | ▲ |
| South Western | 528 | 585 | ▲ | 510 | 566 | ▲ |
| Western | 530 | 564 | ▲ | 513 | 546 | ▲ |
| TANZANIA | 546 | 577 | ▲ | 522 | 553 | ▲ |
| SACMEQ | 500 | 512 | ▲ | 500 | 510 | ▲ |

Values in **Green** = 10 points or more above SACMEQ II mean of 500

Values in **Black** = less than 10 points above or below SACMEQ II mean of 500

Values in **Red** = 10 points or more below SACMEQ II mean of 500

Notes about trends

▲ Increased by 10 points or more

► Minimal change (less than ±10)

▼ Decreased by 10 points or more

Table 2(a): Percentages of Pupils Reaching Various Levels of Competence in Reading

| Reading Skill Levels | | | 2000 | 2007 | Change |
|----------------------|----------------------|---|------|------|--------|
| Level | Description | Skill/Competence | | | |
| 1 | Pre-reading | Matches words and pictures involving concrete concepts and everyday objects. | 2.8 | 1.4 | -1.4 |
| 2 | Emergent Reading | Matches words and pictures involving prepositions and abstract concepts. | 5.5 | 2.1 | -3.4 |
| 3 | Basic Reading | Interprets meaning (by matching words and phrases, completing sentences). | 9.4 | 6.6 | -2.8 |
| 4 | Reading for Meaning | Reads to link and interpret information located in various parts of the text. | 18.9 | 12.0 | -6.9 |
| 5 | Interpretive Reading | Interprets information from various parts of the text in association with external information. | 21.4 | 16.9 | -4.5 |
| 6 | Inferential Reading | Reads to combine information from various parts of the text so as to infer the writer's purpose. | 20.6 | 28.0 | +7.4 |
| 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, prejudices and biases). | 18.8 | 26.8 | +8.0 |
| 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 | 2.7 | 6.2 | +3.5 |

Table 2(b): Percentages of Pupils Reaching Various Levels of Competence in Mathematics

| Mathematics Skill Levels | | | 2000 | 2007 | Change |
|--------------------------|--------------------------|--|------|------|--------|
| Level | Description | Skill/Competency | | | |
| 1 | Pre-Numeracy | Applies single step addition and subtraction. | 2.8 | 0.7 | -2.1 |
| 2 | Emergent Numeracy | Applies a two-step addition and subtraction involving carrying. | 22.7 | 12.6 | -10.1 |
| 3 | Basic Numeracy | Translates verbal information into arithmetic operations. | 35.0 | 29.8 | -5.2 |
| 4 | Beginning Numeracy | Translates verbal or graphic information into simple arithmetic problems. | 21.4 | 25.5 | +4.1 |
| 5 | Competent Numeracy | Translates verbal, graphic, or tabular information into an arithmetic form in order to solve a given problem. | 9.9 | 19.3 | +9.4 |
| 6 | Mathematically Skilled | Solves multiple-operation problems (using the correct order) involving fractions, ratios, and decimals. | 6.2 | 8.7 | +2.5 |
| 7 | Concrete Problem Solving | Extracts and converts information from tables, charts and other symbolic presentations in order to identify, and then solve multi-step problems | 1.6 | 2.5 | +0.9 |
| 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. | 0.4 | 1.0 | +0.6 |