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The results from the 2015 Trends in International Mathematics and Science Study (TIMSS) point to a clear relationship between language and performance in Mathematics and Science achievement worldwide. Using country-specific data from the Grade 5 and 9 study, we examine this relationship in South Africa.

Learners' achievement can be impacted by a wide range of factors. Some factors have particularly powerful effects in certain countries, due to the prevailing context. In the South African context, language and literacy are a crucial part of explaining learner achievement.

The language used in South African education is a highly contentious issue due to its previous use as an exclusion tool under the Apartheid government.

Many learners are taught in their second, or even third language, despite research showing that being taught in your home language at school is associated with better results^{1,2}. This may be because language is interwoven with literacy.

Learners taught in their home language have a strong linguistic foundation on which they can build developing skills. Learners who do not have this foundation will struggle in developing literacy, as they consequently cannot effectively engage with the academic content¹. This spotlight aims to position language as a valuable resource for learners which progressively impacts their achievement.

Definitions

Language: a system of communication, by either spoken or written means

Literacy: the ability to read and write

Learning through a second (or third) language

Although there are 11 official languages in South Africa, the language of instruction from Grade 4 onwards is mostly English or Afrikaans³. Learners who have an African home language, and who do not use the language of instruction out of school, have fewer opportunities to develop literacy skills in English or Afrikaans. TIMSS 2015 was administered in either English or Afrikaans, with the majority of learners having an African home language (80.9% and 76.3% in Grade 5 and 9, respectively).

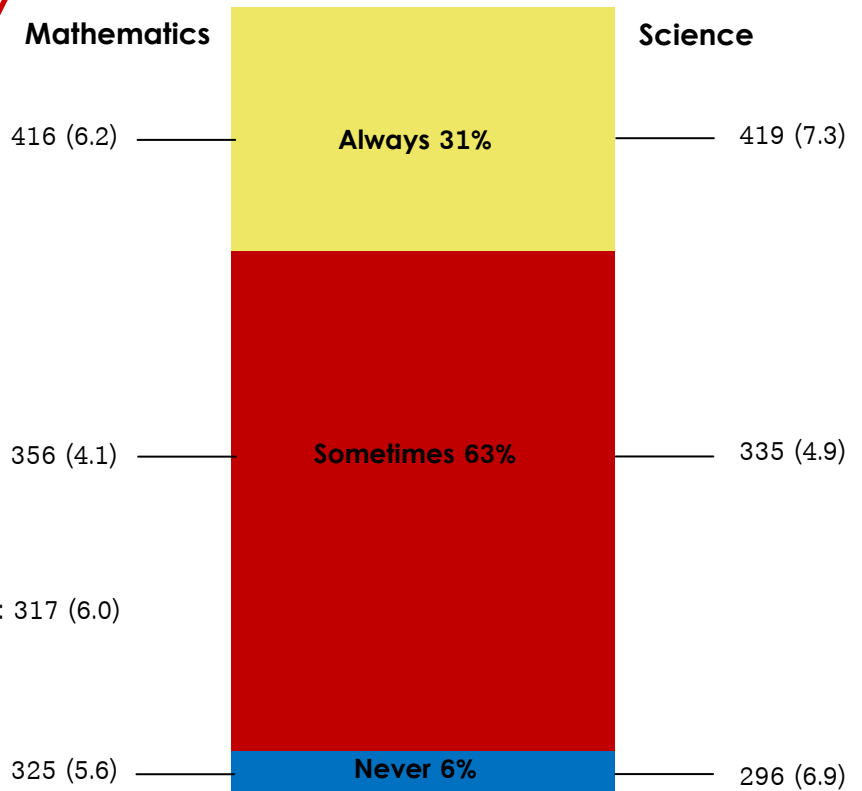
The percentage of learners who spoke the test language always or almost always was:

31%
in South Africa

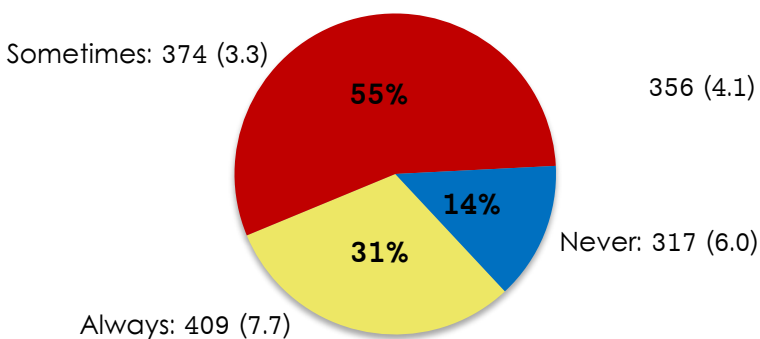
78%
internationally

Being instructed and assessed through a second or third language has a negative impact on achievement^{1,2}. This was evident in the TIMSS 2015 results for both Grade 5 and 9 learners, which are shown in the following two diagrams.

Grade 9: Relationship between frequency of speaking test language at home and achievement score*



Grade 5: Relationship between frequency of speaking test language at home and mathematics achievement*



DID YOU KNOW?

Science is more likely to be influenced by language (i.e. the difference between the language of instruction in school and the home language) and literacy, as it is more text-based and has a unique 'language' of its own.

* Numbers in brackets () indicate the Standard Error, the statistical accuracy of an estimate.

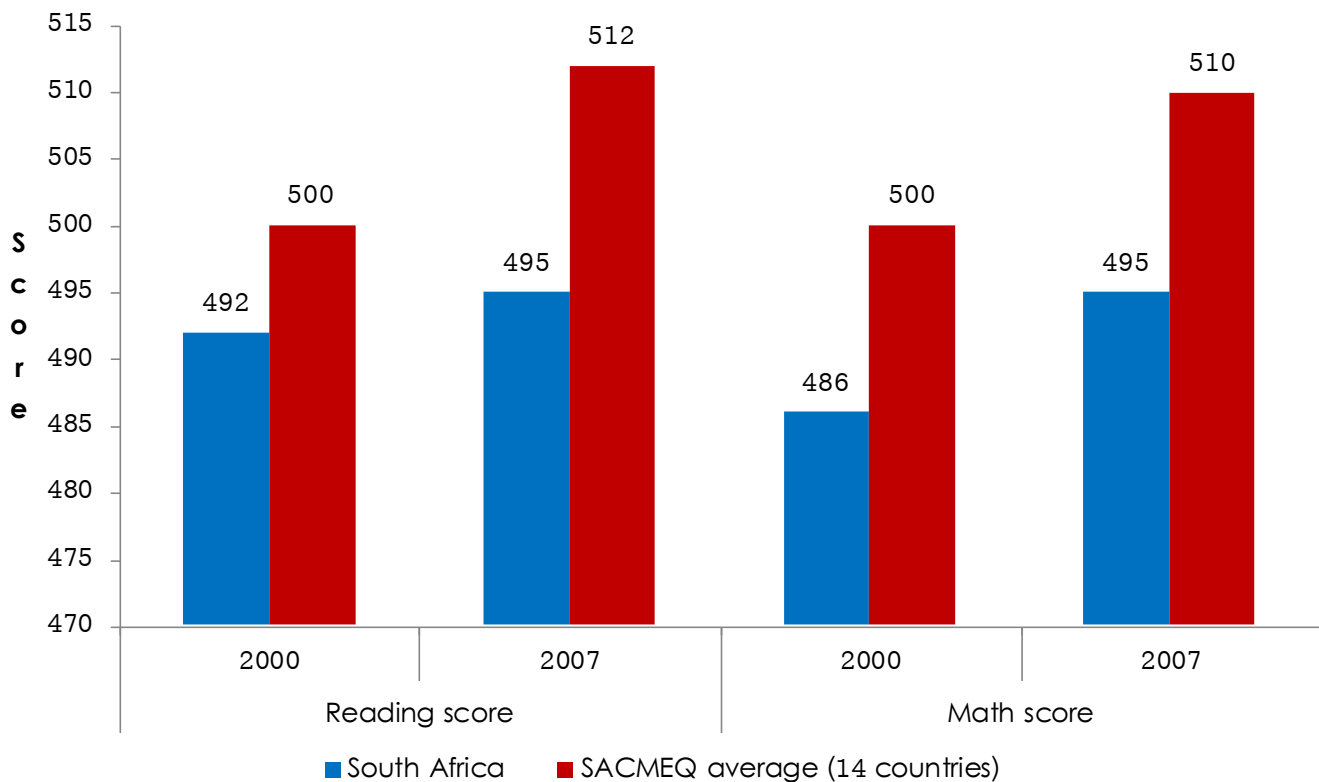
Literacy in reading and mathematics achievement

Despite policy reform, learner achievement in South Africa continues to be poor². Language is deeply interwoven with literacy, where proficiency in the home language provides the precursor skills for the later development of reading and writing in both the home language and additional languages.

Literacy within the classroom relates to the ability to use language in reading, writing, and critically engaging with subject-specific content to master the material. Poor achievement scores suggest that current practices are not allowing learners the optimum opportunity to use their home language resource when

developing literacy. For example, the Southern and Eastern African Consortium for Monitoring Education Quality (SACMEQ) III results show that, although there was improvement, South African Grade 6 learners still performed lower than the SACMEQ average (14 countries) in reading and mathematics achievement tests (see figure below)². In 2007, the differences between the South African mean and SACMEQ mean was larger for reading than for mathematics. The difference in reading scores grew from 8 points in 2000 to 17 points in 2007, while the differences for mathematics remained similar at 14 and 15 points in each year respectively.

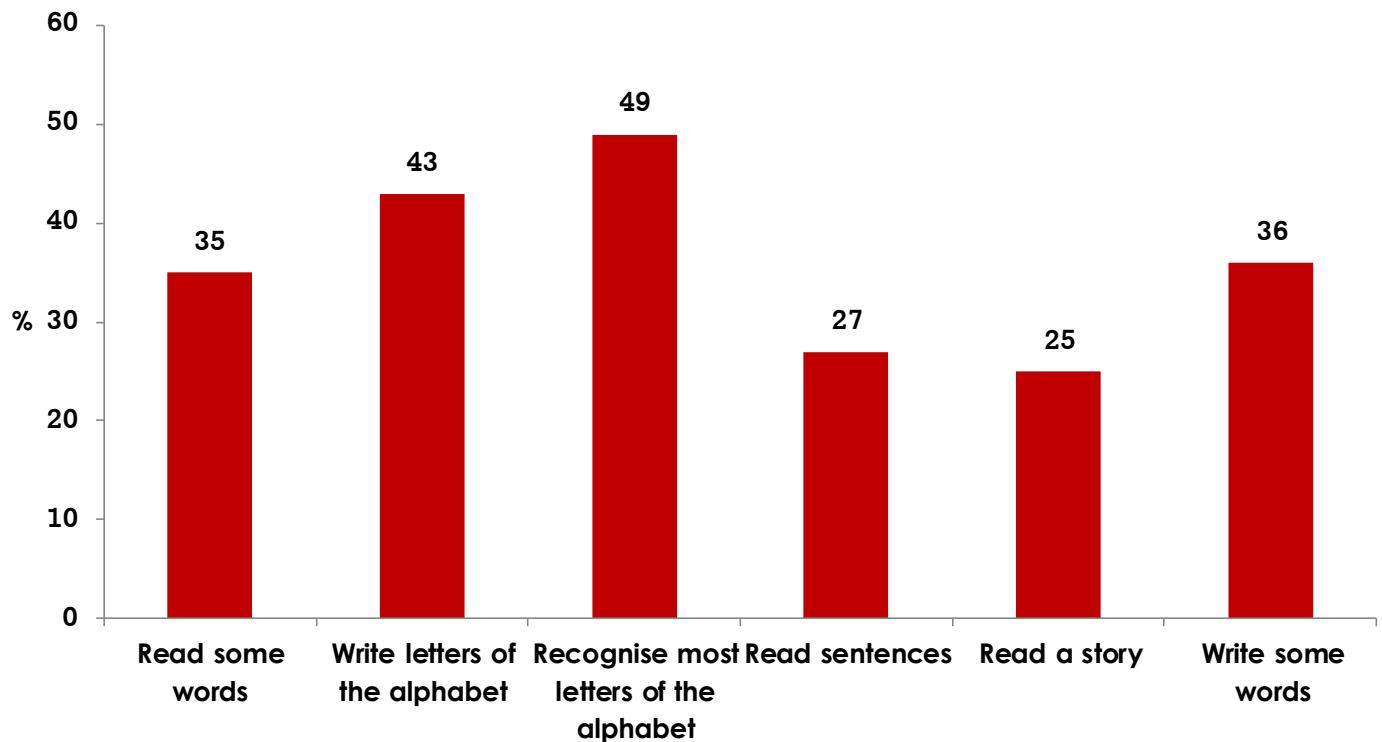
SACMEQ Reading and Mathematics scores– 2000, 2007



Similarly, the 2006 and 2011 waves of the Progress in International Reading Literacy Study (PIRLS) show that South African learners perform below the international averages. This was found for all learners, even when assessed in all 11 official languages^{2,4}. African home language speakers who were tested in their home language scored lower than those tested in English or Afrikaans.

Literacy and language mastery starts early

Learning is built on previous learning⁵. The TIMSS 2015 results highlight this by showing how early literacy is necessary for later academic achievement in mathematics. Early literacy starts within the home, as children are exposed to language by their parents and/or other family members. To assess this, parents of Grade 5 learners were asked how well their children were able to perform literacy tasks before going to Grade 1.



South African learners who performed the literacy tasks **well** achieved

46 points

(one grade level)

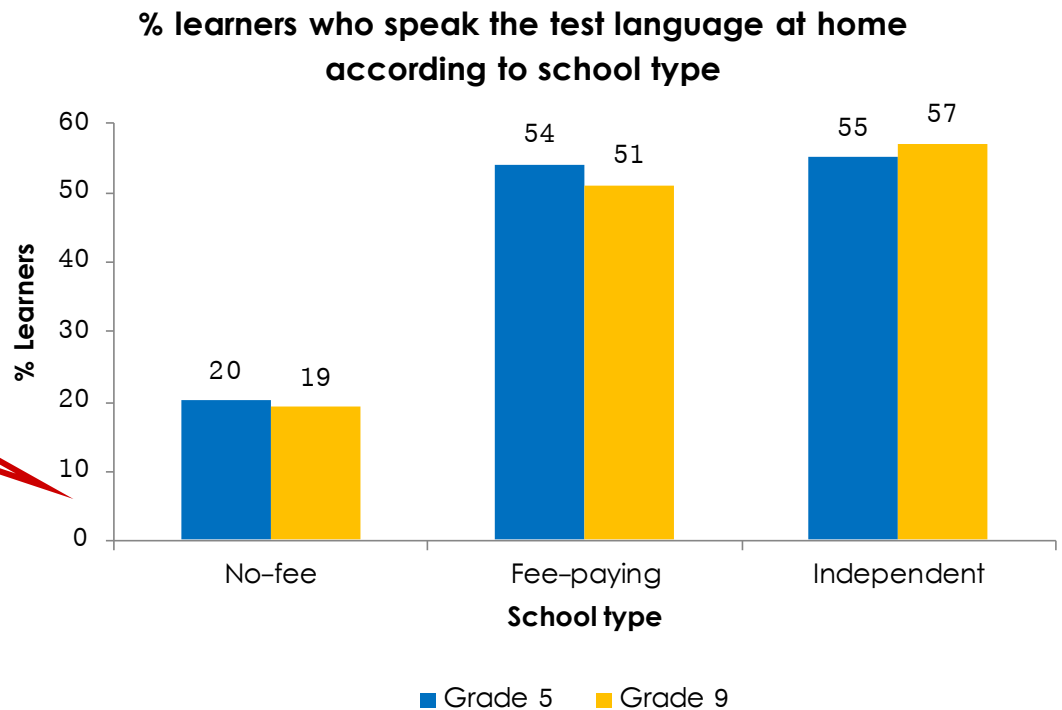
higher in the Grade 5 numeracy test than those who could perform the tasks **moderately well**.

In addition, learners from high-socioeconomic status (SES) backgrounds are provided with more learning materials and more parental support at home. Results from the SACMEQ II show that learner SES was significantly associated with achievement for all 14 participating countries, including South Africa⁶.

How does SES background tie in with language exposure?

Learners from low-SES backgrounds are more likely to attend no-fee schools. TIMSS 2015 showed that learners who attend these schools are less likely to speak the test language at home (see figure below).

While making up 2/3 of the school-going population, only 1 in 5 learners attending no-fee schools spoke the test language at home, compared to 1 in 2 learners in fee paying and independent schools.



Recommendations to improve language and literacy

In order to improve mathematics and science achievement, learners need to develop strong reading and writing skills across several genres⁷ in more than one language. The recommendations are therefore:

- ⇒ High levels of literacy in any language are crucial for academic achievement. Strategies to develop home and first additional language proficiency in parallel should be encouraged.
- ⇒ The development of teaching and learning materials in African languages needs to continue, and resources to support this should be provided.
- ⇒ Learners should be given sufficient, extended opportunities to read and write. In addition to class-work and homework, the use of community resource centres and libraries must be encouraged. In addition, home, family-based or out-of-school literacy opportunities must be expanded. Materials to support parents in improving the literacy of their children from an early age i.e. games, books, should be developed.

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