

y=language¹¹ + maths.science

Exploring the very complex issues of language and the teaching of science and mathematics

Language is communication and miscommunication. It is cultural positioning and political choice. It is inclusionary and exclusionary. Language is a complex issue.

11 official languages vs learning in your home language

Language on its own is a multi-layered subject. Now bring in a policy of 11 official languages, with South African Sign Language on its way to becoming number 12.

But let's not stop there. We have a multilingual country with an imperative to improve its school maths and science outcomes for positive impact on the science, engineering and technology (SET) sectors.

How does this multilingual environment affect learning outcomes when research has shown that learning in your home language is far preferable?

The NSTF provides neutral collaborative platforms where issues and sectors meet

- One of the National Science and Technology Forum (NSTF) functions is to hold discussion forums, bringing the private and public sector together to make connections.
- Feedback from these discussion forums is given to stakeholders, including government.
- This event was hosted by the NSTF membership sector for [Professional Bodies \(proSET\)](#).

The languages of mathematics and science

Language also operates in a very specific manner in SET disciplines. So beyond having to understand a subject in your second, third or fourth language of English, you also have to understand the way English is used in that discipline. An example is concepts and terms in mathematics; these don't necessarily align with everyday use. Think of asking for the 'difference' between two numbers. The languages of maths and science are almost separate languages in themselves.

Understanding the legal framework

Unpacking the issues of language and SET education begins with understanding, discussion and bringing together representatives from multi-disciplinary backgrounds. In partnership with its Professional Bodies and Learned Societies sector (proSET), the National Science and Technology Forum (NSTF) hosted a national Discussion Forum on 'Language and STEM education at school – policy and research' from 3-4 October 2017 in Gauteng. Mr Monyaki, Chief Education Specialist: Languages, Department of Basic Education, began the engagement with a look at the legislative framework.

Not only does the [South African Constitution](#) protect and promote linguistic rights but this is supported by various education policies and Acts. This includes promoting multilingualism, equitable development of the official languages, and fostering respect for all languages.

This all sounds very clear, however, the legal language makes applying equal promotion and protection in the school environment very 'pliable'. "The Constitution says everyone has the right to receive education in the official language or languages of their choice in public educational institutions *where reasonably practicable*," explained Mr Monyaki. The notion of what is 'reasonably practicable' is an open one.

Further to this, the [South African Schools Act](#) says that a public school's governing body (SGB) may determine the language policy of the school.

While the idea is that the 11 official languages should be promoted and used equally with equal quality resources, the SGB's ability to define the language of teaching and learning (LoTL) undermines this. Most SGBs choose English and, in certain areas, Afrikaans. The other languages are offered as subjects.

There is further lack of clarity in that the [National Development Plan](#) recommends that a learner's home language is used as the LoLT for longer yet acknowledges the dominant (hegemonic) role of English.

The reality is that home language as the LoLT doesn't go further than Foundation Phase. The Foundation Phase ranges from Grade R – the reception year – to Grade 3.

South African resources

[Ukuqonda](#) has created free mathematical textbooks.

For reading resources in various official languages see <http://nalibali.org/>

About BSTEP

Mr Mpho Madisha, Chairperson of Black Science, Technology and Engineering Programme ([BSTEP](#)), addressed the NSTF Discussion Forum on '[Establishing a culture of STEM discourse in township and rural high schools](#)'. Part of the presentation included explaining the various outreach BSTEP projects.

English is still the preferred LoLT and then Afrikaans (due to its positioning during apartheid). These two languages are not the home language for the majority of learners in South Africa. Mr Monyaki says that research has shown that this scenario, where the LoLT is not the home language, is a barrier to learning.

Why is English the preferred language of learning and teaching (LoLT)?

Is this a practical issue around resources or finances? Or could this be about political will? Was the decision to have 11 official languages a specific response to Afrikaans (at the ANC's Harare Convention in 1989) rather than an integral part of the ANC's philosophy, policies and political direction? If African languages are so important, why are many of the leadership sending their own children to schools where the LoLT is English? These were just some of the points raised by the delegates.

Multilingualism as a resource

Prof Mamokgethi Phakeng, Deputy Vice Chancellor: Research and Internationalisation at the University of Cape Town, has done research that shows poor performance by multilingual learners can't be solely attributed to the learners' limited proficiency in the LoLT. While language is one of the key problem areas, she says that fluency in LoLT will not solve all the problems. She positions multilingualism as a resource and an advantage.

Language is political

Language is also political. The language you choose, why you choose it, and when you choose to speak it can be a political act. Language can be used to polarise – consider the deliberate underdevelopment of the African languages during apartheid.

Phakeng's research shows that, despite policies in South Africa, teachers and learners in black African schools prefer English as the LoLT in mathematics. This is despite limited fluency in English. Learners want access to 'social goods' such as jobs, higher education, etc. ('Social goods' refers to anything that people believe to be a source of power, status or worth.)

Learner and teacher language preferences are driven by socio-political realities. While policy asks schools to choose one language, Phakeng says that given the hegemony of English the choice is a false one.

The multilingual approach

Phakeng provides a case for a multilingual approach – specifically around mathematics teaching and learning as this is her area of research. This focuses on recognising the hegemony of English, driving interest in mathematics and creating challenges, and drawing on the learners' home languages to develop mathematical proficiency.

The idea is that language is seen as a resource where it is visible and invisible. For example, use Zulu or any of the African languages in the classroom but the language is not the focus. It's a useful 'invisible' tool so that the focus is on the mathematics. The goal is the learners' mathematical understanding and proficiency, not language fluency.

South Africa as the world's multilingual teacher

Phakeng says that we also need to recognise that the world is becoming increasingly multilingual and multicultural. Consider the global issue of immigration and its associated multilingualism. Currently no one has the answer to teaching in the multilingual environment. Yet because of its language policies and the research conducted so far, the world's eyes are on South Africa.

Speakers that addressed the forum can be contacted through the spokesperson, [Ms Jansie Niehaus](#).

Video clips with the full presentations and discussion can be found on the NSTF web site (www.nstf.org.za). Please send information and comments to enquiries@nstf.co.za.

About the NSTF

The National Science and Technology Forum (NSTF), established in 1995, is a broadly-representative stakeholder body for all SET and innovation organisations in South Africa, which seeks to influence policy formulation and delivery.

The NSTF Awards are unique in SA, recognising the outstanding contributions of individuals and groups to SET and innovation.

The science bursaries page <http://www.nstf.org.za/bursary/> provides information on bursaries and bursary providers for science, engineering and related studies.

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