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The role of maths and science in transforming the future of learners

Maths and science can have a huge impact on what learners can choose to study after high school, but are often avoided during those years as they're considered too difficult. STEM (science, technology, engineering and maths) skills are critical in today's fast-paced world, but it is evident that learners in South Africa are showing less of an appetite for subjects like maths and science.



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This mainly comes down to misconceptions and negative perceptions of maths and science, rather than one's ability or aptitude for the subject. "Our youth are brought up to believe that maths and science are too difficult, that it has no real value in the real world and, therefore, they are not worth the effort," says Prof Azwinndini Muronga, Executive Dean of Science at Nelson Mandela University. "This can have an incredibly negative effect on learners' attitudes on these subjects."

"What many learners and parents fail to realise is that maths and science are enabling subjects that are a gateway to higher education and beyond," says Muronga. "They lay the foundation in applying knowledge when encountering complex principles competently in the school curriculum, at university and later on in life."

The performances of learners in maths and science are well below par compared to other countries. Data from a TIMMS assessment shows that South African learners consistently performed lower in maths and science than their international peers. Out of the 64 countries, South African learners in Grade 5 scored an average of 374 for mathematics, and 324 for science – far below the 400 basic threshold – despite being older than their counterparts. While only 41% of Grade 9 mathematics learners demonstrated that they had acquired basic mathematical knowledge, and just 36% of learners in Grade 9 science learners had acquired basic science knowledge.

One of the major factors impacting the findings is the unequal status of learners and their different backgrounds. Learners from households that lack basic amenities like running water, flushing toilets, electricity and access to the Internet, have the lowest educational outcomes. Conditions at home that are conducive to learning are crucial for improved learning and outcomes in maths and science.

Cultivating a curiosity through maths and science

Young people have a natural curiosity about the world around them. Learnings from maths and science 'plant the seed' in gaining an understanding of the order of things and how they work. These skills are honed on the education journey and applied in scenarios that go beyond the classroom, such as in the kitchen, garage, in nature and the rest of tangible reality.

"Maths and science give learners more choice when it comes to applying to study at university," says Muronga. "Without them, they would not be eligible for programmes and apprenticeships in the fields of science, engineering and even commerce, as many higher education institutions place a strong emphasis on maths and science."

Maths is also beneficial in other areas including problem-solving, quantifying and interpreting data, the comprehension of text, debating, project management, and personal finance. Science and technology can cultivate creativity, observation, analytical research, and can also have an impact on society such as sustainability and environmental conservation.

Improving the shortcomings in basic education in South Africa

"The ability of learners to creatively solve real-life problems is vital to address job creation and sustainable economic growth, particularly against the backdrop of 4IR. This underscores a dire need for skills development and support of mathematics teachers and structured programmes to incubate learners for access to and success with STEM study programmes at university," says Prof Werner Olivier, Director: Govan Mbeki Mathematics Development Centre.

Nelson Mandela University has made it a priority to improve shortcomings in basic education in South Africa. The Govan Mbeki Mathematics Development Centre (GMMDC) is a self-funded engagement centre within the School of Computing Science, Mathematics and Applied Mathematics, Physics and Statistics at the Nelson Mandela University for improving teaching and learning of mathematics and physical sciences in South African schools and colleges.

"The GMMDC has successfully developed customised techno-blended models and programmes to support the teaching and learning of mathematics and physical sciences in secondary schools," says Olivier. "These programmes assist hundreds of learners annually from rural and urban districts of the Eastern Cape, to obtain quality Bachelor passes in matric."

STEM in ACTION is a community engagement entity within the EBET Faculty. It supports learners, educators, and parents across the educational phases, through a hands-on, brains-on approach within the teaching and learning of physical science. "This constructivist approach, together with a dynamic and enthusiastic STEM in ACTION team, aims to excite learners and motivate them about the science and start considering possible careers paths," says Muronga.

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