

WHO SHOULD CARE ABOUT


MATHS SCIENCE TECHNOLOGY

TEACHING AND LEARNING?

$$2x^2yy' + y^2 = 2 \quad x_1 = -11$$

$$a^2 = b^2 + c^2 - 2bc \cos \alpha$$

$$\log \frac{x}{2}$$

$$F_2 = 2 \times yz$$


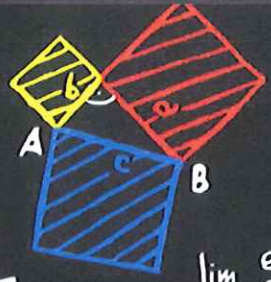
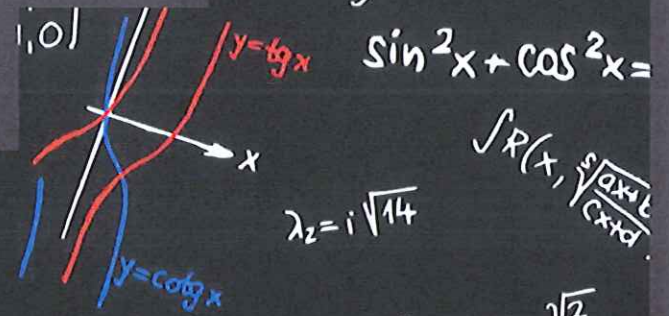
$$x_1 = \begin{pmatrix} 2p \\ -p \\ 0 \end{pmatrix}$$

$$1 + e^x)yy' = e^x$$

$$y(1) = 1$$

$$x_1 = \begin{pmatrix} \alpha + \beta + \gamma \\ \beta \\ \beta \end{pmatrix}$$

$$\cos 2x = c$$



$$\alpha, \beta, \gamma \in \mathbb{C}$$

$$f(x) = 2^{-x} + 1, \epsilon = 0.005$$

$$e^z - xyz = e; A[0; e; 1]$$

$$\lim_{x \rightarrow 0} \frac{e^{2x} - 1}{5x} = \frac{2}{5}$$

$$|k| + |\beta| \neq 0; \mu \neq 0$$

$$\frac{2x}{x^2 + 2y^2} = 2 \quad z = \frac{1}{x} \text{ at } \sin \frac{\sqrt{z}}{2}$$

$$\sin(x+y) = \sin x \cos y + \cos x \sin y$$

By Sharanjeet Shan

$$\left(\frac{\partial f}{\partial x}\right) = 16 - x^2 + 16y^2 - 4z > 0$$

$$A = \begin{pmatrix} x & 1+x^2 & 1 \\ y & 1+y^2 & 1 \\ z & 1+z^2 & 1 \end{pmatrix}; x=0, y=1, z=2$$

$$y' - \frac{\sqrt{y}}{x+2} = 0; y(0) = 1$$

$$3x^7 + 166x^{-0.17} \quad \lim_{h \rightarrow +\infty} \left(1 + \frac{3}{h}\right)^h$$

$$A = [1; 0; 3]$$

$$\cos \varphi = \frac{(1, 0) \cdot \left(\frac{1}{2\sqrt{3}}, \frac{1}{4\sqrt{3}}\right)}{\sqrt{\frac{1}{12} + \frac{1}{48}}}$$

GETTING THE TEACHING AND LEARNING OF THESE THREE SUBJECTS RIGHT IS VITAL FOR THE DEVELOPMENT OF A FUTURE EMPOWERED AND EMPLOYABLE GENERATION.

South Africa's National Development Plan states, "We seek a country wherein all citizens have the capabilities to grasp the ever-broadening opportunities available. Our plan is to change the life chances of millions of our people, especially the youth; life chances that remain stunted by our apartheid history". If, as a country, we are to fulfill these aspirations, anyone and everyone who cares about understanding, creating and maintaining a decent quality of life should care about Maths, Science and Technology teaching and learning. These are gateway subjects that are fundamental to ensuring the youth of South Africa have access to further education and employment.

Unfortunately most of the debate on Maths, Science and Technology in South Africa centres on examination results, both Annual National Assessments (ANA) and Matric rather than how teaching and learning are structured in schools - both at the organisational and classroom levels. The challenges ahead of us are far more complex than this approach suggests. More than 50% of learners leave school with no certification at all and many parents are largely not involved in any significant and informed manner in their children's education.

At the school level, there is a myriad of structures to be corrected. A key challenge in the classroom itself is that many teachers face gaps in their own development. Teachers need to be 100% competent in the Grade that they teach.

Sadly only a very small percentage of teachers can go back to university to acquire appropriate qualifications and professionalism. In the absence of departmental measures, organisations such as ours have developed their own In-Service Education and Training (IINSET) programme for

teachers. After 40 days of carefully planned and executed training, our teachers will achieve 100% knowledge and skills base in the grade that they are teaching. Unfortunately insufficient funding always gets in the way.

For learners in the classroom, promotion of practical work from a very young age is an absolute imperative. Reading, Writing, Mathematical and Scientific drawing and Oracy should be the focus and not colouring of symbols and shapes which as such has no mathematical meaning for learning. I know of children who spend almost all of the lesson in the foundation colouring and trying to draw free hand. Rather children in Grade 1 should be given mathematical sets, conduct natural science experiments and do project based learning. Every school should have a mathematics, science and a technology hub.

Careful choice of examples can also improve children's concept formation. Effective questioning can raise achievement. The quality of praise is at least as important as its quantity. Learners learn more when their educators know their level within a subject and can act on this information. Learners need to be introduced to a wide range of problem solving situations. This would enhance their memory, confidence and mathematical thinking. Teach children from Grade 1 to chart own knowledge of the curriculum, knowledge of what they want to be, their vision and their journey.

Students should also be exposed to how these subjects are connected to the world in practical terms and not just grapple with content Maths.

Another vital aspect to getting this right is restoring the intellectual value of Maths, Science and Technology in our society. Understanding how both Maths and Science are linked to the global economy, to engi-

neering and to artisans must be fully appreciated and understood in all schools.

That means creating special spaces and explorations of these very tough, hard core disciplines. Restoration cannot be looked at unless it is understood that both Maths and Science are a "contested terrain" and have years of established tradition. Mathematical and scientific language has its own vocabulary and meaning and requires deep thinking, retention, immediate recall and reproduction on demand into more

and more complex problem solving situations.

Furthermore the enhancement of the subject can only happen if teaching and learning is connected to local realities, beyond the school curriculum to the nature of mathematics, how it behaves in mother nature's design and of course the cosmos. There is nothing more awe-inspiring and beautiful than fractals, fibonacci and mathematics of metamorphosis. Most teachers and learners have the basic internet familiarity so why not familiarise them with

the wonderful enhanced world of mathematics beyond the curriculum and the rigid, mechanical formula based learning?

Learners should be exposed to theories, laws, facts, famous mathematicians, scientists, what they did and how they did it. We have to get learners excited about the logic of science discovery at a basic level, hypothesis, predictions, inferences and the like. We have to show our children how the whole universe, human thought itself and the fundamentals of existence operate around principles of Maths and Science.

Underprivileged communities in South Africa are developing a greater awareness of the importance of education for the future of their children.

Through the work we've been doing in communities and schools over the last few years we've seen the initial skepticism from teacher and school communities quickly convert into appreciation for the intervention; displaying the pride they have for their children achieving results that they never thought possible. Parents and School Governing Bodies are encouraged to be involved in an ongoing basis in the construction of learning hubs.

While there is a long journey ahead, getting the teaching and learning of these subjects right will yield significant benefits for our communities. And, we have already seen many successes at the Maths Centre. Our high-achieving learners are role models in their communities and have a major impact on the next generation and their thinking about these subjects. Caring about Maths, Science and Technology means that learners will have an opportunity to access higher quality jobs. This means that more young people will have higher self-esteem and be better equipped to support their communities and families, who in turn will achieve a better education and quality of life.

