



National Science and Technology Forum

S.E.T. for socio-economic growth

## Message from the NSTF Executive Director

### Letter to the matrics who have to rewrite their maths and science exams

*“... how do I respond when my best laid plans get disrupted? I’ll admit I experience frustration. But ... I use the Accept and Act Principal. ... I accept the natural emotions that come with the disruption and I choose to focus on my actions instead.”*

Gareth Mole, Performance Psychologist of Condor Performance

The Performance section at South Africa’s **Sport Science Centre** focuses mainly on physical training, but this quote is on their website:

*“Running is nothing more than a series of arguments between the part of your brain that wants to stop and the part that wants to keep going.”*

Unknown

It was distressing news that the matric exam papers in mathematics (maths) and physical science had been leaked. The NSTF annually selects the top-performing learners in the maths and science exams for our [Brilliants programme](#). If learners obtained high marks (90% and above) in these exams – and this is the group from which we select students – we could not be sure that these were their rightfully earned results. Maths and science results are also important for admission into universities, certain courses (notably engineering) and the selection of students for bursary programmes supporting accounting, science, engineering and medicine courses (among others). The matric certificate, despite much criticism of it as a true reflection of a candidate’s ability, can still impress an employer, even if the candidate had studied following matric, and had worked in several jobs before arriving for an interview. Thus, a lack of credibility would have far-reaching effects.

#### The news

The Department of Basic Education (DBE) announced on 16 November that the second matric exam paper in maths had been leaked through social media. On investigation it was found that it had been leaked a few hours before the exam, meaning that those who received it could have worked out the answers before writing the exam. Ironically, the ability of learners to successfully make use of the leaked exam paper would be the same ability they would have used to get good marks in a maths exam! Be that as it may, the damage to the exam’s credibility was done. Four learners had forwarded the paper to a *chom* of theirs asking him how to solve the questions in the leaked paper, who in turn contacted a university student in Johannesburg who also runs a nongovernmental organisation that assists learners. The university student duly emailed the department’s spokesperson, Elijah Mhlanga, in the early hours of Monday.

Physical Sciences (Chemistry) Paper 2 suffered the same fate of being leaked a few hours before the exam on 22 November. Now the DBE has announced that all matric students nationwide will rewrite both leaked exam papers. The Minister explained that the exam results would have no credibility without a rewrite. The department’s chief director of national assessments and public examinations, [Rufus Poliah](#), said that the paper was leaked in eight of the nine provinces, with the Free State being the exception.

“Umalusi [the quality assurance body] has established that the Integrity of the exams has been irrevocably compromised...If we are to restore public confidence in the exam process, we have to take an unpopular decision”.

The minister of Basic Education, Angie Motshekga said, “It is quite sad because it is the same group that went through Covid-19 and all other things and now ... there is a national rewrite, something that has never happened in the history of the exam. We had to do this for their own good, to protect the credibility of their certificate”. She also said that they wanted to prevent any doubts about the top achievers’ results.

Thus, after consultation with the provincial MECs, heads of education departments, school principals, school governing body associations, Umalusi, as well as other stakeholders, the painful decision was made to organise a rewrite. Everyone is inconvenienced by this decision – learners, parents, family members, teachers, markers, departmental officials in all the provinces, and universities. However, Umalusi, the Minister and Poliah are correct. The ripple effects of accepting compromised outcomes will reach further into the future than the rewrite, affecting young people’s chances at studies and employment.

The Congress of South African Students (COSAS) and the teacher unions have now called on learners not to rewrite the leaked papers. Since COSAS and the unions will not be the ones having to bear the consequences of the leakages, and stand to gain by taking advantage of the situation, one should not attach too much importance to their call. However, for learners, parents and teachers it must sound like an attractive course of action. They are very disappointed, and angry, and individual rights must seem to have been transgressed. Yet, at least 195 learners (with maths) or 60 (with science) are guilty of having shared the exam papers. It is hard to determine just how extensive the sharing was, but we know that WhatsApp messages travel very fast, and we know that the growth in numbers of shared messages would be exponential in a case like this. So, there is no denying that the papers would have been widely shared. The Department says there will be an investigation into where the WhatsApp message originated, and will include interviews with learners who were part of the WhatsApp chain. But in the meantime, the papers have to be rewritten.

Yet, Naptosa does not agree with this logical conclusion: [Basil Manuel, Naptosa’s Executive Director](#) said, “Because of the ambiguity of the finding (of the preliminary report into the matter) – it is merely an assumption at this stage that the leak was widespread. Naptosa believes that the decision to order a national rewrite of the two papers is an overreaction. The term “viral”, used by the investigation Task Team conjures up the belief that the papers were splashed all over social media. But we have not seen evidence that this was in fact the case.”

“Merely an assumption” in this case is the result of a logical argument, something that maths can teach one.

The South African Democratic Teachers Union (SADTU) and the Congress of South African Students (COSAS) are taking the matter to court to challenge the Minister’s decision. Is this really a matter for the courts? There is no legal basis on which to fight this battle in court.

Clinical Psychologist Hameeda Bassa-Suleman told SABC News that the rewrite decision could have a negative psychological impact on matric learners. Bassa-Suleman says there will be few students with the resilience to do better in a second exam. “But a lot of students will suffer because of this unprecedented kind of opportunity whereby they will have to rewrite an exam they thought they’d finished,” she warned. This is a distressing fact, but does not change the need for a rewrite.

### **A minority of learners**

It’s important to realise that the rewrite does not affect the more than a million matric learners. For years, declining numbers of matrics have written mathematics. Last year, out of the 787 717 students who wrote the matric exams, only 222 034 (28%) wrote mathematics. Of those who wrote, 45% did not achieve a passing grade of above the required 30%. Not only has the bar been lowered a few years ago, from a requirement of 50% down to 30%, but fewer learners choose maths for grades 10-12.

There is a variety of reasons why this trend has continued. Maths literacy is regarded as an easier subject, and most learners opt to do that instead of grappling with the abstract nature of maths. It is possible that teachers encourage the choice of maths literacy to increase the overall matric pass rates at their schools. However, I am convinced that the most important factor is the nature of teaching in our schools due to the conditions in which teaching has to take place, and excessive burdens on the teachers. Poor teaching impacts learners' performance from grade 0 to 12. Worse, in maths, if a sound foundation is missing in primary school, the content of subsequent years cannot be understood. The cumulative effect means low confidence of learners in their own abilities, and thus maths is avoided as a subject choice.

As is said with boring repetition – it is crucial and urgent to fix our school system! However, for now the concern is about the 200 000+ learners rewriting maths paper 2, including the lesser number of learners rewriting paper 2 of physical science. The learners who have to rewrite both are doubly 'punished'. I wish that they could have been spared this ordeal.

On the brighter side, the content is the same as what they studied for the original exams. Rewriting the papers so soon means they just have to revise what they had studied previously. At least, this would apply to the well-prepared learners. For those learners who were not well-prepared, the ordeal is worse, but they have a second chance and bonus revision time. Although it is stressful to rewrite exams, it is also a definite benefit if approached with a positive mindset.

### **Performance psychology**

Performance psychology might have some advice for our maths and science matrices. This field is used to help sportsmen and women to achieve to the best of their abilities, to persevere, and cope with failure. The [Mental Toughness Digest - Condor Performance - Sport Psychology](#) offers performance psychology advice and assistance. "The Mental Toughness Digest is a weekly email sent by the sport and performance psychologists from [Condor Performance](#)."

Gareth J Mole started Condor Performance in Australia in 2005. He is an Australian who grew up in South Africa. In the 4 December Digest he gives advice to students who are writing exams.

For Condor, the majority of one-on-one clients are athletes. But they have clients who are non-sporting performers – "students, medical personnel, those in the military for example. These non-sporting performers have correctly worked out that the mental skills required by an elite athlete to perform consistently at the top are very much the same as would help them in their profession".

Mole's seven-point advice to athletes and non-athletes is as follows:

1. Focus on the process (effort) and let the outcome take care of itself
2. **Reduce attention to the factors you have little influence on** (such as the past)
3. Avoid only working on your weaknesses. Improve your strengths as well
4. Don't underestimate the impact that overall mental health can have on performance
5. The number of ways to improve is unlimited, but the time you have to improve is very limited
6. Fake It Till You Feel It
7. Be careful whose advice you buy

Much of this advice is applicable to the long term process, but points 1-4 might be useful for performance in maths and science. For the short term, point 2 is excellent advice!

Mole also wrote a short article called *Perfectionism in Sport Is a Road Block To Progress and Mental Wellness*. This might be of interest to the high performers in maths and science. He writes, "I crave order and excellence like a sugar addict craves chocolates and iced donuts".

"Let's talk about why it is so common for self-classified *perfectionists* to contact [us](#) for help. The main reason is that a constant search for the *perfect* round of golf, tennis match, lap, bout, routine, throw

(etc.) is emotionally exhausting.... Yet many of these *perfectionists* are already outstanding performers in their sport or performance area”.

He says there are three major components of performance. (See the [Mental Toughness Digest.](#))

- Outcomes / Results – which are only **somewhat influenceable**

*Examples: winning, medals, ranking, prize money, qualifying, team selection, personal bests*

- [Key] Performance Indicators – which are often **more influenceable** than the above

*Examples: greens in regulation, batting averages, clean sheets, goals scores, passes completion ratios and so many more.*

- Processes or Intentions or Effort – which are **highly influenceable**

*Examples: walking, stretching, reading, memorising, visualising, simulating and millions of others.*

Students (among others) should focus on what they have most control over – the processes they follow, and their intentions and efforts. “Being a *results-perfectionist* is mental sabotage”. Effort consists of both quantity and quality – how often you put in the effort, and the nature of that effort.

“If you separate effort from any possible benefits that may take place – which is highly recommended – then you can focus on making sure that the right quantity and quality is happening week in week out. But if I were obsessing about the much less influenceable outcomes of this effort I’d be in a world of mental pain”.

To the maths and science matrices: The same applies as before the rewrite was announced – study and give your best, regardless of the circumstances.

Mole says: “The irony is that very few of the world’s best try to literally win at all cost. It was their obsession about effort and their training processes that got them to the top. We are much less likely to hear about the athletes, coaches and performers who had/have a Win At All Cost way of thinking. Why not? Most of them crumble under the weight of frustration and pressure well before they become newsworthy”.

“...we encourage those we work with to push this obsession with winning towards their preparation, their processes. Why? For a start we have **much greater influence** on our processes compared with outcomes”.

In a podcast [Exam Psychology - How Do You Mentally Prepare For Yours Exams?](#)

([condorperformance.com](#)) performance psychology for English language exams are discussed. The interviewer says: “I think there’s great overlap between what athletes do and what test candidates do. Obviously, test candidates luckily only do it once or twice”. What he doesn’t understand is that school learners and students at tertiary education institutions do exams repeatedly, and the idea is that they should improve every time.

He also says that if exams are “high stakes”, “they can be very anxiety provoking. One of the things that happens when you get very anxious before an exam or during an exam is that it inhibits your cognition”.

The interviewee, Harley de Vos, gives this advice:

- Get your work done as early as possible
- Have strong study habits and a good routine
- Work hard, even when you are not feeling that well or motivated, or “when your mind is protesting it”
- Remember to move. This helps to cope with the stress, metabolising cortisol, the stress hormone. It also helps with learning and memory
- When you are close to the exam, revise what you have studied, don’t try to cram large sections of material you haven’t worked on before

- The night before the exam, switch off and get enough sleep. Turn off all gadgets to allow your mind to rest.

## **Breathe**

On the day of the exam, it is helpful to do deep breathing. “Deep breathing is really effective physiologically at actually changing our brain chemistry... When we are in a stressful situation, such as an exam, our threat system is activated. .. and that’s when we start to see our heart rate increase, our breathing gets shallower and faster, our digestive system shuts down, which is why we can experience the butterflies in the tummy, we become sweaty, we might become jittery... Breathing is really good, because it actually helps us to switch which parts of our brain are activated... When we’re anxious, it’s like our foot’s on the accelerator, okay? But to perform really well in the exam, you need the brakes on. We need to slow it down. Breathing’s really good for that”.

“A little useful exercise that can help is what we call box breathing. This is simply just to breathe in through your nose for four seconds, hold that breathe for four seconds, breathe out for four seconds, and repeat that. And it’s just like you’re going around a box. For those who are very visual, they might want to imagine that box just in front of them, and that can just be a nice way just to help slow down the breathing.”

- Plus, there’s also the cognitive element, with the worrying and the catastrophising thinking.

## **Sit with the discomfort**

It is also important to have “a willingness to tolerate discomfort, knowing that this exam’s going to be difficult, but it’s really important for me to do that because it’s going to help me with future studies, or with other aspects of my life...I’m willing to sit with the discomfort that I might experience along the way, [to work] towards what’s important for me”.

Say to yourself: “That’s okay, it’s normal. That’s just my body responding to a threat. It’s okay. I’m here to do a job, and I’m going to do that.”

## **Pressure is a privilege**

“You’ve earned the right to sit these exams because of what you’ve done beforehand. Not everyone gets that opportunity. The All Blacks have a saying, that pressure is a privilege. The idea being that if you find yourself in a situation where you feel pressure, that’s actually a privilege, because you’ve earned the right to feel that pressure. I think in many ways, sitting an exam relates quite well to that, the idea that I’ve earned the right to be here. So yes, it is going to be stressful, because it’s a high stakes situation. But I’ve earned the right to do it.”

“... if we can start to see it as a challenge and as an opportunity, that just shifts our mindset slightly and allows us to accept the difficulty that we’ll face, to accept those nerves that are going to be there and the self-doubt, but allow us to do what we need to do to get the performance that we need”.

***The opinions expressed above are those of the Executive Director, Ms Jansie Niehaus, and do not necessarily reflect the views of the [Executive Committee](#) or [members](#) of the NSTF.***