

# News

Faculty of Science

## Govan Mbeki Maths Development Centre

**Message from Professor Werner Olivier, Director of the GMMDC.**

Along with the rest of South Africa in March 2020, the activities of the GMMDC - which were all lined up and in an advanced stage of roll-out in the different parts of the Eastern Cape province and elsewhere in the country – were brought to a complete standstill. And the school system was severely disrupted for the rest of the year.

But the GMMDC programme is all about innovation and problem-solving, so it would have been remiss of us if we were not able to come up with a plan!

Due to our customised technology-assisted models, we could adjust our programmes at short notice to continue with most of our contractual maths and physical sciences development work.

New techno-blended functionalities were developed and added to our educational apps. Agreements with our stakeholders were expanded to maintain the Centre's national and international STEM engagement footprint.

The Gamma commercialisation project also included a successful large-scale distribution and support project in KZN. Projects to promote STEAM education in schools also gained momentum. Our flagship STEAM project, the MathArt competition, was successfully implemented in eight of our nine provinces.

### GMMDC

Govan Mbeki Mathematics  
Development Centre  
*empowering young minds*

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Despite the pandemic, hundreds of learners at under-resourced schools were still able to benefit from the GMMDC's customised long-distance programmes, which were received with great enthusiasm and appreciation.

The way that the GMMDC was able to respond to COVID challenges and adapt to an unprecedented crisis bears testimony to the potential of the Centre's techno-blended approach to solving educational challenges sustainably. The Centre is proud to note that our systems were not found wanting even under the strain of a pandemic.

We will still use all our ingenuity and resourcefulness to continue to contribute to STEM skills development during COVID and we look forward to contributing more in the coming years.



*Prof Werner Olivier*



Above: The Nelson Mandela Bay ISP Learner Cohort, along with student teachers and Facilitators at the ETC Conference Centre

# Our Successful Saturday Schools

Improving results in the Eastern Cape for more than half a decade.

Before the COVID-19 lockdown struck in 2020 we were able to evaluate the results for our Incubator School Programme (ISP) for 2019. And we are pleased to report that the majority of the more than 300 Grade 10 to 12 learners from 45 schools across the Eastern Cape – who had given up their Saturdays for extra study – showed an improvement in their marks.

“Over the past five years, the ISP has helped thousands of promising Eastern Cape learners improve their marks, and gain access to tertiary education,” said GMMDC head Prof Werner Olivier.

The top-achieving Grade 12 ISP learner in the province was Tausiql Islam from Umtata High School, who achieved 93% for maths and 91% for science, while the most improved learner was Zimbini Ntsula from Ndlovukazi Senior Secondary School in Queenstown, whose maths and science marks in June improved by 22%, compared to November.

In addition to the Saturday school lectures, each learner received an Android tablet to use as a “personal tutor” at home. The tablets were loaded with a GMMDC-developed app called TouchTutor®, made up of interactive digital resources, all offline and aligned with the curriculum. These included video lessons, PowerPoint presentations, calculator assistance, self-tests with scoring and feedback, past national and provincial exam papers and language support in eight indigenous languages.

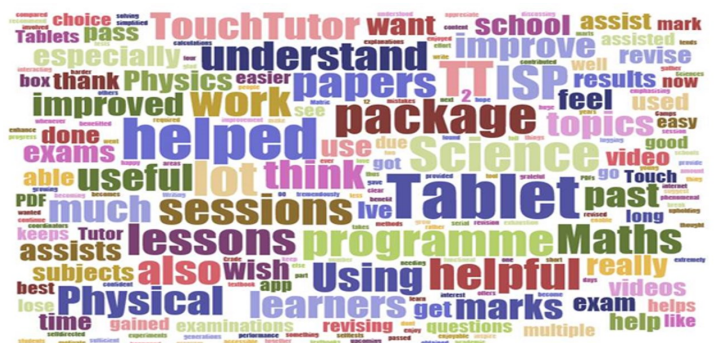
Adding to the success of this year’s ISP was the introduction of student-teacher tutors at the Port Elizabeth and Mthatha ISPs. They were trained to use a small new digitalised teaching device called the Gamma Tutor, which included the TouchTutor® app, and could be directly plugged into a projector, TV or any digital screen.

“The Gamma tutor added to this year’s ISP success,” said Olivier. “We are looking forward to rolling out this new mobile teaching device to other provinces, to empower teachers to engage in teaching practices geared towards 21st century learners.” The tutors, all final-year education students at Nelson Mandela and Walter Sisulu universities, used the Gamma Tutor during 90-minute midweek tutorials with small groups of Grade 10 learners at the participating schools, helping them work through challenges and deepen their understanding of maths and science.

Mandela University student teacher Monique Paule, who tutored at Sancto, Muir and Riebeeck in the Bay, said the tutorials provided an opportunity for learners to ask questions and work through topics they didn’t understand in class. “The Gamma Tutor helped me a lot, as we were able to find different examples on different topics quickly and easily.”

Neptal Khoza, head of Capitec Foundation, who provided the donation to make this Saturday school programme possible, said: “Capitec Foundation has adopted a teacher development approach as part of our strategy. It was therefore fitting that we infuse this into the ISP programme, in partnership with the GMMDC. The aim is to support future teachers with much-needed teaching experience and access to 21 century teaching, whilst assisting high school learners with extra tutorials to help them perform better in maths.”

He said the ISP programme helped learners to “learn for understanding and not just to memorise. The TouchTutor® platform enables learners to access content remotely and enables learners to learn at their own pace.”



Above: A word cloud created from the learner feedback. The frequency of the words used in the feedback influences the size of the words in the cloud—the more they appear, the bigger they become.

# Giving Learners a Second Chance at Success

Creating brighter futures through partnerships for second chances.

The school closures driven by COVID-19 did not only affect learners. They also impaired the chances of past matriculants, who had been hoping to re-write their matric exams to improve their chances of university exemption.

But once again the GMMDC mathematics and physical sciences support programmes showed their versatility – this time in a joint venture between Nelson Mandela University, North West University and the North West Department of Education. In a ground-breaking pilot project, Nelson Mandela University launched a GammaTutor Resource Support Programme at the Mathematics, Science and Commerce Centre (Masccom), an upgrading centre for matrics in Mafikeng.

“You have a really powerful set of instruments in your hands, so you can be prepared and have great success at the end of the year,” said North-West Province University’s Prof Hercules Nieuwoudt, addressing a group of 200 applicants at the launch of the programme in 2020.

“We have been waiting for [support such as] this for a very long time. We are very happy it has come,” said Masccom principal Nthabiseng Kawadza. The technology includes the full suite of the GammaTutor specialised support material, with WhatsApp groups and interactive Zoom sessions, along with full training for the teachers.

“The Masccom project initially began as an emergency plan when the COVID-19 lockdown started in March 2020,” said GMMDC director, Prof Werner Olivier. “It started as a separate learner support project, where North-West University used its new eFundi teaching and learning support platform together with some of GMMDC’s GammaTutor resources, to enable a group of prospective engineering students to prepare for successful access to university studies in 2021. We used senior engineering students as facilitators.”

“We are also setting plans in motion to use this technology-based approach to help in-service health workers and other working professionals across the country, to gain access to university courses that need mathematics and physical sciences to upgrade their qualifications.”

The Masccom/Nelson Mandela University dual project is fully sponsored by the Nedbank Eyethu Community Trust.



**Above:** *Lerato Segonote (left) and Breyton van Wyk, both learners at the Mathematics, Science and Commerce Centre (Masccom) in Mafikeng, learn how to use the Gamma Tutor – developed by Nelson Mandela University’s Govan Mbeki Mathematics Development Centre – to improve their matric mathematics and physical sciences marks.*



**Alongside:** *Nelson Mandela University’s Prof Werner Oliver (front, fifth from left) and Arnold Gwaze (second row, left), together with North-West University’s Prof Hercules Nieuwoudt (front, fourth from left), train learners and teachers at the launch of the technology-based Gamma Tutor Resource Centre at Mafikeng’s Masccom centre.*

# Gamma & GammaTutor™ - A Successful Commercialization Partnership

A huge step forward in expanding the GMMDC's reach.

The success of the GammaTutor project at Mandela University is – like many things – the result of a successful partnership. In this case, the device itself on which the GammaTutor software package is loaded is sourced from a Kwa-Zulu Natal company called GammaTech.

During 2020, a successful commercialisation project of the GMMDC - via Innovolve – the business arm of the Nelson Mandela University – concluded the supply of 4 000 Gamma devices - along with the pre-loaded GammaTutor software and additional support equipment - to 100 schools in Kwa-Zulu Natal.

The project was launched in June by the Kwa-Zulu Natal MEC for Education, Kwazi Mshengu. The result is that each of the schools now has a Technology-assisted After School Support Programme (TAPS): a Gamma resource centre for after-school support, and teacher training in order to get the full benefit of the suite of hardware, software and on-line support material.

This has been a huge step forward in expanding the successful GMMDC TAPS project in Kwa-Zulu Natal schools, and it is hoped that the results in Kwa-Zulu Natal will be as remarkable as they are in the Eastern Cape.



*Above: The actual Gamma device—small and portable, but extremely powerful.*

**4000 Gamma devices distributed to 100 Kwa-Zulu Natal Schools.**

*Below: Examples of the Gamma resource centres that have been introduced at Kwa-Zulu Natal schools.*



# Never Mind COVID: Nelson Mandela University National Math-Art Competition Goes Digital

Expanding “My Universe” in 2020.

COVID-19 may have put the brakes on many events, but it didn't stop Nelson Mandela University's annual national Math-Art Competition from going ahead. It simply moved it online. Even the prize-giving was handled via Zoom and livestreamed across the country.

The competition attracted 270 entries from Grade 7 to 12 pupils across the country, who developed artworks to fit under the broad theme for 2020: “My Universe”.

The winning artworks will be included in the 2021 online exhibition of the Finland-based Bridges Organization, which runs global conferences and educational programmes promoting the connections between mathematics and art.

“Even before COVID, we had been planning to move the competition online – and were busy developing a website for submissions,” said GMMDC competition organizer Carine Steyn. This decision would prove strategic, as the competition launched just weeks before schools closed for lockdown.



**Above:** Stellenberg High School in Cape Town won the prize for the school with most finalists in the competition

Looking beyond art for art's sake, the competition requires pupils to identify the mathematical links – the perfect angles, repeated patterns and more – in the world around them, and also submit a short essay describing how maths and art came together in their artworks.

“There were a few COVID-inspired themes, with pupils describing ‘My world during Coronavirus’, but a lot of artworks had a space theme,” continued Steyn.

The competition fits into GMMDC's broader vision to promote awareness around STEAM education – Science, Technology, Education, Art and Maths – in South African classrooms, which is helping pupils to become both critical and creative thinkers across multiple disciplines.

“We are excited about the new digital format of the competition,” said GMMDC director Prof Werner Olivier. “Our mission at GMMDC has always been to provide educational support over distance, using interactive apps and innovative learner-centered digital resources ... This is helping to prepare learners for future careers in the Fourth Industrial Revolution.”

To enter, the pupils submitted a photograph of their artwork online. Each submission was authenticated, to ensure it was not plagiarized in any way from existing material on the internet. The top 80 entrants had to courier their physical art works for the final rounds of adjudication by a diverse panel of judges including mathematicians, artists, teachers, lecturers, STEAM educators, architects and designers – both local and international.

The competition is supported through strong international and local partnerships, including the Provincial Department of Basic Education (Western Cape and Eastern Cape), Umalusi (the Council for Quality Assurance in General and Further Education and Training), Exxon-Mobil, and GammaTech, the commercialization partner of the GMMDC. Although the participation levels in under-resourced areas were severely affected by the COVID pandemic in 2020, the novelty and potential of the Math-Art competition in schools is set to place this project in a prominent position on the national education calendar in the coming years.



**Above:** MathArt Exhibition of the top 5 in every category at the Bird Street Campus

**Below:** Workshops like this one in the Western Cape were held in various centres to excite and train teachers. This particular workshop took place pre-COVID.



# From Mundane to Motivated with MobiTutorZA

Using MobiTutorZA to tackle problem-solving via competitions.



**Above: Bunono Ngcwembe** (left) from Ndzondelelo High School (Grade 12) with **Prof Werner Olivier**, GMMDC Director (right).

The app is being used by more than 3,000 learners, with over 400 entering the competitions – but GMMDC is working hard to reach thousands more, particularly targeting learners from under-resourced schools, where the need for support is greatest.

GMMDC's Dr Phil Collett, who coordinated the competitions, said the app provided learners with the opportunity to practise maths or science. "Practice is an important component of building competence. The app gives learners the opportunity to practise a range of skills, from the most mundane to the most challenging problem-solving skills, allowing them to really get to know mathematics or physical sciences in a range of different ways which are necessary for success."

The prizes, worth R30 000 in total, were donated by the Capitec Foundation. In the MobiTutorZA maths competition, the first-placed winners were Eugh Schoeman from Langenhoven Gymnasium in Oudtshoorn (Grade 8 and 9 category), Emily Hawkes from Pretoria Girls' High (Grade 10 category), and Chase de Doncker from Alexander Road High (Grade 11 and 12 category).

The GMMDC MobiTutorZA app, which provides free interactive online maths tutoring, proved its worth during the year of lockdown when COVID-19 forced learners to adopt distance learning. One of the biggest drawbacks with distance learning is the lack of peer-pressure as an incentive. So, the three national competitions run through the MobiTutorZA app became very popular.

The annual competitions comprise a mathematics tournament where learners compete over two rounds; a year-long "leaderboard" contest where learners complete monthly tasks; and a financial literacy championship, where learners tackle maths challenges that have a financial component.

"We are trying to use technology and specifically, our MobiTutorZA app, to advance the problem solving-skills of learners, and to support their learning, particularly over distance as this is becoming more and more important," said GMMDC director Prof Werner Olivier, addressing teachers, parents and learners at the prizegiving.



**Above: Prize winners Mava Feni** from Ethembeni Enrichment Centre (left) and **Evangelos Batsis** from Alexander Road High (right) both in Grade 11



**Above: Mrs Parfitt**, representing Grey High School, with winners in various competition categories (from Left to Right) **Tristan Parfitt** (Grade 10), **Jorge Stickells** (Grade 10), **Troy Palframan** (Grade 10) and **Zunaid Lewis** (Grade 9).

In the MobiTutorZA leaderboard competition, winners were Ashil Seejarim from Shree Bharat Sharda Mandir (SBSM) Private School in Lenasia, Gauteng (Grade 8), Bianca van der Walt from La Rochelle Girls' High School in Paarl (Grade 9), Jorge Stickells from Grey High (Grade 10), Evangelos Batsis from Alexander Road High (Grade 11), and Bunono Ngcwembe from Ndzondelelo High School in Zwede (Grade 12).

In the Capitec financial maths competition, tying for first spot in the Grade 8 and 9 category were Hannah du Plessis from Pearson High, Christiaan de Wet from Bonnievale High and Heeral Naram from SBSM. The Grade 10 and 11 category winner was Jaedon Naidu from Eden College in Durban, with four learners tied for first spot in the Grade 12 category, Chase de Doncker from Alexander Road High, Nasreen Chohan from Maritzburg Muslim School for Girls, and Shuaib Nuruddin and Abdul Qadir Omar, both from Al-Asr Education Institute in Centurion, Gauteng.

The school with the most participants was Khanyisa Education Centre in Giyani Limpopo, while the school with the best achievements across the three competitions was Grey High.

The first round of the 2021 Competition takes place on 25 August. Learners are encouraged to enter by going to the site [www.proverto.co.za](http://www.proverto.co.za).

# Making History: The First Recipient of the Flip Potgieter Scholarship

Leaving a legacy for Pottie's passion.

Lonwabo Jacobs, 17, made history this year by becoming the first recipient of the Flip Potgieter Scholarship, which was established in 2019 to fund the university expenses of a deserving previously-disadvantaged student.

The scholarship honours the memory of the late Nelson Mandela University mathematics lecturer and co-founder of the GMMDC, Flip Potgieter, by giving the chance of a university education to a promising rural student in the fields of mathematics, science, technology or engineering (STEM) at Mandela University.

Lonwabo, from Somerset East, started his first year of study in forensic sciences at the beginning of 2020.

"I feel very excited to be awarded the bursary," said Lonwabo, who was raised by his mother Portia, a police officer. "I would like to become a well-known forensic analyst."

Flip Potgieter was well-known in the Bay's political and cricket administration circles, was always intensely passionate about education, and after his passing in 2018 his longterm friend Piet Beyers decided to set up the scholarship in his honour.

"Pottie and I often spoke about the challenges facing South Africa," said Beyers, "and what the country's priorities should be. He always said: 'What is key is education, education, education.' He was passionate about maths and science."

"My hope is that the Scholarship will help to preserve the legacy of a special man, who had a big impact on a lot of people. It's a way to say: 'Thank you, Pottie.'"

The scholarship will provide R100 000 a year for the three years of Lonwabo's Bachelor of Science degree at Mandela University.



Above: The late Flip "Pottie" Potgieter



Above: LEGACY BURSARY: Congratulating **Lonwabo Jacobs**, 17 (third from left), on being the first recipient of the Flip Potgieter Scholarship are (from left) **Prof Werner Olivier**, director of the Govan Mbeki Mathematics Development Centre at Nelson Mandela University, Lonwabo's stepfather **Mziwoxolo Mbutho**, his mother **Portia**, Potgieter's widow **Sally** and **Piet Beyers**, who set up the Scholarship.

The Scholarship will be awarded to a new recipient every three years.

"I'm so excited about a gifted learner like Lonwabo having the opportunity to study further," said Potgieter's widow, Sally, who was on the Scholarship selection panel.

"Our country needs more scientists and engineers. These are fields that need to be developed."

GMMDC Director and Co-Founder Prof Werner Olivier said the Centre would provide a mentor for Lonwabo for the duration of his studies.

Beyers is also awarding R5000 to the top mathematics students in first, second and third-year mathematics at Nelson Mandela University. Based on their 2019 results, the first recipients are Erich du Plessis, who attained 93% for Maths 1, Jason Leonard, who achieved 87% for Maths 2, and Luan Naude, who ended Maths 3 with a 95% average.

# Kareedouw School Support

Partnerships with purpose.

In keeping with the GMMDC mandate of offering assistance to under-resourced rural schools, the Centre launched a Mathematics and Science support programme at the Qhayiyalethu High School in Kareedouw in August 2020, at the height of the massive challenges posed by the COVID-19 pandemic. This project was initiated by the Science Faculty at Nelson Mandela University which has an engagement agreement with this school.

The school was battling to cope with shortages of staff and infrastructure, which were aggravated by co-morbidities amongst the teachers. The Tsitsikamma Windfarm Trust stepped in with funding as part of their Corporate Social Investment strategy and donated a delivery of GammaTutor devices and software. The Centre arranged a 3-hour online training session for the principal Mrs Yake, the Mathematics and Physical Sciences teachers, and five selected Grade 12 learners.

A later follow-up session established that the school had been closed in September but the Centre was able to continue with online tutoring through their Gamma programme.

“The Tsitsikamma Wind Farm Trust is happy to have partnered with Mandela University on the introduction of the GammaTutor programme,” said Sindiswa Speelman, Economic Development Officer for the Trust. “The response we received from the learners and teachers was overwhelming. The school improved from 47% in 2019 to 69% in 2020, and the school principal attributed a lot of this success to the support from the Nelson Mandela University GammaTutor programme.”



**Above: Left:** the cohort of teachers and learners trained at Qhayiyalethu High School with Prof Werner Olivier of the GMMDC. **Right:** A grade 12 learner making use of the GammaTutor device as part of a resource centre established at the school.

## Get in Touch with Us

T 041 504 4743

E [werner.olivier2@mandela.ac.za](mailto:werner.olivier2@mandela.ac.za)

W <https://mbeki-maths-dev.mandela.ac.za/>



[GMMDC NMU](#)



[MobiTutorZA at GMMDC](#)



[GeoGebra STEAM at GMMDC](#)



[Math Art Competition at GMMDC](#)

PO Box 77000, Nelson Mandela University, Port Elizabeth, 6031.

T +27 41 504 1111 (Port Elizabeth) T +27 44 801 5111 (George)

E [info@mandela.ac.za](mailto:info@mandela.ac.za) [mandela.ac.za](http://mandela.ac.za)