

**BASF in South Africa supports science and education projects to uplift local learners.**

BASF in South Africa donates R250 000 to Maths and Science education project.

Techno-blended Mathematics and Science school model supports skills for automotive, manufacturing and chemical industries.



BASF in South Africa yesterday made a R250 000 donation to the Govan Mbeki Mathematics Development Unit (GMMDU), Nelson Mandela Metropolitan University in Port Elizabeth, in order to support their Tablet- and Laptop- Assisted Mathematics and Physical Sciences Support Programme in under-resourced secondary schools.

According to Professor Werner Olivier, Head of the GMMDU, various influential reports have recently confirmed that the crisis in Science and Mathematics Education has deepened in the country. "This dire situation is having a serious impact on skills development and subsequent economic growth in the country," he said. "Also, it is affecting the progress of thousands of learners with potential to access higher education to become part of the skilled or semi-skilled workforce in the near future."

In response to this situation, the GMMDU has, over the past few years, successfully implemented a series of teacher development and learner incubation programmes in the Nelson Mandela Metropolis and adjacent regions of the Eastern Cape Province. An innovative and modern digitally-based Techno-blended Teaching and Learning model (TBTL) for NCS Mathematics and Science was developed by the GMMDU and extensively used during project implementations.

As a result of BASF's donation, two schools in the Nelson Mandela Bay area - Solomon Mahlangu High School and Ethembeni Enrichment Centre - recently received a set of 50 android tablets with the comprehensive TouchTutor® maths and science support package pre-installed.

The package uses innovative curriculum aligned digital teaching and learning material to support teaching and learning at under-resourced schools in the Metropolis, including graphically enhanced video- and PowerPoint based lessons to cover the CAPS Mathematics and Physical Science curricula from grade 10 - 12, a video series of science experiments, interactive self-tests with scoring and feedback. The TouchTutor® package also integrated inter-active mathematics language support functions with context explanations in English and any one of seven indigenous languages.

The schools' Maths and Science FET phase teachers have also been equipped with laptops which include the TouchTutor® resource package for seamless integration of the programme in classrooms. At the handover ceremony, BASF South Africa Vice President and Managing Director, Benoit Fricard, said that developing future engineers and scientists is crucial for the success of the chemical industry.

**Art + maths = magical connections for teachers and learners**

By Nicky Williams - Nov 23, 2017



Although maths and art seem worlds apart, they are more connected than you think.

Nature is full of mathematically-precise patterns - just think of a snowflake or a zebra's pelt - while architecture and fashion rely on mathematics in their designs.

Members of the Department of Basic Education, along with principals, teachers and learners from eight schools in the Somerset East and Bedford areas experienced the maths-art connection first-hand during a workshop run by Nelson Mandela University's Govan Mbeki Mathematics Development Centre, which showed participants how to use open-sourced maths software called GeoGebra, to develop sculptures of giant molecules, soccer balls and igloo-like domes.

"The workshop gave the 40 participants the opportunity to learn mathematics through art and do art through mathematics," said Dr Phil Collett, project leader at GMMDC, which hosts one of GeoGebra's 187 global institutes.

"GeoGebra is already used in maths and science classrooms across the world to help teachers and pupils visualise and experiment with geometry, algebra, tables and so on. Linking GeoGebra with art adds a very practical, real-world dimension."

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Page: 10

**Hi-tech approach getting results**

Herald Reporter

**P**UPILS from 10 under-resourced schools in Nelson Mandela Bay are celebrating improved results in maths and science, thanks to a technology-linked maths and science support programme, run by the Telkom Foundation in partnership with Nelson Mandela University.

The top-performing school in this year's integrated Maths and Science Development Programme was Kwezi Lomso Comprehensive School, while the top pupils were St Thomas High Grade 12 twins Courtney and Chloe Koeberg (who attained 87% and 83%, respectively), and Cillie High Grade 11 pupil Valerie van Vuuren (83%).

Their results in the curriculum-aligned programme were well above the national average for maths and science in this country, which last year were 51.1% and 62%, respectively.

The three-year R3-million project, which started last year, is sponsored by the Telkom Foundation - Telkom's Corporate Social Investment (CSI) arm - and run in partnership with Nelson Mandela University's Govan Mbeki Mathematics Development Centre (GMMDC).

The 10 participating schools include Cillie, Douglas Mtshoza, Golvandale, Kwezi Lomso, Nyedvo, Nzondelelo, St Thomas and

**Maths, science marks soar**

Woolhope in Port Elizabeth, and Solomon Mahlangu and Uitenhage High in Uitenhage.

"The Telkom Foundation is focused on basic education to enable the youth to participate in the economy through the ICT sector," Telkom Foundation senior manager, Corporate Social Investment Nathi Kunene said.

"Through partnerships such as this one, which help to adequately prepare pupils in maths and science to access careers in ICT, the Foundation is able to deliver on its mandate."

The innovative project has three legs, including Tablet-assisted After-school Peer Support (TAPS) run at all 10 schools for 110 selected Grade 11 and 12 pupils; an Incubator School Programme (ISP) run on Saturdays for 64 Grade 11 and 12 pupils from the Telkom Foundation schools and additional pupils from 20 other schools in the Bay; as well as laptop-based skills training via a Professional Learning Network (PLN) programme for 20 teachers at the 10 schools.

Each of the 10 schools has also received a resource centre, with sponsored desktop computers.

At the project's core is GMMDC's pioneering technology-linked teaching and learning model, which is available on tablet and desktop computers for

the TAPS and ISP pupils, and laptops for teachers. The curriculum-aligned maths and science support package is called the integrated TouchTutor® Support Programme (TSP).

It was developed by GMMDC head Professor Werner Olivier, who chose a hi-tech approach to get pupils and teachers excited about maths and science, and to overcome some of the challenges facing many South African classrooms.

"Our aim is to nurture learners who show potential, and enable them to access higher education - and succeed at their studies. At the same time, we are helping teachers to deliver the mathematics and science curricula more effectively," Olivier said.

TouchTutor® includes video lessons, animated PowerPoint presentations, digital interactive mathematics software such as GeoGebra, self-assessment and feedback, interactive language support (in six indigenous languages), past matric papers with memorandums and more - to give academically-talented pupils a chance to improve their results.

It is aimed at schools where there are many challenges, such as a lack of resources, large numbers of pupils in the classroom, a lack of staff capacity or teachers themselves who struggle with core areas of the curriculum.



**MATHS STARS:** Twins Chloe, front left, and Courtney Koeberg from St Thomas High were the top placed Grade 12 pupils in this year's Maths and Science Development Programms, run by the Telkom Foundation and Nelson Mandela University's Govan Mbeki Mathematics Development Centre (GMMDC), while Cillie High's Valerie van Vuuren, back middle, was the Grade 11 winner. Two other pupils, Riebeck Girls' High Grade 12 pupil Loren Campbell and Stretitza High Grade 11 pupil Ahumile Mali were tops in GMMDC's incubator school programme (sponsored by Telkom and Capitec). Congratulating them are the Telkom Foundation's Nathi Kunene, back, GMMDC's Natalie Wood, left, and Prof Werner Olivier

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Page: 4

**Art of puzzling out maths connection**



**ON THE BALL:** This team of Somerset East and Bedford maths teachers, from left, Ernest Bockley, Ayanda Nyatela, Gidon Williams, Nozokelo Nzutu, Neil Bennett and TB Kula were the first to complete their soccer ball sculpture.

**GMMDU in the news 2017**

**High-tech financial literacy boost for Queenstown learners**

By Nicky Williams - Nov 23, 2017



SETTING a budget, monitoring cash flow and learning how to grow your money are all valuable life skills - although they do not form a core part of classroom curricula.

To plug the gap, Capitec Foundation in partnership with Nelson Mandela University's Govan Mbeki Mathematics Development Centre (GMMDC), has developed a tablet-based financial literacy programme, which they piloted on a group of 60 Grade 10 and 11 learners from 12 under-resourced schools in the Queenstown area, along with 15 life skills teachers from 15 schools.

"Research has identified a need for better financial planning in most South African households," said Capitec Bank's Consumer Education Officer, Nicky Molebebe.

"The purpose of these interventions is to educate learners about the importance of basic personal financial skills. We believe that these learners apply the skills they have gained in the financial life skills workshop - including budgeting, borrowing, debt, saving and banking - they will be empowered to make better financial decisions."

The learners are already part of a three-year Capitec-sponsored Maths and Science Incubator School Programme (ISP), run every Saturday by GMMDC, and hosted at Get Ahead College in Queenstown.

**Science, maths project brings results**

Programme's (OMEFP's) maths and science development project, launched at the start of 2015, is geared towards 21st century pupils.

It uses an innovative teaching and learning model, packaged at TouchTutor, that was developed by the Govan Mbeki Mathematics Development Centre (GMMDC) at Nelson Mandela University.

"This project has afforded us the opportunity to test, refine and demonstrate the impact of a technology-blended model in a rural context," GMMDC head Professor Werner Olivier said.

He previously tested the model in an urban context, with similar improved results.

The project, which runs in close collaboration with the provincial De-

partment of Basic Education, focuses on improving Grade 8 to 12 teachers' skills and Grade 10 to 12 pupils' achievements.

To do this, a laptop-based model for teachers - for use as a classroom resource - and a tablet- and desktop-based model for pupils for use after school hours as an offline tutor are used.

Offline and curriculum-aligned, TouchTutor makes use of video content lessons, animated PowerPoint lessons, open-source GeoGebra software, self-tests, language support and various other digital support material, to enhance understanding in maths and science.

The project took the form of a centralised Incubator School Programme, run on Saturdays for 120 pupils with potential from the 18 different project schools, as well as Tablet-assisted After-school Peer Support maths sessions for 200 pupils from 10 of the schools.

"We invest in education so as to effect societal change," Old Mutual senior project manager Kanyisa Diamond said.

The extension of the project, which has cost R6-million to date, was announced at the project's end-of-year certification function at the Steve Biko Centre in King William's Town.

"Over the next two years, we are hoping to boost the impact of the programme even more by adding science, technology, engineering, arts and mathematics activities as well as a mobile app for inter-school maths competition purposes and free maths curriculum support," Olivier said.



**QUIZ WINNERS:** Dr Phil Collett, left, and Prof Werner Olivier, front, from Nelson Mandela University's Govan Mbeki Mathematics Development Centre congratulate the winners in the android app-based TouchTutor Quiz Maths Competition, who are, from left, Chaddleigh Oumhouse (the first, Grade 11), Tarryn van Wyngaardt (first, Grade 9), Keanan Johns (the first, Grade 10), Rene van der Berg (second, Grade 9), Ryan Putzier (tie first, Grade 10), Morgan Moss (tie first, Grade 10) and Adrian Grove (tie first, Grade 11). Grove and Van der Berg attend Pearson High, and the other pupils are from Alexander Road High

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Page: 4

**Workshop helps teachers, pupils master molecule sculpture software**

Members of the Department of Basic Education, along with principals, teachers and pupils from eight schools in the Somerset East and Bedford areas, experienced the maths-art connection first-hand during a workshop run by Nelson Mandela University's Govan Mbeki Mathematics Development Centre (GMMDC), which hosts one of GeoGebra's 187 global institutes, said.

"GeoGebra is already used in maths and science classrooms across the world to help teachers and pupils visualise and experiment with geometry, algebra, tables and so on. Linking GeoGebra with art adds a very practical, real-world dimension."

The workshop tied neatly into the new global shift towards STEAM education, which includes the use of GeoGebra, to boost their knowledge and progress in maths and science.

These learners were selected from four schools in Somerset East and four in and around Bedford to attend the incubation programme, which is sponsored in that area by the Cookhouse Wind Farm Trust Initiative, a 30-year project geared towards building up critical skills for the job market in the region.

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## Hi-tech literacy boost for learners

Setting a budget, monitoring cash flow and learning how to grow your money are all valuable life skills, although they do not form a core part of classroom curricula. To plug the gap, Capitec Foundation in partnership with Nelson Mandela University's Govan Mbeki Mathematics Development Centre (GMMDC), has developed a tablet-based financial literacy programme, which they piloted on a group of 60 Grade 10 to 11 learners from 12 under-resourced schools in the Komaneni area, along with a group of 15 life skills teachers, who come from 15 different schools. Read more on page 5. PHOTO: SUPPLIED

## 10 Under-resourced Bay schools celebrate maths and science success

26 October 2017 By Alan Sitton Add Your Comment



Twins Chloe (front, left) and Courtney Koeberg from St Thomas High were the top placed Grade 12 learners in this year's Maths and Science Development Programme, run by the Telkom Foundation and Nelson Mandela University's Govan Mbeki Mathematics Development Centre (GMMDC), while Cillie High's Valerie van Vuuren (back, middle) was the Grade 11 winner. Two other learners, Riebeeck Girls' High Grade 12 learner Loren Campbell and Strelitzia High Grade 11 learner Ahumile Mali were tops in GMMDC's incubator school programme (sponsored by Telkom and Capitec). Congratulating them are the Telkom Foundation's Nathi Kunene and GMMDC's Natalie Wood (left) and Prof Werner Olivier.

## Teaching and learning in Mthatha will never be the same again

14:18 (GMT+2) Fri, 10 Feb 2017



A technology-linked maths and science support programme was introduced at several schools in Mthatha on Friday.

The Integrated TouchTutor Support Programme, a three year project which is sponsored by the Capitec Foundation and managed by Nelson Mandela Metropolitan University's Govan Mbeki Mathematics Development Unit in conjunction with the Department of Basic Education, was formally launched at Mthatha High School.

It said the programme will be on Saturdays for 90 selected grade 10 to 12 learners from five schools and will take the form of an Incubator School Programme.

It further stated that it will also run a teacher Professional Learning Community support programme for 20 in-service mathematics teachers from 10 schools.

Umtata High School principal Siyakubonga Abraham said he has high hopes that the programme will improve maths and science marks but also boost the confidence among teachers.

Professor Werner Olivier, the head of GMMDC, said their main aim is to nurture learners and to improve their chances of getting into and being successful at universities.

The TouchTutor was created over five years, specifically for under-resourced schools where internet support is not an option and includes video lessons and PowerPoint lesson presentations which are aligned with the current curriculum for grade 10 to 12

"TouchTutor® resources combined with our Technology Assisted Peer Support (TAPS) approach has proved to be a very successful approach, which presents a modern and flexible offline scaffolding [support] platform for mathematics and physical science in secondary schools," said Olivier.

## Maths Unit expands support

A tried-and-trusted technology-linked maths and science support programme is being introduced at several high schools in Mthatha – which is set to improve learners' understanding and results, and grow the expertise of teachers in that area.

The Integrated TouchTutor® Support Programme (ITSP), by the Govan Mbeki Mathematics Development Unit (GMMDC) in collaboration with the Department of Basic Education, has expanded to Umtata.

The three-year project sponsored by the Capitec Foundation was launched at Umtata High in February.

It takes the form of an Incubator School Programme (ISP) run on Saturdays for 90 selected Grade 10 to 12 learners with potential from five schools, and a parallel teacher Professional Learning Community (PLC) support programme – for 20 in-service mathematics teachers from 10 schools.

"This programme will [help] the Mthatha community to experience quality, offline technology-enhanced teaching and learning, that is curriculum-aligned and integrated with traditional teaching tools. [The learners will receive tablets which] will place learning at their fingertips... Teaching and learning will never be the same again," said Umtata High School principal Siyakubonga Abraham.

"I have high hopes that maths and science results will improve... [This programme] will also develop confidence among teachers, and learners will have better understanding of the subjects they are doing." Each of the ISP learners received tablets, on which they access GMMDC's innovative teaching and learning programme – packaged as TouchTutor®

software – after school hours in the form of a "personal tutor". Teachers' laptops are loaded with the same curriculum-aligned software, which they can use as a teaching resource within the classroom.

The ISP and PLC programmes are currently being run with great success at over 80 schools in seven districts of the Eastern Cape.

TouchTutor® was developed by GMMDC over a five-year period, specifically for use in under-resourced schools where internet support was not viable.

Over 1000 tablets are being distributed this year to deserving learners through the ISP programme or the TAPS programme.

More than 200 in-service teachers are also receiving training, and maths and science resource centres have been placed in more than 100 schools over the past three years.

For these projects, GMMDC has partnered with various other blue chip private funding organisations, including Zenz, the Telkom Foundation and Old Mutual.

## Donations all add up

BASF has donated R250 000 donation to the Govan Mbeki Mathematics Development Unit (GMMDC), to support their Tablet- and Laptop-Assisted Mathematics and Physical Sciences Support Programme in under-resourced secondary schools.

The donation is towards addressing the growing crisis in Science and Maths education in South Africa.

"This dire situation is having a serious impact on skills development and subsequent economic growth in the country," said head of GMMDC Prof Werner Olivier. "Also, it is affecting the progress

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Page: 5

## Hi-tech financial literacy boost for Komani learners

REPORTER

SETTING a budget, monitoring cash flow and learning how to grow your money are all valuable life skills, although they do not form a core part of classroom curricula.

To plug the gap, Capitec Foundation in partnership with Nelson Mandela University's Govan Mbeki Mathematics Development Centre (GMMDC), has developed a tablet-based financial literacy programme, which they piloted on a group of 60 Grade 10 to 11 learners from 12 under-resourced schools in the Komani area, along with a group of 15 life skills teachers, who come from 15 different schools.

Capitec Bank's consumer education officer, Nicky Mbebeke said research has identified a need for better financial planning in most South African households.

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"The purpose of these interventions is to educate learners about the importance of basic personal financial life skills. However, this year's conference will also demonstrate the link between GeoGebra and art."

"We believe that if the learners apply the skills they have gained in the financial life skills workshop, including budgeting, borrowing, debt, saving and banking, they will be empowered to make better financial decisions," Mbebeke said.

The learners are also part of a three-year Capitec-sponsored maths and science incubator school programme (ISP, run every Saturday by GMMDC, and hosted at Get Ahead College in Komani.

At the heart of the ISP programmes, which are also run at numerous other under-resourced schools throughout the Eastern Cape Province, is GMMDC's unique technology-linked teaching and learning model, called the Integrated TouchTutor Support Programme (ITSP), which is available

on laptops for teachers, for use as a teaching resource, and on tablets for learners, for use as a "personal tutor" after school hours.

GMMDC head, Professor Werner Olivier, said all the learners who were in the ISP programme already had tablets with the TouchTutor package.

"The interactive financial literacy programme, developed by Capitec and including comprehensive explanations and worksheets, was added to these tablets."

"The learners loved the financial material, which they can continue to work through. It has given them access to an important life skill. They can also share the information they have learned with their parents," Olivier said.

The learners worked in teams, putting together budgets for their businesses, with prizes for the most financially savvy group.

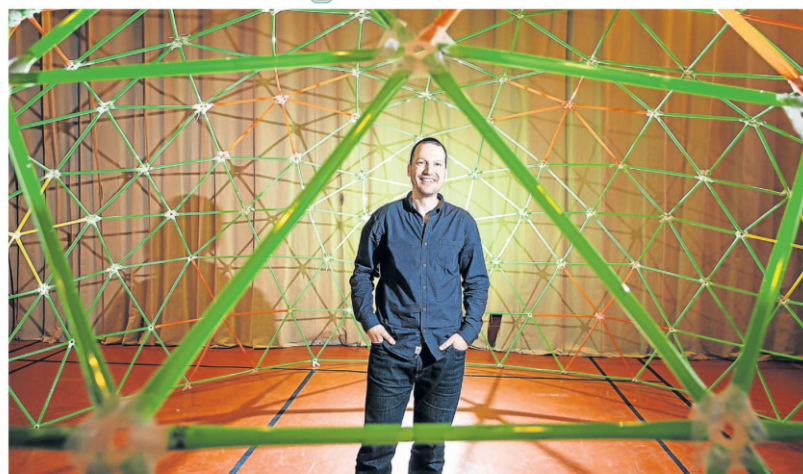


A group of Komani learners tackle one of the projects on their tablets during a financial literacy workshop run by Capitec Foundation and the Nelson Mandela University's Govan Mbeki Mathematics Development Centre. PHOTO: SUPPLIED

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Page: 6

## National Science Week

IN COLLABORATION WITH NRE, SAASTA, MANDALA UNIVERSITY & DST



THE MATHS IN ART: Finland's Kristof Fenyesi – a leading international researcher for Science, Technology, Engineering, Art and Mathematics (STEAM) education and guest speaker at Nelson Mandela University's GeoGebra Conference – stands inside a giant dome structure built by pupils

## Linking maths and art

Teachers, pupils to experience subjects' connections

FROM the perfect symmetry of a snowflake to the intricate patterns on a puff adder's skin to spiral galaxies in space, nature is filled with mathematically precise patterns.

These patterns extend to the world of art, including colourful fashion designs, architecture, African and Islamic art, and much more.

"STEAM education is a much more practical, relevant and career-linked way of teaching maths and science," GMMDC head Prof Werner Olivier said.

International guest speaker at the conference – which was attended by 70 teachers and 1200 learners from across the province – was Finnish STEAM researcher Kristof Fenyesi, vice-president of the world's largest maths, art and education community, called the Bridges Organisation.

Fenyesi also ran his international "Experience Workshop" at the Literature Science Centre, giving 30 pupils from under-resourced schools a practical taste of how art and maths connect, as they built giant soccer balls and 3m-high by 5m wide igloo-like domes using

GeoGebra, which is free, open-source maths software used in millions of maths and science classrooms across the globe, to enable teachers and pupils to visualise and experiment with

geometry, algebra, tables, graphing, calculus and statistics.

There are about 800 000 GeoGebra apps and files which people can download for free to bring the maths and science curricula to life."

He said in addition to "popularising" the study of maths and science, GeoGebra had also built strong links with major organisations, such as Google, Microsoft Office and the Bridges

Organisation. As part of a formal research project in collaboration with the International GeoGebra Institute (based in Cambridge, England) and several national role-players – including Get Ahead College in Queenstown, which is aiming to set up a STEAM centre – GMMDC is also working towards developing resources for the world's first master's degree in maths and art,

which will be available at Johannes Kepler University in Linz, Austria.



AT THE CORE: Prof Werner Olivier is head of Nelson Mandela University's Govan Mbeki Mathematics Development Centre, which is hosting the GeoGebra Conference

Oliver said. The same practical maths-art activities were included in the GeoGebra Conferences, which took place at Nelson Mandela University, and was themed "Steaming ahead: Promoting creative cross-curricular collaboration with GeoGebra".

Olivier said: "A GeoGebra community has been established across the world by also and operated with

which will be available at Johannes Kepler University in Linz, Austria.

The GeoGebra conference tied in with the GMMDC's hi-tech approach to maths and science. The Centre has developed a curriculum-aligned teaching and learning model for high school pupils and teachers, which is available on tablet, laptop or desktop computer.

While there is a global push for maths, science and technology-related education, there is a new shift that is including art in the mix

and includes video lessons, animated PowerPoint presentations, self-tests and many other resources, including GeoGebra.

GMMDC uses the model to boost teachers' skills and help pupils improve their knowledge and performance in maths and science, through Saturday incubator schools and technology-assisted peer support (TAPS). GMMDC will also introduce STEAM at the Open Design Festival this month.

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