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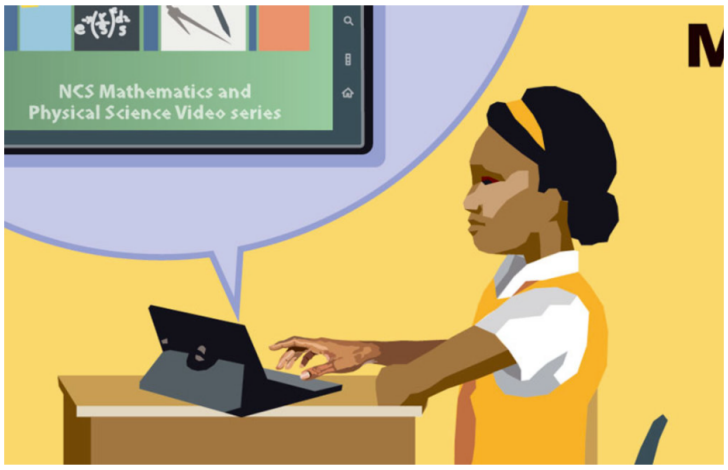
EDUCATION

Programme multiplies pupils' success

Nicky Willemse 8 Aug 2019



(John McCann/M&G)

Two years ago, Queenstown teenager Yamkela Sondlo (17) narrowly scraped through her grade 11

end-of-year exams for maths and science at Nkwanca high school, obtaining 32% and 31% respectively.

But her final results for grade 12 last year showed a vast improvement. She obtained 64% for maths and 78% for science.

The turning point for Yamkela came when she was selected to be a participant in a maths and

science programme using technology and blended learning run by Nelson Mandela University's Govan Mbeki Mathematics Development Centre.

Statistics recently released by the centre show that she was their most-improved pupil for both maths and science last year.

"The programme helped me so much," said Yamkela, who lives with her unemployed parents.

But she is not the only one. Of the 330 pupils who completed the centre's grade 12 incubation programmes in five mostly rural districts across the Eastern Cape last year 70 improved by more than 10 percentage points in both subjects. And about 80% achieved bachelor's passes, enabling them to access university studies, despite the meagre resources in rural schools.

The top-achieving learners received results in the 90s and one pupil, Mvuyisi Njenje, 17, from Attwell Madala High School in Mthatha, achieved 100% for maths.

Whereas Yamkela is taking a gap year, many of her peers from the programme are attending university, including Luphelo Tshemese (17) who passed matric at Hector Petersen High School in King William's Town with 80% for maths.

He is now studying civil engineering at Nelson Mandela University.

"I was in a position where I thought I was dumb," said Luphelo. "I learned that maths is not hard. You just need to understand it and practise it. I started to believe in mysel and put in the effort."

The centre's selection criteria for its programmes is that pupils attend disadvantaged schools, and that they show potential.

At the end of grade 10, Luphelo was selected as a participant in one of the centre's two core programmes — the technology-assisted after-school peer support programme — where teachers provide tutoring to small groups of pupils at their own schools, using an offline interactive teaching and learning app called TouchTutor, installed on tablets.

With improved results at the end of grade 11, he was accepted for the centre's other core programme, an intensive 17-week incubator school programme run at a central venue on Saturdays, where trained facilitators provide lessons, tutorials, weekly tests and exam revision, all linked to the TouchTutor app.

"I learned to tackle problems in a different way," said Luphelo. "I learned easy, quick methods for areas I'd been failing [in] for a year ... The tests we wrote on the tablet made us able to tackle difficult questions on the exam."

TouchTutor, which has been developed and fine-tuned over the past 10 years, is an extensive digital maths and science resource that includes narrated video lessons, presentations, past exam papers and memos, self-tests with scoring and feedback, science experiments, calculator support, a glossary of terms supported by graphics in multiple languages and various other interactive features.

The platform is aligned with the curriculum and assessment policy statement for grades 10 to 12 and workbook guides have also been developed.

All learners on the programmes receive a tablet with the app, which is loaned to them from February to November, which they can use after school hours as a 24-7 personal tutor.

For Luphelo, one of 10 children raised by his grandmother, the incubator school programme was not just a place to gain information but a quiet space where he could focus and study. "I came home each Saturday with knowledge," he said.

"This model has huge value for learners with potential who are prepared to engage with self-directed learning," said Professor Werner Olivier, director of the Govan Mbeki Mathematics Development Centre.

"Each year, we allow those who have improved by 10% in a year in both maths and science, or achieved distinctions, to keep their tablets. Across our five project regions last year — Port Elizabeth, Duncan Village (East London), Queenstown, Mthatha and King William's Town — more than 20% of the pupils achieved this and were able to keep their tablets.

"Some individuals showed extraordinary improvement, which emphasises the potential of what can be achieved through our programme."

The aim of both the core programmes is to help pupils from disadvantaged backgrounds obtain the marks they need to access higher education and to be successful in their studies.

"We've seen a trend of successes over the past five years. Around 50% of all those in our programmes go to university. We've had some going into medicine and actuarial sciences. Many go into engineering and the sciences," Olivier said.

In the Port Elizabeth incubator programme, the centre's most improved pupil in both maths and science was Onondwa Jantjies (17), who is studying towards her BSc degree in biological sciences at the University of the Witwatersrand, and is hoping to be accepted into the university's medicine programme in her third year.

"The incubator school programme improved my chances of getting into Wits and prepared me well for university ... At my school, we had no access to science labs, but I could watch all the experiments on the tablet ... If I didn't know something, I could just check the tablet," she said.

"I also love the fact that the programme is so accessible to poor kids. They paid for our transport to the incubator school programme venue and provided food. They made everything so easy for us."

Olivier would like to see the model scaled up across South Africa — and has recently set up strategic partnerships with the department of basic education in different provinces.

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Saturday school bright sparks soar

BY HERALD REPORTER - 04 NOVEMBER 2019

The top Grade 12 pupils in Port Elizabeth's Incubator School Programme are, front from left, first-placed Asisipho Ndinisa and her twin sister, third-placed Siphosethu, both from St Thomas Senior Secondary, and second-placed Stephanie Cronjè from Linkside High. With them are, back from left, head of corporate social investment at Capitec Foundation, Neptal Khoza, science facilitator Luzuko Jama and maths facilitator Ncedile Konzana
Image: Michael Sheehan

Starting in February, 480 grade 10 to 12 pupils from 45 schools across the Eastern Cape gave up their Saturdays to improve their maths and physical sciences skills — and it's paying off.

Among the Nelson Mandela Bay pupils attending the technology-driven Incubator School Programme (ISP), run annually by Nelson Mandela University's Govan Mbeki Mathematics Development Centre (GMMDC), 65% of the Grade 12s showed an improvement in maths and 70% improved in science, when comparing their June results with 2018's November marks.

More than 60% of the Grade 11s improved in both subjects, while more than 40% of the Grade 10s improved in maths.

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

The top-achieving Grade 12 ISP pupil in the province was Tausiqul Islam from Mthatha High School, achieving 93% for maths and 91% for science, while the most improved pupils was Zimbini Ntsula from Ndlovukazi Senior Secondary School in Komani, whose maths and science marks in June improved by 22%, compared with last November.

In addition to the Saturday school lectures, each pupil 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, old national and provincial exam papers and language support in eight indigenous languages.

Adding to the success of the 2019 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 GammaTutor, which includes the TouchTutor® app, and can be directly plugged into a projector, TV or any digital screen.

"The GammaTutor added to this year's ISP success," Olivier said.

"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 GammaTutor during 90-minute midweek tutorials with small groups of Grade 10 pupils at the participating schools, helping them work through challenges and deepen their understanding of maths.

NMU student teacher Monique Paulse, who tutored at Sanctor Secondary School in the Bay, said the tutorials provided an opportunity for pupils to ask questions and work through topics they didn't understand in class.

"The GammaTutor helped me a lot, as we were able to find different examples on different topics quickly and easily."

Neptal Khoza, head of Capitec Foundation, which sponsored the Saturday school programme, 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 21st century teaching, while assisting high-school pupils with extra tutorials to help them perform better in maths."

He said the ISP programme had helped pupils to "learn for understanding and not just to memorise".

"The TouchTutor® platform enables pupils to access content remotely any time, anywhere and without data costs. It enables them to learn at their own pace."

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news

CLASS ACT: Winners in the national mathematical art competition include, back from left, Paarl Gymnasium's Hano Nieuwoudt, Redhill High's Kiara Knapfmacher and Luke Ferreira, Diocesan School for Girls' Erin Powers, Framesby High's Kiara van Heerden, Eden College's Dorina Chemeva, Sibongani Matsa of the University of Johannesburg's Metropolitan Academy, Bosenhoved High's Morgan Durrheim and, front, from left, Fish Hoek High's Caitlin Wilde, Sir Pierre van Ryneveld High's Busisiwe Mbonani and Eunice Girls' High's Lauren Dansto

BEAUTY IN PRECISION: 'Heritage Mandala, by Caitlin Wilde

WASTNESS OF SPACE: Lauren Dansto's 'Infinity'

CAVE ART PATTERNS: Luke Ferreira's 'Pale Face'

SUM OF ALL PARTS: 'Hidden mathematics', by Morgan Durrheim

● High school kids from across SA shine in unique NMU competition

Bright sparks prove maths is an art form

Herald Reporter

High school pupils from across SA have won accolades for depicting the links between maths and art in unique and vibrant artworks, in the first nationally run mathematical art competition.

The top-placed winners in the competition, run by Nelson Mandela University's Govan Mbeki Mathematics Development Centre, drew their inspiration from the repeated mathematical patterns evident in ancient Khoi and San cave paintings and traditional Zulu beadwork, as well as the mathematical composition of well-known man-made landmarks, and even the mathematical mysteries of outer space.

Others looked for the maths-art connection in majestic animals, including rhinos and cheetahs.

"We were thrilled at the high calibre of the 600 entries we received, although it was a tremendous battle to choose the 12 overall winners," competition co-ordinator Carine Steyn said.

The competition was open to all high school pupils, who could enter artworks in two categories, "maths in nature" or "maths in man-made designs".

They were not judged on artistic merit alone, but also on how they represented the links between mathematics and the arts. First in the "maths in nature" – grades 10 to 12 – category was Lauren Dansstra, of Bastior Girls High School, Bloemfontein, whose work *Infinity* used the vastness of outer space for "the terror of things we don't know".

"I chose this topic because it is something I often think about, Lauren said.

"The uncertainty of science and maths beyond space deeply unsettles me, but the best we can do is keep pro-

'We were thrilled at the high calibre of the 600 entries we received'

Carine Steyn
COMPETITION CO-ORDINATOR

gressing and finding new patterns to make what was once scary, normal," she said.

Placed second was Kara van Heerden, of Port Elizabeth's Framesby High, with her *The functions of a zebra*.

Dorina Chemeva, of Eden College, Durban, came third, with her artwork *Tranquility*.

The grade 8 to 9 winner in the category was Luke Ferreira, of Redhill High, in Johannesburg, for his exploration of mathematical patterns in cave art in his artwork *Pale Face*.

Second and third respectively were Eunice Girls' High's Feng Mei Cheang for her *Romanesco Spiral*, and Erin Powers, of Makhanda's Diocesan School for Girls, for *Patterns of the Golden Ratio*.

First in the grade 10 to 12 "maths in man-made designs" category was Morgan Durrheim, of Beaconhurst High, East London, whose artwork *Hidden Mathematics* showed examples of "applying mathematics for our own benefit".

Her mixed-media artwork showed famous ancient and modern landmarks, from the Pyramids of Giza to Disneyland's castle.

Second was Sibongani Matsa, of the University of Johannesburg's Metropolitan Academy, who chose to draw attention to the pending extinction of rhinos through poaching, in his pencil sketch of a rhino constructed out of metal, titled *Same Difference*.

Third place went to Busisiwe Mbonani of Sir Pierre van Ryneveld High, Johannesburg, with her Ndebele-inspired artwork *Ithathumba*.

The top three winners in the grade 8 to 9 "maths in man-made design" category were Caitlin Wilde, of Fish Hoek High School, Cape Town, for her *Heritage Mandala*, depicting traditional Zulu patterns, followed by Kiara Knopfmacher, of Redhill High, for the ballet-inspired Geometrics of Dancing and Paarl Gymnasium's Hano Nieuwoudt, with *Ngenkleini*, showing the links between the speed of a cheetah and the fighter jet named after it.

All the winners received cash vouchers and book prizes – and Eunice High School in Bethelsdorp was recognised for submitting the most entries.

All the entries are on display at the Nelson Mandela Metropolitan Art Gallery in Port Elizabeth until June 21.

The top 40 entries will also be exhibited at the international Bridges Conference in Linz, Austria, from July 14 to 20, which promotes research and interest in the connections between mathematics and art.

The maths-art link is part of a new global trend in education called STEAM, the acronym for Science, Technology, Engineering, Art and Mathematics, which the competition is also promoting in South African classrooms.

Competition director Prof Werner Olivier said: "The Math-Art competition project adds an innovative educational layer to our centre's technology-blended approach to the teaching and learning of maths and science.

"It aims to develop creative young minds and build awareness around the skills challenges presented by the Fourth Industrial Revolution."

FNB's brief 'blessing' upsets clients

Iavan Pijoos

First National Bank (FNB) confirmed on Wednesday that it would reverse mistaken credits to some customers' accounts.

"We can confirm that incorrect balances on some of our customers' transactional accounts have been resolved.

"The incorrect balances were due to delayed debit card transactions for purchases," FNB said.

"Sincere apologies to impacted customers."

Many people took to social media to say they had received "blessings" from FNB.

"So FNB decided to bless me with R176k @PNBSA.

"What am I supposed to do with it?

"I don't want to get arrested," one comment read.

A second said: "Everyone is getting money from FNB.

something Standard Bank will never do. Now I'm thinking about all the calls to me to open an account with them."

Customers with specific queries should contact their bankers, or call 087 575 9404 (personal), or 087 736 2247 (business). - Iavan Pijoos

Create artwork inspired by mathematics

April 4, 2019

Learners from Creative Clubs, a project run by the University of the Free State's Social Responsibility Enterprises, create artwork using mathematics as part of a national Math-Art Competition for high school learners.

To encourage learners to recognise mathematics in the world around them and bring it to life, the Govan Mbeki Mathematics Development Centre (GMMDC) at Nelson Mandela University, Port Elizabeth, has launched a national Math-Art Competition, where entrants must submit artworks inspired by mathematics.

The University of the Free State (UFS) and Curro Schools are some of the many partners in the Math-Art Competition. Bloemfontein learners can drop their entries at the Social Responsibility Enterprises' offices at the UFS's South Campus.

The unique competition is open to learners from Grade 8 to 12, who can choose between two categories – mathematics in manmade designs, or nature – and they can use any visual medium, including photography, drawing, painting, collage or mixed media.

"In the 'manmade' category, we are looking for mathematics in designs created by humans. Here, learners can interpret the theme of art and maths in everyday objects such as buildings, bridges, vehicles, logos, cultural symbols, decorations, and many more," said GMMDC competition coordinator, Carine Steyn.

"In the 'nature' category, artworks must explore the relationship between nature and maths, for example, mathematical patterns in flowers, animals or mountains."

Each participant will also have to provide a written explanation outlining the link between their artworks and maths, by describing which mathematical concept they have used, how their artwork links to the selected category, and which sources they used to design their work.

Each submitted artwork must be two-dimensional and A4 to A2 in size, with relief work no more than 2 cm high.

Competition prizes, including tablets, cell phones and art classes, will be awarded to the top-placed candidates.

The competition has opened in March and closes on May 3, with the top entries to be displayed at public art galleries.

Winners will be announced on May 17, with a prize-giving taking place in Port Elizabeth on May 25.

For more information, contact: mathart@mandela.ac.za or watch the promotional video on YouTube: https://www.youtube.com/watch?v=rtKxp8rOr70 (keywords: Math-Art Competition 2019).

Tomorrow's teachers use new technology to tutor maths and science

By Nicky Willemse - Feb 12, 2019

Final-year education students in Nelson Mandela Bay and Mthatha are learning how to use cutting-edge technology in real-life teaching situations.

The prospective teachers from Nelson Mandela and Walter Sisulu universities are the very first "student tutors" in a new, extended technology-blended maths and science Incubator School Programme (ISP), which over the past five years has helped thousands of promising Eastern Cape learners improve their marks, and gain access to tertiary education.

If it is successful, the newly-launched "ISP and Student Teacher Tutor Programme" – piloted in Nelson Mandela Bay and Mthatha at the weekend – will be extended to other provinces.

Nelson Mandela University's Govan Mbeki Mathematics Development Centre (GMMDC) – with sponsorship from Capitec Foundation – is running the curriculum-linked programme in the two cities, providing 250 selected Grade 10 to 12 learners with extra tuition through the 16-week Saturday programme.

Each learner will also receive a 7" Android tablet as a "personal tutor", loaded with a GMMDC-developed app called TouchTutor®, which is crammed full of interactive curriculum-aligned digital resources, in the form of video lessons, PowerPoint presentations, calculator assistance, self-tests with scoring and feedback, old national and provincial exam papers and multi-language support in eight indigenous languages.

And they will have the added benefit of the "student tutors", who will provide mid-week tutoring with small groups of Grade 10 learners at their respective schools, using high-tech approaches to help the learners work through maths and science challenges and deepen their understanding of the subjects.

The student teachers are all being trained to use a small new digitalised teaching device – called the Gamma Tutor – which includes the TouchTutor® app, and can be plugged directly into a projector, TV or any digital screen. This dongle-like mini-computer without a screen, which will soon be officially released by GMMDC as a new mobile teaching device for school classrooms, will empower the student teachers to engage in professional teaching practices, geared towards 21st century learners.

Tomorrow's teachers use new technology to tutor maths and science

At the Nelson Mandela Bay launch of the new programme on Saturday (9 February), held at the Eastcape Training Centre (ETC) in Struandale, the student tutors, all fourth-year education students from Nelson Mandela University, couldn't wait to get started.

"I think the learners will appreciate it a lot, having someone sit next to them, helping them to see where they're stuck," said student tutor Frans Louw. "It will also help us to grow as teachers – especially learning how to incorporate technology with teaching."

"There are different types of learners," said fellow tutor Monique Paulse.

"I'm looking forward to learning how to adjust to learners who are slower and faster [to catch on]. Not all learners will understand the first time, so you need to try different techniques."

"It's an opportunity to stay up to date with the content," said Danielle du Plessis.

"By tutoring, we'll be helping ourselves to learn the content and bring this across to the learners."

"Someone once said: 'When you teach, you learn.' I believe this new tutor component of the ISP programme will help me to learn while I'm teaching," said Anita Rossouw.

"In this crucial year before getting my own classes, it will help me to develop to the fullest I possibly can."

GMMDC director Prof Werner Olivier said: "This new programme – and the new technology – is a way to empower teachers to deal with real challenges, with the assistance of very modern mobile teaching tools and resources, which have been researched and developed over the past 10 years.

"It could impact the course of their professional careers as teachers."

Neptal Khoza, Head of Capitec Foundation, said: "We are excited about the launch of this programme in Port Elizabeth and Mthatha. By offering university teaching students an opportunity to harness their teaching/tutoring skills, we enable them access to 21st century teaching and practical experience. We believe it will improve the maths and science performance of all learners participating in the programme."

Learners in Nelson Mandela Bay are hopeful the programme will boost their results.

Sanctor High Grade 10 learner Codi Ownhouse, 15, said: "Maths and science are a big struggle. I'm hoping this programme will help me a lot."

"I'm expecting higher marks and hope to learn more and know more," said Sinazo Kafatyi, 15, a Grade 10 learner from Khwezi Lomso High.

Grade 12 Gelvan High pupil Ruwellen Jacobs, 17, said attending the traditional ISP over the past two years had helped his maths mark climb from 47% to 85%. "I'm looking forward to this year's ISP – I'm aiming for level 7 (over 80%) in science as well."

Nelson Mandela University final-year education student Frans Louw discusses maths and science challenges with s the learners he will be tutoring (from left) Carla Michaels, 16, Kayla Prins, 15, and Mihle Lloyd, 15, all from Linkside

Prof Werner Olivier (right), director of the Govan Mbeki Mathematics Development Centre at Nelson Mandela Univ teaches final-year education students (from left) Bongiwe Magalala and Frans Louw, how to use an innovative mo teaching device – called the Gamma Tutor – to tutor learners in maths and science.

Nelson Mandela University final-year students (from left) Monique Paulse, Danielle du Plessis and Anita Rossouw a looking forward to boosting learners' maths and science skills – along with their own content knowledge in the sub by using new teaching technology.

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Tomorrow's teachers use new tech to tutor learners

PE EXPRESS | WEDNESDAY 20 FEBRUARY 2019

REPORTER

FINAL year education students in Nelson Mandela Bay and Mthatha are learning how to use cutting-edge technology in real-life teaching situations.

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Student tutor, Frans Louw said, "I think the learners will appreciate it a lot, having someone sit next to them, helping them to see where they're stuck.

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"It could impact on the course of their professional careers as teachers," said Olivier.

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Grade 12 Gelvan High pupil, Ruwellen Jacobs (17), said attending the traditional ISP over the past two years has helped his maths mark climb from 47% to 85%.

"I'm looking forward to this year's ISP. I'm aiming for level 7 (over 80%) in science as well," said Jacobs.

Prof Werner Olivier (right), director of the Govan Mbeki Mathematics Development Centre at Nelson Mandela University, teaches final-year education students (from left Bongiwe Mapalala and Frans Louw, how to use an innovative mobile teaching device called the Gamma Tutor to tutor learners in maths and science.

Twee leerlinge van die Hoërskool D.F. Malherbe in Port Elizabeth, Bjorn Futter (links) en Simonè Gous, kyk na verlede jaar se inskrywings vir die Nelson Mandela-Universiteit se wiskunde-kunskompetisie wat vanjaar landwyd aangebied word.

Foto: VERSKAF

Wen met wiskunde en kuns

Die wonder van wiskundige lyne in die ontwerp van objekte omring ons elke dag. Of 'n mens nou in 'n besige straat tussen wolkekrabbers dwaal of in die veld die skoonheid van 'n enkele blommetjie bewonder, wiskundige presisie in lyne, hoeke en ontwerp is oral om ons sigbaar.

Om leerlinge aan te moedig om wiskunde in die wêreld om hulle raak te sien, bied die Govan Mbeki-sentrum vir Wiskunde-ontwikkeling (GMMDC) tans die tweede jaarlikse Wiskunde-Kunskompetisie by die Nelson Mandela-Universiteit aan. Om deel te neem moet leerlinge teen 3 Mei 'n kunswerk, wat deur wiskunde geïnspireer is, inskryf.

Die kompetisie het sy oorsprong in die Oos-Kaap en is verlede jaar vir die eerste keer gehou. Die betrokkenheid van verskeie organisasies het dit moontlik gemaak om dit vanjaar landwyd aan te bied.

Volgens GMMDC se koördineerder van die kompetisie, Carine Steyn, was die kompetisie verlede jaar 'n groot sukses.

"Verlede jaar was die reaksie in die Oos-Kaap so positief dat ons besluit het om die kompetisie na al die ander provinsies uit te brei," sê Steyn.

Leerlinge van graad 8 tot 12 kan tussen twee kategorieë kies. Die een is wiskunde in mensgemaakte ontwerp en die ander in die natuur. Deelnemers kan enige visuele media, soos fotografie, teken, skilder, collage of 'n vermenging vir hulle inskrywings gebruik.

"In die mensgemaakte-kategorie soek ons na wiskunde in objekte wat mense ontwerp het. Hier kan leerlinge na wiskunde in kuns kyk in alledaagse objekte soos geboue, brûe, voertuie, simbole, versierings en baie meer," sê Steyn.

"In die natuur-kategorie moet die kunswerke die verhouding tussen wiskunde en die natuur ondersoek, byvoorbeeld die wiskundige patrone in blomme, diere of berge."

Elke deelnemer moet 'n geskrewe verduideliking van die kunswerk verskaf. Dit moet die skakel tussen die kunswerk en wiskunde, die wiskundige konsep en die bronne vir die ontwerp omskryf. Kunswerke moet tweedimensioneel wees en mag in grootte wissel van A4 tot A2 met 'n hoogte van nie meer as 2 cm nie.

Die GMMDC se doelwit met die wiskunde-kunskompetisie is om wetenskap, tegnologie, ingenieurswese, kuns en wiskunde (Steam) se gewildheid in die klaskamer te bevorder.

Pryse wat op die spel is, sluit in tablette en kunsklasse. Die beste inskrywings sal ook by openbare galerye uitgestal word. Die wenners sal op 17 Mei aangekondig word en die prysuitdeling volg op 25 Mei.

■ Vir meer inligting verlang, e-pos mathart@mandela.ac.za of kyk na "Math-Art Competition 2019" op YouTube.

Excellent result for Framesby Pupil in National maths-art competition

20 JUNE 2019 BY ALAN STRATON ADD YOUR COMMENT

Winners in a national mathematical art competition include (back, from left) Paarl Gymnasium's Hano Nieuwoudt, Redhill High's (Johannesburg) Kiara Knopfmacher and Luke Ferreira, Diocesan School for Girls' (Grahamstown) Erin Powers, Framesby High's (Port Elizabeth) Kara van Heerden, Eden College's (Durban) Dorina Cherneva, Sibangani Matsa from the University of Johannesburg's Metropolitan Academy, Beaconhurst High's (East London) Morgan Durrheim and (front, from left) Fish Hoek High's Caitlin Wilde, Sir Pierre van Ryneveld High's (Johannesburg) Busisiwe Mbonani and Eunice Girls' High's (Bloemfontein) Lauren Damstra.

High school pupils from across South Africa have won accolades for depicting the links between maths and art in unique and vibrant artworks, in the first nationally-run mathematical art competition.

The top-placed winners in the competition, run by Nelson Mandela University's Govan Mbeki Mathematics Development Centre (GMMDC), drew their inspiration from the repeated mathematical patterns evident in ancient Khoi and San cave paintings and traditional Zulu beadwork, the mathematical make-up of well-known manmade landmarks, and even the mathematical mysteries of outer space. Others looked for the maths-art connection in majestic animals, including rhinos and cheetahs.

"We were thrilled at the high calibre of the 600 entries we received, although it was a tremendous battle to choose the 12 overall winners," said GMMDC competition coordinator Carine Steyn.

The top 40 entries will be exhibited at the international Bridges Conference in Linz, Austria from July 14 to 20, which promotes research and interest in the connections between maths and art.

The competition was open to all high school pupils, who could enter artworks in two categories "maths in nature" or "maths in manmade designs". They were adjudicated not only on artistic merit, but on how they represented the links between mathematics and the arts.

First in the "maths in nature" (Grade 10 to 12) category was Lauren Damstra from Eunice Girls High School in Bloemfontein, whose artwork "Infinity" used the vastness of outer space to represent "the terror of things we don't know".

"I chose this topic because it's something I often think about. The uncertainty of science and maths beyond space deeply unsettles me, but the best we can do is keep progressing and finding new patterns to make what was once scary, normal," said Lauren.

Placed second was Kara van Heerden from Framesby High in Port Elizabeth, with her artwork "The functions of a zebra", with Dorina Cherneva from Eden College in Durban coming third, with her artwork "Tranquility".

The Grade 8 to 9 winners in the same category were Luke Ferreira from Redhill High in Johannesburg, for his exploration of mathematical patterns in cave art, in his artwork "Pale Face". Placed second and third respectively were Eunice Girls' High's Feng-Mei Chuang for "Romanesco Spiral", and Erin Powers from the Diocesan School for Girls in Grahamstown for "Patterns of the Golden Ratio".

First in the Grade 10 to 12 "maths in manmade designs" category was Morgan Durrheim from Beaconhurst High in East London, whose artwork "Hidden Mathematics" showed "many examples of applying mathematics for our own benefit". Her mixed-media artwork showed famous ancient and modern landmarks, from the Pyramids of Giza to Disneyland's famous castle.

In second place was Sibangeni Matsa from the University of Johannesburg's Metropolitan Academy, who chose to draw attention to the pending extinction of rhinos through poaching, in his pencil sketch of a rhino constructed out of metal, titled "Same Difference". Third place went to Busisiwe Mbonani from Sir Pierre van Ryneveld High (Johannesburg) with her Ndebele-inspired artwork "Ithuthumbo".

The top three winners in the Grade 8 to 9 "maths in manmade designs" category were Caitlin Wilde from Fish Hoek high School in Cape Town, for her "Heritage Mandala", inspired by traditional Zulu patterns, followed by Kiara Knopfmachter from Redhill High In Johannesburg for the ballet-inspired "Geometrics of Dancing" and Hano Nieuwoudt, from Paarl Gymnasium with "Ngesivinni", showing the links between the speed of a cheetah and the fighter aircraft jet named after it.

All the winners received cash vouchers and book prizes – and Eunice High School in Bloemfontein was recognized for submitting the most entries.

The maths-art link is part of a new global trend in education called STEAM, the acronym standing for Science, Technology, Engineering, Art and Mathematics, which GMMDC is promoting in South African classrooms.

"The Math-Art competition project adds an innovative educational layer to our centre's technology-blended approach to the teaching and learning of maths and science," said GMMDC director Prof Werner Olivier.

"It aims to develop creative young minds and also build awareness around the skills challenges they will face in their future careers in the Fourth Industrial Revolution."