Editorial

The Govan Mbeki Mathematics Development Centre (GMMDC) programme for semester two of 2018 was again packed with a number of exciting project activities and development milestones of different types. Dedicated efforts by GMMDC staff have ensured that the scope of GMMDC engagement activities in this period actively reached more than 80 secondary schools in six districts of the ECP. Some new project links were established with the DBE at national level and also with key stakeholders outside the Eastern Cape. On the development side, several exciting new education support functionalities were added to the TouchTutor® Quiz application for mobile phones. A new and exciting teaching device called Gamma Tutor was also conceptualized and developed in partnership with an external IT company in semester 2 of 2018. This device, which will incorporate the use of TouchTutor® software, holds great promise as it will add new dimensions of educational innovation to the Techno-Blended T&L model of the GMMDC. Central Maths and Science resource centres supported by ICT support capacity at schools and public spaces were also launched for the first time in a number of rural project nodes. The value of the engagement work that the GMMDC does, received a vote of confidence as a number of key funding partners have extended their financial support for multi-year periods in the second half of 2018. As a result, the annual value of externally sponsored mathematics and science engagement activities of the GMMDC has grown for the first time to over R15 million in the second half of 2018.

Left: Two Grade 12 learners from Umtata High School in the Eastern Cape who participated in the Incubator School Programme of the GMMDC from 2016 to 2018 received Top Achiever Awards from the Premier of the Eastern Cape after the release of the 2018 National Senior Certificate Results. Both these learners attained distinction in all 7 subjects.

Uzma Shaikh received an award as the Top Learner (Position 2) for the Province, while Anjali Radhakrishnan received an award as the Top learner (Position 1) in the OR Tambo Inland District.
In June 2018, the TPACK (Technological, Pedagogical and Content Knowledge) Mathematics Programme received SACE accreditation. The TPACK Mathematics programme is designed to deliver Mathematics content knowledge covering a range of FET CAPS aligned topics and training in the use of technology in the classroom. The programme is divided into eight full-day short learning programmes (SLP).

The teachers are assessed using Pre- and post tests as well as a self-study assignment. For the completion of the assignments, teachers encouraged to use technology and actually to photograph themselves whilst they used technology in their classrooms.

Through the existing Professional Learning Network (PLN), the teachers in the GMMDC project schools were invited to attend the TPACK Mathematics Programmes sessions and were awarded 10 SACE CPD (Continued Professional Development) points for each SLP they attended and completed the assignment. The first SACE accredited SLP on Trigonometry was held in July and the second on Probability and Data Handling, in October. The sessions were held in East London, King Williamstown, Queenstown, Bedford and Port Elizabeth and teachers from the sponsored projects were invited to attend the sessions.

The Govan Mbeki Mathematics Development Centre’s first pilot Math-Art Competition in public schools in 2018 was a resounding success. Most of the 133 entries that were received were from previously disadvantaged secondary schools in the ECP and most of the artworks were locally exhibited at the Nelson Mandela Metropolitan Art Museum at St Georges Park from 19 – 25 May 2018. The competition has highlighted the wealth of hidden talent amongst school learners from different cultural and socio-economic backgrounds as far as creativity is concerned when mathematics and art are linked to real-life or abstract designs. The competition has also attracted the attention of the organizers of the International Bridges organization. This organization is the leading professional body worldwide to promote connections between mathematics and art. As a result, the organizers of the local MATH-ART competition were invited to exhibit a selection of learner MATH-ART entries from South Africa at the annual International Bridges Conference which took place at the National Museum of Science and Technology in Stockholm, Sweden in July of 2018. The 30 entries that were selected and exhibited during this event were well received by conference organizers and visitors from many parts of the world. Much praise was received for the creativity expressed in the art works and written narratives that accompanied the learner displays. Plans are in place to extend this engagement project to a National Math-Art competition in secondary schools in 2019 and the GMMDC has already received a follow-up invitation from the Bridges Conference organizers to bring an exhibition of winning artworks from South African learners to the Bridges conference in Linz, Austria in July 2019.

The MATH-ART competition is in line with the international trend of STEAM (incorporating Art into Science, Technology, Engineering and Mathematics) and is supported by both Umalusi and the National DBE in South Africa.

Winning Math-Art Competition Entries from Project Schools Exhibited at International Conference in Stockholm

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Above: In-service Maths teachers of the Professional Learning Network (PLN) in King William’s Town

Above: Professional Learning Network (PLN) Maths teachers in Mthatha

Above: A selection of learner artwork from the first MATH-ART competition held in May was exhibited at the International Bridges Conference at the National Museum of Science and Technology in Stockholm, Sweden.

Right: Prof Werner Olivier, Director of GMMDC at the Bridges Conference
GMMDC exhibit at National Science Week

In collaboration with the Faculty of Science, a GMMDC team travelled to Mvezo to exhibit at the National Science Week which took place from 28 July to 4 August. The theme for the 2018 NSW was “Deeping our Democracy through Science”. The exhibit created awareness of the Centre’s broad involvement in maths and physical sciences at FET and Senior Phase level and provided opportunity for learners and visitors to engage interactively with STEAM-related materials.

GMMDC launches centralised maths and science resource centres

For a long time, Nelson Mandela University’s Govan Mbeki Mathematics Development Centre (GMMDC) has been pioneering technology-based solutions to help learners in the form of tablet-based maths and science support, which they can access at Saturday incubator schools, after-school sessions with peers, or at small maths and science resource centres set up at their schools or elsewhere. In September of 2018 GMMDC also launched a number of centralised resource centres which can be accessed by all the schools in the immediate area. These new centres, one in East London and two in King Williamstown, will give many more pupils a chance to improve their maths and science marks. In-service mathematics and science teachers will also benefit from professional skills development and resource support activities at the centres.

Sets of Tablets, onto which GMMDC’s innovative teaching and learning resources have been uploaded, will be available at each resource centre. The digital package, called TouchTutor®, covers the entire maths and physical sciences curriculum from Grade 8 to 12, and includes PowerPoint lecture-driven presentations, video content, calculator tutorials, a multi-language glossary of maths and physical science terms, self-tests and old exam papers with memos. Mathematics learners will also have access to printed easy-to-follow TouchTutor® learner guides, to assist with self-directed learning. An on-site IT assistant will also be available to provide technology support to the learners who come to the resource centre. Resource centres will also be places where GMMDC can run its unique Science, Technology, Engineering, Art and Mathematics (STEAM) hands-on workshops, where teachers and learners participate in practical experiential learning activities using science and maths to solve real-life problems in creative ways.

The new resource centre model has the full support of the Eastern Cape Department of Basic Education at district level, including the subject advisors and chief education specialists who have been working with the GMMDC over the past three years. Several senior officials from the National Department of Basic Education who have also attended the launch of the centre in King Williamstown, have expressed their support for this initiative.
Pupils discover the world of coding

22 OCTOBER 2018 BY ALAN STRATON

Mimi Mini, Deputy Director of Teaching and Learning Resource Development at the National Department of Basic Education, chats to pupils playing an innovative coding game called “Tanks”, at a STEAM (science, technology, engineering, art and maths) workshop run by Nelson Mandela University’s Govan Mbeki Mathematics Development Centre (GMMDC). The DBE recently proposed Coding as a new South African school subject.

Pupils from disadvantaged schools across the Eastern Cape are taking their first steps towards IT careers, by getting a feel for coding theory. Nelson Mandela University’s Govan Mbeki Mathematics Development Centre (GMMDC) has included coding theory in its interactive STEAM (science, technology, engineering, art and maths) experiential-learning workshops, run in classrooms from East London to King William’s Town, Queenstown, Bedford and Somerset East. The STEAM workshops are run in partnership with Capitec, Old Mutual, Cookhouse Windfarm Trust and BK Admin Services.

“STEAM typically looks at various geometric structures including 2D or 3D tessellations (patterns) to help pupils see the links between mathematics and careers in science, engineering, design and architecture. Now we are adding a new dimension – in the form of two coding theory games called ‘Tanks’ and ‘Boats’ – to introduce them to the world of IT as well,” said GMMDC director Prof Werner Olivier.

“Coding theory is a precursor to programming and it’s very important for setting oneself up for a career in IT,” he said.

The introduction of coding theory is timeous, given that the national Department of Basic Education (DBE) last month (September) proposed Coding as a new school subject. The Boats game links to a second proposed new school subject, Marine Sciences.

Senior DBE officials recently travelled to rural Dimbaza near King William’s Town, to observe GMMDC’s STEAM activity sessions with pupils at Archie Vellei Senior Secondary School, gaining a first-hand glimpse of Tanks and Boats.

Both games were developed by postgraduate students in the university’s Department of Computing Sciences, under the supervision of Prof Jean Greyling. In Tanks, pupils, in teams competing against each other, must piece together puzzle-piece instructions to guide a tank through obstacles to a pre-determined destination. They then take a picture of their puzzle-piece pattern using a tablet or mobile phone with the free Tanks app installed (available at Google Play stores). The app uses photo-recognition to execute the path they have coded – and determine whether their steps were correct. Once they have found the solution, they can proceed to the next level of difficulty.

“Tanks is very tricky because you have to know which pattern to put where. What I learnt was that no matter how challenging your situation, there is always a solution waiting to be discovered,” said Esosa Siphno Nombali from Alphandale Senior Secondary School, at a STEAM workshop in Duncan Village, East London.

“I found the game a bit challenging but fun because of the many steps needed,” said Lutho Mgwayibana, from Ebenezer Majombobi High School, also in Duncan Village.

“In order for you to win, you have to use your mind and have a strategy,” said Anathi Gose, also from Mzokhanyo Senior Secondary School.

Olivier said teachers from schools participating in the STEAM workshops received Tanks and Boats sets, along with tessellation sets and guides to engage with other groups of pupils at their schools.