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NEWS

Nelson Mandela Metropolitan University
for tomorrow
Port Elizabeth & George

GMMDU Newsletter

Govan Mbeki Maths Development Unit July - December 2016

Editorial

The year 2016 has been an extremely busy one for the staff of the GMMDU. The development of the professional version of the TouchTutor® software package for Android devices was completed in December of this year with interactive language support in 7 indigenous languages built in as an innovative support layer for learners and teachers. Semester 2 of 2016 also saw the completion of a two-year long development of a comprehensive CAPS aligned Physical Science digital resource package for Grades 10-12. Furthermore, an extension of the TouchTutor® Mathematics support package, which also includes support components for the Senior Phase mathematics school syllabus, was successfully completed. In addition, the unit also managed to redevelop the Mxit-based mobile application for Maths and Science support and competitions in schools. A new independent application for mobile Android devices, which will be downloadable for free via Google Play Store soon, is currently being tested for use in project schools. This application could be used by all mathematics learners in secondary schools by the middle of 2017.

All of the above contributed richly in assisting the GMMDU to move a step closer towards a strategic aim to develop and implement a fully-fledged offline techno-blended T&L model for Mathematics and Physical Science for secondary schools that would give impetus to the Research and Development mission and vision of the unit.

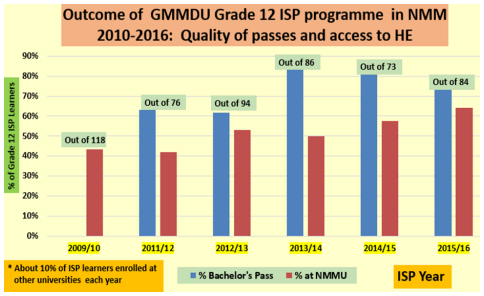
Semester 2 of 2016 also saw the successful completion of a number of exciting mathematics and physical science learner and teacher development project implementations in secondary schools across six education districts of the Eastern Cape Province. In July 2016 an exciting new Maths, Science and English support programme sponsored by ZENEX (Sakha Ikamva) was launched and implemented. This 5-year learner and teacher support intervention, which focuses on 10 secondary schools in PE, will see a full project implementation in place by the start of school year in 2017. The successful implementation of Maths and Science development and support projects for learners and educators in more than 70 secondary schools and two TVET colleges this year, the GMMDU and its partners have re-established themselves as valuable contributors to the advancement of Maths and Science education in the province.

Maths and Science incubation programme for access to HE - a reflection on success

The GMMDU management has recently conducted a review of the outcomes of their Maths and Science incubation programme for selected Grade 11 & Grade 12 learners with potential from more than 30 under-resourced secondary schools in the Nelson Mandela Metropolis. The quality of ISP matric passes as well as the subsequent success rate of Grade 12 ISP learners entering the University system were tracked over the period 2010 to 2016.

Customized digital T&L material that is curriculum aligned was used during a structured incubation programme that was delivered on Saturdays at the Missionvale campus of the NMMU. Since 2013 the GMMDU's TouchTutor® digital software package formed the basis of the support model which also saw the use of a 7" Android Tablets to support each learner on a 24/7 basis.

The graph shows salient trends linked to the quality of Grade 12 ISP passes, their access to NMMU (and some other universities) and the subsequent success rate of ISP learners



who are studying at the NMMU. A steady increase in the % Grade 12 ISP learners who successfully registered at NMMU can be seen – 43% in 2010 to 64% in 2016. On average, 80% of the Grade 12 ISP learners have presented a Bachelors pass in matric over the past three years. The cohort of ISP learners have registered for a range of study programmes (mostly SET related) over the past five years and official NMMU records showed that more than 40% of each cohort managed to complete the maximum of 120 study credits in their first year of study. The above statistics show that the Maths and Science incubation programme of the GMMDU in the NMM have made invaluable contributions to ensure that learners of who perform well from previously disadvantaged schools enrol at NMMU and other universities over the period 2010 to 2016. Currently the GMMDU also runs similar ISP programme in other educational districts of the ECP.

SCOPE OF GMMDU MATHS AND SCIENCE DEVELOPMENT PROJECTS

- > 80 project schools in 6 districts
- > 1200 selected ISP and TAPS learners with tablet and TouchTutor® packages
- > 200 in-service Maths educators received PLC training with laptops and TouchTutor® packages
- > Desktop PC - based Maths and Science resource centres in over 100 schools

Govan Mbeki Mathematics Development Unit
empowering young minds

"Our South African youth must study maths and science in order for us to be a winning nation"

Dr Govan Mbeki (LLD)

Sakha Ikamva - a Zenex Foundation sponsored project

The Zenex Foundation Board approved a grant of R25, 9 million at the beginning of 2016 to implement a five year programme (2016 to 2020) of support to 10 selected high schools in the Nelson Mandela Bay metropole (Port Elizabeth and Uitenhage).
The project was formally launched on 18 October 2016 at the Beach Hotel, Summerstrand, and Port Elizabeth, where the project name **"Sakha Ikamva"** was announced.
The primary goal of the project is to increase the number of schools in the Eastern Cape that offer quality Mathematics, Physical Sciences and English teaching to previously disadvantaged Grade 10 to 12 learners. The secondary goal is to increase the pool of learners in the Eastern Cape that obtain quality passes and enter tertiary studies in the fields of Mathematics and the Sciences.
The project objectives are to improve the performance in Mathematics, Physical Sciences and English of the selected schools through providing support through the provision of:

- Targeted teacher training focusing on pedagogical classroom practice and theories of learning.
- Support for grade 10 to 12 learners focusing on: extra academic tuition, camps, mentoring, blended learning support through innovative models of intervention highlighting the importance of technology in preparing learners for the 21th century and tertiary access support for learners.
- School Leadership support for curriculum management through training and coaching.
- Teaching resources (Laptops, Tablets, Data projectors, Calculators, Study guides) to the school.
- Establishing and developing Communities of Practice among teachers and school leaders.

The GMMDU is one of the partners of the project specifically providing Mathematics and Physical Sciences support to selected learners and teachers from the 10 project schools.
The initial launch of the project took place on 20 April 2016 and was attended by all principals and subject coordinators of the 10 project schools. A total of 150 Grade 11 and 12 learners were initially selected, but eventually 54 grade 11 and 74 Grade 12 learners participated in the project during 2016.
A Winter School Programme was held from 27 June to 01 July 2016 at the NMMU Missionvale campus to prepare learners for the second semester curriculum. Mathematics and Physical Science teachers participated in four Professional Learning Community (PLC) training sessions, while the Mathematics learners participated in afterschool TouchTutor® TAPS sessions facilitated by teachers from the schools. In 2017 the programme will be extended to include Grade 10 learners and will also provide support for Physical Sciences learners in the form of 6 four-hour Saturday sessions during the first three school terms and one 6 hour school holiday session during October.

Initial introduction of project attended by Principals and Project co-ordinators from the 10 project schools

Learners attending the Winter School Programme at Missionvale campus

GeoGebra project leads to international collaboration to boost links between Arts and Mathematics

An Erasmus Mundus HE mobility grant was awarded to the GMMDU in July 2016 in order to establish a partnership with members of the International GeoGebra Institute which is based in Hungary. This grant was based on the fact that the GMMDU has active links with the said institute and the unit also hosts the oldest and most active GeoGebra virtual institute in SA. Members of the International GeoGebra Institute have been partnering with the Arts Faculty of the University of Budapest in Hungary to promote Science, Technology, Engineering , Arts and Mathematics (STEAM) education globally and the Erasmus collaboration with the GMMDU at NMMU will see aspects of this project being extended to South African secondary schools. STEAM education represents a modern expansion of the global STEM Education movement with the focus on innovative use of technology to promote the awareness of the important role mathematics plays in providing the skills basis for problem solving and design in many professional environments including the Arts (see http://educationcloset.com/steam/what-is-steam/)
The GMMDU Erasmus project aims to introduce STEAM education to the education community in SA via existing GeoGebra development projects which forms part of the Mathematics development programme of the GMMDU in schools and TVET colleges. The particular focus will be to develop digital GeoGebra T&L materials and accompanying ICT training that could assist with the integration of ethno-mathematical aspects as part of the T&L of mathematics in SA schools and colleges.
The first phase of the Erasmus project consisted of a joint 5-day STEAM planning and sharing seminar that was hosted by the Faculty of Arts at the University of Budapest in Hungary during December 2016. Prof W Olivier and Dr P Collett represented the GMMDU and delivered an overview talk about the use of an offline techno-blended model and GeoGebra to develop mathematics skills of educators and learners in schools and colleges in South Africa. Various aspects of the use of GeoGebra to represent and promote applications of mathematics in art were also presented to participants during a series of workshops. Various follow-up seminars, including a GeoGebra STEAM conference at NMMU in 2017, is planned as part of the implementation of the Erasmus project over the eighteen months.

CAPITEC Maths and Science programme in Queenstown, extended to Mthatha

A successful Integrated TouchTutor® Support Programme (ITSP) for maths and science that has been offered by the GMMDU in Queenstown since 2014 will be extended to several high schools in Mthatha in 2017.
The three-year project, which will also be sponsored by the **CAPITEC Foundation** and run by Nelson Mandela Metropolitan University's Govan Mbeki Mathematics Development Unit (GMMDU) in collaboration with the Department of Basic Education, will formally be launched at a participating school, Umtata High, early in 2017.
It will take the form of an **Incubator School Programme (ISP)** run on Saturdays for 90 selected Grade 10 to 12 learners with potential from five local schools, and a parallel **Teacher Professional Learning Community (PLC) support programme** for 20 in-service mathematics teachers from 10 local schools.
Each of the participating ISP learners will receive a 7" Android tablet, on which they can access GMMDU's innovative teaching and learning support programme packaged as **TouchTutor®** software. This to serve as their personal "Tutor" after-hours. A structured centralized incubation programme on Saturdays will also assist learners to actively engage with the curriculum aligned digital resources on the Tablet on a 24/7 basis.
Project teachers will receive laptops loaded with the same curriculum-aligned software and focussed training to use this as a teaching resource within the classroom.

Learners on the Mthatha Maths and Science Incubator School Programme with their android tablets

The extension of the Maths and Science ITSP programme aims to help the Mthatha education community in secondary schools to experience quality offline technology-enhanced teaching and learning that is curriculum aligned and integrated with traditional teaching tools that are being used.
Local leadership of the Department of Basic Education expressed their excitement and full support for this initiative and referred to the programme as "a very good and progressive initiative".

Tablet-Assisted Mathematics learner project shows great promise

A **Telkom Foundation** sponsored integrated TouchTutor® mathematics and science support programme was launched in ten PE secondary schools in February 2016. An after-school tablet-assisted peer support model for selected Grades 10-12 mathematics learners was implemented at each school and top performing learners from each school were also selected to join a structured Tablet-assisted Maths and Science incubator school programme (ISP) that is run by the GMMDU at the Missionvale Campus of the NMMU on Saturdays. The results from these programmes, which ended in September of 2016, were most encouraging. The project impact showed that the offline techno-blended model, which is based on the use of the Tablet and TouchTutor® digital support package, has great potential to assist learners in challenged secondary school environments to succeed with their maths and science studies.
The average final mathematics mark for the cohort ISP & TAPS learners (more than 200) improved by more than 5% points from 2015 (Grade 11) to 2016 (matric). The general trend for other learners from these schools was a lower final mathematics mark in matric. One Grade 11 Tablet learner improved his mathematics mark from 42% at the end of 2015 to 70% at the end of 2016 – an astonishing improvement of 67% in one year!
Some other positive quantitative factors, based on the impact of the 2016 Telkom Foundation learner programme, is reflected in the table alongside.

A TAPS training session at Kwesi Lomso Comprehensive School with teachers Mr Dasi and Ms Makhana (left) and Mr Nathi Kunene from the Telkom Foundation (far right)

Tablet Learners who improved final Mathematics Mark in 2016 compared to 2015		
Improvement	**No. of Learners**	**% of Total number of Learners (218)**
By more than 20 percentage points	10	5%
By more than 15 percentage points	17	8%
By more than 10 percentage points	44	20%
By more than 5 percentage points	67	31%

Old Mutual Education Flagship Project

The Old Mutual Education Flagship Programme's Maths and Science Development Project celebrated the successful completion of its second year at an Awards Function at the Steve Biko Centre in King William's Town in November 2016.

Project participants from schools in the Bhisho area, together with GMMDU, Old Mutual and DoBE staff attended a function to recognize the participation of teachers, principals and the top performing learners.

Programme components in 2016 have included:

- An afternoon tablet assisted peer support (TAPS) programmes in 18 project schools which aims to consolidate knowledge and skills of Grade 10, 11 and 12 learners and to prepare them for examinations. The model has been tried and tested in other GMMDU projects with promising results. For the OMEPF Grade 12 group, 60% of learners were able to improve their mathematics marks compared to their grade 11 performance level.
- Professional learning communities for FET Mathematics and Science. Teachers were resourced with laptops and extensive teaching, learning and testing material tailored for the CAPS curriculum.
- A Spring School for 150 Grade 12 learners during which intensive examination preparation workshops were conducted for Mathematics and Science.
- The desktop resource centre project which makes the same maths and science learning resources available to the learners in projects schools who do not have access to the tablets.

Learners at the Mathematics Spring School

Professional Learning Community for Mathematics teachers

The Govan Mbeki Mathematics Development Unit would like to express our gratitude for the continued support of our generous funders.

GMMDU in the News

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Taking on the hi-tech challenge

Project aims to help pupils prepare for changing world

Nicky Willemse

A TALK by trends analyst, journalist and former fashion editor Dion Chang on the age of digitisation – and how young people should prepare themselves for a working world where change is the only constant – was a fitting way to launch a new hi-tech maths, science and English project in Nelson Mandela Bay on Tuesday evening.

The project, a partnership between the Zenex Foundation and the Eastern Cape Department of Education, is being implemented at 10 disadvantaged Bay schools.

"What skills are needed for a new world order?" Chang asked.

"The two most important skills that are missing are critical thinking and problem solving.We are seeing a new HR mantra: hire for attitude, retrain for skills."

Chang was the keynote speaker at the launch of the R25-million, five-year project, which will use modern technology to improve teaching, learning and pass rates and prepare pupils for the highly digitised, sprint-paced 21st century working world.

The project was introduced in April at the Bethelsdorp, Cowan, Chapman, Ethembeni, KwaMagxaki, Masiphatisane, Motherwell, Molly Blackburn, Newton Technical and Westville high schools.

"Our research shows we need to address a number of challenges in the way maths and science are taught in order to make a tangible difference in the outcomes for learners," Zenex Foundation chair Thandi Orleyn said.

The project involves coaching school management, training teachers in subject content and providing direct support to pupils.

Implementing partners include the Nelson Mandela Metropolitan University's Govan Mbeki Mathematics Development Unit.

The unit has developed a technology-linked teaching and learning model, aligned with the CAPS curriculum for maths and science for Grades 10 to 12, which is available on laptops for teachers (as a teaching resource), tablets for selected pupils (as a personal, after-school tutor) and desktop computers (to form a resource lab at the schools).

The model includes video lessons, animated PowerPoint presentations, science experiments, a calculator support video, self-assessment with immediate feedback, past exam papers and interactive language support.

New Leaders Foundation is providing schools with an information management system, which synthesises and analyses data.

Other implementing partners include Partners for Possibility, Tsebo Education Network and English specialists Sally Potgieter and Angela Schaffer.

LAUNCH LESSON: Masiphatisane Grade 11 pupil Sisipho Zamxaka, middle, explains to Mervyn Patrick, left, Sally Potgieter and Robert Stephens how the TouchTutorTM maths and science programme on her tablet works Picture: NICKY WILLEMSE

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LEARNING ALL THE TIME: Teachers from schools in Komani, King William's Town and Port Alfred attended the launch of a technology-linked maths and science support programme, running at eight schools in the Border region

Maths, science help for schools

Teachers, trust link to bring technology to classrooms

MATHEMATICS and science pupils at eight schools in Komani, King William's Town and Port Alfred are benefiting from a leading-edge technology-linked support programme, run by Nelson Mandela Metropolitan University's Govan Mbeki mathematics development unit, in partnership with BK Administrators, a charitable trust in the Border region.

Training is also being provided to teachers at the schools – which include Komani's Get Ahead College, Queen's College, Girls' High School and Hangklip High School; King William's Town's Dale College, Kingsridge High School and De Vos Malan High School; and Port Alfred High School.

GMMDU's innovative teaching and learning programme – packaged as TouchTutorTM software – is available on tablets for selected pupils (for use as "personal tutors" outside school hours), desktop computers for general use by pupils, and laptops for teachers (for use as a teaching resource within the classroom).

TouchTutorTM includes recorded video lessons and animated PowerPoint presentations, which are fully aligned with the CAPS curriculum for Grades 10 to 12, along with a wealth of teaching and learning material designed to boost understanding among pupils, while also boosting the core skills and knowledge of their teachers.

The package includes the dynamic mathematics software package GeoGebra, past matric papers (with memoranda), self-assessment and feedback, a glossary of terms (in six indigenous South African languages), calculator support and other high-tech resources.

The techno-blended teaching and learning model was pioneered by GMMDU head Prof Werner Olivier, specifically for use in under-resourced schools – in some cases, the tablets have been used in schools where there are no science and maths teachers. However, as is the case in this programme, the model is also being rolled out in former Model C schools as an additional teaching and learner resource.

"The integrated TouchTutorTM mathematics and science support programme was developed over a five-year period, and presents a modern and flexible offline scaffolding (support) platform for mathematics and physical science in secondary schools," said Olivier.

"Currently, this programme is also active in more than 50 under-resourced schools in the Eastern Cape province where the aim is to nurture learners to improve their chances of getting into universities."

About 150 tablets were handed to principals and teachers at the recent formal launch of the programme at De Vos Malan High School, where the respective memoranda of understanding were also signed. The eight schools received their desktop computers and laptops prior to the launch.

"The eight schools have committed to a process of identifying needs and strategies to use the resources to support mathematics and science teaching and learning, with the aim of boosting performance in these subjects," said GMMDU project coordinator Dr Philip Collett.

At the launch, BKA board chairman Hugh Wormald encouraged schools to "utilise the opportunity fully" and stressed the significance of individual commitment and action by teachers and learners.

"BKA is committed to supporting improvement in schools, particularly in the disciplines of mathematics and science, which are key drivers of economic and social development," Wormald said.

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ACHIEVERS: Alexander Road High's Brandon le Roux, 14, and Pearson High's Kianna Peterson, 16, won this year's cellphone-based TouchTutorTM Maths Competition for Grade 9 and 11. Maths comes naturally to the two winners

App-based maths contest launches

Weekend Post Reporter

THIS week marked the end of a landmark Mxit-based maths competition – run nationally, provincially and citywide since 2013 – and the launch of a brand new android-based maths competition, which will kick off next year.

The TouchTutorTM Maths Competition, sponsored by the Capitec Foundation, was developed to "popularise" maths among tech-savvy pupils – and its developers, Nelson Mandela Metropolitan University's Govan Mbeki Mathematics Development Unit, are determined to keep it fresh by shifting to the latest cellphone technology.

Next year's competition will run on a new app, available free from the App Store. The app gives access to assigned tests for competition purposes, along with other downloadable tests.

The announcement of the new competition format took place on Wednesday at the prizegiving for this year's Grade 9 and 11 competition winners. Ironically, the top spots in each went to pupils in the grade below – Alexander Road High Grade 8 pupil Brandon le Roux, 14, and Pearson High Grade 10 pupil Kianna Peterson, 16. Neither had studied the Grade 9 or 11 maths syllabus before attempting the curriculum-aligned maths tests.

"I just get maths," said Le Roux, who is interested in pursuing an accounting career. "Maths comes easily to me."

Peterson, 16, who is planning to study actuarial sciences, said her win was a surprise, "not knowing Grade 11 work".

"I just looked at the different equations and figured it out."

The new app will have language support in six indigenous languages, and will be available from Grades 8 to 12.

Publication: Die Burger (Oos Kaap), Saterdag
Date: 10 Sep 2016
Page: 3

Matriekleerders aan die Hoërskool Cillié (van links, kloksgewys) Valerie van Vuuren, Rudean Lackay, Aladdin Siebritz (hoofseun) en Kate-Lynn Jacobs neem deel aan die tegnologie-gesteunde wiskundeprojek van Telkom en die NMU.

Wiskundeprojek wil dié matrieks help

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Page: 23

Telkom Foundation invests in pupils

Three-year technology-based maths project aims to improve results of pupils and make maths, science exciting

TNA REPORTER

THE Telkom Foundation is pouring R3m into a three-year technology-linked maths project to boost the results of pupils in 10 under-resourced high schools in Nelson Mandela Bay.

The project is run in partnership with Nelson Mandela Metropolitan University's Govan Mbeki mathematics development unit.

It is already in full swing at the 10 high schools which include Cillie, Douglas Mbopa, Gelvandale, Khwezi Lomso, Nkyebo, Ndzondelelo, St Thomas and Woolhope in Port Elizabeth and Solomon Mahlangu and Uitenhage high schools in Uitenhage.

Pupils say the innovative maths programme is already making a difference.

"Most of the chapters which I used to struggle doing have become more understandable," Woolhope Grade 12 pupil Madodandile Soyiki said.

Solomon Mahlangu Grade 11 pupil Muziwandile Thubane said: "It helped me a lot in studying and it inspired me to do my schoolwork because I have everything I need". At the heart of the project is the units pioneering technology-linked teaching and learning model which for pupils at the project schools has led to Saturday incubator schools, a Tablet-assisted After-school Peer Support programme and a school-based resource centre with desktop computers.

The Integrated TouchTutorTM Support Programme (ITSP) is the brainchild of the units head prof Werner Olivier, who has adopted a high-tech approach that is "in harmony with the challenging educational environment in the majority of South African schools and aims to get teachers and pupils excited about maths and science".

"The aim is to assist teachers to deliver the mathematics curriculum effectively and to nurture pupils with potential for access and success at higher education level," Olivier said.

Through the course of this year, the unit has successfully implemented similar ITSP programmes in more than 50 schools in several districts of the Eastern Cape.

Nathi Kunene, Telkom Foundation's senior manager: CSI, said the foundation's primary focus is education.

"When you look at how you can change society, education becomes the most important lever to drive socio-economic development," Kunene said.

He said the foundation's involvement in the Nelson Mandela Bay maths project was a way of enabling more pupils to be equipped with critical skills and to access ICT careers.

"It's very important for us to create an ICT industry skills pool as well as contribute to addressing critical skills in the country."

The Telkom Foundation, as part of its integrated plan, will also be engaging with each of the 10 schools to pinpoint socio-economic challenges that may be affecting the performance of pupils (as in child-headed households) and will then identify possible long-and short-term interventions and partnerships.

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HELPING HANDS: GMMDU head Prof Werner Olivier, Telkom Foundation senior manager Nathi Kunene and Cecil Heradien, subject advisor for mathematics (FET level) in Port Elizabeth.