

Tablet-assisted After-school Peer Support (TAPS) for learners

A TABLET-ASSISTED After-school Peer Support (TAPS) programme introduced in 2015 has enabled even more learners to benefit from the tablet model. TAPS is run by teachers at participating schools for one afternoon in the school week, and takes place at the project schools. The aim of the TAPS programme is to promote self-directed learning, and it is also supported by structured learner guides that follow the syllabus implementation in schools. More than 1 500 selected learners from 50 schools have so far participated in TAPS.

School Resource Centres provide support for learners

THE resource centre programme has seen participating schools receiving two desktop computers or 10-inch tablets loaded with the TouchTutor® package, for use by any mathematics or physical sciences learners who do not have a personal tablet. This programme aims to ensure that quality mathematics and physical sciences resources are available to support teaching and learning in schools.

Professional skills upgrade programmes for teachers

A STRUCTURED skills development programme for in-service maths and physical sciences teachers has also been a key focus of the Centre. The participating teachers receive training on how to use TouchTutor®, with each teacher receiving a laptop with TouchTutor® resources and each school receiving a projector, as a teaching resource for the classroom, to complement what is already being taught. A modern open-source dynamic graphics programme called GeoGebra is utilised as an integral component of the teacher training and support programmes.

To date, GMMDC has trained more than 1 000 mathematics teachers and over 450 physical sciences teachers from 450 schools across the Eastern Cape and further afield.

Subject advisors for FET maths and physical sciences from all districts of the Eastern Cape have also received a laptop, TouchTutor® resources and skills training.

The laptop-based techno-blended teaching model is also being used to boost the skills levels of mathematics educators at Technical Vocational Education and Training (TVET) Colleges in the Eastern Cape.

An Android app for maths school competitions via mobile phones

Historically, a Mathematics School Competition was the first tool we used to engage with learners across the province, allowing us to get a feel for the level of their development. In recent years, we have experimented with the use of social technology MXit and, more recently, a modern Android app that all learners can freely download from Google Play Store. This has transformed the competition project by providing access to innovative technology-based digital resources to support and popularise the study of mathematics at school level.

“ We sincerely hope that our development and support models can be duplicated in more areas of South Africa in future to empower as many leaners and educators as possible.”



Prof Werner Olivier, GMMDC
Director and Designer of the
Centre's Techno-Blended Model

GMMDC's model works

OUR offline techno-blended teaching and learning model is free from the access, data-cost and other constraints usually associated with blended learning approaches.

And we believe it works.

The proof of this is in the increased motivation and improved results of learners who have participated in our projects. The improved levels of content skills and confidence of hundreds of maths and physical sciences teachers in the Eastern Cape Province, who benefited from the modern techno-based resources and training, also confirmed this.

We are delighted that the Eastern Cape Department of Education, in recent years, has chosen to work closely with us to ensure that an accredited and more sustainable professional development programme is implemented in the province.

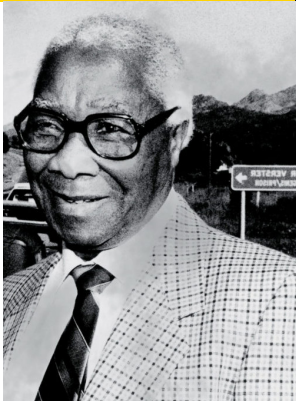
The scalability of our teaching and learning models have been demonstrated, as both the teacher development and learner incubation programmes have been successfully implemented in a number of districts in this province and also in the Free State over the past few years.

We aim for our development and support models to be duplicated in more areas of South Africa in future to empower as many leaners and teachers as possible. This would honour the legacy of “Oom Gov” Mbeki who, in 2002, very enthusiastically agreed to lend his name to a programme sparked by a vision to help build the rainbow nation by empowering as many young minds as possible for a brighter tomorrow.

Left: The Govan Mbeki Mathematics Development Centre team includes (front, from left) Margot Collett, Flora Olivier, Nadia le Roux, Brendan Barnes, (second row, from left) Victoria Shezi, Lizz Franke, Natalie Wood, (third row, from left) Werner Olivier, Carine Steyn, Armien Hendricks, Arnold Gwaze, and (back row from left) Phil Collett, Placide Mbella Ebongue, Belinda Petersen, Lucas Ferreira, and Peter Weisswange.



Right: The late Dr Govan Mbeki



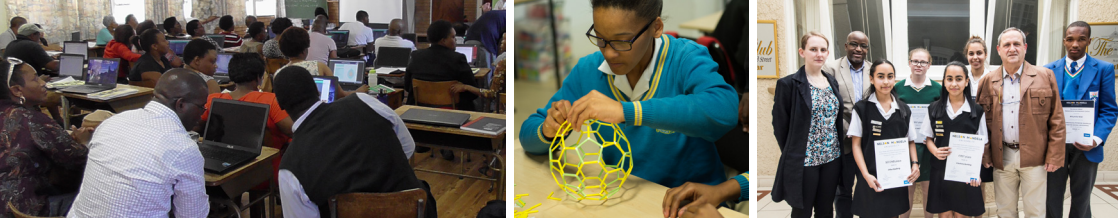
NELSON MANDELA
UNIVERSITY

Govan Mbeki Mathematics Development Centre



Customised techno-blended mathematics and physical sciences interventions for a better future:
Empowering young minds for the 21st century

Change the World



Brief History

Our origins

SOUTH Africa is facing major challenges in mathematics and physical sciences education. Many have called it a crisis and indications are that the poor quality of teaching and learning in the majority of public schools is having a negative effect on economic growth in the country.

At the heart of the problem is the fact that there are huge deficits in school management and too few teachers of maths and physical sciences that meet the minimum standards. Many teachers are unqualified or under-qualified, and little is being done to encourage and support them to improve their subject knowledge.

“South Africa is facing major challenges in mathematics and science education ... It is the learners who ultimately suffer.”

What’s more, most teachers are teaching the same way they’ve done for decades which can, at best, be described as perpetuating a talk-and-chalk sponsored “sit, get and forget” model in classrooms. Most teachers have not made any attempts to adjust to the changing needs of today’s techno-savvy learners who have to become productive digital citizens in a socially-connected 21st century world.

It is the learners who ultimately suffer. Many drop out of school before getting to matric. And our matric pass standards and rates are low. In fact, the World Economic Forum survey released in 2017 confirmed once again that our maths and science education in South Africa is at the very bottom of the list.

Not nearly enough qualify for science, engineering, technology and related courses at universities and colleges, and those who do are often not equipped well enough to cope with the demands of tertiary education.

This is the context that inspired the creation of the Govan Mbeki Mathematics Development Centre in 2002, and has governed all our programmes ever since. (The Centre was initially established by two academics, Prof Werner Olivier and Dr Hennie Boshoff, as the Govan Mbeki Sasol Mathematics Development Programme, in the Mathematics Department of the then University of Port Elizabeth. It became an official university unit in 2008 – the Govan Mbeki Mathematics Development Unit – before being recognised as a university centre in 2017.)

Our focus

SINCE our launch in 2002, our main aim has been to develop content knowledge and skills in mathematics and physical sciences among learners and teachers at the Further Education and Training (FET) level, i.e. Grades 10, 11 and 12. Subsequently, we have extended our focus to include the Senior Phase (SP) for secondary schools (i.e. Grades 8 and 9).

This has led to our unique teaching and learning model, and linked development programmes for learners and teachers, where we have seen real results in the classroom – most importantly, the boosting of learners’ marks.

A common thread through all our programmes has been our focus on harnessing technology to reach the new “screen generation” of learners, who cannot imagine a world without TVs, mobile phones and computers.

Our offline programmes are particularly geared towards disadvantaged schools, where there is no internet connection, and where there are often too few or, in some cases, no maths and physical sciences teachers at all.

Our programmes give learners a chance to improve their maths and physical sciences marks, thus improving their chances of gaining access and being successful at university.

Our unique teaching and learning model

GMMDC’s comprehensive, innovative and modern offline techno-blended teaching and learning model – accompanied by the TouchTutor® digital teaching and learning package – for maths and physical sciences has reached the point where it is available on tablets for selected learners with potential (participating in GMMDC programmes) as a “personal tutor” to be used outside of the classroom on a 24/7 basis. The TouchTutor® package is also available on desktop computers and 10-inch tablets in under-resourced schools as a support platform for all learners after school hours. This resource is also used by teachers on laptops as a teaching tool within the classroom.

The video-supported content is fully-aligned to the new maths and physical sciences school curricula – and we have integrated appropriate technologies in an innovative way to enhance understanding and stimulate the interest of the modern “screen generation” of learners. These even include an independent layer of android-based maths and physical sciences support and feedback for self-assessment, a multi-language support function, specialised exam revision material and exciting, open-source software called GeoGebra that brings mathematical concepts to life.

As technology changes – and new curricula are ushered in – the GMMDC model will continue to adapt and extend, as we pursue our vision to harness and customise ICT to assist promising learners.

“Educators of mathematics and physical sciences are in desperate need of modern teaching approaches to connect and address aspirations and the content gaps of learners in South Africa.”

Our programmes

OUR specially-designed learner incubation programmes, Tablet-assisted After-school Peer Support (TAPS) sessions and professional skills development programmes for in-service teachers have been successfully tested and implemented throughout urban and rural areas of the Eastern Cape and further afield.

The learner interventions have all taken the form of urgent short-term solutions to assist academically-promising learners caught in a vicious education spiral, who aspire to acquire a post-school qualification.

Incubator schools for learners

OUR incubator school programme (ISP) was successfully piloted in 2004, with five top Grade 12 learners from 10 schools in Nelson Mandela Bay participating. It ran over 16 Saturdays, and content was delivered in the form of a lecture, by a university lecturer. The programme, which was officially launched in 2005, quickly spread to more schools in the area.

Since those early successes, the format of ISP content delivery has constantly evolved – shifting from lectures to the development of a PowerPoint lesson series delivered by teachers, to a standardised DVD series and eventually, with the advent of touch screen tablets globally in 2012, to the current tablet and TouchTutor® model for learners. Recently an exciting layer of learning activities associated with the modern STEAM (Science, Technology, Engineering, Arts & Maths) education approach was added to the ISP.

The ISP programme, which continues to run on Saturdays has to date reached over 100 under-resourced schools and more than 6 000 Grade 10, 11 and 12 learners with potential.

From the ISP programme in Nelson Mandela Bay, typically more than 40% of the ISP learners enrol for study programmes at Nelson Mandela University and a further 10 to 15% go to other universities.



Total private sector project funding secured over the period 2012-2017:
R59 million

Programme Impact Categories	Numbers reached:
Eastern Cape Province: Districts	6
Project Schools	> 100
TVET Colleges	9
Maths Teachers	> 1 000
Science Teachers	> 450
Tablet-assisted incubation of learners with potential (Incubator School Programme or ISP)	> 6 000
Tablet-assisted After School Support Programme for learners (TAPS)	> 1 500
School-based tablet support for maths and science learners	> 10 000
TouchTutor® Resource Centres in schools	> 60

Impact Stats: Techno-Blended Development Projects from 2012-2017