SASOL INZALO FOUNDATION

Ten years in STEM education in South Africa 2008 – 2018

Foreword

In 2018 we brought down the curtain on the decade-long work of the Sasol Inzalo Foundation (SaIF). At the same time we looked, with great expectation, towards building on that remarkable legacy of hard work, achievement, insight and impact.

Sasol is a large international company that has always owed its success and growth to the skills, knowledge and ingenuity of its people. By its people I don't mean just the company's employees but also its suppliers, partners and customers.

Sasol's well-being and success are inextricably tied to the well-being and success of its people – the people of South Africa. As a company, if we are to prosper, we need our people to be knowledgeable and increasingly prosperous. This is why, every year, we invest considerable resources in supporting science and technology, engineering and mathematics (STEM), particularly the teaching of these vital subjects to our younger fellow South Africans – our future employees, suppliers, partners and customers.

The book you now hold is not really about the Sasol Inzalo Foundation; it is more about its beneficiaries, the hundreds of thousands of learners, students and educators whose lives and prospects the foundation impacted. This book tells many of their stories as well as the stories of how one foundation made a big impact on the South African education system over a short period.

The stories of impact – on a system, a society and on countless lives – are not just the stories of the Sasol Inzalo Foundation. They are the stories of a dedicated band of professionals from within and without the foundation, from the public and private, the for-profit and non-profit sectors, all professional individuals dedicated to making a difference.

It is to these selfless individuals that this publication is dedicated.

Charlotte Mokoena

Executive Vice President: Human Resources and Corporate Affairs
Sasol Limited

Introduction

A tribute to the human spirit

This book tells many remarkable stories; stories of determination, devotion and achievement.

Most importantly, they tell stories of pride and belief in work that is worth doing, despite enormous challenges, overwhelming need and daunting obstacles.

The stories are also about belief: belief that by empowering our people with understanding and skills we can build a South Africa that is competitive, just and increasingly prosperous.

The injunction, 'Unto whom much is given, much is expected' guides Sasol, to recognise that it and its people are custodians of opportunities and resources that can transform society. It also reminds us of the need to create shared value, especially for the underprivileged.

In 2008, when Sasol put together the Sasol Inzalo Broad-Based Black Economic Empowerment (B-BBEE) transaction, it was decided to set up the Sasol Inzalo Foundation (SaIF), to give expression to the company's desire to contribute to the education of our country's children. SaIF's Trust deed committed it to being a 'significant contributor' to economic growth by building our people's skills. By June 2018, when the Sasol Inzalo transaction matured and was replaced by Sasol Khanyisa, a decade of hard, inspired work had more than delivered on that commitment.

Here you will read many statistics about bursaries given to promising youngsters who were the first in their families to go to university; of brilliant minds awarded PhD degrees; and of the thousands of knowledge-hungry learners reached through our mobile science labs.

You will also read about the lives and communities touched through the foundation, its resources and, most significantly, its people.

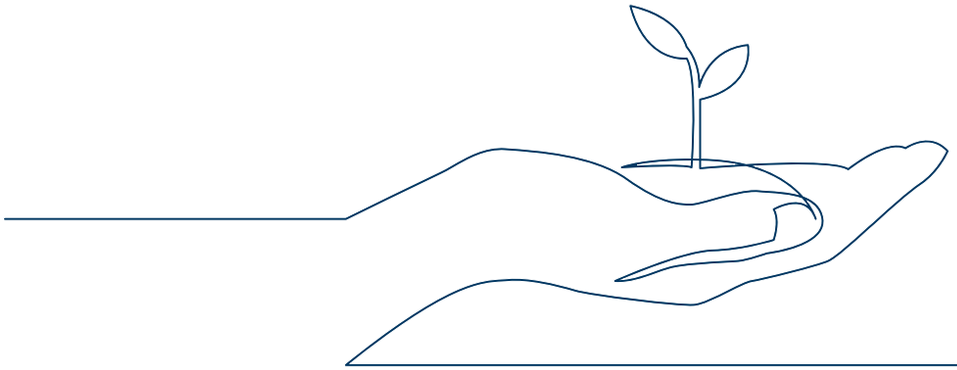
SaIF's people include many (almost countless) individuals and organisations. They include dedicated, selfless educators and facilitators with whom the foundation partnered, various levels of government, companies and civil society, all of whom shared the foundation's sense of pride in doing work that was worth doing.

Sasol is an international chemicals and energy powerhouse built on intellectual and human capital. It is by harnessing and sharing this capital that the company can have the greatest social impact, particularly in the areas of science, technology, engineering and mathematics. These were the areas on which the foundation focused.

SaIF constantly reached out to like-minded individuals and entities, seeking partnerships to co-create solutions that would empower those giving and receiving knowledge with opportunities and tools, many of which were provided on an open-source, no-fee basis.

In marking the end of the SaIF era, we look back with great pride, and we look forward with confidence to the work that the Sasol Foundation will do to carry on this invaluable legacy.

This book is a testament to that legacy – and to the resilience of the human spirit and fortitude to overcome great odds and achieve extraordinary things.



1 Landscape

2008 – a watershed year

Between 2005 and 2007, the South African economy grew by more than 5% per year.

The country was adding jobs and erecting great monuments: vast football stadiums for the 2010 World Cup and two of the world's biggest dry-cooled coal-fired power stations.

Just 14 years after democracy was achieved, historically disadvantaged children were attending school in record numbers, many of them doing so without their caregivers having to pay fees. Black economic empowerment was finally gaining traction and there were hopes that, at last, the economy might become more equitable, more inclusive.

Unaware of the global contagion that lay just around the corner, on many levels and judged by many indicators, South Africans believed their country's outlook was positive . . .

But all was far from well in the country's classrooms. At many schools, thousands of learners were routinely being let down by a system that was failing. The legacy of apartheid – of unequal access to resources, skills and capital – played itself out every day in underprivileged schools, especially in rural areas.

Numerous studies and surveys at the time found that historically disadvantaged schools lacked laboratories, textbooks and workbooks. And it was not just physical resources poorer schools were short of. Many of their administrators, having received an inadequate apartheid education themselves, lacked the skills to effectively manage their schools and to make the most of the often scant resources at their disposal.

The third dimension

In 2008 considerably more than a third of those who had entered the formal school system failed to matriculate. A third of teachers were underqualified to teach science and mathematics, a reality which universities believed informed the fact that (another unfortunate third) 30% of undergraduates dropped out before graduating. University enrolments were rising but academics reported that far too many high school leavers were under-prepared, in terms of knowledge and language skills, and lacked the psychosocial skills needed to transition from school to university or college.

In many schools, maths and physical science classes often numbered

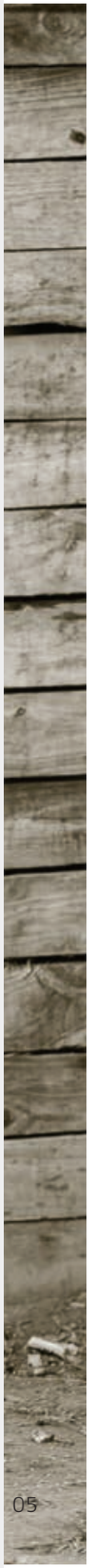
well over 100 learners

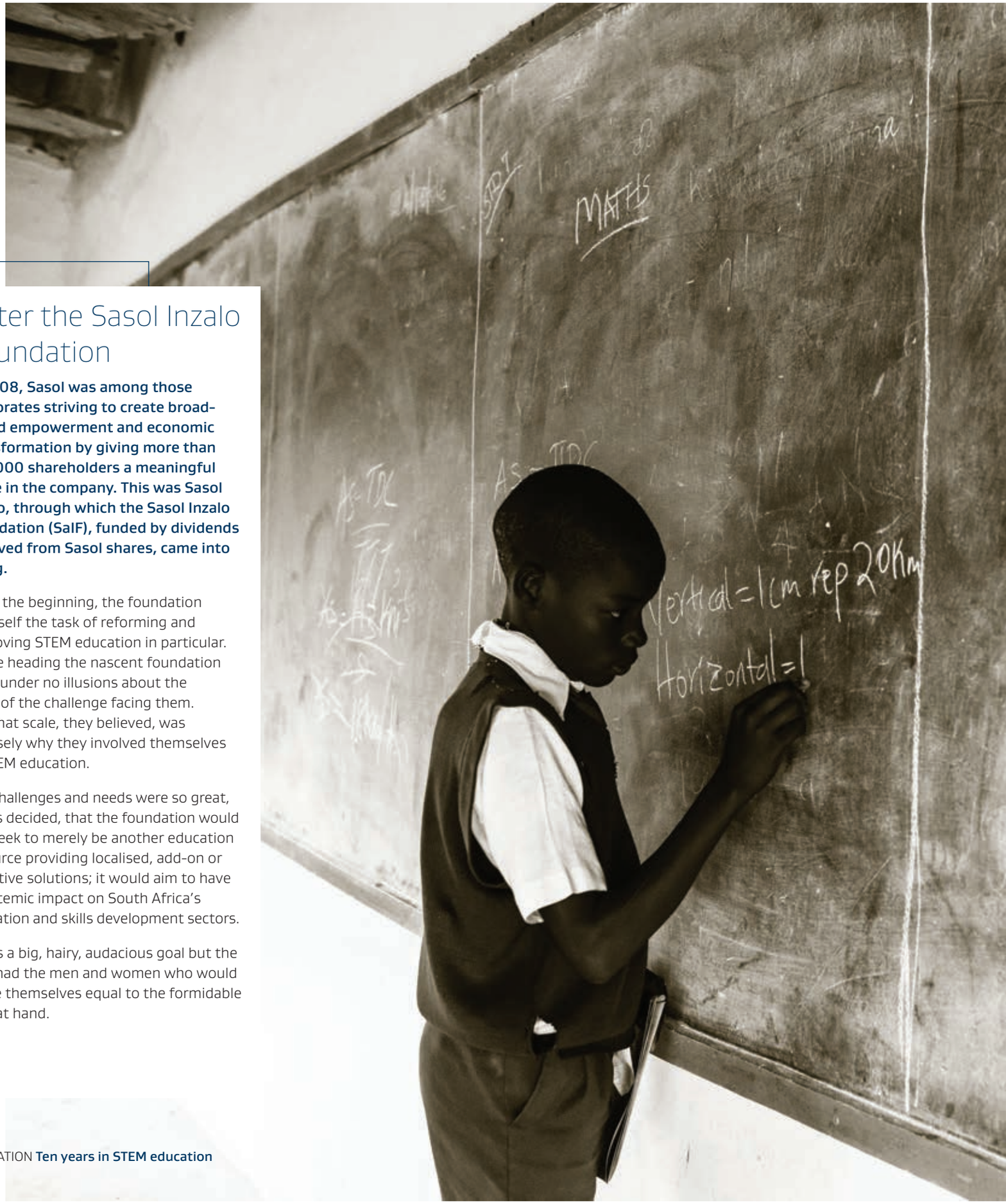
Since 1994 government had spent vast amounts of money on energising school education while at both national and provincial level it had deployed many world-class individuals and teams to overcome centuries of stark discrimination in classrooms, laboratories and lecture halls (the 2007/8 education budget exceeded R105 billion). Still, it was apparent to all that something needed to change and the private sector had to step up like never before.

"The state of science and mathematics in South African schools has frequently been termed a national crisis. South African learners have fared poorly in comparative tests of science and mathematics at both international and regional levels as well as in local benchmark tests . . . as a result, the pool of potential scientists, engineers, health practitioners and future teachers of mathematics and science is severely limited. This, in turn, limits South Africa's ability to be internationally competitive."

Professor Robin Crewe, University of Pretoria, 2009

43 the percentage of learners who, in 2008, had begun schooling but never finished





Enter the Sasol Inzalo Foundation

In 2008, Sasol was among those corporates striving to create broad-based empowerment and economic transformation by giving more than 220 000 shareholders a meaningful stake in the company. This was Sasol Inzalo, through which the Sasol Inzalo Foundation (SaIF), funded by dividends received from Sasol shares, came into being.

From the beginning, the foundation set itself the task of reforming and improving STEM education in particular. Those heading the nascent foundation were under no illusions about the scale of the challenge facing them. But that scale, they believed, was precisely why they involved themselves in STEM education.

The challenges and needs were so great, it was decided, that the foundation would not seek to merely be another education resource providing localised, add-on or palliative solutions; it would aim to have a systemic impact on South Africa's education and skills development sectors.

It was a big, hairy, audacious goal but the SaIF had the men and women who would prove themselves equal to the formidable task at hand.

The state of education in 2008

In 2019, the Department of Basic Education released, for the first time, a 25-year review. In looking back to 2008 (the year before it was separated from the Department of Higher Education), the department's review reflected on the reality of basic education in the year in which the SaIF came into existence.

Some of the key points made in the review about the state of basic education in 2008:

Poor learner performance and high failure rates across all levels of the education system were reflected by poor performances in international benchmarks including the respected Trends in International Mathematics and Science Study (TIMSS).

Since 2003, South Africa had languished at the bottom of the TIMSS rankings on both science and mathematics

43%
of learners were dropping out of school before matric

Textbook provisioning was inadequate in about
50% of schools

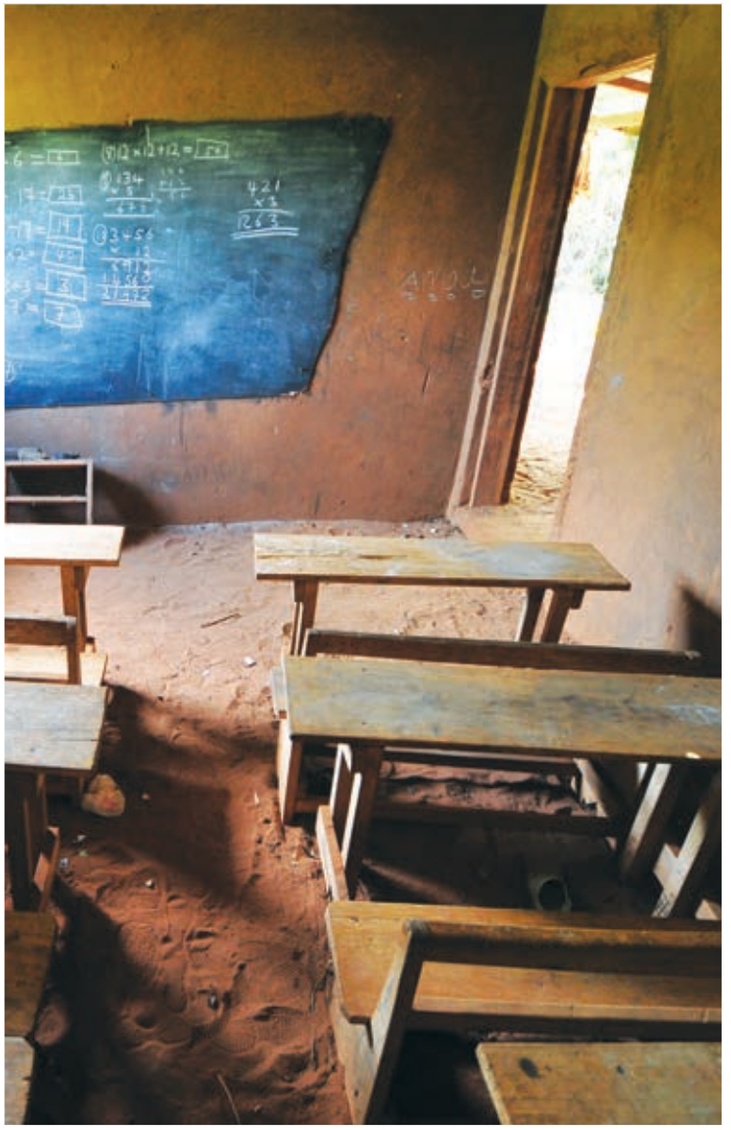
In six provinces,
60% of schools
did not have any materials

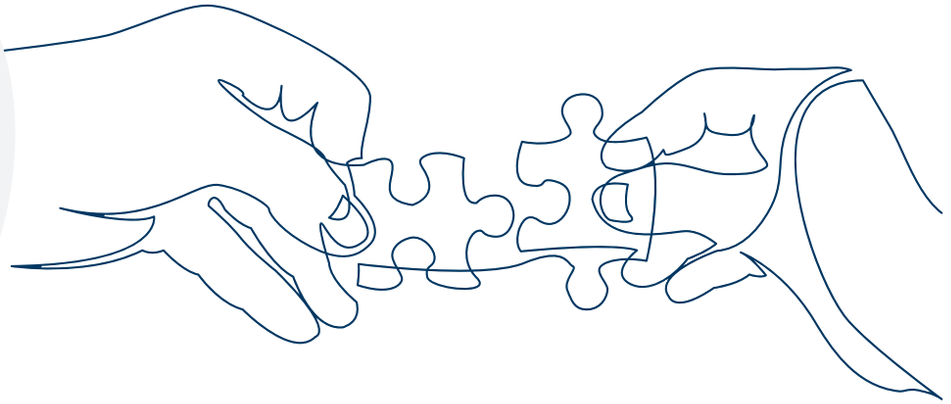
A third of science and mathematics teachers were not properly qualified in their subjects

Leadership and management of schools was poor, particularly in rural and township schools

Historically disadvantaged matriculants (especially females) lacked access to university because of **poor performance and a lack of funding**

The country had a **shortage** of **skilled scientists, engineers, health practitioners** and future teachers of **mathematics and science**





2 Defining purpose

What to do?

In 2008, SaIF was set the task of supporting economic transformation by working to overhaul the South African education and skills development sectors. And to do so on a national, systemic scale.

But how exactly should the new entity go about achieving its lofty goals? And ensure that 85% of beneficiaries were from historically disadvantaged backgrounds?

The foundation's purpose was clear to all: "Using the great levellers of education and skills development to extend opportunities to the most deserving, yet most excluded members of society."

But deciding precisely how to structure and deploy the foundation's financial, human and intellectual resources to achieve that purpose was another matter altogether.

"The foundation's first years involved an enormous amount of work," Chairperson Dr Yvonne Muthien remembers, "researching, researching, researching; refining our mandate and understanding exactly where and how we should intervene to achieve maximum impact."

While researching and conceptualising (and listening to those with experience in their targeted fields), the new foundation also experimented, spending limited amounts of time and money at a time on specific programmes, to establish what worked, what delivered the greatest return on investment and what was sustainable. In other words, what would have the greatest possible, lasting impact on the lives of the greatest possible number of beneficiaries.

Some interventions were 'low-hanging fruit', specifically bursaries and Saturday schools: relatively easy to activate and to demonstrate short-term outcomes.

The foundation commissioned a number of expert, external research studies. After initially researching, conceptualising and scoping what was to be done, the SaIF was ready to move on to its second phase: programme design mode.

What follows is an explanation of how the foundation formulated not only its purpose but how it would give effect to that purpose – and deliver the outcomes its Trust deed envisaged.

Nolitha Fakude

Former Executive Director, Sasol Limited and founding member of Sasol Inzalo

Lessons learnt by listening

“Community participation was one of the four pillars of the Inzalo transaction and the Sasol Inzalo Foundation arose from that.

“Once we had approval from the Sasol Limited Board, we started benchmarking and research. We found that a lot of work was already being done in skills development. The work was around upgrading teacher skills, building infrastructure for laboratories, schools and technical colleges. We realised we had a bigger, grander vision of changing the country for the long term and so we approached the different role players in the sector, from academics to teachers and NGOs, and held a series of workshops to share ideas.”

Nolitha Fakude
Former Executive Director,
Sasol Limited and founding member of Sasol Inzalo

The programme design mode

The SaIF wanted models that could be replicated and materials that could be of value to the entire education system. Most importantly, the SaIF wanted to make a difference throughout the education value chain – helping not only learners but also teachers, principals and governing bodies, even up to provincial and national levels.

The SaIF was greatly helped by being able to draw on Sasol’s organisational expertise in many areas.

Defining purpose
continued

Mpho Letlape, SaIF's first director, recalls:

"For the first six months [Programmes Director] Marietjie Vosloo and I literally spoke to hundreds of people. After we'd gathered our information, we approached departments of education and science and technology to assess what their needs were. We said we had been mandated to work in science and technology but needed to understand what was required to ensure that what we did was aligned with national government goals."

Says Maurice Radebe, who was Managing Director of Sasol Oil in 2008, and who became a Trustee of the Inzalo Foundation in 2011 after being appointed Sasol Group Executive for Corporate Affairs in 2010:

"Mpho Letlape and Marietjie Vosloo painstakingly developed an innovative model to address the systemic challenges facing maths and science students. There had been a lot of interventions in this field – through various organisations and NGOs – but most of them focused on service delivery and were curative. We wanted an intervention that would make a strategic change to the system.

"I believe SaIF has made a significant difference in the teaching of STEM education in South Africa.

"I pay special tribute to Mpho Letlape and Marietjie Vosloo and their teams for developing science and maths workbooks which impacted millions of learners and hundreds of educators."


Mpho Letlape


Maurice Radebe

Dr Yvonne Muthien

Says Dr Yvonne Muthien:

"We always wanted the foundation to have a systemic impact; an impact on the system, not just some individuals. And we decided to go the open-source route; we wanted our work to be capable of being used by others who shared our objectives.

"For that reason it was important to develop models that could be replicated and scaled up. One example: we didn't want learners to undergo bridging courses, but instead we aimed to ensure that when they got to university for their first year, they were ready. Some things were obvious and easy to implement; others required more work."

Methodology and Approach

The process to determine the focus areas and the type of intervention required was by no means a random nor arbitrary affair. It was robust and methodical. It started with extensive consultation with various stakeholders and institutions both locally and internationally to obtain leads and hints on what SaIF could focus on. During these consultations, enormous lessons were learnt on best practices, and possible areas of intervention.

1 National Government Engagement

The investigation stage involved the team probing a particular proposed project, looking at other players in the proposed area of intervention and establishing whether what had been proposed matched the foundation's strategy and expected outcomes, and could qualify as a potential project.

2 Research Conducted

The engagement exercise was followed by a number of commissioned research studies involving organizations like CDE (Center for Development and Enterprise), the Narrative Lab and the Leadership Lab to help with "below-the-surface" understanding of the unique needs and challenges in the STEM education and to assist in charting our intervention trajectory. This was also supported by intense desktop research and literature review.

3 Distillation and Filtering of Ideas

In the process, the foundation also received a number of suggestions and unsolicited proposals from a wide variety of organizations and individuals. All these ideas had to be put through a "sifting and refining" process to generate solutions that align with the intended goals of SaIF which had potential to make a big and systemic impact in the sector.

4 Stage-Gate Methodology

The foundation adopted a robust and proven methodology known as "Stage-Gate" which uses seven stages or 'gates' to systematically investigate, assess, design, develop and implement interventions before monitoring and refining them to ensure their sustainability. The filtered ideas were taken through this process. Some ideas were discarded through this process due to the fact that they were either premature, or not sustainable, and in some cases not practical. One such initiative which was premature at time but later adopted was the Teacher Induction Programme.

A matter of principal

Foundation leaders very quickly appreciated that without effective leaders there would be no effective schools.

SAiF Programmes manager Dr Cynthia Malinga notes that the first SaIF programme to evolve from the foundation's upfront research focused on school leadership. That programme, which has reached hundreds of school heads, empowers principals with the skills to run their schools like businesses, with clear targets and measurable outputs. "In life, leadership matters," Malinga says, "whether in countries, communities or families. Leadership makes or breaks a school."

The School Leadership Programme had three legs:

- Sponsoring principals to undergo School Leadership Programme
- A 'longitudinal' research study leading to a framework for school improvement, and
- A mentorship and professional-learning-communities model for schools focused on the Technical Schools of Excellence Network (TechSENet).

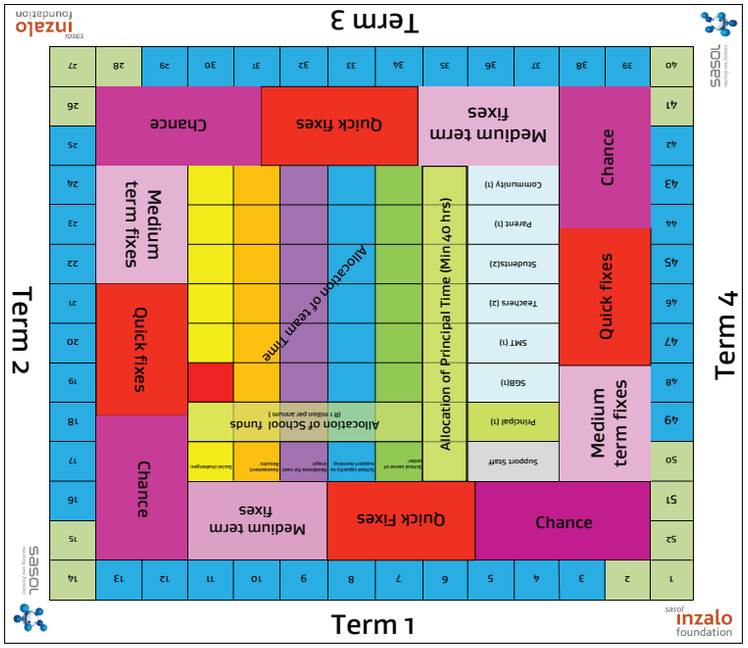
Initially, principals sponsored for the leadership programme were supported by the uMlambo Foundation, an NGO involved in improving the quality of education. This foundation was established by former Deputy President, Dr Phumzile Mlambo-Ngcuka, who was herself a teacher in the early 1980s.

Participants in the longitudinal study were drawn from a number of school leadership development programmes in addition to those in the uMlambo Foundation's Principal Development Programme. These included the Catholic Institute of Education Principals on Leadership Programme, the Nelson Mandela Metropolitan University (NMMU) Advanced Certificate in Education (ACE) in School Leadership Programme, the University of KwaZulu-Natal Principals Management Development Programme (PMDP), Penreach Whole School Development Programme, the University of Johannesburg Principals Network by the Education Leadership Institute, the University of the Witwatersrand (Wits) Executive Leadership Seminars in Teaching and Learning, as well as the Imfundo School Development Programme.

Beginning in 2011, the study's first phase collected data from 54 schools in five provinces, supplemented by data from another 52 schools in a subsequent phase. The mass of data was analysed through discussion and debate in 'learning clinics' or focus groups involving the SaIF's leadership team, academics, leadership programme coordinators and school principals.

As well as informing SalF's own leadership interventions, the study produced a number of important outputs over its three-year life. These include conference papers for the South African Basic Education Conference and a case studies handbook in which principals shared some of the social challenges they had to deal with – before they attended to the business of schooling (see sidebar).

There was even a board game produced (pictured alongside), not to entertain school leaders but to demonstrate how particular leadership decisions affect different parts of the school system. The game deals with the implications of choices with different actions leading to different outcomes and unintended consequences. Through role playing, it also helps principals understand the attitudes of different stakeholders: parents, learners, teachers, governing body members and members of school management teams.



EXTRAORDINARY TALES

A SalF booklet containing real-life case studies related by a range of principals lifted the veil on some of the extraordinary situations faced by school leaders – situations no educator should ever have to face.

In the booklet, principals told stories ranging from the all-too-common problems with drugs and stabbings to finding a "choose your bullet" sign at the school gate and learners throwing stones to voice their demands. They also told how political faction fights damaged morale and school functioning, and how politics sometimes influenced key school appointments.

Yet the tales were not all ones of doom and gloom; principals also told positive, uplifting stories of teamwork and how introducing learner awards had motivated pupils.

Dr Al Witten, a research consultant, says a study that culminated in a manual helping principals to deal with exceptional demands showed that South Africa lacked a proper understanding of the complexities faced by school leaders. Says Witten: "Principals often find their job overwhelming and feel helpless in the face of some of the challenges and contexts they work in. When faced with challenges, principals often retreat into compliance and bureaucratic mode instead of tackling the challenge. This is the mindset we're trying to change."

Programmes that made a difference

No sooner than it had been set up, SaIF swung into action to get practical, effective programmes off the ground. To begin making a real difference to South African education.

In very short order, opportunities to make that real difference were investigated, assessed, designed and developed. And then it was time for action – rapid, far-reaching action: it was time for programme implementation. From the very beginning, the foundation and the professionals who worked for (and with) it remained imbued with a can-do, let's-get-on-with-it attitude. They never lost that ethos . . .

On many levels, through countless hours of engaging and delivering with educators, officials, experts, learners and teachers across the length and breadth of the country, the SaIF's practical, interventionist programmes were always about results. On the following pages, we offer some insight into those programmes – into what they sought to achieve and what, after only a few short years, they did achieve. Here, you will read about millions of school workbooks being produced, of hundreds of bursaries, donations of equipment, teacher and principal upliftment, technical teaching interventions, and about how real science was brought to far-flung schools. These are the programmes through which SaIF went about engineering truly systemic change.

STEM workbooks

While funds were spent on putting **revolutionary, impactful workbooks into the hands of literally millions of learners,** those workbooks empowered teachers as much as they empowered their charges; teachers whose skills levels had been uplifted through workshops and interactions with curriculum advisers. And through the workbooks themselves.

Here, we showcase some of the work done, over ten years, through various programmes that were discrete but never executed in isolation from one another.

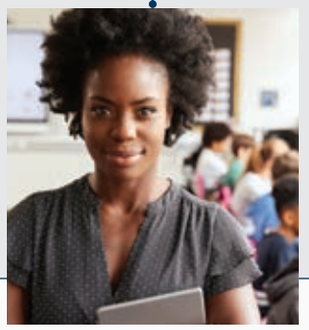
Mobile science laboratories

The mobile science laboratories weren't just about children – SAIF sponsored **interventions to teach teachers how to get the most out of these remarkable travelling resources.** It was the first of its kind, and made a huge difference.

Technical education

In 2008 South Africa was not only not producing enough artisans and technicians, it was producing fewer and fewer all the time. **Technical high schools were almost all under-funded and staff (and pupil) morale was plummeting.** Small wonder, then, that a technical education had lost the lustre it once enjoyed. SAIF set out to change this through a programme called the **Technical Schools of Excellence (TechSENet).** It was the first of its kind and if any single intervention succeeded in beginning to right the wrongs of technical schooling, TechSENet can claim that distinction.

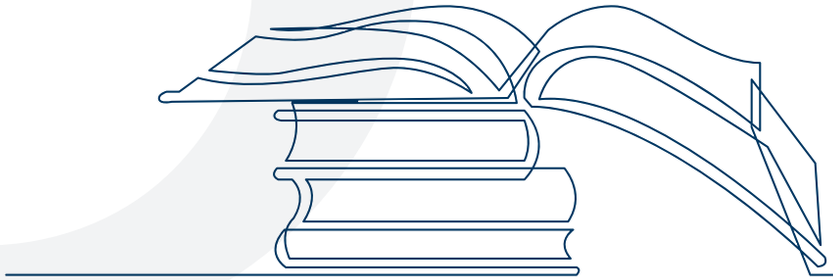
Teacher and principal support



Without empowered, qualified teachers and school leaders, the country's education system was never going to flourish. Which is why SAIF sought, from the beginning, to uplift South Africa's teaching profession. **It sought to achieve this by giving principals the skills to run their schools like businesses, against a sea of administrative and social troubles.** To educate the educators – not just hundreds of them, but thousands of them.

Student funding and support

The long, dark shadow cast over education by apartheid extends from wretchedly underfunded, under-resourced schools all the way to tertiary education. At all places of higher learning, even the most gifted young minds often struggle to overcome their legacies of poverty and inferior education. **SAIF made a substantial contribution to addressing that legacy by funding almost 1 400 bursaries,** by extending the human touch to help hundreds of young people navigate the often daunting world of academia, and supporting particularly historically disadvantaged universities where devoted scientists and professors had for decades struggled with a lack of funding and equipment for their departments.



Groundbreaking workbooks

Learning resources that keep on giving

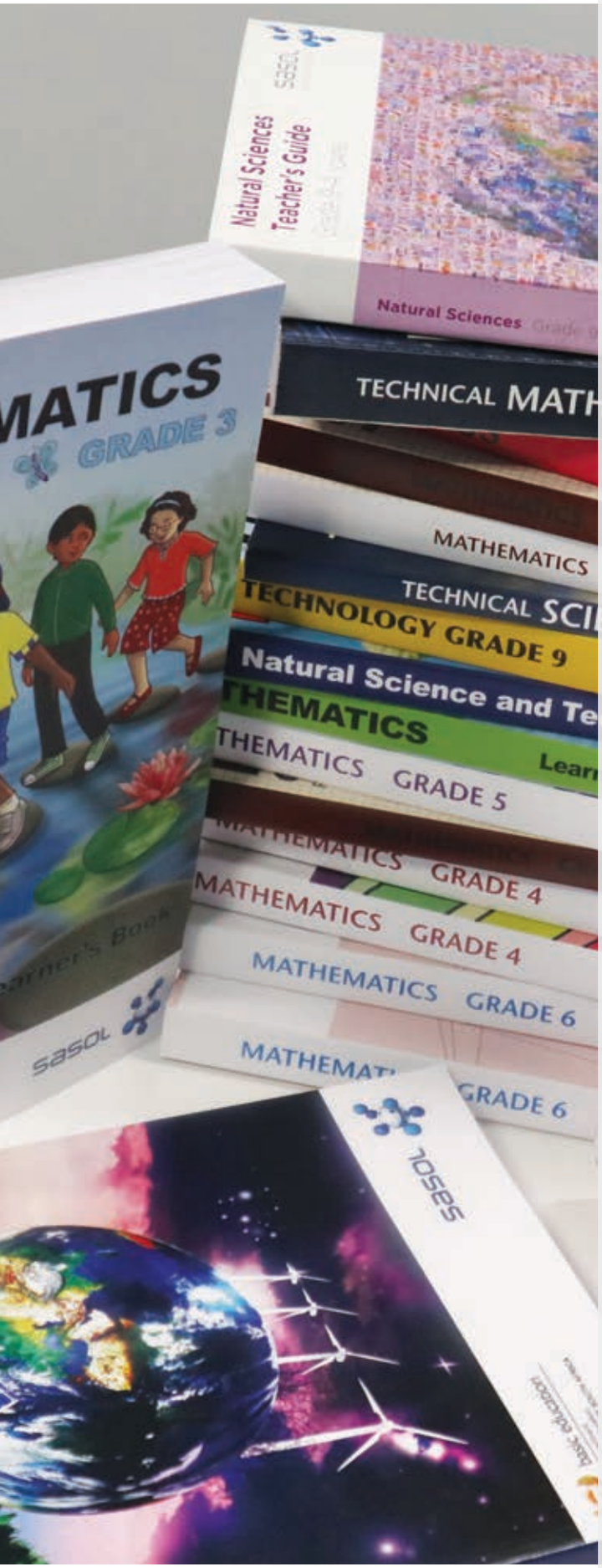
At least 10 million, probably a lot more ...

Those are the numbers of South African school learners who experts believe have benefited from the almost 200 STEM workbook titles produced by the foundation since 2013.

No one will ever know for sure just how many millions of young people and their teachers have used the workbooks. What is certain, however, is that they have transformed the learning of maths and science in South Africa, and that they have saved tens (perhaps hundreds) of millions of rands for expenditure on other educational priorities.

Most significantly, thanks to the foundation's workbooks, millions have grasped concepts and gained insights and understanding which previously had simply been beyond their reach.

> "All of these developments and the work being done by the Sasol Inzalo Foundation are incredibly exciting and incredibly important for the future of the country, especially in the fields of mathematics, science and technology."
>
> **Angie Motshekga, Minister of Basic Education, at the launch of the workbooks project in 2014**



> We decided to create workbooks with teacher training materials so children could learn the curriculum by doing exercises. Large-scale printing was done by the Department of Basic Education. SaIF further put books online, so anyone with access to a computer can practise the exercises as many times as they like, until they get them right. We estimate the Internet reach is about ten million learners."
>
> **The SaIF Chairperson, Dr Yvonne Muthien**

Yet textbooks were not something SaIF originally intended involving itself in.

It took a national crisis to get the foundation to sponsor what was arguably its greatest single impact. It took a national crisis to catalyse an intervention that had a national (even international) positive impact on a scale no one could have imagined.

At the beginning of the 2013 school year it suddenly became apparent that textbooks were simply not being delivered to hundreds of schools in certain provinces, particularly Limpopo. Scrambling to address the crisis, the education authorities set new deadlines by which all textbooks had to be delivered. But May passed, then June, and then October, and still some schools were without their teaching materials.

SOS from the ministry

In the face of a mounting public outcry, the education ministry sent out an SOS to the SaIF. "We decided to help," Chairperson Yvonne Muthien remembers. "We had to find experts to help us write the books, so we used people who had written them before and who had set up their own NGOs.

"We decided to create workbooks with teacher training materials so children could learn the curriculum by doing exercises. Large-scale printing was done by the DBE. SaIF further put books online, so anyone with access to a computer can practise the exercises many times until they get them right. We estimate the Internet reach is well over 10 million learners since 2013.

"There were many students without teachers in their classrooms, so we had to summarise critical chapters and core information. The Department of Basic Education (DBE) was very grateful and so were the teachers because we provided them with fit-for-purpose resources – and it was accessible."

3 Workbooks
continued

The workbook material was not only accessible, it was pioneering. (A workbook includes both teaching material and exercises while a textbook consists mostly of teaching material.) And, perhaps MOST significantly, they were produced under open licence, meaning that the SaIF at no stage reserved any copyright.

Among the experts the foundation turned to in answering the minister's SOS was the Ukuqonda Institute, which had been founded in 2006 to promote excellence in maths, physical science and technology.

Ukuqonda (the name means "understanding") wrote the first maths and technology workbooks. The institute's Andrew Hofmeyr explains: "When writing the workbooks, we assumed that there was no teacher in the classroom. The workbooks were designed to help learners in the absence of a teacher."

Workbooks were developed by Ukuqonda for both learners and teachers. The teacher guides were workbooks with answers and explanatory notes. Each began with two pages of notes for teachers with additional notes introducing each chapter. Page layouts were simple and uncluttered and the books made use of illustrations rather than photographs because research had shown that these aided comprehension. Content was developed in consultation (and with input and feedback) from teacher volunteers, whereas, traditionally, textbook writers had written and compiled their books believing they knew what teachers needed and wanted.

Teaching the teachers

The effect of the workbooks was much, much greater than anyone could have imagined, impacting teachers almost as much as they helped their pupils.

The SaIF Trustee Professor Nadine Petersen says feedback from teachers in Soweto schools was that the SaIF workbooks were their first choice in teaching materials. "The workbooks aligned to the curriculum but they present the content in a very coherent and synchronised way," Prof Petersen says.

Mpho Letlape had similar experiences: *"The year we launched the workbooks, a teacher in Johannesburg West was phoning me five times a day; she would phone and say, 'This is the best thing ever' and then again to say, 'This is absolutely great.' I was called by a mother in Stellenbosch who said, 'I've seen these books for my son and I wish I had them in Afrikaans.' I said: 'Give me your postal address and I'll send you an Afrikaans version.' People really loved the workbooks."*

Another important area was developing interactive workbooks which simplified concepts in maths, physics and chemistry. Before this, there were no similar workbooks; although there were textbooks, these were simply harder to learn from. Feedback on how the workbooks addressed systemic challenges was mostly anecdotal, but overwhelming. Scores of teachers told how the books had helped them overcome their lack of confidence in teaching maths and science.

Trustee and Sasol Executive Vice President, Energy business Maurice Radebe, experienced for himself how the workbooks had empowered teachers:

> "Many teachers are simply nervous because they don't understand the subjects they're teaching," he says. "If you empower them with workbooks and provide focus groups and discussions, they too can learn".

To Fiji, with love

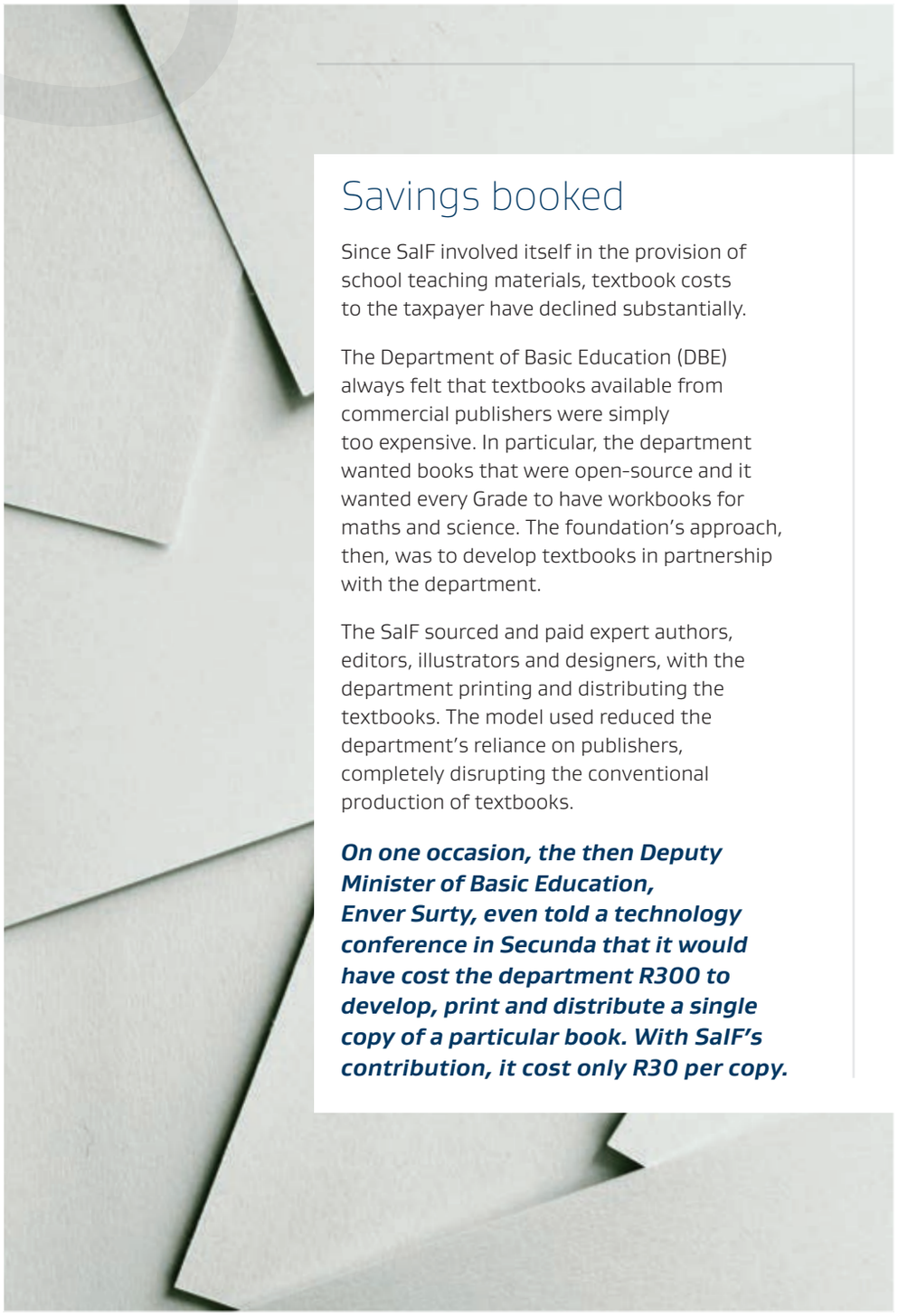
The Pacific Ocean nation of Fiji never featured in the impact the foundation hoped to make, but rural youngsters in this far-flung group of islands have also benefited from the workbooks developed since 2013.

"Schools in Fiji came across our resources online and are now using them to support rural development," says Megan Beckett, in charge of learning research and analytics at Siyavula, an NGO that compiled the science workbooks for the foundation. "Things happen that we could not have predicted."

"Because of the open licence, this project will continue forever. Even in places we never expected. If Fiji wants to use our intellectual property, well, we are delighted."

It was not only Fiji that recognised the SaIF's workbooks as a good thing: two states in the United States picked up on the groundbreaking materials produced in a faraway African country.

Workbooks
continued



Savings booked

Since SaIF involved itself in the provision of school teaching materials, textbook costs to the taxpayer have declined substantially.

The Department of Basic Education (DBE) always felt that textbooks available from commercial publishers were simply too expensive. In particular, the department wanted books that were open-source and it wanted every Grade to have workbooks for maths and science. The foundation's approach, then, was to develop textbooks in partnership with the department.

The SaIF sourced and paid expert authors, editors, illustrators and designers, with the department printing and distributing the textbooks. The model used reduced the department's reliance on publishers, completely disrupting the conventional production of textbooks.

On one occasion, the then Deputy Minister of Basic Education, Enver Surty, even told a technology conference in Secunda that it would have cost the department R300 to develop, print and distribute a single copy of a particular book. With SaIF's contribution, it cost only R30 per copy.

Digitally disrupting education

After 2013, SaIF's workbook involvement snowballed rapidly, mostly digitally.

Materials were made available online so that anyone could download them, print and circulate as many copies as they wished and share the content as they saw fit.

Organisations including Magic Moments, Zano-Kathleho and ACP Projects came to the party to help develop new books. Other organisations were involved in translating the study guides into various languages, on a voluntary basis.

Most recently, Siyavula (which developed science content for the workbooks), worked with SaIF on a project to give Eastern Cape schools access to interactive learning platforms. "We've made these tools accessible by mobile devices so that students or teachers can access them, with access being zero-rated by Vodacom and MTN," says Siyavula's Megan Beckett.

"We interact with users through social media and have a Facebook page. The Facebook presence is particularly aimed at learners from rural areas who feel they are not being supported by their teachers. It enables them to interact with other like-minded learners."

SaIF also sponsored the roll-out of a STEM teacher-assessment portal. This lets teachers self-assess their mastery of the content on a voluntary basis, in their own time. "Normally, determining gaps in teacher knowledge comes from learner feedback, so we have never assessed teachers directly before," Megan says. "After a teacher has completed the self-assessment, we give feedback.

"We're in contact with more than 2 000 teachers through this platform, although many more are using it as a practise tool for professional development. In the second phase, we will do targeted training, based on real results that show where teachers need attention. This is real, wonderfully exciting value-adding stuff."

A dispatch from afar

In February 2015, SaIF received a letter from Ms Annemie Stander, a science teacher at Messina Primary School, in the far-northern border town of Musina, Limpopo Province. This excerpt from Ms Stander's letter requires no explanation.

11 February 2015

Dear Sir

We are using the Sasol workbooks for Natural Science and Technology (Gr 4–6) for the third year now. Although we have received new textbooks for 2015 these are not nearly as good as the Sasol books. Learners even enjoy working from these colourful books at home, doing their homework. The new textbooks do not cover half the set work according to CAPS whereas the Sasol books are so packed with useful experiments and videos about them, these learners cannot wait to come to Science class.

I have had many years of teaching experience, of which 13 years are in natural sciences and technology and these are the best textbooks I have ever had.

A class act

SaIF sponsored and organised many teacher interventions, including STEM training workshops across the country, achieved through 50 teachers at a time.

But after several years, the foundation believed there was an even bigger impact it could have on the quality of STEM teaching. The result – from 2014 – was a series of interventions, carefully planned and implemented nationwide, which targeted 800 curriculum advisers. These are the people whose job it is to interact with tens of thousands of teachers on a daily basis. By empowering the advisers, SaIF was having an impact on a scale that could never be achieved 50 teachers at a time.

Kuzani Noxolo, a science curriculum adviser from Mount Frere's education department, says many of the teachers she deals with did no practical experiments during their initial teacher training. So, workshops such as the ones she and her colleagues presented were invaluable – as were the mobile science labs. But were better equipped teachers making a difference? Well, in 2014 (the year SaIF's involvement with curriculum advisers began), Mt Frere had a matric physical science pass rate of 34%; in 2018 it was 64%.

3

Mobile science labs

Science on safari

In 2013, Minister of Basic Education, Angie Motshekga released a report on school infrastructure, much of which made for grim reading.

In particular, the report showed that 21 021 out of 24 793 public schools (85%) had no laboratories and only 1 231 had labs that were stocked.

Yet, somehow, learners were expected not only to pass, but to excel in science subjects by which the authorities laid such great store. Clearly, they couldn't build 20 000-plus school labs any time soon.

There had to be another solution. And there was: put the laboratories on wheels and take science to far-flung schools, wherever they were.

Isaac Ramovha from the Department of Science and Technology (DST), explains that in 2013, DST led an initiative in collaboration with other national and provincial departments, to establish how innovative technologies could improve education in the rural Cofimvaba District of the Eastern Cape. The initiative included the development of a local science centre, in which SaIF became a project partner. But because it would take time to build the science centre, it was decided to deploy a mobile science lab, which SaIF equipped with state-of-the-art technologies.

"Both the DST and SaIF continued to support the Cofimvaba initiative," Ramovha says. "Other than Cofimvaba, the DST has, to date, deployed a total of 19 mobile lab vans to various science centres. SaIF has conducted training for operators of these DST-supported mobile units."

21 021 out of **24 793 public schools (85%)** had **no laboratories** and only **1 231 (6%)** had laboratories that were stocked

By 2018, the foundation had supported nine mobile labs with another two in the pipeline. Four were in the Eastern Cape, one based in Kimberley in the Northern Cape, one at Hartebeeshoek outside Johannesburg, one near Sasolburg in the Free State, one in Gauteng and one in KwaZulu-Natal. Together, in 2018, these labs served some 300 schools across the country – bringing real scientific understanding to tens of thousands of learners. Almost all of them without access to the functioning laboratories which Minister Motshekga's report had drawn attention to five years earlier.

> This is a different kind of initiative. We are absolutely delighted that Sasol has come to the party so generously and that it is profoundly interested in building the capacity of our kids and encouraging them to follow careers in the sciences and engineering.
>
> "We are wildly excited about this initiative but not nearly as wildly excited as the kids will be when they experience it first-hand."

Derek Hanekom, former Minister of Science and Technology, at the launch of the first mobile science laboratory

Under-equipped, underperforming

SaIF had a particular focus on the Eastern Cape because there were so many underperforming schools in one of the country's poorest provinces. What the foundation provided were fully equipped vans that could service the science teaching needs of Grade 4 to 12 learners at 30 schools a year, if fully utilised. Partners provided the teachers/drivers, and the foundation ensured that they received advanced driver training. The foundation also developed an expertly compiled mobile science lab handbook as a resource to help teachers get the most out of these remarkable resources.

Alice Mcukulwa, a senior education specialist for the Chris Hani District, based in Cofimvaba, says there are 27 senior schools in the district and two technical schools. Some of the problems they face are lack of teacher contact time at certain schools, lack of laboratory facilities at most schools, a high turnover of physical science teachers, large classes and, in some cases, schools without physical science teachers for up to three years.
The mobile science labs, she says, are "extremely useful" in reaching, particularly, underperforming and under-equipped schools. They prioritise Grade 12 and, where schools have no teachers for the subject, the labs visit them more regularly, sometimes showing the same experiment over and over again until the teacher is convinced that the learners have understood it.

To this day, across the country, from the rolling green hills of the Eastern Cape to the arid plains of the Northern Cape, a web of partnerships involving basic and higher education and parties such as SaIF and now the Sasol Foundation, is involved every time a mobile science lab trundles down a rutted dirt track to park at a far-flung school and a dedicated educator goes to work.

Mobile labs
continued

Reaching teachers

In Kimberley, Northern Cape, Sol Plaatjie University runs the local SaIF-sponsored mobile science lab. Dr Nazir Hassan, lecturer in maths education at the university, says the mobile science lab will reach ten schools in the Kimberley District. But it won't be targeting just learners, he says.

A pilot project, he explains, found that a number of schools had lab equipment but that all too often it was packed away gathering dust, possibly because science educators were new to their posts or were simply intimidated by the equipment.

"We want to bring about 20 science educators identified by the Department of Basic Education to the university where we have great, fully-equipped labs. There, we can give them in-service training on how to run labs. We will also use questionnaires to identify what they want to focus on. When we take the labs out to schools, we will use our senior students as co-presenters."

Sol Plaatjie lecturer Wiets Botes says: "We want to expose more primary school learners to practical science. It is really useful for schools with no equipment or where they are not using their equipment regularly because teachers don't know how to use it."

> "The real purpose of the lab is to travel to where it is needed. We travelled to Carnarvon (Northern Cape) recently to teach intermediate classes and we had some brilliant lessons with them. We had to sit under trees because it was too hot in the classrooms. When you go into one of these schools with the equipment and show the other side of science, you can see the pupils' faces light up."
>
> **Mr Wiets Botes, lecturer at Sol Plaatjies University**

Teaching the science behind the science

Getting the most from the substantial investment in the nine foundation-sponsored mobile science labs meant a great deal of training for those involved.

By 2018, 1 000 Grade 10 to 12 teachers in other areas such as Limpopo and the Eastern Cape had been trained in how to use the labs to make science teaching meaningful.

In 2013, 2014 and 2015, dozens of the facilitators who take the labs to beneficiary schools and give instruction underwent specialised training of their own.

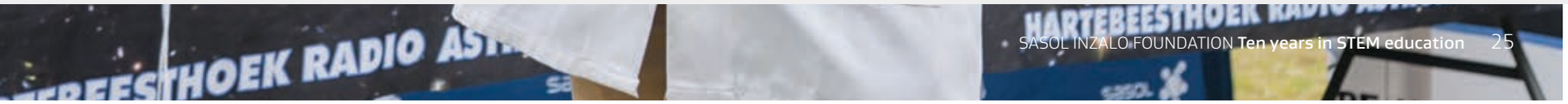
The foundation's Dr Rufus Wesi (left) also produced a comprehensive step-by-step guide to setting up, kitting out and running a mobile science laboratory. Like much of the foundation's work, the handbook, *Safari into Science*, was aimed at encouraging other funders to follow the SaIF's example – and benefit from its many lessons learnt. At no cost. As long as their interventions were benefiting learners and teachers.

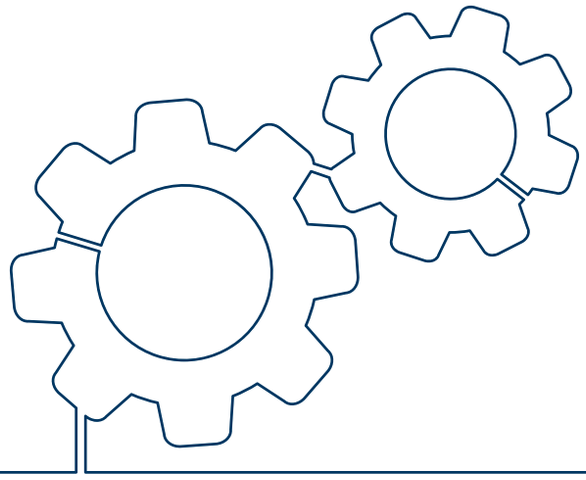
"When you prepare an onion skin and put it under a microscope you just see a 'wow' expression. These are physical science classes where the average size is about 40 learners, and sometimes even 50. We want to express our appreciation to the foundation for the labs. It is really rewarding to see the gratification of the teachers and learners."

Luchmen Poonawassy of the Northern Cape Department of Education

"I am moved to tears when I hear how we have changed some young people's lives. Sasol's contribution will be there in perpetuity."

Sadruddin Doorze, natural and life sciences teacher at Emmanuel Senior Secondary School, a no-fees Northern Cape school





Technical schools

Fixing technical education

In 2011 John Orr High School in Milpark, Johannesburg, faced many challenges.

Its glory days, when John Orr was considered an 'international technical school', one of the best in the country, were well behind it and the school was struggling with behavioural and discipline issues. Its matric pass rate had slumped from 100% in 2007 to 68% in 2010, with only three matric exemptions.

Principal Jannie Venter was determined to do something and he reached out for help. So in 2011 the SaIF visited John Orr, saw some workshops and classrooms still in a reasonable state, met dedicated teachers, and reckoned that John Orr was well worth restoring.

Working with the then Gauteng Education MEC, Barbara Creecy (in 2019 the national minister of Environment, Forestry and Fisheries), to unlock resources, the foundation decided that John Orr could serve as its prototype for technical school excellence. SaIF, it was resolved, would work hard to transform a struggling institution into a shining example of a top-notch engineering academy, a place of 'focused learning'.

But we first had to apply our research methodology to fully understand the challenges in the school and to inform our intervention. To this end we roped in The Narrative Lab who conducted an intensive survey amongst learners, teachers, school management and leadership team and mapped our intervention trajectory.

Rona Mostert, who would later succeed to the principalship, recalls that

"Sasol came in with all guns blazing".

Rona Mostert, who would later succeed to the principalship, recalls that “Sasol came in with all guns blazing”.

"It was a very intensive intervention. The foundation personnel were too eager to make the change. They were determined to push ahead with creating a stellar engineering academy, with the necessary systems and procedures. However, this change was too much, too quick and too soon, forcing all parties involved to step back and re-evaluate the approach”.

Technical schools
continued

Ironing out glitches

In 2013, SAIF reviewed its involvement with John Orr, to take stock of learnings and map a way forward.

A lot had already been achieved. Partners had installed in a library and librarian; automotive and electrical workshops had been refurbished, and foundation-initiated support structures to help with learners' psychosocial issues were still functioning two years later. Also, the school was benefiting from changes to its student body.

Mostert says that after Sasol's work to have John Orr declared a school of 'focused learning', the institution could screen learners before admission and offer a specialised curriculum for engineering, with an emphasis on pure maths and science.

"We have seen an improvement in results. In 2016, our matric pass rate was 96% and we were one of a few public schools where 100% of Grade 8 and 9s passed maths," says Mostert.

Changing tack

From its learnings at John Orr, SAIF decided that, rather than biting off more than it might be able to chew by trying to change an entire school, it would establish a targeted network of technical schools where only technical subjects would be supported. At the time, the National Development Plan envisaged South Africa producing 30 000 artisans a year by 2030; in 2015 it was producing fewer than half that number. The foundation believed it could make a difference.

The main outcome of the SAIF's new approach was the creation of the Technical Schools of Excellence Network (TechSENet) programme. From the start, John Orr was part of that network and was used as a pilot project.

To be in the network, schools had to meet certain criteria including the most basic functional requirements. Which didn't have to mean consistent high performance, but did require that participating schools worked to orderly timetables and had effective administration while offering technical subjects.

By 2018, TechSENet consisted of five schools, in addition to John Orr: Hazyview Comprehensive and Lekete Secondary in Acornhoek (both in Mpumalanga) and Barnard Molokoane Comprehensive in Parys and Iketsetseng Comprehensive High in Sasolburg (both in the Free State). With the exception of John Orr, which had a smattering of white learners, the other schools' enrolments were all 100% black, and they were all non-fee schools.

Highlights of the SaIF's engagement at John Orr

Registration as a school of **focused learning in 2012**

Stringent screening of learners for **technical aptitude**

Strict recruitment for technical-subject teachers

Fully-equipped, safely demarcated, and well-functioning workshops

Matric pass rate improved from **64% in 2011 to 96% in 2016**

Hard work always pays off

By 2018, SaIF's intervention at John Orr was showing. Nobody would describe the buildings as state-of-the-art but they were serviceable, clean and functional. And workshops were well equipped, thanks to various partners, including the SaIF. It had fixed and maintained machinery, demarcated floors, paid for safety equipment and sponsored many machines.

The improvements made possible by the SaIF at John Orr also meant the project could claim a bigger resource allocation from the DBE, from R400 000 annually to as much as R3 million. That was extra money that could be spent on textbooks, manuals, projectors and smartboards and on students and teachers.

In 2018 Principal Rona Mostert spoke about the less tangible differences the foundation's work had made at John Orr. "They exposed us to a totally new approach to running a school and a project, and how to make it successful. We didn't have that knowledge. It was extremely enriching, but also exhausting. We didn't think we could reach those standards. It changed the way we perceived management."

3

Technical schools

continued

If it is broke – fix it

Before 2014, Barnard Molokoane Secondary School in Parys was, technically at least, a technical school.

But as Principal Nefthaly Maine puts it, before SAIF arrived at the school, "We were a technical school that could not teach technical subjects because we had no equipment. Our workshops were empty.

"Thanks to the foundation, our workshops are now fully equipped and we have completely transformed into a technical high school, with a focus on science, technology and maths. Learners want to be here and the school helps the community."

Pule Sedi, Principal of Iketsetseng Secondary School in Sasolburg, tells a similar story. When SAIF came to the school, also in 2014, equipment in the technical department was old and largely worn out. "SAIF helped us to install state-of-the-art equipment and it has improved our results. For example, they have equipped the electrical department for practicals and in the technology department we have new welding machines. In engineering, graphics and design they have installed overhead projectors and cabling, so we have all the necessary hardware and software. They are also in the process of installing security systems to protect that equipment."

> "Thanks to the foundation, our workshops are now fully equipped and we have completely transformed into a technical high school, with a focus on science, technology and maths. Learners want to be here and the school helps the community".
>
> **Principal Nefthaly Maine, Barnard Molokoane Secondary School, Parys**

Better equipment, better performance

Better tools, Principal Sedi says, has translated into better results. "When SaIF intervened, our matric pass rate for maths and science was 41%. Now it is above 90%. There has also been a huge improvement in other Grades. They provide extra lessons during holidays for Grades 8 and 9 in maths and science and the pupils are benefiting from that too."

SaIF's involvement with the 1 000-learner Hazyview Comprehensive began in 2015 with refurbishing workshops and providing machinery, protective equipment and safety equipment. Over several years the SaIF took hundreds of pupils on educational trips to Pretoria, Secunda and Sasolburg while supplying meals and tutors for holiday classes in March, June and September.

For a long time, hospitality subjects had been popular with learners, many of whom believed the leisure industry was their only plausible way out of the grinding poverty in which they had grown up. (Physically near Hazyview but a world away from the reality of most of the community were plush Kruger National Park game lodges where international guests comported themselves in a level of luxury unimaginable to most of the children of Hazyview.)

According to Principal Max Mashele, before SaIF intervened, very few learners were interested in technical subjects, which most of them considered "boring".

But that mindset changed. "This year, only 12 learners chose to do hospitality studies and the rest wanted to do technical subjects," Mashele says. "After they've been to the careers exhibition, they understand that certain subject choices will enable them to become artisans – and that is what South Africa needs."

> "Our performance in maths is much better than in other schools. In Grade 9, we have 14 learners getting 80% and above. We really appreciate what SaIF has done. It has brought good changes and opened new opportunities for the teachers.

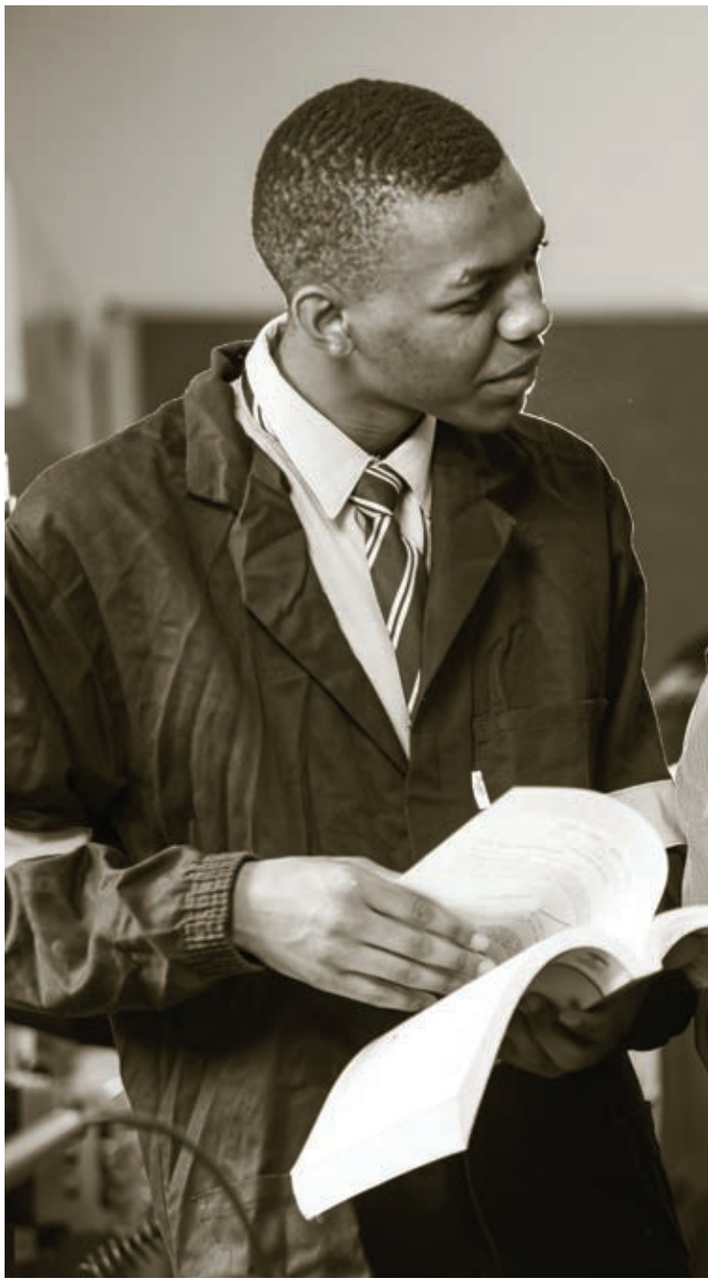
All the tools in the box

The SaIF's approach to empowering technical high schools through TechSENet involved much more than equipping workshops and upskilling teachers.

In addition to these vital interventions, SaIF:

- Focused on learners in Grade 8 and 9 because, the SAIF Programme Manager, Dr Cynthia Malinga says, "You have to lay a good foundation. The effect has been to increase the number of learners in the country who take technical subjects.
- Offered learners career guidance. Traditionally, artisanal skills were looked down upon, but SaIF's interventions told pupils about the many opportunities in technical fields, including the chance to open their own businesses.
- Took hundreds of learners to industrial workshops and construction sites.
- Made sure that beneficiary schools had all the textbooks they needed.
- Worked with the sector education and training authorities to understand what was needed for accreditation. This guided what equipment was bought (19 workshops were equipped through SaIF at the five participating schools between 2014 and 2018).

In their own words



Andy Mguni, Grade 12 learner at John Orr:

"I came here because of the career path I want to follow, which is automotive engineering, and they provide those subjects. When I arrived, the school was using old tools and equipment but that has all improved."

John Orr life orientation teacher Salmina Davhina:

"SAIF has given the school so much support. I would never have learnt to use a computer without them."

Pule Sedi, Principal of Iketsetseng Secondary School, Sasolburg:

"Last Monday we took registrations for next year and the parents slept outside the school on Sunday night to try to get places. When SAIF came here we had 1 600 learners – now we have over 2 000. Our learners are enthusiastic about these subjects and so are the teachers."

Sharon Chiloane, teacher of electrical subjects at Hazyview Comprehensive:

"To start with, the workshops were built but a couple of machines were not working; it all works now. The learners are really interested in the subject. There has definitely been an improvement in the matric results because when you have done the practical work it makes the theory much easier."

Michael Mutsharini, John Orr teacher and supervisor of engineering design (who also holds a SaIF bursary to study Honours in Engineering Technology):

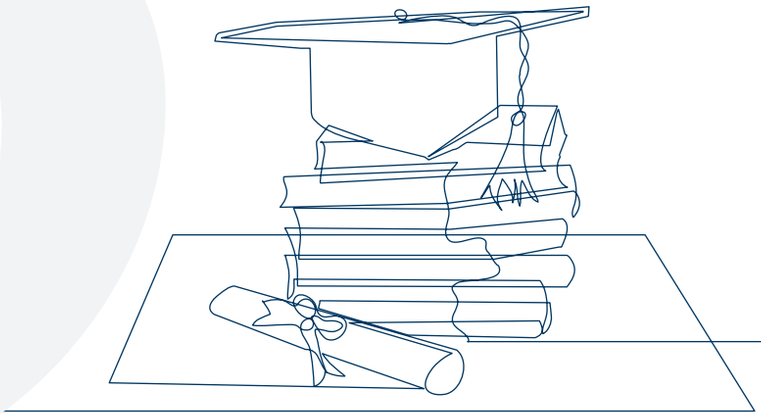
"I saw the workshops and infrastructure being fixed and upgraded and Sasol contributing to the safety equipment. There have been big changes in the working environment and that's helped with the results."

Thabang Mahule, Grade 12 learner at Hazyview Comprehensive:

"I love the school. Most of the other schools don't have this equipment. My ambition is to become an engineer and I hope to study electrical engineering next year. I am getting 80% for maths and science. The extra lessons have helped."

Jeffrey Mahlangu, welding and metalwork teacher, Hazyview Comprehensive:

"The school is very different because we can expose children to a workshop environment. Our workshops got the welding simulators this year – last year they got plasma cutters, mag welding machines, Tig welding machines and arc welding machines."



Graduating to greatness

In 2017, a SaIF advertisement for 300 bursaries attracted a flood of applications – no fewer than 15 000.

Conditions for the bursaries were stringent and many of those applying were never going to make the grade. But the overall quality of applications was such that almost half met the pre-selection criteria: 7 000 in total.

At the end of the day, the SaIF adjudicators were so impressed that, instead of awarding 300 bursaries, they found the funds to grant 350 bursaries. By far the most awarded in a single year.

Between 2008 and 2017, SaIF awarded almost 1 400 bursaries and fellowships to students at 15 academic universities and universities of technology. A great many of those who were able to follow their dreams, thanks to the foundation's intervention, were the first in their families' history to pursue higher education. For the vast majority, without the foundation's help, their academic progress would have ended at matric – and they would have spent the rest of their lives wondering what might have been.

Shortly after being set up, the SaIF appointed NGO, StudyTrust, to sift through the many thousands of applications for study assistance received each year. From the outset, the plan was to sponsor some 100 students a year and to keep funding them so that in any one year, about 400 students would be in the system.

Deliberate bias

The SaIF started with certain explicit biases: 85% of funding would be for black and disadvantaged students and 60% for women, an approach which made a real difference because women are, to this day, the least supported.

In 2008 Sasol already had its own bursary scheme but it was under pressure to provide bursaries on a needs basis. The company's existing scheme had a requirement that bursars work for Sasol. The foundation, on the other hand, looked at needs as well as employability, at individuals' future ability to make a difference in the worlds of science, technology, engineering and mathematics (STEM). And that meant that those bursars who wanted to work for Sasol after graduation would have to follow the same application process as anyone else.

When the SaIF started its undergraduate bursary programme, it provided (as envisaged) approximately 100 bursaries a year, mainly for STEM degrees at traditional universities and did not support technical, and technology degrees or diplomas at universities of technology. In 2017, however, the bursary scheme was expanded to provide support for national diplomas and Bachelor of Technology degree studies. The aim, essentially, was to increase the pool of technicians and technologists needed to support scientists and engineers.

Trustee Dr Meshack Khosa says bursaries were a way to give a massive "leg up" to students who could not otherwise further their studies. "They knew SaIF was making a big commitment to them and the competition to get those bursaries was intense."

More than money

"Psychosocial support was critical, possibly more important than the financial aid," adds Dr Khosa. "We knew there had to be a network of support measures which came not only from the foundation, so we partnered with others to multiply the benefits for students. We started with first-year bursaries and mentored the students to help them with the transition."

Dr Khosa's fellow Trustee, Professor Nadine Petersen, remembers: "Dr Marietjie Vosloo did a huge amount of work at the beginning on the issue of support, because often students who had been top performers at school struggled in their first year. They struggled to fit in socially, with the academic content and the level at which it was pitched.

"The idea was not just to hand out bursaries, but to build a programme that others could learn from. The foundation drew on the principles of a good bursary programme. It planned, intervened and determined what worked and what did not, over successive cycles to draw out a set of principles to guide the way forward."

Psychosocial support, Professor Essor Petersen says, was vital. "Those who needed it the most are generally reluctant to ask for help. It's very hard for a top student to admit that he or she is failing. We also conducted a series of workshops, so that students could revise basic concepts to fill in any gaps in their knowledge."

TVET support and teacher bursary programme

In 2017 the bursary programme was expanded to include funding for artisan training at TVET colleges. Learners received full support during mandatory work integrated learning and were provided with equipment for on-the-job training. The bursaries included tuition, accommodation, allowances and meals as well as academic and psycho-social support.

The bursary programme in 2017 also extended support to STEM teachers who had undergraduate science or technology degrees and had registered for the postgraduate certificate in education (PGCE).

Support was also provided to teachers in the TechSENet schools who had B.Tech degrees or national diplomas in technology but lacked professional teaching qualifications. This programme was run in conjunction with Teach South Africa, which recruited STEM teachers for rural and township schools where there were shortages.

Helping hands

Handing out money for university fees, accommodation, books and sustenance allowance was never going to be enough to ensure that foundation bursars got the most out of their studies. And that they successfully completed their degrees.

Especially those (the vast majority) who came from poor households and had achieved academic excellence despite – and not because of – the school education they had received.

To help bursars survive and thrive in a demanding academic environment, SaIF worked with various partners to provide on-campus support, mentoring and counselling. In providing as holistic a support function as possible, campus mentors were always just a phone call away whenever students faced difficulties.

The SaIF also provided bursary holders with winter and summer schools to teach them life skills, give them a sense of belonging and to fill in gaps in their learning.

> Students were grateful – we heard many stories at the bursary committee from students who said the intervention helped them to manage and cope better."
>
> **Professor Nadine Petersen, former Trustee**

Cultivating a culture of research

Education fellowships began in 2010, financing fellows for full-time study towards master's and PhD degrees with the goal of producing 20 South African PhD researchers. In particular, their research should contribute to knowledge about STEM education.

During its lifespan the foundation supported fellows at any university but it reserved its funding for fellowships in chemistry and environmental chemistry for historically disadvantaged universities.

Academics repeatedly told SaIF that research output was low because of a scarcity of funding. So it was decided that SaIF would throw its weight behind helping to build a deep-rooted, productive research culture in historically disadvantaged universities.

Education fellowships

Full-time education fellowships were awarded to, especially, master's and PhD students to "generate evidence on which to base interventions and systemic improvements in the education system". In other words, to produce practical, real-world research findings about what was wrong with an historically skewed education system – and practical, real-world ways to overcome those shortcomings.

Science fellowships at disadvantaged universities

Initially the science programme targeted a pipeline of 50 postgraduate fellows in chemistry and environmental chemistry from seven historically disadvantaged universities: Venda, Limpopo, Zululand, Fort Hare, Walter Sisulu, Northwest (Mahikeng campus) and Free State (QwaQwa campus). Co-funded with the National Research Foundation (NRF), it subsequently grew to the point that there were 170 fellows in 2018, most of those students at master's and PhD levels.

> The NRF's partnership with the Sasol Inzalo Foundation has grown significantly since 2014, and presented the NRF with a unique opportunity to deliver on its key mandate to produce knowledge that is both globally competitive, and able to transform the socio-economic landscape of the country."
>
> **Dr Matutu, National Reasearch Foundation**

> I extend a special word of gratitude and congratulations to the Sasol Inzalo Foundation for this initiative. It is through projects and partnerships such as this bursary programme that education opens the door to a brighter and more prosperous future."
>
> **Dr Naledi Pandor, former Minister of Science and Technology, speaking at a bursars' graduation ceremony in 2016**

It's about giving back – Liam's story

In 2015 Liam Baker, a maths prodigy from Mitchells Plain on the Cape Flats, was in his second year of doctoral studies at Stellenbosch. Without the help he received from SaIF, this brilliant young man's academic progress would likely have faltered years ago, his massive potential unrealised.

"I grew up in Mitchells Plain and matriculated from Mondale High School in 2009 when I was 17. In my first year of high school I started to get into maths Olympiads. I went to Olympiads in Benin, Spain and Germany.

Liam explains that his father left him when he was small and he and his brother were brought up by their unemployed mother. "Money was tight; there was no money for studies.

"I had scholarships for my first year at UCT [University of Cape Town] as a result of participating in the Olympiads and from second to fourth years, I had a SaIF bursary. I stayed at home until I completed my master's at Stellenbosch.

"The older SaIF bursary holders helped the newer students. They understood the issues the other bursary students were facing better than those students whose parents were paying their fees.

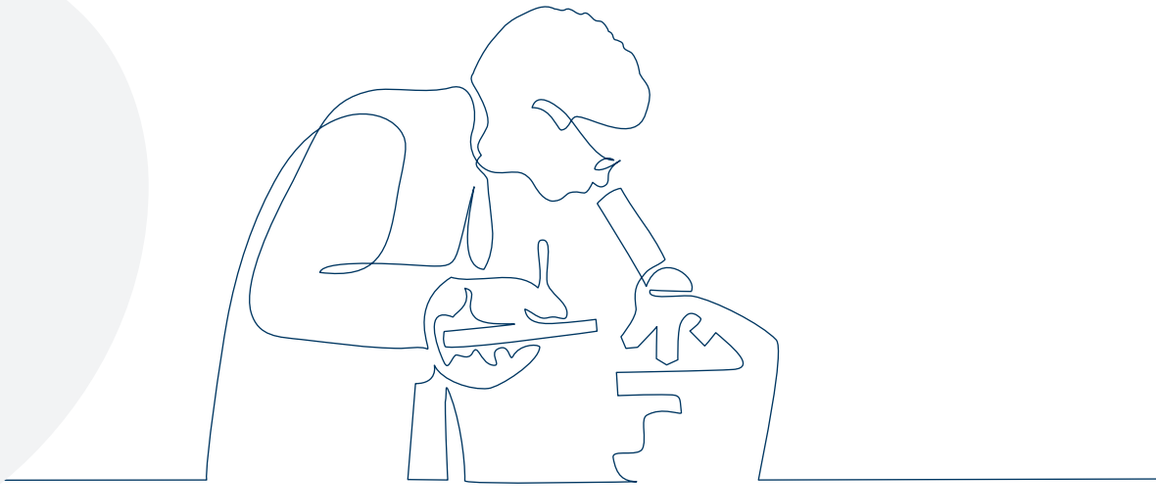
"The SaIF bursary only pays accommodation for students at residences but I'd chosen to stay with my mother. They made an exception for me and the money they paid towards my accommodation helped us to cover the rent. I don't think I would have been able to continue my studies without that allowance."

Speaking in 2018, after working for two years, Liam said: "Since January I've been enrolled for a PhD at Stellenbosch in pure maths and I'm also doing some lecturing to first-year engineering students, taking tutorials and marking.

"If it weren't for the assistance I received from SaIF and others I would not have been able to study second to fourth year without incurring huge debt, and not at all beyond that. It made a huge difference.

"When I'm older I would like to have enough money to give back in some way – not just by giving money but by setting an example. I've received so much it would be selfish not to give something back. I'd like to teach but not just knowledge of maths. It is more important to inspire a love of maths and that comes across in the way you teach."

> Without the financial help I received from SaIF and others I would not have been able to study second to fourth year without incurring huge debt, and not at all beyond that. It made a huge difference."
>
> **Liam Baker, PhD student, Stellenbosch University**



Critical research equipment for under-resourced universities

Equipping South Africa's 'underserved' universities

Most people have no idea what a LAMBDA™ 365 UV/Vis Spectrophotometer is, or what it does.

And only a few have ever heard of cyclic voltameters.

But Dr Richard Mampa, senior lecturer in the University of Limpopo's chemistry department, and Professor Mugera Gitari of the University of Venda's environmental chemistry department are two individuals who knew exactly what these pieces of equipment are – and what they can do. They also knew that their students needed them. But until recently, neither had any idea how their institutions would ever afford them.

In 2015, the foundation commissioned an audit of the equipment available to historically disadvantaged universities. The findings were discouraging: campuses outside the major centres lacked even the most basic equipment to do even the most basic research.

And that meant those institutions of higher learning struggled to keep talented postgraduates, who migrated to better funded, better equipped campuses where they could do the research they wanted to do.

Staunching the brain drain

In 2016, SaIF budgeted funds to give four of South Africa's smaller universities basic research equipment. The SaIF had also found the money to support chemistry researchers. Just two years later, SaIF could point to a stunning success: the migration of promising science honours, master's and PhD candidates from historically disadvantaged universities was already slowing.

Dr Simon Mnyakeni Moleele, head of the chemistry department at the University of Venda, says local science students are generally expected to start working as soon as they graduate. "Our students come from the surrounding areas which are poor and their parents expect them to start earning an income as soon as they have their first degree. The parents do not understand why their children are not bringing in an income."

But things have changed. Dr Moleele says. When he arrived at the university in 2013, there were only three master's students and four studying honours. In 2018, with scholarships supplied by SaIF and the National Research Foundation (NRF), the department boasted 18 master's candidates and 22 studying honours.

3

Critical research equipment for under-resourced universities

continued

Things begin to change

Dr Richard Mampa at Limpopo has a similar tale to tell: "In the last five years the number of students in this department has increased as we've acquired better equipment. Twenty years ago, we had only six students in our honours class. Now, we have to apply strict criteria for admission to honours because we can only accommodate a maximum of 24 and they need intensive tuition.

"Last year, out of our 18 honours students, 13 had SaIF/NRF scholarships. We can see the interest that other institutions have in our students, with UCT and others competing for our postgraduate students. It's a pity to lose them but it gives us confidence in the quality we have been able to achieve with the foundation's support."

By 2018, the foundation had spent R50 million on science fellows, which support had helped **ten science PhDs** to complete their degrees, **58** master's and **161** honours. Over **300** research publications had been produced by these fellows.

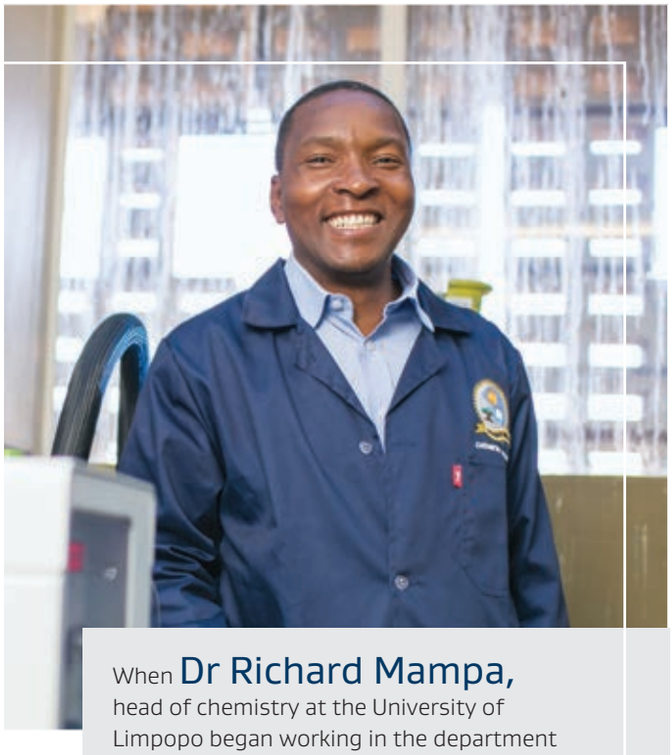
Let the experiments begin

In total, **R10 million** was devoted to essential research equipment for chemistry labs at the previously disadvantaged universities targeted by the foundation. Says Dr Moleele: "This year, we received two items that cost about R1,7 million. It definitely makes students more enthusiastic because they can come in and do experiments; we don't have to send them away to other universities or research institutions such as the CSIR [Centre of Scientific Research] to do practical research."

Today, Dr Mampa's students can increasingly do their research on their own campus using, among other pieces of equipment, a LAMBDA™ 365 UV/Vis Spectrophotometer paid for by SaIF. And at the University of Venda's environmental chemistry department, students get to do experiments using a shiny new cyclic voltameter, also funded by the foundation.

But SaIF didn't just provide funds and programmes; it also called upon the vast intellectual resources at its parent company. Sasol scientists were enlisted to visit campuses and provide fellows with research support, helping with sample analysis and the writing of research reports. Comments Dr Chester Lutendo Murulana, a Venda chemistry lecturer and a beneficiary of SaIF (through the Science Fellowship Programme): "Mentors from Sasol visit the university about twice a year. The Sasol people talk to the students, find out their challenges and try to help. For example, last year, some students were having challenges with getting their material analysed and the Sasol mentors intervened to have this done elsewhere. The effect of the Sasol Inzalo Foundation's intervention has been immeasurable."

(In case you're wondering, a spectrophotometer can determine what substances are in a target, and in what quantities, by observing wavelengths while a voltameter is used for measuring a quantity of electric charge through electrolytic action. Now you know . . .)



When **Dr Richard Mampa,** head of chemistry at the University of Limpopo began working in the department in 2008, little research was being done, resources were limited and departmental staff were focused on teaching.

> There were pockets of research in some departments, but our chemistry department had limited resources.
>
> "Since 2016 the pace of research has increased. Before 2012 we barely produced one academic paper a year, but the number has increased; in 2017 there were eight publications."

Dr Vhahangwele Masindi, who received a SaIF scholarship to complete his PhD in environmental chemistry at the University of Venda, is currently working at the CSIR's hydraulic infrastructure engineering department. Until securing the foundation/NRF scholarship, he says he received state funding. "The NRF/SaIF grants covered my costs of accommodation, some of the chemicals I needed for my research, and a stipend."

His patent for a zero-discharge process to treat acid mine drainage has been filed in the United States, Australia and Canada. The process is currently being used in a pilot plant which is being demonstrated at several mines.

> I wrote about 25 articles for my PhD, which helped with the funding for the University of Venda. "I could not have done this PhD without Sasol Inzalo. I owe them my appreciation. This opened up opportunities for me, such as the work I am doing for the CSIR."

Beyond the numbers

"Give me a place to stand, and a lever long enough, and I will move the world."
Archimedes

The Sasol Inzalo Foundation only ever had a decade – ten short years – in which to move the world of South African teaching, especially that of STEM education.

It did so in ways and to an extent that few, if any, had achieved before. It did so by leveraging the goodwill and the intellectual and financial capital of many other like-minded individuals and organisations.

It was always about more than statistics . . .

Over
10 million learners
received
SalF-sponsored
open-source
workbooks

Over a decade, the SalF spent
R630 million on making a real and lasting difference to South Africa's STEM education

180 digitised STEM learner/ educator workbook titles

were released on an **open-source basis,** reaching over
10 million learners on three continents

Nine mobile laboratories

travelled to more than **300 rural schools** each year, inspiring hundreds of thousands with an interest in science

R300 ↔ R30

The **difference** between the cost to the taxpayer of printing a single textbook **before** – and **after – the SalF workbook intervention***

Through the foundation, **four historically disadvantaged universities** were supported through funding critical research equipment

By publishing some **300 research papers and filing at least two patents,** these universities could unlock state funding that had previously been off-limits to them.

** Source: HE Enver Surty, former Deputy Minister of Basic Education,*

Between 2008 and 2018, the Sasol Inzalo Foundation awarded over

1 400 bursaries and fellowships

to students at **21 academic universities and universities of technology**

More than

850 graduated with

BEng, BSc and BSc (Hons), PGCE, BEd, Master's and PhD degrees

23 students

completed their PhDs

68 completed **Master's degrees**

161 received **Honours degrees**

R326 million

was spent on undergraduate bursaries for **over 600 graduates**

Engineering prosperity

To prosper economically, it is a simple, universally accepted fact that countries need engineers, technicians and artisans. In short, they need men and women who know how to do, make and fix things; who know how to plan and execute large- and small-scale projects that will create lasting value for large numbers of people.

In **2008** two eminent Human Sciences Research Council researchers described South Africa's shortage of engineers as "one of the worst capacity and scarce-skills crises in years". They noted that this country had one-seventh as many engineers per head of population as did Japan. Emerging economies such as Chile and Malaysia had three or four times as many engineers. And for each engineer in the field, a country such as South Africa needed four technicians and as many as 16 artisans.

A few years later, in **2012** the National Development Plan (NDP) 2030, seeking to eliminate poverty and reduce inequality, was unveiled to near-universal acclaim. The NDP required all parties to put their shoulders to the wheel – to do work that would have to include producing 30 000 artisans per year.

In **2013** – only five years into SaIF's existence – South Africa was producing just under half the annual number of qualified artisans demanded by the NDP.

But things were improving. In 2005 the country had produced fewer than 5 000 artisans a year. And in early **2019** government could announce that the year previously 21 000 artisans had qualified.

If, in **2018,** the country had turned one of its most critical skills corners, it was thanks to a massive multi-party effort. That achievement was by no means all down to SaIF. But the foundation could claim to have invested heavily in the technical skills bedrock by upgrading technical high schools through its groundbreaking Technical Schools of Excellence Network (TechSENet) network, a network that had reached five schools attended by 6 600 young learners. Offering them quality practical learning delivered by motivated teachers. Offering the leaders of other technical schools a roadmap to achievement.

Twenty five years ago

the University of Limpopo's chemistry department had just six students studying towards honours degrees. In 2018, it had many more honours applicants than places. Making the difference were the millions SaIF spent on much-needed scientific equipment and the provision of bursaries.

800 curriculum advisers

reached with hands-on learning delivered through hundreds of workshops and individual interactions. Between them, these 800 advisers passed on invaluable skills to tens of thousands of frontline educators.

Free for all

SAIF always operated on an open-source model.

This meant that it put money and time into programmes and research, and developed tools (such as the school workbooks) which anyone – even those halfway across the world – who shared its ideals and aspirations was welcome to use. At no cost. So it was that workbook content was taken up by education authorities in the United States and even in the middle of the Pacific Ocean.

Its mobile science laboratories were a tremendous success but

the SAIF's people hoped that another corporate would 'plagiarise' its intellectual property and replicate the model with even greater success. (And do so with its blessing.) To this end, SAIF developed *Safari into Science*, an intensely practical free handbook on how to learn from the SAIF – both its achievements and its setbacks, from what worked and what did not work. Produced by an expert PhD programme manager, *Safari into Science* is being used to train operators of mobile labs. Shortly after its inception, SAIF commissioned research from the Centre for Development in Education (CDE) on the state of teaching.

The groundbreaking study coming out of that research predicted that **another 30 000 teachers** would be needed by **2025.**

The CDE identified other problems: that about **19% of teachers** in South Africa were not properly qualified, the age profile was rising **(74% of teachers were over 40)** and staff turnover was high. Not only did the foundation act on these findings – by putting in place practical workshops attended by 50 teachers at a time – it shared the CDE findings and insights widely. Again for no cost.

Other, landmark research produced by the SAIF (primarily to inform how it would invest its limited resources) was shared widely with educators and education-policy specialists. These findings, including the seminal "longitudinal" survey, in turn informed further research and, most importantly, the allocation of scarce resources.

A case-studies handbook was widely disseminated to principals, helping to learn from each other's experiences while an online self-assessment tool was taken up by thousands of teachers. All for free.

A mere coincidence?

In 2016 physical science pass rates in the OR Tambo coastal educational district of the Eastern Cape were woeful.

In 2017, 20 schools in the district began to receive regular visits from one of the Sasol Inzalo Foundation's nine mobile laboratories. At the end of that year, results in the district had already improved significantly. And, two years later, they were even better. It's impossible to prove a causal link between the labs' visits and this very dramatic improvement, but . . .

The graphic below shows the increase in pass rates from eight sampled OR Tambo District schools that are served by the Mobile Science Labs.

Secondary school	2016	2017	2018
Ben Mali	16	48	100
Dumezweni	43	43	97
Gcinimthatho	13	78	60
Gobinamba	9	28	86
Ngubezulu	48	78	80
Nogemane	15	35	92
Sobala	28	67	100
Zanokanyo	35	83	77

85

Percentage of South African schools that had **no laboratories in 2013**

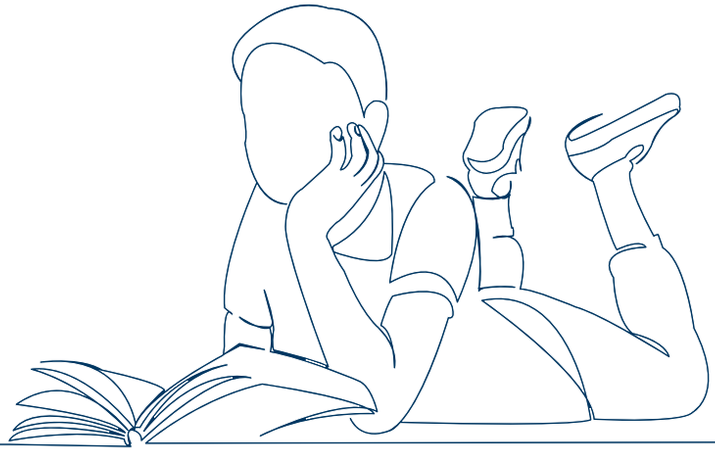
R15,3 million

was spent on **direct teacher training**

Through TechSENet the foundation had an undoubted, far-reaching impact on the quality of technical high school training. **At John Orr alone, the school disbursed almost R8 million** and nearly double that amount was spent on technical teacher training. At the five schools reached, some

R60 million

was allocated to upgrading workshops in technical schools and universities



Lessons learnt

Lessons learnt along the way

The foundation can claim a great many achievements in the ten years of important interventions, but pursuing these came with a unique set of challenges – many of them unforeseen.

Challenges included managing beneficiaries' expectations; ensuring that solutions were sustainable; being often forced to unexpectedly change direction and sometimes having to take a few tough decisions.

What follows is a brief account of some of the key lessons the foundation learnt in its first decade.

Don’t try to be everything to everybody

From the outset, the SaIF identified niche opportunities in which it believed it could have the greatest impact, and where its work might be replicated throughout the country.

For example, the organisation wanted to provide learners with STEM textbooks that were simply easier for them (and their teachers) to comprehend – and to make sure that they were universally available. The SaIF delivered that solution, producing 180 open-licensed textbooks and workbooks. These are now easily accessible online and can be shared without restriction; several other corporates have since embraced the SaIF’s model for their own textbook development.

Regarding tertiary education with its many challenges, the SaIF aimed to be more than just another bursary programme. Instead, its offer was a comprehensive one that provided academic, psychosocial and financial support, targeting youths from disadvantaged backgrounds.

5 Lessons learnt
continued

Co-create solutions with partners

Instead of trying to do everything yourself – or not doing anything because a problem seems insurmountable – break an intervention down and actively recruit partners for areas that are not your key competence, or to which you cannot give sufficient focus.

Working closely with the Department of Basic Education (DBE), the National Research Foundation (NRF) and many NGOs, millions of workbooks have improved STEM teaching, tens of thousands of learners have received real, hands-on science teaching, and under-resourced schools have been equipped and empowered.

In 2015 the foundation provided the National Education Collaboration Trust (NECT) with a mobile science laboratory with a view to improving learning outcomes in natural and physical science education in the deeply rural Eastern Cape districts of Mt Frere and Libode. Godwin Khosa, the CEO of NECT, says SAIF "understood the education-improvement need in South Africa and embraced the duty to work with government and other partners to address challenges which government alone could not fix."

SAIF Programme Manager Dr Bulelwa Keke points out that the foundation's partnership with the National Research Foundation significantly increased the number of supported postgraduate students transitioning from honours to master's, from just 40% to 90%.

Align with national initiatives for better traction and leverage

Sasol has found that where its strategic intent intersects with the national agenda and the needs of beneficiaries, that is where resources should be directed to achieve maximum impact. The partnership with DBE on the workbooks/textbooks project leveraged government funds for the large-scale printing of books, significantly reducing the cost per unit.

Similarly, SAIF aligned with the government's Decade of the Artisan programme (launched in 2014) and the technical high schools recapitalisation programme which helped schools unlock funds from government. Subsequently, a partnership with the National Research Foundation accessed funds from the Department of Science and Technology and National Treasury.

Have patience – educational outcomes take time

Invest in a structured and programmatic approach and do not expect results immediately.

Learner enrolments in technical subjects have shown a steady increase, while research outputs at historically disadvantaged institutions have taken a number of years to be realised. The results were by no means immediate, but they certainly began to show traction.

Have the courage to venture into uncharted territories

Be bold, innovative and creative in generating new solutions. The very best opportunities are often found in circumstances where challenges seem insurmountable.

The SaIF's technical schools programme purposefully highlighted the importance of the often overlooked 'T' in STEM. Also providing funding for historically disadvantaged institutions was a deliberate attempt to focus funding on areas of greatest need, areas that are not always appealing to other funders.

Exploit your brand value

Take advantage of the strength of your brand; avoid the temptation of seeking a unique identity.

SaIF very consciously (and very effectively) leveraged the Sasol brand. The fact that programmes were executed bearing the Sasol name helped to open doors as most partners and allies were only too willing to be associated with such a trusted name.

5 Lessons learnt

continued

Don't do things just because you can

SalF had to – sometimes painfully – pull the plug on initiatives that simply did not yield the desired results, although they could be sustained.

One such example was the Abaholi Saturday Schools project, which was discontinued because of relatively high costs per learner. Although hard to deal with at the time, it proved to be the right decision in the long run.

Start small and grow interventions gradually

This will minimise losses in the event that outcomes disappoint. Several key SalF initiatives began as small experiments which grew into long-term programmes. A great example was the workbooks initiative, which at first focused only on Grade 4 to 6 natural sciences and technology workbooks but was later expanded to cover all the schooling grades.

For the Technical Schools of Excellence Network (TechSENet) Programme, the SalF started with just one school, John Orr Technical High in Milpark, Johannesburg to understand exactly what technical schools were all about, how they operated, what their unique needs were and how they created value. That one school later grew to five extremely successful schools, with two more in the pipeline.

Lean towards systemic interventions

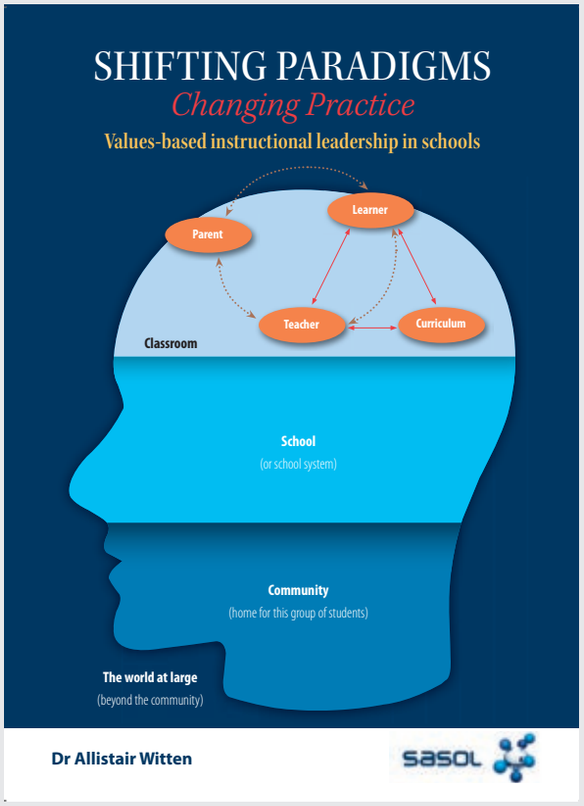
Avoid once-off, short-term interventions as these often prove difficult to sustain and embed into a system.

Because learners constantly enter and leave the system, to achieve sustainable improvement, it's often better to invest in teachers. A single teacher reaches about 500 learners each year and has at least 30 years in the system. So, multiplying 500 by 30 gives an idea of the impact a quality, motivated teacher can have.

Invest in school leadership and management

The SaIF learnt that many principals or school leaders were simply not properly prepared for the social challenges they faced on a daily basis.

To address this, the foundation developed a school leadership programme to support effective school management and leadership. Subsequently, a compelling, practical schools' leadership book was developed. Today this is used in most schools.



500 X 30

= 15 000

The number of learners' lives a teacher will impact in an average career

"The foundation embraced the need to work with government to address challenges which government alone could not fix."

Godwin Khosa, Chief Executive Officer, National Education Collaboration Trust

"We chose technical education . . . because we understood the need to grow the country's artisanal skills pool."

Dr Cynthia Malinga, Programme Manager

They made a *difference*

The preceding pages are mostly about the beneficiaries of the SaIF and how the foundation's work, and the work of its partners, impacted these many beneficiaries, their families and their societies.

But real heroes were involved in this impact (none of whom had direct input into this publication). Unsung heroes.

For a decade, a few good men and women went to work every day determined to make a difference.

For a decade, these good men and women of the Sasol Inzalo Foundation reached out to hundreds of other good men and women.

And among them, they made a difference.

It was a very big difference. It was a very big difference made to the lives and the life prospects of more than 12 million young South African learners and students, their teachers and lecturers.

Throughout its existence, the SaIF closely tracked its outputs: the R630 million invested directly, the thousands of hours spent crafting exceptional learning materials. The almost 7 000 learners at supported technical schools, the 800 curriculum advisers empowered, the 300 schools served by mobile science labs.

But what mattered – what really mattered – were not the outputs but the outcomes:

- The improvement in STEM teaching achieved: by putting millions of world-class workbooks into tens of thousands of classrooms.

- The sea change that began to happen at technical high schools.
- The belief that took root in countless youngsters that they really could excel at science and technology.

Youngsters like those at Ben Mali Senior Secondary School in Lusikisiki. Between 2016 and 2018, not a great deal changed at this rural, impoverished Eastern Cape school. But something that did change was that the school began to receive visits from the SaIF's mobile science laboratories.

And in those two short years Ben Mali's physical science pass rates went from 16% to 100%. Throughout the district, improvements in pass rates were similarly dramatic; at 20 schools, pass rates rose an average 40% to 63% by 2018. At Mthata's Zanokanyo Senior Secondary (where the pass rate more than doubled) between 2016 and 2018 enrolment in physical science went from 12 to 120.

Why did Zanokanyo's science enrolment shoot up so dramatically? Because learners began to believe that they could. Learners began to believe and understand. At historically disadvantaged universities, enrolments in postgraduate science subjects shot up. Because students began to believe that they could.

In 2018 South Africa had its first matric cohort in subjects that, just a few short years earlier, had simply not existed: technical sciences and technical maths. National leaders of basic education acknowledged that without the foundation, the roll-out of these new subjects would have been a challenge.

At the end of the day, the true value of the Sasol Inzalo Foundation and the true story of the systemic impact it had on this country is not one of hundreds, thousands or even millions, or of percentages. It is rather millions of individual true stories.

Of the high-school learner who finally grasped what that equation on the board was all about.

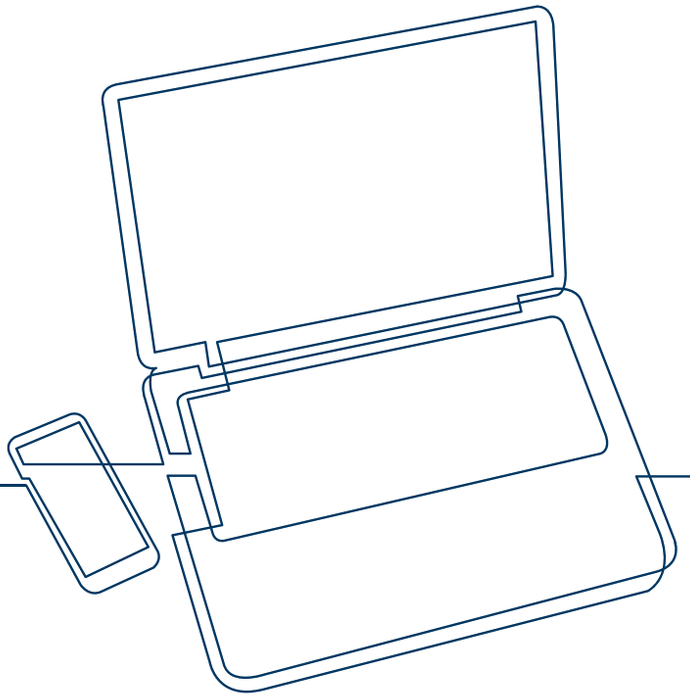
Of the science teacher who, at last, had the understanding and the tools to teach her subject with confidence.

Of the BSc bursar whose family had depended entirely on state grants to survive, who shared his stipend with his loved ones while studying to become the first graduate from his village. And who, today, is supporting his family through his well-paid scientific job.

A few good men and women – they made a difference to these lives and to many thousands of others. A very big difference that will endure.

7

The next 10 years and beyond



A legacy that will last

In June 2018 Sasol Inzalo B-BBEE ownership empowerment scheme came to an end but one of the greatest legacies of that landmark empowerment scheme – the achievements of the Sasol Inzalo Foundation – were set to endure for many decades more.

When the SaIF's Board of Trustees met earlier that year, they were unanimous that that legacy – a steadfast commitment to making a systemic difference to STEM education – should be actively built upon.

The new, enhanced mandate of the Sasol Foundation acknowledged that the quality of STEM education at schools and tertiary institutions remained an impediment to achieving South Africa's development goals. In particular, it recognised the country's failure to produce sufficient technical skills, and the demands of the Fourth Industrial Revolution, threatened the country's economic and social prospects.

Early Childhood Education (ECE)

- Increase access to quality ECE
- Provide facilities and resources for stimulation of early learning and school readiness
- Empower and support practitioners and centre managers

Schooling Education

- Develop educator competence levels
- Increase access to quality teaching and learning resources
- Develop functional and effective school leaders

Technical Education

- Contribute towards the development and resourcing of technical education institutions
- Inspire learners to follow technical careers
- Develop and up-skill capable technical education practitioners

Tertiary Education

- Improve success and throughput in higher education
- Enhance employability and entrepreneurship skills of graduates
- Advance research training and innovation at historically disadvantaged institutions

Provide comprehensive psychosocial support

From Early Childhood Education to Employment and Entrepreneurship Readiness

The next 10 years and beyond

continued

From Early Childhood Education to Employment and Entrepreneurship Readiness (E2E²)

The Sasol Foundation, it was decided, would continue working to impact the education value chain, from Early Childhood Education to Employment and Entrepreneurship Readiness (an approach dubbed E2E²), through interventions which sought to:

Develop a strong **ECE** platform

Make systemic interventions in learner and teacher education – and in so doing share best practice and thought leadership

Create access to, and success in, tertiary education

Build vocational skills at schools and technical and vocational colleges

Prepare learners for work readiness and the future world of work, and

Provide psychosocial support to learners.

It is the mission of the Sasol Foundation, working with multiple influential and committed partners, to ensure that the graduating class of 2040 is equipped to add value to an economy that is likely to be very different to that of 2019.

The Sasol Foundation will work hard to build on SalF's close and productive partnership with the Department of Basic Education. It also envisages working hand-in-hand with the departments of Science and Technology and Higher Education and others to produce the fit-for-purpose technical and vocational skills that will equip this country to ride the coming wave of the Fourth Industrial Revolution. This will ensure that this country produces the 30 000 qualified artisans each year, as envisaged by the National Development Plan, and that the new workers of 2040 are truly work-ready.

Intervening in early education is a core tenet of the E2E² philosophy that guides the new foundation as it seeks to help deliver on government's call for two years of compulsory education before formal schooling. In this most vital area, the foundation will glean many learnings from the work Sasol has done since 2016 in supporting 121 early childhood development centres in five provinces. It will be a key task of the foundation to take that work forward and to broaden its impact.

EDUCATION'S MISSING LINK

The Sasol Foundation's leaders are convinced that, without investing in ECE, investments in other areas of the education value chain are at risk. ECE, they acknowledge, was the missing link in SalF's efforts to help transform our education system; E2E² addresses that missing link.

Vusi Cwane, head of the Sasol Foundation, believes that if there has to be just one take-out from SalF's legacy, it should be the importance of partnerships. "If our country's young people are to get the STEM education they deserve, the skills and abilities they deserve, all of us – in the private and public sectors – need to work together."

> "Together we all dream of a stronger, more equitable society, one in which our youth can achieve their full potential. The achievements of the Sasol Inzalo Foundation show us that, with hard, inspired work, dreams do come true."
>
> **Vusi Cwane**
> **Head of the Sasol Foundation**

BUILDING THE FUTURE NOW: INDUSTRIE 4.0

The Sasol Foundation's future will be defined not just by how it expands and enhances delivery against its mandate, but largely by how it reshapes and repositions itself to ride the wave of change being brought by the onset of the Fourth Industrial Revolution.

This reality is increasingly shaping the foundation's approach to adapting to new ways of doing things and in working with the system to prepare current and future generations to be not just subjects of change but, drivers of change.

Already, in 2019, the foundation has begun to roll out training programmes that introduce learners and educators to critical skills such as coding, robotics, big data analytics and the Internet of Things. Although these key Industrie 4.0 skills have not yet been incorporated into school curricula, the foundation has launched a programme through its mobile science lab partnership with the University of South Africa (Unisa). On a daily basis, highly skilled Unisa academics and scientists are travelling to township and rural schools to train teachers and learners in how to code, build and program robots.

Sasol Inzalo Foundation

Timeline 2008 – 2018

Sasol Inzalo Foundation Timeline

Sasol Inzalo Foundation starts

2008

2010

Bursary Programme

- Peer mentoring
- Psychosocial support
- Winter seminars
- Summer seminars
- Campus visits
- Eyecare

Research by **'Narrative Lab'**

Education Fellowship Programme

2011

John Orr Technical High School Programme

School leadership longitudinal study design

Umlambo Foundation School Leadership Programme

Science Fellowship

- Science fellowship induction
- Mentoring

2012

Abaholi Saturday School Project

Maths and science workbooks

2014

Curriculum Adviser training

Dissemination and repurposing of systems framework for schools improvement and its tools

Mobile Science Lab programme

2015

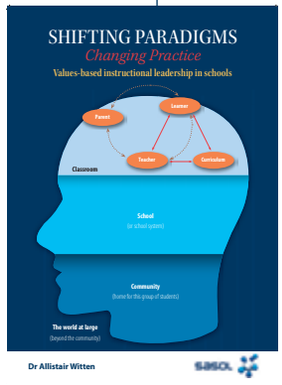
TechSENet
Programme

2016

Science Fellowship Programme
Equipment support

2017

Tertiary Bursary Programme
TVET Support
– Funding Technical Teachers and maths and science graduates to study towards PGCE



Published school leadership book

TVET Support Programme

2018

Online self-diagnostic assessment portal for teachers

New Principal Induction
Programme

Acknowledgements

The Sasol Inzalo Foundation was always about people: the young people whose lives and futures it sought to touch and improve.

In touching these young lives, the foundation always relied on passionate, skilled, patriotic people – both within and outside the foundation – who laboured to make a difference. Here we salute just some of the many institutions, organisations and individuals who made the Sasol Inzalo Foundation the great engine for good it was:

- **THE DEPARTMENT OF BASIC EDUCATION AND MINISTER ANGIE MOTSHEKGA** for, especially, their roles in the development and roll-out of STEM workbooks and textbooks and for giving the foundation multiple platforms on which to make a difference.
- **THE DEPARTMENT OF SCIENCE AND TECHNOLOGY** and its **LEADERSHIP** for their unwavering support in the development and roll-out of the mobile science laboratory programme, from small beginnings in Cofimvaba in the Eastern Cape.
- **THE EASTERN CAPE, MPUMALANGA, FREE STATE AND NORTHERN CAPE PROVINCIAL DEPARTMENTS OF EDUCATION** for facilitating and creating an enabling environment for infrastructure upgrades and teacher development.
- **THE NATIONAL EDUCATION COLLABORATION TRUST (NECT)** for rolling out the mobile science laboratory programme, and for sustaining and growing the programme's work and impact.
- **THE NATIONAL RESEARCH FOUNDATION (NRF)** for co-funding the postgraduate science fellowship programme, to increase the output of Black science masters and doctoral graduates at historically disadvantaged universities, and for capacitating these institutions to undertake much, valuable research.

TERTIARY INSTITUTIONS' HEADS OF DEPARTMENTS and **ACADEMIC STAFF** for providing research support to postgraduate students while working tirelessly to ensure that all shared programmes achieved their objectives. The following institutions are acknowledged:

- Nelson Mandela Metropolitan University School of Education
- North West University (Mahikeng)
- Sol Plaatje University
- Tshwane University of Technology
- University of Johannesburg (UJ) Centre for Leadership
- University of Cape Town
- University of Fort Hare
- University of Limpopo
- University of the Free State (Qwaqwa)
- University of Venda
- University of the Western Cape
- Vaal University of Technology
- Wits Executive Leadership

NGOS AND OTHER CIVIL-SOCIETY ORGANISATIONS for their sterling contributions in walking a ten-year journey, step by step, with the foundation:

- ACP Project Consultants
- Brainwave Projects
- BRIDGE
- Centre for Development & Enterprise
- Education Moving Up
- Imperial Ukhamba
- Infundo Consulting
- Khulisa Management Services
- Magic Moments
- Sci-Bono Discovery Centre
- Siyavula Education Study Trust
- The Narrative Lab
- Ukuqonda Institute
- Zano-Kahleho Projects
- Seabelo Consulting

GOVERNMENT AGENCIES for the multiple parts they played in helping the foundation achieve its key objectives:

- South African Agency for Science and Technology Advancement (SAASTA)
- South African Radio Astronomy Observatory (SARAO)

A FEW GOOD MEN AND WOMEN

Here we hail the contributions of individuals, mostly without mentioning them by name:

- **Sasol Limited Board, management and staff:** We acknowledge the Sasol Limited Board and the Group Executive Committee of 2008 for their vision in establishing SaIF giving expression to the company's desire to play a major part in transforming our children' education.

  Also, throughout the ten years the support given by the leadership of Sasol and the various teams which made great contribution to this legacy.
- **The Sasol Foundation team,** both past and present. Some are mentioned in this book; many are not. We salute them all for their commitment to our children's education, for sharing their unique skills and for working with the utmost dedication to ensure maximum impact and transformation.
- **The foundation Trustees,** who unstintingly gave of their time to direct all activities, to maintain the highest standards of governance and accountability and who were always conscious of delivering a legacy that mattered.

AND, BY NAME

Here we single out just three particular champions of the Sasol Inzalo Foundation:

- **Dr Yvonne Muthien,** the longest serving Board Chairperson and Trustee. For providing decisive leadership and guidance on programmes, disbursements and strategic direction
- **Ms Nolitha Fakude,** founder of Sasol Inzalo who served as a foundation Trustee for most of the ten years of the foundation's existence while always providing sage counsel, support and access to essential resources
- **Mr Enver Surty,** former Deputy Minister of Basic Education and a politician who strove, well beyond his regular ministerial responsibilities, to support the foundation, to make things work, for the benefit of our country's youth.

“Education is a human right with immense power to transform."

Kofi Annan
United Nations Secretary General
(January 1997 to December 2006)