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1 Wanga Zembe-Mkabile felt like both an insider and an outsider doing community research.

# 3 SOUTH AFRICAN SCIENCE FACES ITS FUTURE

**W**anga Zembe-Mkabile learnt a lot about herself from being uncomfortable in other people's kitchens. In 2009, the South African social-policy researcher was collecting data for her PhD on the outcomes of government child-support grants. The research called for 'cupboard inventories' — taking stock of the food in study participants' kitchens. But seeing the embarrassment in home after home as people opened their often-empty pantries, Zembe-Mkabile felt something was amiss. "It just didn't feel right to look into people's cupboards," she says.

At the time, she did not act on her unease. Only years later, as an established scientist, did Zembe-Mkabile begin to understand the complexity of her apprehension. Community-based research often puts young scientists in a position of power over research participants, a role that can be daunting and unfamiliar. But for Zembe-Mkabile, the feelings went deeper. She'd known apartheid, and how its architects had used science to underpin their racist philosophies. The vestiges of that power imbalance were still there in her kitchen encounters.

Zembe-Mkabile grew up around poverty, but as a scientist trained at the University of Oxford, UK, she was the product of a system shaped by and for white Europeans. The tension between these two roles — the ▶

4 *Amid a tumultuous political landscape, a generation of black researchers is gearing up to transform South African science.* 7

BY LINDA NORDLING

► insider and the outsider — is central to her identity as a researcher, and has shaped her thinking about how research can, and should, be done. Now, working at the South African Medical Research Council in Cape Town, she directs studies on how social policy relates to poverty, inequality and health. She plans to involve communities at the design stage of her experiments and, eventually, to include them in the analysis as well. Already, if she feels a tool or question is not appropriate for its setting, she eliminates it from her research. “Some questions are not worth exploring if they are going to trample on people’s dignity,” she says.

Zembe-Mkabile thinks about her experiences a lot when she considers the mounting calls in her country to decolonize academia. Decolonization is a movement to eliminate, or at least mitigate, the disproportionate legacy of white European thought and culture in education. According to advocates, this is not just about increasing the number of black scientists, although such racial ‘transformation’ is an important part of the process. It also means dismantling the hegemony of European values and making way for the local philosophy and traditions that colonists had cast aside. Substantial literature from around the world supports the need to change curricula, and some South African universities have begun to take action and establish review committees. But the push for change is sometimes tense. Student demonstrations have wrapped arguments about decolonization into protests over university fees, and have resulted in disrupted classes, fires and millions of dollars spent on security and repairs.

Science departments have struggled to define what decolonization means for their curricula and for research. Most are ramping up efforts to overcome the glaring under-representation of black scientists, but what comes next is unclear. Zembe-Mkabile’s generation, which straddles pre- and post-apartheid South Africa, will soon be leading the country’s research institutions as they grapple with the challenge of reformulating science for the new South Africa.

## THE ROLE MODELS 5

South Africa, like many nations, is currently dealing with high unemployment rates and glaring inequality. These are cast into sharp focus by the legacy of apartheid rule. Although political power has been in the hands of the black majority since the dawn of South African democracy 24 years ago, economic power remains with white people: white households in 2015 earned around 4.5 times as much as black households, and whites hold more than 60% of top management positions, despite accounting for only 10% of the working population. In universities, black people account for not quite 35% of academics, despite making up about 80% of the population. Students, meanwhile, face multiple barriers to achievement, including an education system that has left many unprepared for university studies. A 2015 government report found that black South Africans had the highest dropout rate in the country; 32% leave their studies in their first year. As for curricula, African literature, philosophy, medicine and culture are often relegated to optional courses or skipped entirely.

It is against this backdrop that researchers in Zembe-Mkabile’s generation forged their academic paths. Children during apartheid, they reached adulthood in the rainbow-coloured afterglow of Nelson Mandela’s release from prison in 1990. Some hail from communities that are distrustful of science. In Xhosa, Zembe-Mkabile’s home language, there isn’t even a word for research. The best approximation, she says, is

*ukuphanda*, which has negative connotations. “It means to search for a bad thing, like a police investigation,” she says.

The scientists of Zembe-Mkabile’s generation are role models for the generation born after 1994, known locally as ‘born frees’. According to a study<sup>1</sup> published last year, this generation is predicted to boost the country’s proportion of black researchers to more than 50% by 2025. That’s a heavy burden for those like Zembe-Mkabile squeezed between

the demands of the academic system that trained them and the expectations of a youth clamouring for radical change. Zembe-Mkabile says that protesting against inequality in the universities was not on the table when she was a student. “You entered these spaces and you were so grateful to be there that you didn’t question anything. We were fast asleep. At least now, students are alert.”

## DECOLONIZING THE MIND 10

Zembe-Mkabile’s experience is not unique. Amanda Hlengwa, an academic developer at Rhodes University in Grahamstown, has similar memories of her undergraduate degree in Durban in the late 1990s. “The goal was assimilation. That was the only way to survive.” This is changing, she says: universities are beginning to recognize students’ diverse backgrounds, and the challenges that university culture presents. But strategies to address this gap have been slow to materialize and are unevenly implemented.

Thaddeus Metz, a philosopher at the University of Johannesburg, agrees. A white American who settled in South Africa in 2004, he was the first to teach African philosophy at the nearby University of the Witwatersrand, the city’s most prestigious research university, where he worked before his current post. “There is this long-standing intellectual tradition that has been neglected

at best, at worst denigrated,” he says. He adds that the majority of students, regardless of their race, are curious about African knowledge traditions, but that there’s a lack of institutional leadership. Many in the humanities and social sciences are angry because they feel isolated and powerless.

In the natural sciences it gets more complicated, because the meaning of decolonization is not well defined and its relevance is contested. Does decolonizing science mean throwing out Isaac Newton, Charles Darwin and Gregor Mendel, and starting afresh with indigenous knowledge? Such demands have been made, most famously by a University of Cape Town student in an online video of a campus discussion titled ‘Science must fall?’. Metz says he’s encountered the argument. “Some of my colleagues think that if something hasn’t come from Africa, it’s somehow disqualified.”

But only a small minority of scientists hold such radical views. For most, decolonization of science calls for something more complex and

subtle. “Decolonization is going to happen in the mind,” says Siyanda Makaula, a former cardiology lecturer who now works in university governance. Such shifts in thinking could mean, for example, that pharmacology students hear how drugs are being developed from plants their grandmothers used to treat stomach

ache. This would show the relevance of traditional culture in modern science and anchor the curriculum in local experience. In other subjects, it could be about highlighting the contribution of non-Europeans, or facing the unsavoury history of a discipline: for example, exploring how medical research had a role in fuelling racist ideas and how these were challenged and overturned. Across the board, it means ensuring that research addresses local problems and challenges.

Nokwanda Makunga was warned off joining the faculty of a formerly all-white university.

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Makaula thinks that scientists often hide behind their disciplines' putative universality — that a cell is a cell, whether it belongs to an African or a European, or that the laws of physics apply to all — to avoid the need to question the way they do things. "It's an excuse they use," he says. But the point of science, he adds, is to find solutions for real-world problems. And for that, context needs to be part of how science is taught, he says. "It's about how you teach it, how you apply it, how you make it relevant, so the person can receive it and absorb it better."

Such refocusing is taking much too long in South African universities, says Makaula. And that inertia is costing the country dearly in terms of black research talent. He sees himself as a prime example. A decade ago, Makaula earned a PhD in cardiology. But repeated brushes with racism and tokenism — being asked, along with other black students, to meet potential funders while his white colleagues could stay in the lab — frustrated him to the point that he left academia. Today, he works for the Council on Higher Education based in Pretoria, a public-sector body that deals with quality control and regulatory compliance in universities.

On the face of it, South African universities are working on decolonizing their academic offerings. Most have created committees to review their curricula — although few have much to show for it. And all are under pressure from government and funding bodies to train and hire more black academics. Research funders are following suit. A few years ago, the Medical Research Council dedicated a significant portion of its largest grant programme to early-career scientists, and added weighting for gender and race. The proportion of the grants going to white investigators has since shrunk, from 72% in 2012 to 37% in 2016. The council is also working on a position statement on decolonization to sharpen its efforts to recruit black scientists, says Glenda Gray, the council's president (see

"Three cultures"). It will look at how medical research can draw on social science to become more sensitive to community needs. "You only get true well-being if you understand the context in which the biological happens."

#### 'NO PLACE FOR A BLACK WOMAN'

Some South Africans approach decolonization as a way to rediscover their heritage. Nokwanda Makunga, a biotechnologist at Stellenbosch University near Cape Town, grew up in the intellectual circles that gave rise to anti-apartheid freedom fighters such as Steve Biko and Nelson Mandela. From a young age, Makunga knew exactly what a scientist did. One of her early memories is of helping her father — a botanist — count kernels of maize (corn) for an experiment. In the dying years of apartheid, she attended a private boarding school in Grahamstown, where racial tensions were muted. It therefore came as a shock when, in 1990, she arrived at university in Pietermaritzburg in the politically fractious province now known as KwaZulu-Natal. "I came from a bubble that was non-racial, non-political. Then I was launched into the true South Africa." It was a struggle. Her superior education and clipped private-school vowels singled her out as "too white" to belong with the black students. But she was also too black for the white students. "I was getting it from both ends."

In 2004, after earning her doctorate, Makunga yearned to move to a quieter, more research-focused institution. She got an offer from Stellenbosch University, a formerly all-white institution nestled in the picturesque Cape Winelands. It offered stability, and a platform for Makunga to build an international reputation. But it had also, historically, been a bastion of white supremacy, having produced infamous apartheid-era prime ministers such as Hendrik Verwoerd and D. F. Malan. Some of Makunga's friends were horrified. "One told me that Stellenbosch is no

## THREE CULTURES 1

## FOREIGN BLACK RESEARCHERS FACE ADDITIONAL CHALLENGES IN SOUTH AFRICAN ACADEMIA 2

Black researchers are rapidly moving into South Africa's academic spaces. But not all of them are considered 'black' by the country's Department of Higher Education and Training. Researchers from other parts of the world are instead classified as 'foreign'.

It's a large and fast-growing segment. One report<sup>4</sup> found that although black PhD graduates outnumbered whites for the first time in South Africa's history in 2012, more than half of them hailed from countries such as Nigeria, Zimbabwe, Uganda and Kenya.

There are a few reasons for this. It is cheaper to study in South Africa than in Europe or the United States, and the country offers better research facilities than elsewhere in Africa. But for some locals, the growing presence of foreign black researchers is a problem. Jobs are scarce, and some believe that universities are more willing to hire non-South African black people than locals.

So foreign black scientists — such as Thumbi Ndung'u, a Kenyan virologist based at the University of KwaZulu-Natal in Durban — experience a special kind of alienation. "You can't completely identify with the local black population. They see you as an outsider. On the other hand, you are not in the white old-boys' club," he says.

Ndung'u had anticipated some friction when he moved to Durban in 2005 to study HIV. But it wasn't until he lived there that he began to understand the frustrations of local black academics. The system is blind to its own biases, he says.

Most of Ndung'u's own graduate students are black South Africans. They face many challenges, he says, but, given the right support, they blossom. "There needs to be express effort to get them into the system. So South African universities don't continue to have this problem in the future." **L.N.**

place for a black woman. He didn't say why, just that it was very conservative." Makunga took it as a challenge. "How will it ever be a place for black women if no black women are willing to go there?"

Makunga's research has brought her closer to her roots. When she was growing up, her family did not use traditional medicine, she says. But now she studies South African medicinal plants, using modern biotechnology to explore their pharmacological properties — and she reckons the work is "pretty decolonial". Having studied a variety of plants, in 2016 she returned to the Eastern Cape, where she grew up, to learn about the traditional medicine practised by her ancestors. She takes her responsibility as custodian of these practices seriously. "I'm holding somebody else's knowledge. I need to treat it with respect," she says.

Stellenbosch has changed a lot since she was warned off, says Makunga, who is currently at the University of Minnesota in Minneapolis for a nine-month Fulbright scholarship. She feels welcome at Stellenbosch and valued as a

black woman — still a rare occurrence at faculty level. Still, she longs for the day when that is not the headline issue; when she can be a scientist first and a black woman second. "I would like us to move beyond our apartheid race hangover," she says wistfully.

Black women are among the most under-represented groups in South Africa's academic melting pot. They make up 14% of the country's researchers, compared with black men's 18%. And they face tough odds. In her 2015 article 'Leadership: The invisibility of African women and the masculinity of power', Mamokgethi Phakeng writes<sup>2</sup> that black women, as well as being marginalized for their gender and race by white society,

face opposition from patriarchal African cultures. This "masculinity of power", she writes, needs to be challenged alongside colonialism and sexism.

Phakeng is a scholar of mathematics education and deputy vice-chancellor of research at the University of Cape Town. Her outspokenness about the experience of black researchers has charmed an army of Instagram and Twitter followers. But at times the veneration is misguided, she feels. It's great to inspire young people to speak up and be themselves, "but I don't want that to be my most powerful role", she says.

To her, the most important thing she has done is excel as a researcher. Phakeng's work centres on mathematics and language. She showed<sup>3</sup>, for example, that code-switching — alternating between languages — helps multilingual people to understand mathematical concepts. This is significant in South Africa, where students have been scolded for using their home language. Today, code-switching is encouraged in many classrooms.

Yet, critics have argued that her field is not a suitable background for the head of research at one of Africa's strongest science institutions. Last October, an e-mail started circulating, questioning her qualifications. She took on her attackers, and vice-chancellor Max Price denounced the e-mail and its contents.

The future of South Africa's university sector is uncertain. Hlengwa worries that the momentum created by student protests might fizzle out with-

out sustained change taking root. "While the heat was on, you had opportunities to work on transforming curricula," she says. But as universities learn to work with unrest, they snap back to old ways, she says. She also worries that black academics are being run into the ground by the demands placed on them — from being called on to sit on diversity committees to giving advice on the complex challenges facing black students and staff. "Where's the space for me to do some deep thinking about my research?" Hlengwa asks.

It is a burden and a challenge. And Phakeng argues that it can be helped only by discourse. One of the things she has done since joining the University of Cape Town in mid-2016 is to speak to its black South African academics. For some, she says, it's the first time they've been called on by

management to share their experiences. "I ask people, what stories do you tell yourself? Those stories shape the possibilities of what we can do." ■

**Linda Nordling is a freelance journalist in Cape Town, South Africa.**

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**Mamokgethi Phakeng is ambivalent about being a role model for young black academics.**

ALEXIA WEBSTER FOR NATURE